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**A MONOGRAPH OF THE GENUS
ADENIA FORSK.
(PASSIFLORACEAE)**

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SUMMARY

In this taxonomic revision of the genus *Adenia* 92 species are accepted; 57 of them are restricted to Africa, 21 to Madagascar, and 13 to Indo-Malesia; 1 species (*A. wightiana*) occurs with two distinct subspecies in South India & Ceylon, and in Tanzania respectively.

In some precursory papers several new species have already been described and 11 have been added in this revision. Furthermore, a number of new taxa of infraspecific rank and several new combinations have been proposed.

Several dozens of names have been suppressed by reduction. The species synonymy is considerable, and comprises not less than 83 specific epithets. This is partly due to the fact that there are some widely distributed variable species. I had c. 4000 collections at my disposal, several times as many as former workers, mainly HARMS. Through this abundant material it appeared that many locally described species could no longer be maintained.

The synonymy is furthermore rather complicated because frequently species have been misinterpreted; in this respect I have restricted myself to the mention of the most obvious ones.

After a history and survey of former subdivisions of the genus and its position within the family *Passifloraceae*, I have devoted a rather detailed chapter on the morphological characters in *Adenia*. In this a new conception of the hypanthium is proposed; furthermore great attention has been paid to the position of the foliar glands for which a series of supposed evolutionary progression is proposed. A similar series of developmental tendencies of the various flower parts and inflorescences has been indicated.

Simple sessile glands on the margin of the leaf blade and solitary, stalked, dichasial inflorescences in the axils of normal leaves are regarded as the morphologically most primitive features. The most primitive flower structure is assumed to be with free sepals and petals on the hypanthium.

A new subdivision of the genus is proposed and the definition of the 6 sections has been adjusted. The subdivision agrees in outline and nomenclature with that formerly given by HARMS. Major differences are the merging of sect. *Keramanthus* with sect. *Blepharantes*, the transfer of some 20 species from Madagascar from sect. *Microblepharis* to sect. *Adenia*, and the segregation of sect. *Erythrocarpus* from sect. *Microblepharis*.

Below the rank of section I have not accepted the series proposed by HARMS. Alternatively I have arranged the species within each section in groups of alliance, on two levels, and these groups have been arranged in a sequence which I assume to be leading from more primitive towards more derived. The same idea is reflected in the arrangement of the sections themselves. This must be accepted cum grano salis, as it is of course impossible to arrange affinities in one- or two-dimensional schemes.

Separate chapters deal with the anatomy, palynology, phytochemistry, and

flower biology, almost entirely based on data from literature.

Finally a chapter has been devoted to the geographical distribution. It has appeared that each section has a range of its own. In conjunction with my ideas about primitiveness and derived stages in the genus as to the morphological characters, I have tried to visualize how the distribution of the sections has come into being during the evolution of the genus. I assume that the 'archimatrix' of the genus comprises East Africa, Madagascar, Ceylon and the southern Deccan, i.e. the Lemurian part of the hypothetical ancient Gondwana Land. This is represented by the range of sect. *Microblepharis*. In this section there is even one species (*A. wightiana*) which is represented in Ceylon & S. Deccan by one subspecies and another in Tanzania. Two other somewhat less primitive sections, *Adenia* and *Blepharantes*, still occupy in part the same ancient area. Three derived sections, *Paschanthus*, *Erythrocarpus*, and *Ophiocaulon*, have migrated to and developed in areas bordering on this primitive range, which are in part arid (in southern Africa) and in part wet rain-forest (West Africa and Malesia). These extreme climates must have given an impetus towards speciation and adaptation to new habitats. Compare maps in fig. 5.

In the taxonomical part keys are given to the sections and to the species. Of each species a description and its synonymy is given. Specimens have been cited wholly if a restricted number of collections is known. Of the species of which very many specimens have been collected a representative number is cited for indicating the range. In these cases the specimens are cited only if three or less specimens are known from a certain area. A complete Identification List will be separately issued.

Range size of species is very diverse, some are of continental size. It is, however, peculiar that obviously good species have frequently distinctly restricted ranges and allied ones occur often widely spaced.

INTRODUCTION

Immediately after my final ('doctorandus') examination at Leyden University (12-3-1963) it was arranged that I would go to the African tropics in order to study African plant taxonomy in the field; my African work was organized by the Laboratory for Plant Taxonomy of the University for Agriculture at Wageningen. A doctor's thesis was agreed by Prof. Dr. H. C. D. DE WIT at Wageningen and Prof. Dr. C. G. G. J. VAN STEENIS at Leyden (Rijksherbarium). African *Passifloraceae* were to be the subject.

It was planned that after a stay in Africa I would return to the Leyden Rijksherbarium to resume working with Prof. VAN STEENIS, either as a member of the Flora Malesiana team or otherwise.

On April 26, 1963, I left for Ivory Coast, for a six months' stay at the Centre Néerlandais (near Abidjan, the tropical field station maintained with the French organization ORSTOM, by the University for Agriculture at Wageningen). Expenses and further financial support were borne by 'Wageningen' and I was temporarily incorporated into the Wageningen Staff of scientists.

As the subject for my doctor's thesis had been suggested by Prof. DE WIT 'The *Passifloraceae* of Africa' and this proposal was accepted by all concerned, although it proved to be of advantage, later on, to limit my study to the genus *Adenia*, but then again, to take up *Adenia* as a whole. The outcome is the present monograph.

In Ivory Coast I began my field observations. Noting the habit of fully developed specimens in various localities, their growth and development, ecological and environmental conditions, flowering and fruiting in nature in *Passifloraceae* (and in *Adenia*) is of much importance, especially in correlation with data from herbarium and literature.

Passifloraceae in Africa often escape notice because, although they attain (often lianas) a considerable size, they are rather inconspicuous and often overlooked. I gratefully remember this unique opportunity of assembling numerous new data on the living plants *in loco*; many were very valuable when trying to solve the taxonomic problems and arriving at a conclusion.

From the beginning I regularly sent living specimens (fruits, cuttings) to Wageningen, where a large number of seeds germinated and so provided data on seedlings. Several species were raised to the flowering stage and I even found a new species among them, of which the type is now alive (apart from the herbarium specimens) in the Laboratory's greenhouse at Wageningen. I warmly acknowledge the able care of Mr. W. H. GROTENBREG, head-gardener, and his men.

In passing I wish to mention that my work on *Passifloraceae* stimulated several members of the Wageningen Staff to collect and add living and dried *Passifloraceae* in Africa, after my return to Europe, which aided me and enriched (specimens, detailed field notes) the collection at Wageningen very

considerably; gratefully I note in particular the work done by Mr. F. J. BRETELIER, Dr. A. J. M. LEEUWENBERG, Dr. J. J. F. E. DE WILDE and Mr. J. J. BOS.

My stay in Ivory Coast ended in October 1963, when I moved to Yaoundé, Republic of Cameroun, where I worked with the Service des Eaux et Forêts, in close co-operation with Dr. R. LETOUZEY. I was in a position to extend my Ivory Coast observations and collections in another part of western tropical Africa. Accompanied by my wife – we made all trips together and her never failing help in sorting out, labelling and drying the plants explains the unusually large and excellently conserved herbarium collections we brought home – I left Cameroun in November 1964.

We intended to go by car to Addis Ababa (Ethiopia); my brother Dr. J. J. F. E. DE WILDE joined us at Yaoundé (Cameroun) in October, before we started on our collecting trip across Africa. My brother, senior staff member of the Laboratory for Plant Taxonomy, was financially enabled to participate in our journey by the University for Agriculture and by the Bureau of International Technical Assistance at the Hague. We left Cameroun passing by N'Gaoundéré, Garoua and Fort Lamy, traveled through the Republic of Tchad (December-January) and the Republic of the Sudan (January-February), slowly progressing because we made collections on the way. The authorities of Tchad and of Sudan gave their full support and contributed in many ways to make our efforts successful. By way of Abéché and El Fasher we reached Khartoum.

At Khartoum, however, where we stayed till March 22, 1965, it proved to be impossible to go by land to Addis Ababa; we went by air. Dr. J. J. F. E. DE WILDE returned from Khartoum to Wageningen.

In Ethiopia I stayed part of the time at Alemaya (near Harar) in the Agricultural College of Haile Sellassie I University, and mainly, at Addis Ababa. Similar to my practice in Cameroun, numerous trips were made in various parts of Ethiopia, among them half a dozen with Prof. DE WIT. In June 1966 I returned to the Netherlands, having spent in Africa a considerably longer period than was initially planned which certainly resulted in very much larger collections and better, more extensive data than otherwise would have been possible, but nevertheless made it necessary that I should rejoin the scientific Staff at Leyden without further delay.

I finished a period of 3 years and 3 months of tropical research as a member of the botanical Staff of, and aided in many ways by, the Laboratory of Plant Taxonomy at Wageningen. Financial aid was received in addition to the Wageningen allowances, of the Bureau of International Technical Assistance. After 2 months' of work in the Laboratory I resumed my work in the Rijksherbarium at Leyden (August 1966).

My knowledge of African *Passifloraceae* led Prof. Dr. C. G. G. J. VAN STEENIS to propose that I would revise *Passifloraceae* for the Flora Malesiana, after my return and appointment in the Rijksherbarium. Having started this with a revision of the Malesian *Adenias*, he agreed that I would make use of my accumulated knowledge and data and work under BENTHAM's dictum that 'The preparation of a revision or monograph is still recognized as the best

exercise for the young botanist'; it was to be a monograph of the genus *Adenia*, viz. including the (majority of) African species.

Adenia is a fascinating genus because of the diversity of habitats it occupies, from the tropical rain-forest to almost desert conditions, and the corresponding diverse morphology, from large woody climbers to small erect herbs emerging from sometimes colossal subterranean tubers.

Though HARMS for several decades had contributed to the knowledge of *Adenia* in Africa, no monographic study emerged. Besides, since his last listing of the species in 1925, collections have enormously increased. The lack of a monograph has caused much confusion because species were often misinterpreted. This was also in part due to the prevailing dioecism in the genus whereby species were often known in one sex only. For these reasons a re-appraisal of the genus appeared highly desirable.

As to the presentation I only mention that certain descriptive terms or ways of description have been explained in the chapter on the morphology; see also the schematic sections of flowers in fig. 3.

Sizes in descriptions are derived from those in the dried state and appear to be $\pm 10\%$ smaller as compared with those in living material.

Vernacular names have not been cited as they appear to be unreliable and erratic.

ACKNOWLEDGEMENTS

I acknowledge pleasant contacts with Prof. Dr. R. HEGNAUER on chemotaxonomical matter relating to *Passifloraceae*. I have already referred to Prof. dr. H. C. D. DE WIT and I now wish to acknowledge his continued interest and encouragement. Our discussions and exchange of opinion both in the field and in the Laboratory promoted my work which was materially aided also by the cultivation of *Adenias* in his greenhouse at Wageningen which resulted in seedlings in herbarium and numerous photographs.

Dr. R. C. BAKHUIZEN VAN DEN BRINK JR. generously provided the Latin text of the descriptions of new species in my precursory papers and to Dr. H. O. SLEUMER I feel indebted for doing a similar task for the new species proposed in the present revision.

To Miss R. VAN CREVEL (Rijksherbarium, Leyden) I express my sincere thanks for the excellent drawings.

To Prof. Dr. C. G. G. J. VAN STEENIS, who supervised my work at Leyden, I feel much indebted for his never ceasing attention, instruction, and criticism. Through his mediation I was able to visit the herbaria at Brussels, Kew, London (British Museum, Botany Department), Munich, and Paris.

The high costs of publishing the present monograph were generously met by the University for Agriculture at Wageningen and also by the 'Landbouwhogeschoolfond's' a fund for financial support of various research at Wageningen, and finally by the Netherlands Organization for the Advancement of Pure Research (Z.W.O.); I wish to express my gratitude for enabling me to publish the *Adenia*-monograph unabridged and illustrated. The kind interest of Prof. Dr. J. P. H. VAN DER WANT and Prof. Dr. H. C. D. DE WIT who paved the long and hazardous way to the press, I remember with deep appreciation.

The present revision could only be performed through large loans of material from foreign herbaria. I feel highly obliged to the Directors and Curators of the following herbaria:

A (Arnold Arb., Cambridge, Mass.), ABI (Abidjan), B (Berlin), BM (London), BO (Bogor), BR (Brussels), BRI (Brisbane), C (Copenhagen), CAL (Calcutta), COI (Coimbra), E (Edinburgh), EA (Nairobi), ETH (Addis Ababa, incl. Alamaya), FHO (Oxford), FI (Florence), G (Geneva), GH (Gray Herb., Cambridge, Mass.), HBG (Hamburg), K (Kew), L (Leyden), LD (Lund), LISC (Lisbon), LISJC (Lisbon), LISU (Lisbon), M (Munich), MEL (Melbourne), MICH (Ann Arbor), MPU (Montpellier), NY (New York), P (Paris), PNH (Manila), PRE (Pretoria), S (Stockholm), SING (Singapore), SRGH (Salisbury), U (Utrecht), UPS (Uppsala), US (Washington), W (Vienna), WAG (Wageningen), YA (Yaoundé), Z (Zürich).

TAXONOMIC HISTORY, POSITION WITHIN PASSIFLORACEAE, AND SURVEY OF PREVIOUS SUBDIVISIONS

THE GENERIC CONCEPT

The genus *Adenia* with 92 species in the tropics of the Old World is, next to *Passiflora* with over 350 species in America (see KILLIP, 1938) and Asia, the largest genus in the *Passifloraceae*.

The genus was founded by FORSKÅL in 1775 with the description of *Adenia venenata*, one of the remarkable pachypodous species in the genus, collected in the Yemen.

The first record pertaining to *Adenia*, however, is in RHEEDE'S Hortus Malabaricus (1688) where specimens from India are figured and described under the pagan name 'Modeccu'. These descriptions and figures served in 1797 as basis for the genus *Modecca* Lamarck, with as type species *Modecca palmata* Lamk.

Afterwards not less than ten other generic concepts were proposed between 1807 and 1891, which were later recognized to belong to the one single genus *Adenia*. The reason for this has been its great variation in habit and detail structure of the flowers. In fact, several of these generic concepts are perpetuated as sections. The complete list of generic synonyms is found in the systematical part. Type species are mentioned in the synonymy under the sections.

POSITION WITHIN THE FAMILY PASSIFLORACEAE

The family *Passifloraceae* (nom. cons., type: *Passiflora* Linné), formerly called 'order' *Passifloreae*, was established by A. L. DE JUSSIEU in 1805 (see also KUNTH, 1817).

This family or 'order' *Passifloreae* was for a long time used in a rather wider sense than it is now commonly accepted. Thus, in A. P. DE CANDOLLE'S Prodrômus III (1828) the 'order' is subdivided in three tribes, 1. *Paropsieae*, 2. *Passifloreae verae* (comprising among others the genera *Paschanthus* and *Modecca*) and 3. *Malesherbieae*.

A similar or slightly altered family concept (with a subdivision into tribes or not), but mostly excluding *Malesherbieae*, was adopted by several authors, viz. G. DON (1834) and MEISNER (1838) who recognized two tribes *Paropsieae* and *Passifloreae*. LINDLEY (1836) and SPACH (1838) did not make a subdivision into tribes, but recognized a number of genera. ENDLICHER (1839) and WALPERS (1843) accepted three tribes, 1. *Paropsieae*, 2. *Passifloreae verae*, and 3. *Modecceae* (comprising among others the genera *Modecca*, *Paschanthus* and *Kolbia*). In 1846 ROEMER proposed a rather deviating division by accepting five tribes, raising *Paschanthus* to tribal level, namely 1. *Patrisieae*, 2. *Paropsieae*,

3. *Passifloreae*, 4. *Modecceae* (with the genera *Microblepharis*, *Modecca* and *Erythrocarpus*), and 5. *Paschanteae* (comprising beside other genera the genera *Paschanthus* and *Kolbia*). Other views were those of DUMORTIER (1829), who accepted two families, the *Paropsiaceae* and the *Passifloraceae*, the latter comprising two tribes, *Passifloreae* and *Malesherbieae*, and AGARDH (1858) who distinguished a separate family *Modeccaceae* apart from *Passifloreae*.

In BENTHAM and HOOKER's *Genera Plantarum*, HOOKER (1867), accepting the 'order' *Passifloreae* in a wide sense, proposed a subdivision into the following five tribes: 1. *Malesherbieae*, 2. *Passifloreae* (incl. *Paropsieae*), 3. *Modecceae*, comprising the genera *Modecca* (with *Clemanthus*, *Paschanthus* and *Kolbia* as synonyms), *Ophiocaulon* and *Machadoa*, 4. *Acharieae*, and 5. *Papayaceae*. This view was largely adopted in later local floras e.g. by HARVEY (1868), MASTERS (1871, 1879) and by MASTERS in his essay 'Contribution to the Natural History of the *Passifloraceae*' (1871), although the latter advocated a narrower circumscription of the family. MASTERS wrote: 'The tribes *Modecceae*, *Acharieae* and *Papayaeae*, included by BENTHAM and HOOKER in *Passifloraceae*, should either form a suborder or preferably a distinct order, intermediate between *Passifloraceae* and *Cucurbitaceae*. I am disposed to exclude them from *Passifloraceae* proper by reason of their unisexual flowers, their perigynous stamens, the different attachment of the anthers, their want of corona, or, if present, its different nature', etc.

BAILLON (1885) divided the family *Passifloraceae* into four 'series' or tribes, 1. '*série des Passiflores*', 2. '*série des Modecca*' (consisting of the genera *Modecca*, *Machadoa* and *Atheranthera*), 3. '*série des Acharia*', and 4. '*série des Malesherbia*'.

In recent times the family *Passifloraceae* is often regarded as restricted to the tribe *Passifloreae* in the sense of A. P. DE CANDOLLE, that is the tribes *Passifloreae* and *Modecceae* in the sense of HOOKER taken together, the other three tribes forming each a family in their own right. The position of the group of genera referred to the tribe *Paropsieae* is still in discussion, sometimes it being assigned to *Flacourtiaceae*, sometimes to *Passifloraceae*. The position of the *Paropsieae* is further briefly discussed in the paragraphs on the anatomy, chemotaxonomy and palynology, and also by DE WILDE (1971).

PREVIOUS SUBDIVISIONS OF THE GENUS

As to the subdivision lower than the rank of genus WIGHT & WALKER-ARNOTT (1834) installed within the genus *Modecca*, on account of differences in the flower morphology in the two in India and Ceylon occurring species, two subgenera, viz. subg. *Microblepharis* W. & A. and subg. *Blepharantes* W. & A.

This subdivision of *Modecca* was adopted by most later authors: MEISNER (1838) as subgenera, ENDLICHER (1839), MIQUEL (1856), BENTHAM and HOOKER (1867) as sections, and later on, beside other sections within *Adenia*, by ENGLER and by HARMS.

BAILLON (1885) recognized three sections in *Modecca*, 1.sect. *Eumodecca*, 2.sect. *Ophiocaulon* and 3.sect. *Keramanthus*.

In revising the African *Passifloraceae*, ENGLER (1891) was faced with an evaluation of the generic entities then published. He recognized officially the identity of *Adenia* Forsk. with *Modecca* Lamk., following an earlier suggestion of ASCHERSON (1876), and consequently referred all species of the latter genus to *Adenia*.

He subdivided *Adenia* into four sections, viz. 1.sect. *Blepharantes* (W. & A.) incl. *Paschanthus* and *Clemanthus*, 2.sect. *Microblepharis* (W. & A.), 3.sect. *Euadenia*, and 4.sect. *Hildebrandtiothamnus* (containing *A.globosa* Engl. from East Africa, a thorny species with a strongly deviating pachypodous habit). *Ophiocaulon* was retained as a separate genus, and a new genus, *Echinothamnus*, was described to accommodate *A.pechuëlii* (Engl.) Harms, a species from SW. Africa with a strange habit of short bushy thorny branches growing from a lumpy stem.

This same sectional subdivision was retained by HARMS in 1893. He kept *Machadoa*, *Paschanthus*, *Echinothamnus* and *Ophiocaulon* as separate genera.

Four years later HARMS (1897) enlarged the circumscription of the genus and merged these genera with *Adenia*, with the exception of the ill-known *Machadoa* which he kept as a separate genus.

Within *Adenia* he distinguished six sections (see p. 27); these were also maintained by DE DALLA TORRE & HARMS (1903), by ENGLER & HARMS (1921), and by HARMS himself (1925), but in the latter paper he added two series within sect. *Blepharantes*.

Finally also the identity of the ill-known monotypic genus *Machadoa* could be established by A. & R. FERNANDES (1958) and referred to sect. *Blepharantes* series *Nanae* Harms, by which the circumscription and synonymy of *Adenia* was completed.

It may be added that HUTCHINSON (1967), in his *Genera of Flowering Plants*, in addition to *Adenia* maintains *Machadoa* and *Keramanthus* (already reduced by Harms in 1893) as separated genera, obviously largely induced by their erect habit and absence of tendrils.

For the subdivision into sections proposed in the present paper, the system of HARMS has essentially served as a basis, but some modifications had to be made, as will be argued in the next two chapters.

MORPHOLOGICAL CONSIDERATIONS

HABIT

The family *Passifloraceae* (excl. *Paropsieae*) consists for the majority of herbaceous to subligneous climbers provided with tendrils. The related *Flacourtiaceae*, incl. the *Paropsieae* (which are considered as a transitional group to the *Passifloraceae*) are mainly non-climbing, woody plants.

A great variety of life forms is found in *Adenia*, which is likely the result of its adaptation to various habitats, from evergreen rain forest to almost desert conditions.

Most *Adenias* are small, (sub)herbaceous to sub-woody climbers of but a few metres long to medium size; several primary forest species (e.g. *A. macrophylla* from Malesia, *A. lobata* from Africa), and *A. gummifera* from the drier East and southern Africa, however, attain a large size up to 30–50 m. A few species are low, erect plants, without tendrils, growing from large tubers.

ROOTS AND TUBERS

Rootstock-like lignotubers and true tuberous roots are found in many, erect as well as climbing species, especially in those growing under arid or seasonal conditions. In the greenhouse of the Wageningen herbarium a specimen of the forest species *A. gracilis*, brought from Liberia, produced large oblong subterranean tubers up to 50 cm long. Also many of the Madagascan species are characterized by peculiar tubers or thickened stem-bases, the characters of which, according to PERRIER DE LA BÂTHIE (1940, 1945), provide for their systematic distinction. Whether species from the everwet Malesian rain forest, like *A. macrophylla* and *A. cordifolia*, are also provided with some kind of tubers is unknown.

STEM

Beside the subterraneous, tuberous root structures also a pachypodous main stem occurs quite often as an adaptation to drought. It is mostly more or less conical, sometimes \pm spherical. Conically thickened stem-bases are found in *A. palmata* from S. India and Ceylon, and e.g. in the African *A. venenata*, *A. glauca*, and *A. fruticosa*; more or less spherical main stems occur in *A. ballyi*, *A. globosa* and *A. spinosa*. In Madagascar various shapes of swollen main stems are found.

The morphological nature of the thickened stem-base is not entirely clear and cannot be studied from older specimens. In a seedling collection, probably

of *A. gummifera* (Fanshawe 8457, in K) from Zambia, I observed that the subterranean hypocotyledonous part is already distinctly tuber-like thickened, the thickening slightly extending above the insertion of the cotyledons. This reminds very much of a similar development in *Myrmecodia* and *Hydnophytum*, as revealed by TREUB (1883). It could well be that in *Adenia* the corm originates from both the hypocotyl and the primary stem-base above it. Blastogenic studies are highly desired.

LIEBENBERG (1939, p.515) admitted to accept the line of demarcation of root and stem part of the corms, being differently coloured, as a matter of convenience for the description of the South African species.

In *A. palmata* and *A. monadelpha* the branches are zig-zag between the nodes.

In most species the stems and branches are slightly fleshy or succulent, especially the bark. In *A. lobata*, *A. rumicifolia* and *A. letouzeyi* the older stems are provided with succulent tubercles or wings.

Stems, also when older, are mostly greenish and smooth; only in *A. aculeata* the stems are distinctly prickly by epidermal outgrowths (not in ssp. *inermis*).

Thorns occur in a few species. As they are homologous with tendrils or peduncles they have been treated below between the discussion of these two structures.

In some members of the sect. *Ophiocaulon* the twigs are often finely blotched when dry, which is caused by tannin-conglomerations (see also under anatomy). The twigs are often pruinose or provided with a thin (sometimes thick) resinous-waxy cover in species of sect. *Ophiocaulon* and in e.g. *A. panduraeformis*, *A. globosa*, *A. pechuëlii*, *A. venenata*, *A. hondala*, *A. wightiana*, and in several species from Madagascar. (See also JUMELLE, 1903).

RAMIFICATION

Ramification usually occurs through the second, \pm supra-axillary (serial) bud. The side-branches start with 2(-4) minute cataphylls, resembling bracts. In sterile shoots the first bud, in the leaf-axils, is either abortive or mostly developed into a sterile tendril (see fig.2 a, 44 b). Whether this ramification through the serial bud holds true for the sparingly branched, erect species is unknown. Many tuberiferous species grow with annual shoots which die off in the dry season.

INDUMENTUM

Most species are glabrous; a few from eastern Africa, namely *A. keramanthus*, *A. volkensisii*, *A. ellenbeckii* and *A. stricta*, are hairy on stems, leaves, and pedicels, and may be glabrescent. *A. keramanthus* is strongly bristly hairy by straight, several-celled, brownish red hairs. In *A. ellenbeckii* also entirely glabrous forms are found. The flowers are always glabrous.

The lower surface of dried leaves of some species from Madagascar, and e.g. *A. reticulata* var. *cinerea*, *A. gummifera* var. *cerifera*, *A. pechuëlii* and *A. spinosa*, bears hair-like, waxy-whitish protuberances or papillae, well visible with a lens. This is caused by enlarged, probably air-filled, epidermal cells. Often the phenomenon disappears when the leaves are boiled. Whether these papillae ('poils cireux', 'papillose' leaves) are visible in living material is not known.

LEAVES

Phyllotaxis is always that of a $2/5$ spiral.

In climbing plants the leaf-shape is often highly variable, and to this *Adenia* makes no exception: in most species both entire and variously lobed leaves occur. In some species the leaves of mature plants are always entire, e.g. in the climbing species *A. cissampeloides*, *A. cordifolia*, *A. penangiana*, *A. tricosata*, and in the erect *A. erecta*, *A. goetzei*, *A. huillensis*, *A. ovata*, *A. tisserantii* and *A. tuberifera*. Always lobed, or even compound leaves are found in the climbing *A. digitata*, *A. fruticosa*, *A. glauca*, *A. karibaensis*, *A. kirkii*, *A. stenodactyla*, *A. trisecta* and *A. welwitschii*, and in the erect-growing *A. wilmsii* and some species from Madagascar.

These seemingly compound leaves (*A. digitata*, *A. glauca*, etc.) are to be regarded as proceeding from palmately lobed or -parted leaves in which the basal laminal tissue of the lobes is reduced to the nerves, leading in some species to distinctly petioluled leaflets. The leaflets are entire or sometimes once more deeply lobed.

Palmately compound leaves and strictly palmately nerved leaves are probably to be regarded as an advanced condition, pinnately nerved leaves as primitive.

LEAF VENATION

The venation varies from pinnate (e.g. in *A. banaensis*, *A. cynanchifolia* (p.p.), *A. penangiana*, *A. repanda*, *A. tuberifera*) to palmate (*A. digitata*, *A. glauca*, *A. karibaensis*, *A. perrieri*, *A. welwitschii*, etc.). In many species the venation is variable, with the (basal and) lower nerves strongest and \pm approximate, but also with one or more pairs of less strong, lateral nerves from the midrib higher up, hence with a subpalmate venation. Often these strongest basal nerves are neatly arching towards the apex of the blade, as e.g. in *A. tricosata*, *A. stolzii*, *A. macrophylla* or *A. kinabaluensis*.

Usually the lateral nerves are reticulately or often arch-like anastomosing (interlooping) at some distance from the leaf margin, occasionally forming a marginal nerve. In a few species, e.g. in *A. cissampeloides*, *A. gummifera*, *A. gracilis*, the subpalmate basal nerves end in small glands in the leaf margin. In lobed leaves the nerves usually end in the lobe-tips. The finer venation or 'reticulation' may be fine or coarse, distinct or indistinct when dry. When used in the descriptions it is always as observed on the lower leaf surface.

LEAF TEXTURE

The texture of the leaves varies from herbaceous to coriaceous. Forest species have mostly herbaceous leaves (e.g. sect. *Ophiocaulon*), but the dried leaves of the Malesian rain forest species *A. macrophylla* are usually distinctly coriaceous. In the steppe-savanna species *A. ellenbeckii* fresh leaves are rather thick fleshy-leathery, but they become surprisingly membranous when dry.

LEAF COLOUR

The lower leaf surface is usually distinctly paler than the upper surface, often glaucous or whitish (*A. macrophylla* var. *singaporeana*, *A. cissampeloides*, several Madagascan species), in other species both sides are often nearly concolorous, e.g. in *A. cordifolia*, *A. penangiana*, *A. manni*, *A. tricostata*.

In many species the dry leaves show a fine purplish-red or brown punctation, especially on the lower surface, which is caused by tannin-containing cells in the epidermis. In some species of sect. *Ophiocaulon* (e.g. *A. gracilis*, and near the leaf margin in *A. cynanchifolia*) there are also larger blackish spots due to tannin conglomerations.

Though the presence or absence of these tannin spots is often variable within one species, it can serve as an additional character for some taxa.

The black tannin spots may also occur in the sepals and petals in sect. *Ophiocaulon*.

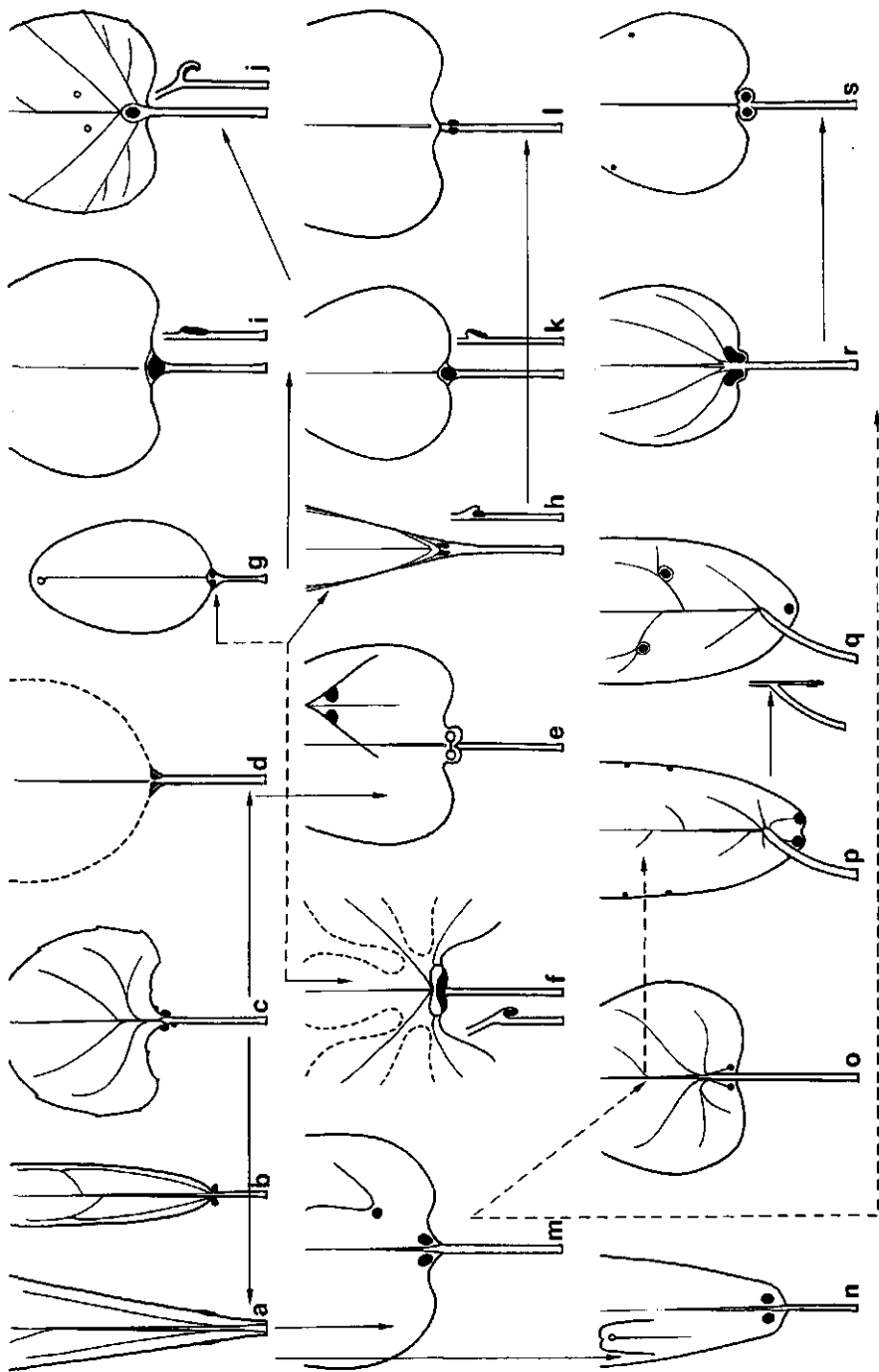
LEAF GLANDS¹

Except for the disk glands in the flower, glands are only found on the lower surface of the leaves, on the leaf margin, or on the underside of the leaf-base. The position of the glands, especially those of the leaf-base, provides very constant taxonomic characters. Some types of the latter are illustrated in fig. 1.

Three types of leaf glands can be distinguished:

1. *Basal glands* (or glands at blade base) are the most conspicuous and taxonomically most important. Of these there are usually 2 or 1, very rarely 0, or 3 or 4, sessile or placed on wart-like excrescences, or on auricles, situated either laterally at the apex of the petiole, or (on the margin) at the very blade base or on the often more or less peltate blade base, or on a single, median, \pm spatulate appendage (sect. *Ophiocaulon*). Sometimes the fused basal glands are almost marginal on a minutely-peltate base and are seemingly inserted on the upper side of the leaf and hardly visible from beneath in dried specimens.
2. *Blade glands* are either scattered on the leaf surface or fixed in certain places

¹ According to the studies of CUSSET (1965, 1970) the glands are understood as homologous with one or more non-foliolate primitive units ('*métamère*') out of which the leaves are ultimately constituted.



(e.g. at about 1/3 from the blade base in *A. banaensis*, in the nerve axils in *A. bequaertii*, approximate to the upper nerve axils in *A. cissampeloides*, etc.). Very often the blade glands are submarginal, either in correspondence to submarginal nerves or not. In lobed leaves the submarginal glands are practically always corresponding with the sinuses between the lobes; only in *A. repanda* the position of the blade glands corresponds with the lobes (if present), not with the sinuses in between.

Sometimes the midrib ends in an apical or subapical gland, as in *A. repanda* and *A. spinosa* (fig. 1g, n; 37 b-b₄). Basal glands and blade glands are flat or crateriform.

3. *Marginal glands* are minute to small, mostly discernible as brown or blackish points at the leaf apex and on the margin; in dentate leaves they occur mostly on the tops of the teeth.

In some species (*A. volkensii*, *A. keramanthus*) the tops of the serrate or lacinate stipules bear similar small 'marginal' glands.

In specimens grown in the greenhouse it was observed that the glands may profusely guttate in the early morning.

It is assumed that separate basal glands situated on the blade margin at the transition to the petiole, represent the most primitive condition in *Adenia*. These glands can be imagined as being derived from marginal glands. As also assumed by KALKMAN (1965) for *Prunus* and by CUSSET (1965) for *Passifloraceae* (*Tryphostemma*, *Adenia*, *Passiflora*) marginal glands are regarded as the original condition.

In *Adenia* this is found e.g. in *A. gedoensis*, *A. goetzei* and *A. tuberifera* (see fig. 1a, b, c).

A more advanced stage is realized when the basal glands are situated in the very basal part of the blade, or on the peltate blade base, and still more so if both glands are fused into a single median gland. This tendency or evolutionary trend has gone farthest when the gland is situated on a single median spatulate appendage as found in the species of sect. *Ophiocaulon*. A second line of development can be seen in the position of the glands on two distinct lateral (often hollowed) auricles at the apex of the petiole, as found e.g. in the Asian *A. heterophylla*, *A. cardiophylla*, *A. cordifolia*, *A. crassa* and *A. macrophylla*, the species of the African *A. lobata*-group, or *A. sphaerocarpa* from Madagascar. The supposed semophylexis is illustrated in fig. 1.

FIG. 1. Various positions of laminal glands, schematic. Arrows indicate theoretical lines of development in the position of the basal glands. a. *A. goetzei*; b. *A. tuberifera*; c. *A. gedoensis* (note also marginal glands); d. *A. digitata*; e. *A. hastata* (note subapical glands in var. *glandulifera*); f. *A. glauca*; g. *A. spinosa* (p.p.) (note subapical gland); h. *A. pachyphylla*; i. *A. aculeata*; j. species of sect. *Ophiocaulon* (note blade glands approximate to nerve axils as found in *A. cissampeloides*); k. *A. olaboensis*; l. *A. firingalavensis*; m. *A. hondala* (note submarginal gland corresponding with sinus); n. *A. repanda* (note apical gland); o. *A. staudtii*; p. *A. penangiana* (note marginal glands); q. *A. banaensis* (note large blade glands); r. *A. kinabaluensis*; s. *A. sphaerocarpa*, species of the *A. lobata*-group and most species of sect. *Erythrocarpus* (note submarginal glands as found in e.g. *A. macrophylla*).

STIPULES

The stipules are small, \pm persistent or caducous, entire or lacinate, $\frac{1}{2}$ -3(-8) mm long, filiform to triangular in most species but reniform in sect. *Ophiocaulon*. They are inserted on the stem. In *A. hondala* the stipules are persistent and developed into rather soft thorn-like structures, remaining after the leaf is shed.

HETEROBLASTY

In several cases the leaves of seedlings are quite different from the leaves in the adult stage, differing in the shape of the blade as well as in the presence and the position of the glands. In leaves of adult *A. cordifolia*, for instance, the basal glands are situated in two distinct, separate, hollowed auricles lateral at the apex of the petiole. In the juvenile stage these auricles are absent, whereas the leaf is mostly peltate and without or with 1 or 2 very small sessile glands. The shape of the blade is here often lunate or 3-lobed, instead of ovate-cordate as in the adult stage. In sect. *Ophiocaulon* the first leaves often lack the spatulate median appendage which is so characteristic for the leaves of adult plants, and are often glandless altogether.

HETEROPHYLLY

Heterophylly occurs in many species, the leaves in the lower portion of the plant or the corm-born shoots being entire or less divided as compared to the leaves higher up, especially those in the fertile branches.

In other cases, however, the leaves of juvenile plants or of sapling shoots are more divided than the leaves of the adult stage, but in a different (usually finer dissected) manner (see also under seedlings).

TENDRILS

The term 'sterile tendrils' is used in the descriptions to denote those tendrils which are not in connection with inflorescences, and which develop on sterile shoots, or below the inflorescences, from the axils of the leaves. They are always homologous with inflorescences, not side branches, which is proved by the fact that inflorescences occupy the same position, i.e. in the axils of the leaves, and by that they often bear two (sub)opposite scales reminding of the first bracts of the inflorescence. Not rarely the sterile tendrils are 3-fid. The tips of the sterile tendrils, especially in juvenile forms, may bear adhesive disks.

In the inflorescences – which are essentially dichasial – the first flower or the first three flowers may be replaced by (a) tendril(s). HARMS (1897) and CUSSET (1968) went into greater detail on the structure of the tendrils.

Whether the absence of tendrils in the erect species like *A. volkensis* and *A. keramanthus*, and in the species of the *A. huillensis*-group (series *Nanae* with HARMS) is to be regarded as primitive or as an indirect adaptation to the dry environment is difficult to decide upon. See further under inflorescences.

THORNS

Thorns are found in *A. globosa*, *A. ballyi* and *A. spinosa*. They are homologous with sterile tendrils or the peduncles of the inflorescences as found in non-thorny *Adenias*. The thorns are situated in the axils of the leaves (or leaf scars), and bear two minute subopposite scales which are the first pair of bracts, as also found on sterile tendrils. (Compare also HARMS, 1897, p. 168).

In *A. spinosa* sometimes thorns with a tendril-like end are found; in *A. venenata* rarely the tendrils are stiffened into thorn-like structures.

The thorns in *A. petchuëlii* are of a different origin, being the more or less pointed normal twigs.

A. aculeata has spiny (prickly) stems, not thorns.

INFLORESCENCES

Detailed information on the inflorescences in *A. venenata* is given by ENGLER (1891, p. 380) and by HARMS (1897, p. 166, 168). A good account of the inflorescences in *Passifloraceae*, including several types found in *Adenia*, is given by HARMS (1925). LIEBENBERG (1939, p. 517–531) gave many interesting observations on the inflorescences of South African species. CUSSET (1968, p. 45–61) provided an extensive enumeration of the existing types and modifications of the inflorescences in *Passifloraceae*, also paying much attention to *Adenia*. The morphological interpretation of the inflorescences of e.g. *A. ambongensis* (= *A. cladosepala*) and *A. globosa* given by CUSSET differs, however, from the one given here.

The simplest type of inflorescence is an axillary stalked few- to many-flowered cyme (dichasium). This situation is found in many species, e.g. in several species of sect. *Ophiocaulon* (*A. tricostata*), in the *A. lobata*-group of sect. *Blepharantes* (*A. lobata*, *A. rumicifolia*), in sect. *Erythrocarpus* (Asia), and in sect. *Microblepharis* (for example *A. gedoensis*). See fig. 2a.

In most species the inflorescences bear 1 or (2–)3 tendril(s), the tendrils replacing the first flower or first 3 flowers of the dichasium. For ample considerations and literature see HARMS (1897) and CUSSET (1968).

As shown in fig. 2 also sessile inflorescences occur. In several species both sessile and stalked inflorescences are found even within one specimen, the sessile inflorescences being then situated near the base of the shoots. (*A. rumicifolia*, *A. schweinfurthii*, *A. ellenbeckii*, *A. repanda*).

The non-climbing *A. volkensis* and *A. keramanthus*, and the members of the

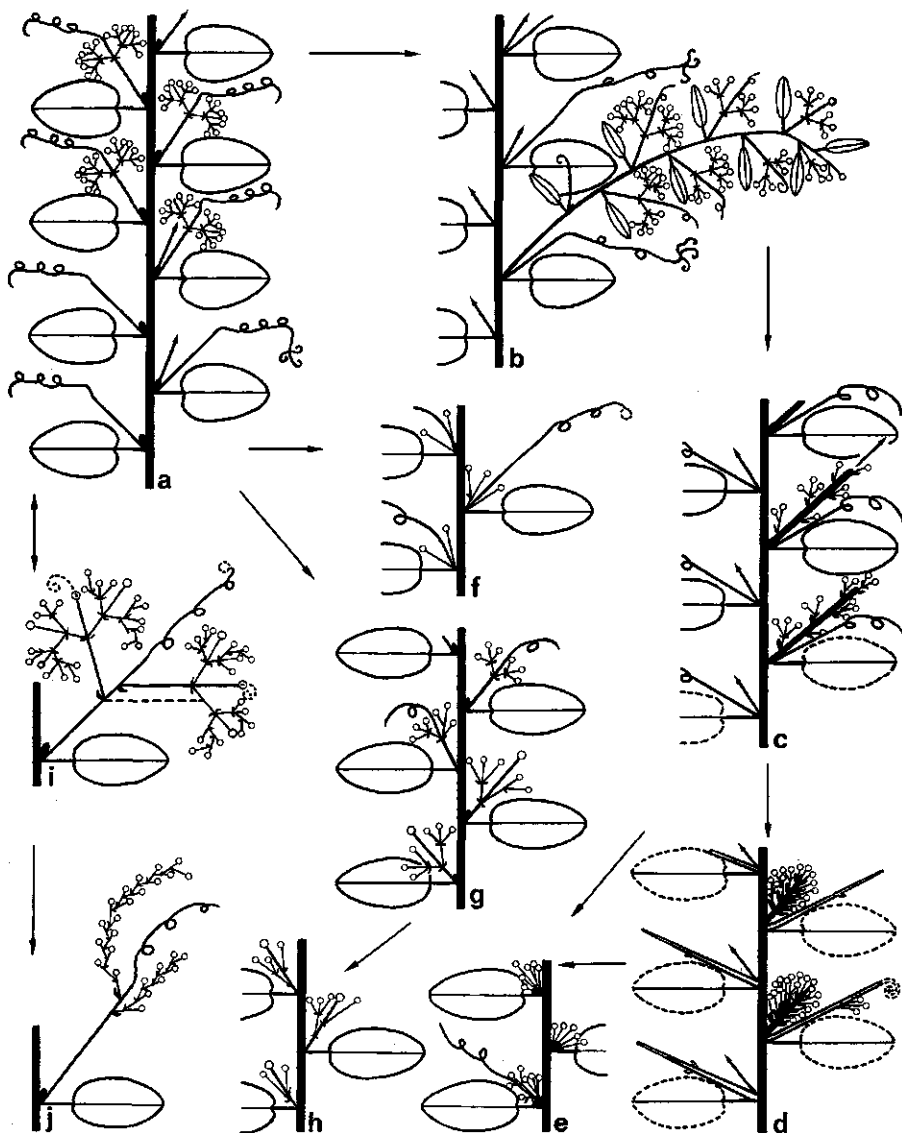


FIG. 2. Various types of inflorescences, schematic. Arrows indicate theoretical lines of development. a. Inflorescences in the axils of normal leaves, as found in e.g. *A. gedoensis*, *A. wightiana*, *A. mannii* (p.p.), *A. cordifolia* or *A. tricostata*; b. inflorescences arranged in special shoots, found in sect. *Ophiocaulon*; c. situation in e.g. *A. racemosa*, *A. penangiana* (p.p.), *A. cladosepala*, *A. venenata*; d. ditto in *A. spinosa* or *A. globosa*; e. inflorescences-bearing short-shoots reduced to fascicles as found in *A. fasciculata*; f. inflorescences sessile in the axils of normal leaves as found in *A. mannii* (p.p.), *A. rumicifolia* (p.p.), *A. repanda* (p.p.); g. ditto in e.g. *A. schweinfurthii* or *A. ellenbeckii*; h. sessile inflorescences without tendrils in *A. keramanthus* or *A. huillensis*; i. many-flowered cyme; j. branches of cyme cincinnal as found in *A. wightiana* and *A. penangiana* (p.p.). For further explanation see the text.

group of small erect species (*A. huillensis* and others) usually have sessile or subsessile, rather few-flowered inflorescences without tendrils.

The inflorescences may be condensed or lax. The first ramification is either strictly opposite or subopposite, or, as in many species, the two branches are mutually shifted (concaulescence), sometimes strongly so, e.g. in *A. panduriformis* and some South African species (cf. LIEBENBERG, 1939, p. 518 and following). The higher ramifications often become monochasial. In *A. penangiana* and *A. wightiana* double cincinnae are characteristic (fig. 2j, 8c and 9k).

Bracts and bracteoles are always present, persistent, triangular to linear, acute.

The pedicel is always demarcated from the usually stiped flower by a distinct articulation.

From the above mentioned assumed original type of inflorescence two types or stages of specialization in the arrangement of the inflorescences can be derived, as shown diagrammatically in fig. 2.

1. In sect. *Ophiocaulon* the stalked inflorescences, which are mostly provided with tendrils, are arranged in specialized flower-bearing shoots of up to c. $\frac{1}{2}$ m long, mostly developed from the serial bud above the sterile tendrils. On these specialized shoots the leaves which subtend the inflorescences are usually of a normal appearance, but mostly smaller, especially apically. In *A. poggei* these subtending leaves are of a different shape (elliptic) as compared to the normal leaves which are broadly ovate.

2. In species like *A. racemosa* and *A. venenata*, and in several species from Madagascar (e.g. *A. cladosepala*) the inflorescences are much reduced, few-flowered and without tendrils. These small inflorescences are arranged in raceme-like or thyrsoid short-shoots up to 15 cm. Like the specialized shoots in sect. *Ophiocaulon* these short-shoots are also (mostly) situated above sterile tendrils, which in turn are produced in the axils of (fallen) normal leaves. The original inflorescences along the short-shoots are situated in the axils of much reduced leaves which usually consist only of the basal glands. In *A. globosa* these short-shoots are still more reduced to irregular outgrowths; in *A. fasciculata* and *A. pachyphylla* into pauciflorous fascicles reminding of the single pauciflorous inflorescences as found e.g. in *A. huillensis*.

FLOWERS

The plants are mostly dioecious, sometimes monoecious with male and female flowers on different shoots (GAGNEPAIN, 1918, p. 75-77). A few species, e.g. *A. huillensis*, *A. ovata*, etc., and *A. repanda* are polygamous, often with male, female and hermaphroditic flowers on one plant. Polygamous flowers can be considered as a relatively primitive character.

Generally the male and female flowers are very similar in shape (for example *A. lobata*, and many other species), though the female flowers are usually smaller (shorter, but broader). In some species from Madagascar, however, the female flowers are largest (e.g. in *A. densiflora*).

Female inflorescences are as a rule much poorer in flowers as compared with males.

In general, male flowering specimens are much more frequently collected than females.

The flowers are always glabrous, also in the otherwise entirely hairy species, but the corona, the margins of the petals and the in bud (quincuncially) overlapped margins of the sepals are often serrate or lacinate, sometimes to such degree that they appear to be finely woolly hairy.

The colour of the flowers varies from greenish to yellowish, sometimes tinged reddish or dirty purplish, when dry often finely purplish spotted or striped. The petals are usually paler, whitish or \pm cream-coloured. In some species of sect. *Ophiocaulon* the sepals and petals are blackish spotted by tannin conglomerations similar to those found in the leaves. *A. densiflora* has reddish flowers. Most flowers are of a fleshy consistency.

The assumed original structure of an *Adenia* male flower is given in fig. 3b. It is found in sect. *Microblepharis*. The following parts can here be distinguished:

1. Stipe, the obconical to terete part between the articulation with the pedicel and the hypanthium.
2. Hypanthium, the fleshy \pm cup-shaped part. In sect. *Microblepharis* it is about as wide as long. It is demarcated above by insertion of the corona. It is largely identical with the concept of the receptacle by previous authors (including HARMS) which included mostly also the stipe and, if present, the calyx tube. For convenience of description these are kept apart.
3. Corona, a ring-shaped appendage attached to (the inner side of) the rim of the hypanthium. It is membranous, rarely fleshy, often lacinate, sometimes very finely so with hair-like threads. In many species, especially when it consists of a finely lacinate membrane or of such 'hairs', the corona extends on the upper edges of the septa mentioned below. In general the corona in *Adenia* is less developed as compared to most other genera in *Passifloraceae*.
4. Sepals 5, free in sect. *Microblepharis*, inserted on the rim of the hypanthium.
5. Petals 5, free, also inserted on the rim of the hypanthium, alternating with the sepals. The flowers are peri- to epigynous.
6. Stamens 5, free or connate at base, inserted at or near the base of the hypanthium, sometimes on a short androgynophore, alternating with the petals.
7. Disk glands 5, rarely merged into an entire ring, inserted mostly near the base of the hypanthium, between the sepals and the stamens. They are lingulate, strap-shaped, or clavate, of a firmly fleshy consistency, either erect (*A. heterophylla* and others) or quite often outward curved (*A. lobata* and many other species). The disk glands are apparently homologous with the fleshy nectary-ring as found in many *Passiflora* species.
8. Vestigial ovary, fusiform to linear, situated in the centre, subsessile or shortly stalked.

The female flowers in all *Adenias* resemble the male flowers in structure. They contain subulate or often \pm dilated staminodes, sometimes with an hook-like appendage at the top, reminding of the anthers. The pistil is sessile or developed on a distinct gynophore. The gynophore usually stretches after anthesis.

The filaments in the male and hermaphroditic flowers and the staminodes in the female flowers in *Adenia* are free or connate at the base into a filamental tube, which is mostly about as high as or shorter than the hypanthium. In many species there are 5 vertical septa, opposite the petals, connecting the filamental tube with the hypanthium. Not rarely these septa form, together with alternating shallow bulges in the hypanthium, 5 pouches or sacks in which the disk glands are situated (markedly so e.g. in *A. hondala*, species of the *A. lobata*-group, *A. karibaensis* and others).

As a rule there is a considerable variation within each species in the size of the flower as a whole, as well as in the various flower parts. The length of the stipe, however, is often fairly constant, and can be used as a character on the species level, a fact which was already noticed by GAGNEPAIN (1918) and HARMS (1925). LIEBENBERG (1939) recorded various variations and abnormalities found in the flowers of South African species.

The above described situation (fig. 3b), which is regarded as primitive, is found in sect. *Microblepharis*. In this section the hypanthium is cup-shaped, either 5-saccate or not. In *A. karibaensis*, belonging to this section, the sepals in the female flowers are, as an exception, sometimes connate into a very short tube.

Proceeding from the situation as found in sect. *Microblepharis* several other types of flowers can be derived, by reduction of the corona and the disk glands, and by connation of sepals (forming a calyx tube), and adnation of petals and filaments, as shown in the diagrammatical longitudinal sections given in fig. 3.

The six accepted sections are mainly based on these different flower structures.

The situation in sect. *Ophiocaulon* (fig. 3a) can be imagined to be derived from that in sect. *Microblepharis* by the entire reduction of the hairy or membranous or lacinate corona, which is replaced by an inconspicuous to distinct fleshy rim, or by 5 fleshy cap-shaped parts. The five disk glands at the base of the hypanthium as normally found in other *Adenias* are absent, which suggests the homology of the cap-shaped parts (situated at the place of the corona) with the disk glands. As additional evidence for this may be mentioned that in *A. bequaertii* the cap-shaped parts are superposed by a few wart-like appendages reminding of the 'true' corona. In ssp. *macranthera* of this species the caps are remarkably low inserted in the hypanthium.

A. tricostata deviates in having two fleshy rings, whereas the sepals and petals are partially adnate.

Sect. *Adenia* (fig. 3c, d, e) possesses essentially the same structure as sect. *Microblepharis* and differs merely by the slender flowers, with a long stipe and very narrow hypanthium, while the filaments are in some species adnate to the

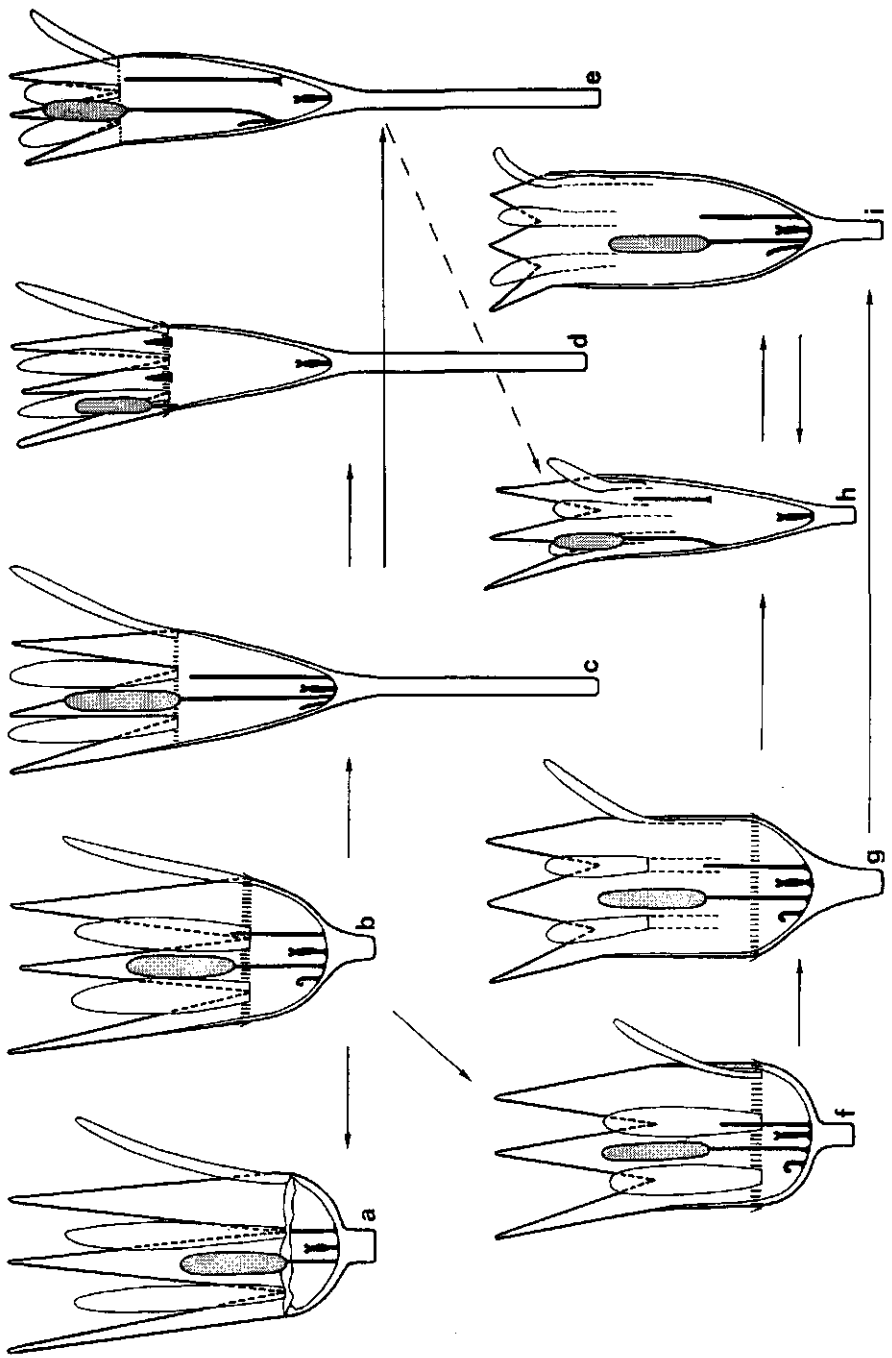


FIG. 3. Various types of flowers in longitudinal section, schematic. Septa omitted. Arrows indicate assumed line of evolution. a. sect. *Ophiocaulon*, sepals and petals free, corona composed of a flesh yrim, disk glands absent; b. sect. *Microblepharis*; c, d, e. sect. *Adenia*, hypanthium narrow; f, g. sect. *Blepharantes*, sepals partially connate into a calyx tube; h. sect. *Paschanthus*; i. sect. *Erythrocarpus*. For further explanation see the text.

hypanthium. In the East African representatives the corona is absent; in the Madagascan species it is either present or reduced to a line-shaped indication.

Sect. *Blepharantes* (fig. 3f, g) is the most variable in its flowers. It can be derived from sect. *Microblepharis* by partial connation of the sepals into a calyx tube, and in a part of the species by partial adnation of the petals with this calyx tube. The hypanthium may be wide and either \pm 5-saccate or not, or cup-shaped, or narrow, often tapering to beneath. The shape of the hypanthium can be used for the distinction of certain groups of species within the section.

Sect. *Paschanthus* (fig. 3h) contains one single species, *A. repanda*. The structure of the flower can be derived from that in sect. *Blepharantes*. It is kept in a separate section because of the deviating, tubular, polygamous flowers, in which the corona and disk glands are lacking and with the filaments inserted at about halfway in the calyx tube. The leaves have a characteristic (sub)apical gland at the end of the midrib.

Sect. *Erythrocarpus* (fig. 3i) is derived from sect. *Blepharantes* by the entire reduction of the corona. The flowers are small, narrow, the sepals are connate into a long tube and the petals are for a long distance adnate with this calyx tube (inserted near the throat). The stamens are entirely enclosed in the calyx tube.

FRUIT

The fruits are 1-celled capsules composed of 3(-5) carpels, with 3(-5) parietal placentas. The capsules are loculicidally dehiscent along the midribs of the carpels, leaving the seeds attached to the middle of the valves.

The dry valves are either woody (e.g. in *A. cordifolia*) or coriaceous (*A. heterophylla* and most other species), but in a number of species the fresh pericarp is fairly fleshy, so that the fruit, together with the fleshy pulp, is berry-like, and in some species apparently not opening with ripeness (e.g. *A. lobata*, *A. rumicifolia* opening with ripeness; *A. ellenbeckii*, *A. volkensii*, *A. keramanthus* probably not opening at maturity). In the species of sect. *Ophiocaulon* the valves of mature fruits are rather cartilaginous and brittle.

The shape of the fruits varies from fusiform to globular, the size, without the gynophore, varying from c. 1 to c. 15 cm long; shape and size are often characteristic for the species.

After pollination the gynophore usually stretches considerably, the length of the gynophore in fruit providing sometimes a specific character.

Even in ripe fruits the dried perianth is persistent on the flower stipe.

The colour of fresh ripe fruits varies from greenish (e.g. the species of sect. *Ophiocaulon*) to pale yellowish (*A. lobata*) or bright red (many African and all Indo-Malesian species). Dry fruits are generally dull orange-brown to purplish brown.

The parietal placentas are usually many-ovuled. In some species (e.g. *A. glo-*

bosa, *A. repanda*) the fruits have few seeds, in others, like *A. lobata*, they are many-seeded. In this latter and related species (*A. lobata*-group) the placentas are broad and carry numerous ovules.

The ovules are anatropous, with 2 integuments and a distinct funicle. After fertilisation a purse-like, membranous to very juicy, whitish aril develops from the top of the funicle, entirely or nearly entirely enveloping the seed. In ripe fruits the funicles are quite long, in Asian species attaining 10–20 mm, in African species usually but 1–5 mm long.

SEEDS

The seeds are orbicular to elliptic or obliquely triangular in shape, mostly distinctly flattened, rarely (sub)globose. Most seeds are \pm beaked at the side of the chalaza.

The smallest seeds are found in sect. *Ophiocaulon* and the *A. lobata*-group, c. 2–4 mm in diameter, the largest seeds in *A. penangiana* and *A. banaensis*, up to c. 11 mm across.

The testa is crustaceous-coriaceous, (reddish-)brown to blackish, smooth (or nearly so) to mostly distinctly pitted, the pits projecting inside into the firmly fleshy or horny, whitish endosperm (albumen). Sometimes the seeds are rugose or muricate. ENGLER (1891, p. 380) gave a description and figure of the cross-section through the seed of *A. venenata*.

The size, shape and texture of the seed are to a certain degree characteristic for the species, though less than supposed by CUSSET (in Fl. Vietnam, Laos & Camb. 5, 1967). In *A. pinnatisecta* and *A. penangiana*, for example, both smooth and ribbed and pitted seeds occur.

The *embryo* is large, straight, creamy white and of a firm consistency. The cotyledons are relatively large, flat, foliaceous, broadly ovate to suborbicular, with rounded to cordate base and with rounded or mostly with obliquely truncate or emarginate top. The size of the embryo varies with the seed, but the radicle is always small, straight, ovate to ellipsoid(-oblong), blunt to subacute, $\frac{3}{4}$ –1½ mm long, turned towards the hilum. The plumule is not developed; only in *A. pinnatisecta* var. *muricata* a fairly well developed plumule was found.

For further information on the seed anatomy see LUBBOCK, Seedlings I (1892, p. 582–593) (*Passiflora*) and PRITZEL (1897, p. 381).

SEEDLINGS

Few seedlings are found in the herbaria, and if present it is not always certain to what species they belong. Little is published by previous authors. LUBBOCK (1892) described, beside the seedlings of some *Passiflora* species, the seedling of *A. trilobata*.

Recently the seeds of a few species sent from the Cameroons were sown in the

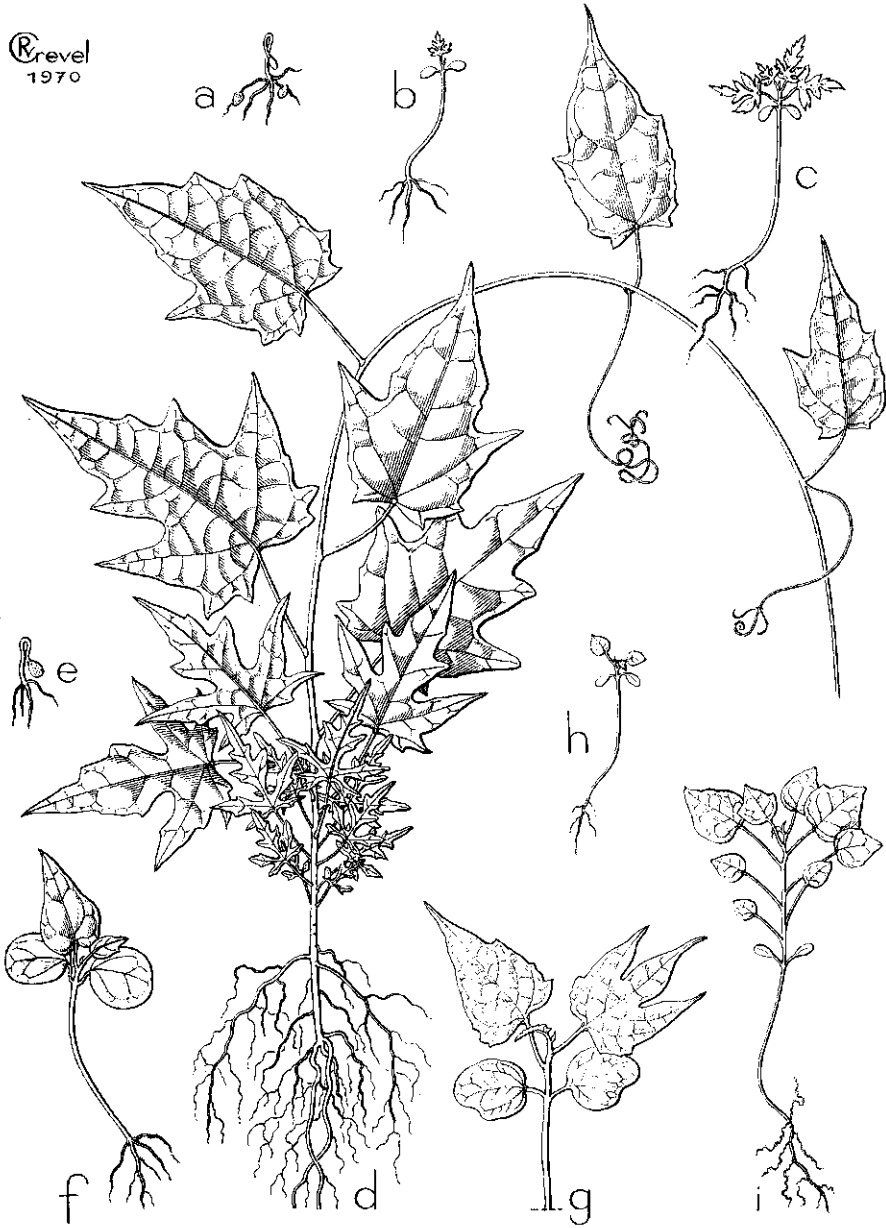


FIG. 4. Seedlings. — a-d. *A. cynanchifolia*, $\times \frac{1}{2}$; a. germinated seed, b-c. seedlings, d. young plant (de Wit & Bos s.n., cultivated from seeds collected near Douala). — e-f. *A. letouzeyi*, $\times \frac{1}{2}$ (Bos 3797, from Kribi). — g. *A. trilobata*, $\times \frac{1}{2}$ (copied from LUBBOCK, 1892, fig. 379). — h-i. *A. gracilis*, $\times \frac{1}{2}$ (Bos s.n., from Kribi).

greenhouse of the Laboratory for Plant Taxonomy in Wageningen. This allowed me to observe the germination of *A. gracilis*, *A. cynanchifolia* and *A. letouzeyi*. The germination is epigeal.

In the observed species the hypocotyl and radicle develop first, the hypocotyl arching above the ground, later on straightening, usually leaving the seed coat in or on the soil but the endosperm mostly remains enveloping the cotyledons. Later on the hypocotyl lengthens still more and the cotyledons – which are already foliaceous in the seed – enlarge, throwing off the withering endosperm.

In fig. 4 some seedlings and stages in germination are depicted.

The final size of the cotyledons in the seedling apparently agrees with the size of the seed (and hence with the size of the cotyledons of the embryo) as *A. gracilis* and *A. cynanchifolia* (sect. *Ophiocaulon*) and *A. letouzeyi* (*A. lobata*-group in sect. *Blepharantes*) have small seeds and small cotyledons, whereas *A. trilobata* (sect. *Blepharantes*) with large cotyledons in the seedlings, has relatively large seeds.

According to the description and figure by LUBBOCK (1892) the first leaves in *Passiflora caerulea* (and other species) are entire, the 'adult' leaves higher up assuming the normal deeply lobed shape. This sequence, with the primary leaves entire and the higher leaves lobed, is also more or less found in *A. trilobata* and *A. letouzeyi*. In *A. gracilis* and *A. cf. gummifera* (sect. *Ophiocaulon*) the adult leaves as well as the primary leaves are entire. In *A. cynanchifolia* (also in sect. *Ophiocaulon*) it is strikingly the reverse, in that the first leaves of the seedlings are deeply lobed or divided, whereas the adult leaves are entire.

Much divided or comparatively more divided leaves in young plants or sapling shoots are also found in e.g. *A. reticulata* and *A. perrieri* and in the African passifloraceous *Crossostemma laurifolia* Planch. and *Schlechterina mitostemmatoides* Harms. See also above under heteroblasty and heterophylly.

Finally I observed that in the first leaves of the seedling the basal blade glands are often absent, or present in a different size (smaller), shape and position as compared to the adult stage, e.g. in juvenile leaves in several species of sect. *Ophiocaulon* the basal gland is absent or sessile, not situated on a distinct spatulate median appendage which is characteristic in mature plants.

SUBDIVISION AND INTERRELATIONS WITH NOTES ON THE SYSTEM PROPOSED BY HARMS

As regards HARMS' system, the most important characters used by this author for the distinction of the sections are the shape of the 'receptacle' and the place of insertion of the petals and stamens. The receptacle, as defined by HARMS, comprises the whole saucer-shaped, or cup-shaped, or tubular, or infundibuliform, or urceolate part of the flower, bearing the calyx lobes, petals, corona, disk glands, stamens, and gynoecium.

The usage of the floral characters, their interpretation and evaluation, and the taxonomic value attached to them by HARMS I can largely share. This should have led to essentially similar results. However, of many species HARMS had apparently not sufficient material at his disposal for accurate analysis, through which several species or even groups of species were wrongly placed in his system.

Major differences between his system and the one proposed here are the merging of sect. *Keramanthus* in sect. *Blepharantes*, the transfer of 20 Madagascanspecies tentatively placed by HARMS in sect. *Microblepharis* to sect. *Adenia*, and the segregation of sect. *Erythrocarpus* from sect. *Microblepharis*.

Furthermore, the distinction of two series within sect. *Blepharantes* based on habit (erect or scandent) has not been accepted, as this does not reflect taxonomical affinity.

Though I have, in my proposed subdivision, indicated a large number of groups of species, on two levels, I prefer to refrain from distinguishing formal taxa below the rank of section.

As to the separate species, which I have transferred from one section to an other, the argumentation has been given in the commentary to the new subdivision.

HARMS (1925) distinguished the following sections and series:

1. sect. *Microblepharis* (W. & A.) Engl.
2. sect. *Euadenia* Engl.
3. sect. *Blepharantes* (W. & A.) Engl.
ser. *Nanae* Harms
ser. *Scandentes* Harms
4. sect. *Keramanthus* (Hook. f.) Harms
5. sect. *Paschanthus* (Burch.) Harms
6. sect. *Ophiocaulon* (Hook. f.) Harms

Under the commentary on the sections in the new subdivision proposed here I have under each mentioned in what way this differs from the one by HARMS.

NEWLY PROPOSED SUBDIVISION

It should be remembered that as far as possible I have tried to arrange the

sections in a more or less 'phylogenetical' way by attaching to the characters a morphological value (primitive versus derived), as set forth in the preceding chapter. Though aware that these characters occur mixed, and that no species possesses solely primitive or solely derived characters, I still believe that if taken cum grano salis, this interpretation can grosso modo have some significance, especially if it would fit in with the geographical distribution patterns of the sections.

The most important criteria for this evaluation are summarized in the following table:

	Primitive	Derived
Flowers	sepals free petals free corona present septa present disk glands present filaments inserted at the base of the hypanthium stigmas on free style arms hypanthium about as long as wide bisexual flowers or polygamous	sepals partially connate into a calyx tube petals partially adnate with the calyx tube corona absent septa absent disk glands absent filaments inserted higher up in the hypanthium stigmas sessile hypanthium narrow, much longer than wide dioecious
Inflorescences	many-flowered, in the axils of common leaves; provided with tendrils	few-flowered, arranged in special inflorescences -bearing twigs, or in the axils of cataphylls arranged on short shoots; no tendrils in the inflorescences
Leaves	pinnately or subpalmately nerved	strictly palmately nerved or palmately compound
Glands at blade base	2(-4) glands on the leaf margin near or at the transition to the petiole	glands sessile on the blade base, or on auricles; or gland single, either (sub)sessile or on a median spatulate appendage
Habit	small or medium sized climbers, growing from tubers	pachypodous climbers with variously thickened stems; or large climbers in the forest; or (?) low erect plants growing from tubers

It is not surprising that – as in many other groups of plants – also in *Adenia* the species (and hence the sections) show a mixture of apparently more primitive and derived (advanced) characters.

Notwithstanding this, the 6 recognized sections can fairly well be judged as either relatively primitive or derived (advanced), in which the flower morphology is considered as a major criterion, and which is in general accordance with other criteria accepted, e.g. the position of the basal blade glands and the morphology of the inflorescences. As will be exposed in the last chapter, this appreciation of the degree of primitiveness of the sections is also in general accordance with the corresponding distributional areas.

The sections and groups with a synopsis of their main characters and distribution, and the species belonging to them, are listed below.

The sequence roughly reflects their supposed affinities, as far as possible in this linear way. The 'groups' comprise species which mutually show a comparatively greater affinity.

The groups are demarcated in the list of species by either a continuous or broken line, depending on whether the differences are considered of greater or smaller importance.

Within each group or section the species are listed alphabetically, because a further arrangement based on phylogenetical considerations would become too speculative.

Notes on the relationships of individual species are sometimes also given in the notes under the descriptions of these species.

SURVEY OF SECTIONS AND SPECIES OF ADENIA

- | | |
|---|---|
| <p>1. Sect. <i>Microblepharis</i> (W. & A.) Engl.
 Sepals free. Petals free. Corona membranous or consisting of filaments or hairs, rarely absent. Disk glands present, rarely absent. Filaments inserted at the base of the hypanthium. Stigmas on free style arms. Hypanthium about as long as wide. Flowers dioecious. Inflorescences in the axils of common leaves or in short shoots. Glands at blade base (4-)2 or 1. Mostly climbers, often pachypodous or with subterranean tubers.
 9 spp. in E. and S. Africa, 1 sp. in Madagascar, 5 spp. in SE. Asia.</p> | <p>1. <i>A. gedoensis</i>
 2. <i>A. latepetala</i>
 3. <i>A. racemosa</i>

 4. <i>A. aculeata</i>
 5. <i>A. fruticosa</i>
 6. <i>A. glauca</i>
 7. <i>A. karibaensis</i>
 8. <i>A. spinosa</i>

 9. <i>A. pechuëlii</i>

 10. <i>A. wightiana</i>

 11. <i>A. banaensis</i>
 12. <i>A. penangiana</i>
 13. <i>A. poilanei</i>

 14. <i>A. pinnatisecta</i>

 15. <i>A. densiflora</i></p> |
|---|---|

2. Sect. *Adenia*

Sepals free. Petals free. Corona membranous or consisting of filaments, or absent. Disk glands present or absent. Filaments inserted variably: at the base or laterally, or at the throat of the hypanthium. Stigmas on free style arms or rarely on a (long) single style. Hypanthium much longer than wide. Flowers dioecious. Inflorescences in the axils of common leaves or mostly in short shoots. Glands at blade base 2 or 1. Mostly pachypodous climbers, or climbers with tubers.

3 spp. in E. Africa, 20 spp. in Madagascar.

3. Sect. *Blepharantes* (W. & A.) Engl.

Sepals partially connate into a calyx tube. Petals free or partially adnate with the calyx tube. Corona consisting of filaments or hairs, rarely absent. Disk glands present. Filaments inserted at the base of the hypanthium. Stigmas on free style arms. Hypanthium variable, shallow (much wider than long) to rather long. Flowers dioecious or polygamous. Inflorescences in the axils of common leaves, peduncled to (sub)sessile. Glands at blade base 2-1(-0), in the *lobata*-group on auricles. Small to large climbers, sometimes pachypodous or with tubers, or erect herbs with tubers.

32 spp. in Africa, 2 spp. in S. Asia.

16. *A. antongilliana*
17. *A. cladosepala*
18. *A. elegans*
19. *A. firingalavensis*
20. *A. isaloensis*
21. *A. longestipitata*
22. *A. sphaerocarpa*
23. *A. pyromorpha*
24. *A. subsessilifolia*

25. *A. perrieri*

26. *A. epigea*
27. *A. monadelpha*

28. *A. boivinii*
29. *A. peltata*
30. *A. refracta*

31. *A. ecirroza*

32. *A. acuta*
33. *A. fasciculata*
34. *A. pachyphylla*

35. *A. olaboensis*

36. *A. ballyi*
37. *A. globosa*
38. *A. venenata*

39. *A. hondala*
40. *A. trilobata*

41. *A. mannii*

42. *A. letouzeyi*
43. *A. lobata*
44. *A. panduraeformis*
45. *A. rumicifolia*
46. *A. schweinfurthii*

47. *A. natalensis*
48. *A. stenodactyla*

49. *A. dolichosiphon*
50. *A. metriosiphon*
51. *A. hastata*

52. *A. staudtii*

53. *A. lindiensis*
54. *A. schliebenii*

55. *A. stricta*
56. *A. ellenbeckii*

57. *A. keramanthus*

58. *A. volkensis*

59. *A. lanceolata*

60. *A. digitata*

61. *A. kirkii*

62. *A. mossambicensis*

63. *A. trisecta*

64. *A. welwitschii*

65. *A. wilmsii*

66. *A. erecta*

67. *A. goetzei*

68. *A. huillensis*

69. *A. malangeana*

70. *A. ovata*

71. *A. tisserantii*

72. *A. tuberifera*

4. Sect. *Erythrocarpus* (Roem.) de Wilde

Sepals largely connate into a narrow tube. Petals largely connate with the calyx tube. Corona absent. Disk glands present. Filaments inserted at the base of the hypanthium. Stigmas on free style arms or subsessile. Hypanthium not differentiated. Flowers dioecious, rarely monoecious. Inflorescences in the axils of common leaves. Ripe fruits red (greenish in other sections). Glands at blade base 2, on auricles. (Large) lianas.

7 spp. in SE. Asia and Malesia.

73. *A. cardiophylla*

74. *A. heterophylla*

75. *A. viridiflora*

76. *A. kinabaluensis*

77. *A. macrophylla*

78. *A. cordifolia*

79. *A. crassa*

5. Sect. *Paschanthus* (Burch.) Harms

Sepals partially connate into a narrow calyx tube. Petals adnate with the calyx tube. Corona absent. Disk glands absent. Filaments inserted laterally in the flower tube. Stigmas on free style arms. Hypanthium not differentiated.

Flowers polygamous. Inflorescences in the axils of common leaves. Glands at blade base 2. Small climber with tuber.

1 sp. in S. and SW. Africa

80. *A. repanda*

6. Sect. *Ophiocaulon* (Hook. f.) Harms

Sepals (mostly) free. Petals (mostly) free. Corona 0 or consisting of 5 fleshy 'caps' or as a fleshy rim (rarely 2 rims). Disk glands absent. Filaments inserted at the base of the hypanthium. Anthers mostly \pm inward curved (mostly straight in other sections). Stigmas (sub-)sessile. Hypanthium shallow, saucer-shaped. Flowers dioecious. Inflorescences in the axils of \pm common leaves in special inflorescences-bearing twigs. Gland at blade base 1, on a median spatulate appendage. (Large) climbers, sometimes with tubers.

12 spp. in Africa.

- 81. *A. adenifera*
- 82. *A. bequaertii*
- 83. *A. cissampeloides*
- 84. *A. cynanchifolia*
- 85. *A. dinklagei*
- 86. *A. gracilis*
- 87. *A. guineensis*
- 88. *A. gummifera*
- 89. *A. poggei*
- 90. *A. reticulata*
- 91. *A. stolzii*

- 92. *A. tricostata*

COMMENTARY ON THE SURVEY OF SECTIONS AND SPECIES

1. Sect. *Microblepharis* comprises 15 species which can be assigned to several rather different groups, but which all have in common the free sepals and petals inserted on the rim of a \pm cup-shaped hypanthium (which is about as wide as or wider than long). The range of most species is distinctly locally endemic, with wide gaps between them, suggesting that of old relicts.

The group of *A. gedoensis*, *A. latepetala* and *A. racemosa* (all species local endemic in remote localities in E. Africa) is regarded as the most primitive, with the basal blade glands situated on the margin of the blade at the transition to the petiole. In *A. gedoensis* occasionally there are up to 4 basal glands. This species is furthermore to be considered as primitive by the occurrence of 3–5 styles, as compared with the normal 3 in *Adenia*. *A. racemosa* has raceme-like inflorescences.

The species of the group of *A. aculeata* (spp. 4–8) have all thickened stem bases or tubers, and leaves with 1 or 2 basal glands. In *A. glauca* the corona is lacking.

A. pechuëlii from SW. Africa is a small shrubby, thorny plant, the branches growing from a peculiar irregular lumpy trunk; it has no tendrils.

A. wightiana, the type species of the section – with a subspecies in E. Africa and one in India and Ceylon – is characterized by the relatively very small flowers. Here there is one single base gland, situated on the thickened, slightly peltate blade base.

A. banaensis, *A. penangiana* and *A. poilanei* from SE. Asia form a group of related species with \pm elliptical, peltate leaves with 2 basal glands. *A. pinnatisecta* has mostly pinnately lobed leaves, and larger flowers.

A. densiflora, the only species of the present section from Madagsacar, does superficially not much resemble the other species of the section because of its large, fascicled, reddish flowers. This species has 2 basal blade glands.

The accommodation of the Indo-Malesian group of species (which is here

referred to sect. *Erythrocarpus*) in the sect. *Microblepharis* by HARMS (and earlier by ENGLER, 1891) probably stemmed from the insufficient knowledge of these authors with *A. wightiana*, the type species of the section. The same reason may underlie their incorporation (with reserve) of the majority of the Madagascan species in this section.

To the present section also belongs *A. petchuëlii*, which was by HARMS referred to sect. *Paschanthus*, apparently due to insufficient knowledge of its flower structure.

2. Sect. *Adenia*. Like the preceding section this section possesses also free sepals and petals, but mostly with a long narrow hypanthium. It falls apart into two main groups, viz. a Madagascan group of 20 species and the 3 East African species *A. ballyi*, *A. globosa* and *A. venenata*. These African species are characterized by the extremely long, narrow flower tube, the absence of a corona and the insertion of the filaments usually distinctly above (not at) the base of the hypanthium. *A. globosa* is well known for its peculiar lumpy trunk and strongly thorny branches.

The Madagascan species are rather heterogeneous.

Of these the group of *A. antongilliana* (spp. 16–24) forms an entity of closer natural affinity, all species with non-peltate leaves with 2 basal glands, and with narrow flowers with the filaments inserted at the base of the hypanthium.

In the species 25–31 the filaments are inserted in or near the throat of the narrow hypanthium.

A. perrieri has 5-parted leaves.

A. boivini, *A. peltata* and *A. refracta* have peltate leaves, *A. epigea* and *A. monadelphica* non-peltate leaves.

A. ecirrota is an erect plant, without tendrils.

A. acuta, *A. fasciculata* and *A. pachyphylla* are doubtlessly closely related, characterized by distinctly raised, knob-like leaf scars, but mutually differing in shape and texture of the leaves and in the place of insertion of the basal blade glands.

A. olaboensis has one single sessile base gland at the transition of petiole and blade.

For a key to the Madagascan species with considerations on the affinities in the *A. antongilliana*-group, see DE WILDE (1970).

A. globosa and *A. ballyi* are allied to *A. venenata*, the type species of the genus, and are all from Africa.

As said above the Madagascan species were tentatively placed by HARMS in sect. *Microblepharis*, but should in my opinion be classified in sect. *Adenia*.

3. Sect. *Blepharantes*, the largest section, consists of 34 species in which various quite differing species or groups of species can be distinguished, but which are all tied together in having partially connate sepals. They have 2, or rarely 1, basal blade glands. The section as a whole can be regarded as fairly primitive.

A. hondala and *A. trilobata* are Asian; the remaining 32 species (spp. 41–72) all are African.

A homogeneous group of species is formed by the *A. lobata*-group (spp. 41–46), with broad campanulate or urceolate flowers and the basal blade glands situated on two lateral, \pm hollowed auricles at the apex of the petiole, by which latter character this group can be regarded as relatively advanced. *A. mannii* (sp. 41) deviates by the entire (not lobed) elliptic leaves. The group as a whole is mainly distributed in the African dense forest region, but the widely distributed *A. rumicifolia* extends in gallery forest and in (montane) forest patches far into East Africa, whereas *A. panduraeformis* has a rather local distribution in the Zambesi Valley. The area of the group strongly resembles that of sect. *Ophio-caulon*.

A. natalensis (rare in Natal) and *A. stenodactyla* are systematically rather isolated, local endemic species.

A. dolichosiphon and *A. metriosiphon* are also local endemic species in E. Africa, and are doubtlessly related to *A. hastata* from Transvaal and Zululand (Natal). In this affinity also belongs *A. staudtii* which is, among other characters, well characterized by the much divided stigmas and the peltate leaves. This species is restricted to the central African dense forest region.

A. lindiensis and *A. schliebenii* are mutually related, local endemic species in E. Africa, the latter species inconspicuously pubescent on the nerves and linked up with the next group of 4 hairy species.

Of this group of hairy species (spp. 55–58), all occurring in East Africa, *A. stricta* is a climber up to several metres high. *A. ellenbeckii* is a low plant, the shoots with tendrils in the apical part, growing from a large subterranean tuber. The closely related *A. volkensii*, and also *A. keramanthus*, are erect plants, without tendrils.

The first mentioned 10 species of the present section, spp. 39–48, are characterized by a broad, shallow hypanthium and free petals; the species 49–58 have either a broad or a rather narrow, \pm tapering hypanthium and the petals free or (longly) adnate with the calyx tube. In *A. lindiensis*, *A. schliebenii*, *A. stricta*, *A. ellenbeckii*, *A. keramanthus* and *A. volkensii* (spp. 53–58) the septa connecting the filaments with the hypanthium wall are absent.

The flowers in the remaining species of the section, comprising *A. lanceolata* and the species of the *A. digitata*-group and the *A. huillensis*-group are relatively narrow, with rather narrow hypanthia, the petals either free or adnate with the calyx tube.

A. lanceolata, with oblong to lanceolate leaves, is a taxonomically rather isolated species, with climbing branches growing from a large tuber. In this species 2 subspecies are recognized, one with separate basal gland-bearing auricles, the other with connate auricles.

The *A. digitata*-group is fairly coherent, all species having digitately compound leaves. *A. digitata*, a very variable species with a wide distribution in S. and SE. Africa, is easily distinguished by the slightly curved anthers which are \pm connate at the apex by the apiculae; in the other species, which are rather

locally endemic in various parts of S. or E. Africa, the anthers are straight and free at the top. *A. wilmsii* of this group is peculiar by its low, erect habit, resembling that of the species of the next and last group belonging to the present section.

The *A. huillensis*-group consists of 7 more or less affiliated species (spp. 66–72), which are low, erect, without tendrils, sprouting from tubers. The 2 basal blade glands are small, situated on the margin of the leaves (fig. 1a, b) near the insertion of the short petiole. In several species bisexual flowers are usual. In *A. tuberifera* the flowers are nodding.

The species of this group have small, widely spaced distributional areas in Angola, S. Congo, Zambia, S. Tanzania and Malawi.

The circumscription of the present section is largely identical with that proposed by HARMS. Several species not yet known in 1925 are added. HARMS (1897, 1925) placed the two erect growing species with broad urceolate flowers, *A. keramanthus* (which was described by HOOKER in a separate genus, *Keramanthus*) and *A. volkensii*, in a separate section. Both species are, however, distinctly linked up with *A. ellenbeckii* and others, and hence belong to sect. *Blepharantes*. HARMS divided the section *Blepharantes* into 2 series, viz. 1. series *Scandentes*, comprising the climbing species, mostly with unisexual flowers, and 2. series *Nanae*, with 2 erect species with bisexual flowers, *A. wilmsii* and *A. goetzei*.

Though the group of *A. huillensis* (which also comprises *A. goetzei*) certainly stands apart, I do not advocate a formal taxonomical distinction of this group, which is mainly based on the erect habit. In spite of its similar habit, *A. wilmsii*, moreover, does not belong to this group because of differences in flowers and leaves; I never found bisexual flowers in this species, which is distinctly affiliated with *A. digitata*. *A. keramanthus* and *A. volkensii* are also erect species, but differing from the *huillensis*-group by various characters in leaves and flowers.

4. Sect. *Erythrocarpus* is composed of 7 species, all occurring in SE. Asia or Malesia. *A. heterophylla* is very variable and occupies the largest area, ranging from Indo-China to N. and NE. Australia and the Solomon Is., but avoiding the everwet parts of West Malesia (Malaya, Sumatra, Borneo and W. Java). *A. cardiophylla* ranges north to the southern Himalaya and the mountains of Yunnan. *A. macrophylla* (with a related local species *A. kinabaluensis*) and *A. cordifolia* (with the related local endemic *A. crassa*) are, supplementary to the area of *A. heterophylla*, restricted to the everwet forest region in Malesia.

All species of the section have bright red fruits and are characterized by 2 basal blade glands situated in 2 hollowed auricles lateral at the apex of the petiole and by a derived type of flower (see also fig. 1r, s; 3i).

This section was included by HARMS in sect. *Microblepharis* but is in my opinion quite distinct. HARMS' arrangement was likely due to his insufficient knowledge of the flower morphology of the Indo-Malesian species.

5. Sect. *Paschanthus* consists of but a single species, *A. repanda* in Angola, SW. Africa, Botswana, S. Rhodesia, and South Africa. It occupies a rather

isolated taxonomic position by reason of the special type of flower which can be imagined as being derived from that in sect. *Blepharantes* as well as that found in sect. *Adenia*.

HARMS included *A. petchuëlii* in this section, and the position of the basal blade glands indeed suggest such a relation. The accurate analysis of the flowers of recently collected material, however, proved that it belongs in sect. *Microblepharis*.

6. Sect. *Ophiocaulon* is here placed at the end of the enumeration of the sections; it shows in fact both primitive and derived (advanced) characters. The free sepals and petals in the majority of the species can be regarded as primitive, but the apparent replacement of the corona by a derivative of the disk glands (see also under flower morphology), and the situation of the basal blade gland on a single median spatulate appendage, gives the section a distinct separate position, possibly directly derived from (ancestors of) sect. *Microblepharis*. According to SPIRLET (1965) the section (by her and other authors regarded as a separate genus) has its own pollen type. The species 81–93 form a coherent block, in which only *A. tricostata* deviates by connate sepals and petals and a 'double' corona composed of two superposed fleshy rims.

The majority of the species is distributed in the African forest belt; only *A. gummifera* occupies a large area in drier East and South Africa, going east to the Seychelles and south to Transkei Province, whereas *A. stolzii* is restricted to the highlands north of Lake Malawi (Nyassa). *A. bequaertii* ssp. *bequaertii* occurs at an altitude of 1500–2500 m on some high mountains in Central Africa.

An account of the sect. *Ophiocaulon*, with a key to the species, mainly based on vegetative characters is given by DE WILDE (1968).

Due to insufficient knowledge of the Madagascan species *A. firingalavensis*, HARMS erroneously included this species in the present section.

ANATOMY

Diagnostic anatomical characters, common to all members of the family *Passifloraceae*, do not exist (SOLEREDER, 1899).

An extensive account of the investigations on the general anatomy in the *Passifloraceae* as a family, including several *Adenias* and related groups, was published by HARMS (1893, 1897, 1925). These investigations convinced HARMS that the tribe *Paropsieae*, which are in contrast with the *Passifloraceae* proper almost exclusively shrubs or trees, should be excluded from the *Passifloraceae* because of the occurrence in the former group of abundant scalariform perforation plates to the vessels, the presence of sclerenchymatous elements between the primary groups of fibres in the pericycle, and the often radially arranged vessels. In *Passifloraceae* the vessels are mostly dispersed, with simple perforations (excl. *Mitostemma*), and the primary groups of fibres in the bark mostly free.

Both SOLEREDER (1899) and METCALFE & CHALK (1950) treat the *Passifloraceae* in the wider sense, including the *Paropsieae*, but finding points in common with the *Flacourtiaceae*. Beside differences between the *Paropsieae* and the *Passifloraceae*, METCALFE & CHALK also found anatomical similarities, for example the occurrence of fibriform vessel members in some *Paropsias*, which may support affinity with *Passifloraceae*. Investigations of DEN BERGER (1928) and TUPPER (1934) also support the view that *Paropsia* belongs to *Passifloraceae*.

A recent account of the anatomy of the *Passifloraceae* (incl. *Paropsieae*), with a consideration of the position of the *Paropsieae* is given by AYENSU and STERN (1964, with bibliography), which also supports the view to include *Paropsieae* in *Passifloraceae*.

For the anatomy of certain *Adenias* of Madagascar see CLAVERIE (1909).

The vessels in the *Passifloraceae* are, as in many climbers, generally wide. The rays are variable in width. Fibres and parenchyma have simple or bordered pits, or both.

Anatomical features concerning the genus *Adenia* are briefly summarized as follows:

Leaf: 1. Sessile or short-stalked glands on the petioles, glandular spots on the lower side of the blade, and small glands in the leaf margin; also found in other genera of *Passifloraceae*. CUSSET (1965), in his morphological and anatomical study of the extra-floral nectaries in *Passifloraceae* figures the anatomical cross-section of the apex of the petiole (with glands) of *A. lobata* on tab. 17, fig. 6.

2. Epidermis partly or wholly 2-layered, with calcium oxalate crystals in the lower layer in some species; similar crystals also in some other genera. Larger solitary crystals are found in special sacs in the mesophyll, e.g. in *A. lobata*.

3. Most *Adenias* are glabrous, but some species (e.g. *A. keramanthus* and others)

have uniseriate hairs. Frequently the lower epidermis is papillose.

4. Stomata are of the ranunculaceous type. They occur usually only on the lower leaf surface, but are found in *A. keramanthus* also on the upper surface, but fewer.

5. Secretory elements include frequent tanniferous cells in the parenchymatous portion of both stem and leaf, whilst secretory cavities, which also contain tannin, are found in the leaf and axis of *Adenia* (especially in sect. *Ophiocaulon*), where they sometimes appear as black dots.

Stem: 1. Young stem sometimes winged or tubercled (*A. rumicifolia*, *A. lobata*) (sometimes also in *Passiflora* species).

2. Epidermis often encrusted with wax-like substance, especially in the younger stems. Related with this are probably the resin-like coverings of the stems in certain species from Madagascar (e.g. *A. firingalavensis*) as investigated by JUMELLE (1903, 1907).

3. Tannin-sacs in the cortex and pith of certain species (also in *Hollrungia* and *Passiflora*).

4. According to BACCARINI (1908) and JANSE VAN VUUREN (1970) the stems of the succulent *A. venenata* and some South African species include abundant water-storage parenchyma formed partly by subdivision of the ground parenchyma, and partly by cambian activity.

5. The primary groups of fibres in the pericycle ('Baststränge') are free; they are very strong (thick) in *A. globosa*.

6. Stem structure in *Passifloraceae* is usually normal. Anomalous stem-growth is reported by STERN and BRIZICKY (1958) and AYENSU and STERN (1964) in *Passiflora*, and by OBATON (1960, with figures and descriptions of cross-sections of stem and root) in *Crossostemma* and *A. cissampeloides*. In this species the phloem is arranged in several rings included in the wood. This growth in rings seems not to be correlated with seasonal climatic changes. Other *Adenias* have normal stem structure.

7. According to MENNEGA (in litt.), who studied a wood sample of *A. macrophylla* (Jacobs 5003, from Borneo), the wood of *A. macrophylla* shows a special feature by the presence of numerous thin, orange-brown coloured sheets of shrivelled unlignified parenchymatic cells extending from the pith to the bark over the whole length of the sample, generally with tangential ramifications between the vessels, often connecting two radial sheets; the parenchymatous tissue is always enveloped by a layer of crystalliferous fibres. She found similar sheets also in a sample of *A. rumicifolia* (Breteler 2617, from Cameroun) and further points to the occurrence of non-lignified intervacular rays described by OBATON (see above) in *A. cissampeloides*.

For the distinction of sections detailed studies are still too erratic to provide practical information. The anomalous stem structure in *A. cissampeloides* of sect. *Ophiocaulon* may point to a different wood structure in this section.

An ample study of the anatomy of the stems in various stages of the woody representatives in South Africa, viz. *A. fruticosa*, *A. glauca*, *A. spinosa* and *A. gummifera* made by JANSE VAN VUUREN (1970) came recently to my knowl-

edge. In this paper the ontogeny of the stem tissues are described and depicted by photographs. Anomalous secondary growth is described for all four species mentioned. Interesting adaptations to drought are shown by the epidermis; the stems retain their assimilation function by that the epidermis is not replaced by a corky layer. The swollen water storing stems are regarded as an adaptation to an arid habitat. The ancestors of these species were probably lianas.

PALYNOLOGY

Two recent articles (PRESTING, 1965; SPIRLET, 1965) deal rather extensively with the pollen grains of *Passifloraceae*, both including the study of and comparison with members of the tribe *Paropsieae*.

In the paper by PRESTING a phylogeny within the *Passifloraceae* based on pollen characters is proposed. In *Adenia* the pollen of the following species are described: *A. densiflora*, *A. spinosa* (sect. *Microblepharis*); *A. ambongensis*, *A. antongilliana*, *A. elegans*, *A. firingalavensis*, *A. olaboensis*, *A. peltata*, *A. perrieri*, *A. refracta*, *A. sphaerocarpa*, *A. subsessilifolia* (sect. *Adenia*); *A. digitata* (= *A. senensis*) (sect. *Blepharantes*); and *A. gummifera* and *A. poggei* (= *Ophiocaulon apiculatum*) (sect. *Ophiocaulon*).

SPIRLET studied the pollen of the following *Adenias*: *A. peltata* (sect. *Adenia*); *A. lobata* (sect. *Blepharantes*); *A. cardiophylla*, *A. cordifolia* (= *A. obtusa*), *A. heterophylla* (= *A. acuminata*), *A. macrophylla* (= *A. longipedunculata*) (sect. *Erythrocarpus*); *A. cissampeloides*, *A. poggei* (= *A. apiculata*) (sect. *Ophiocaulon*).

In both studies it is assumed that the genus *Adenia* represents the most simple pollen type within the family. The pollen of the species belonging to sect. *Ophiocaulon* represents a more derived, separate type within the genus.

SPIRLET found the pollen of *A. lobata* (most likely she studied, however, the related *A. rumicifolia*, sect. *Blepharantes*) quite differing from the other species studied by her.

Regarding the sections adopted by me it appeared from PRESTING's work that indeed the species belonging to the sections *Microblepharis* and *Adenia*, which are regarded by me as the most primitive, have in general the most primitive (simple) pollen type.

In both studies the pollen of the tribe *Paropsieae* (*Paropsia*, *Paropsiopsis* and *Smeathmannia* investigated by PRESTING; *Paropsia*, *Smeathmannia* and *Barteria* by SPIRLET) are found to be distinct, but they can be derived from those in other *Passifloraceae*, i.e. certain species of *Passiflora*, *Hollrungia* or *Deidamia*. According to PRESTING the pollen of true *Flacourtiaceae* resemble in general the more simple type as found in several *Adenias*.

PHYTOCHEMICAL CHARACTERS

A review of the phytochemistry of the *Passifloraceae* is given by HEGNAUER (1969, with bibliography; 1972).

The following chemical substances are the most striking:

1. Cyanogenic compounds. HCN or cyanogenic glucosides have been found in many *Passiflora* species, *Deidamia*, and in several *Adenias*, i.e. *A. cissampeloides* (stem), *A. digitata* (roots), *A. firingalavensis* and *A. sphaerocarpa* (thickened stem bases), *A. gedoensis* (stem and leaves), *A. glauca* (stem and leaves), *A. gracilis* (stem and leaves), *A. gummifera* (leaves), *A. lobata* (stem and leaves), *A. rumicifolia* (stem and leaves), *A. venenata* (stem and leaves), and *A. wightiana* (leaves). A sterile specimen of *A. dinklagei* was found to be not cyanogenetic.
2. Tannin or probably phenolic tannin constituents.
3. Alkaloids (found in several *Passiflora* species and in *A. firingalavensis* and *A. sphaerocarpa*).
4. Toxalbumine. The strongly poisonous modeccine is found in the roots of *A. digitata* and supposed to occur in various other species.
5. Several oils found in the seeds of *Passiflora* are presumably also present in *Adenia*.
6. Various constituents in the edible fruits of *Passiflora*. In this respect it is mentioned that also the fruits of a few *Adenia* species are recorded as edible (e.g. those of *A. glauca* and *A. hastata*), others as poisonous.

Regarding the systematic position of the tribe *Paropsieae* and the interrelations of *Passifloraceae* and *Flacourtiaceae* recent chemotaxonomic data point to an affinity of these groups because all share the tendency of the accumulation of cyanogenic glucosides.

Recent investigations of TANTISEWIE, RUYGROK and HEGNAUER (1969) proved the presence of the cyanogenic glucoside gynocardin (or a very related compound) in several *Passiflora* species and in *A. lobata*. Gynocardin was first isolated from *Gynocardia* and later found in several other genera of the tribe *Pangieae* of the *Flacourtiaceae*, whilst Professor HEGNAUER kindly informed me that a very related substance was recently found in *Barteria*, a member of the tribe *Paropsieae* (PARIS c.s., 1969).

The phytochemical relationship of the groups concerned was also supposed during field research in tropical Africa, where I observed a strikingly similar rubber-like cyanide smell (apparently decomposition products, HCN and benzaldehyde, of cyanogenic glucosides) from the freshly cut stems of species of *Oncoba* and *Calancoba* (tribe *Oncobeae* of the *Flacourtiaceae*), *Barteria* and *Smeathmannia* (tribe *Paropsieae*) and *Adenia*, *Tryphostemma* and (cultivated) *Passiflora*.

WATT and BREYER-BRANDWIJK (ed. 2, 1962) enumerated various cases of poisoning and mention medicinal and magic properties ascribed to parts of *Adenias* (with literature references) for Africa. The toxicological aspects of the

two Indian species *A. hondala* (= *A. palmata*) and *A. wightiana* are described in CHOPRA c.s. (1965).

The use of the (pounded) stem as a fish poison is not rarely mentioned on the field labels of herbarium specimens, especially in species of the sect. *Ophiocaulon* (Africa) and some Malesian species. This was not mentioned by HEYNE (1927, p. 1142) who recorded uses of two species in Indonesia. BURKILL (1935, p. 48), who gave further data on Malayan species, mentioned two to be poisonous.

NOTE ON THE FLOWER BIOLOGY

Proterandry is well known in *Passiflora*. In *Adenia* cross-fertilisation will in general be assured because of the mostly dioecious flowers.

Pollination is likely effectuated by insects as the anthers in many species remain hidden in the flower tube during anthesis, i.e. in the narrow flask-shaped flowers found in sect. *Erythrocarpus*, and in *A. ellenbeckii*, *A. erecta*, etc.

In specimens in the field, and in those cultivated in the greenhouse, bees (on *A. gracilis*) and ants (on several species) have been observed visiting the flowers of *Adenia*, apparently feeding on the pollen or the exudate of the disk glands.

In several species fragrant flowers are reported, e.g. in *A. rumicifolia* from East Africa.

GEOGRAPHICAL DISTRIBUTION

The distribution of the genus *Adenia* as a whole is paleotropical, with the main centre in Africa: 58 species occur in this continent, 21 species in Madagascar and 14 species in S. India & Ceylon and Indo-Malesia.

In Africa the northern limit of *Adenia* coincides roughly with that of the savanna belt south of the Sahara, going east through the southern Sudan and Ethiopia into the Yemen (*A. venenata*) and the Horn of Africa. Towards the south the genus reaches far into South Africa, several species occurring far beyond the Tropic of Capricorn, e.g. *A. repanda* and *A. gummifera* which go south as far as about 30° and 33° respectively.

Adenia occurs throughout Madagascar, several species occurring in the low and semi-arid areas, others in the central highlands or in the wet forest region in the eastern part.

Adenia is absent from the arid main part of Arabia, and from Persia, W. Pakistan and NW. and Central India, but is represented again in the southern Deccan Peninsula and in Ceylon with 2 species, *A. hondala* and *A. wightiana*. East of this area there is another gap in its range to the Indo-Malesian region, the most western species here being *A. cardiophylla* and *A. trilobata*, which both extend to the Khasia Hills and the southern Himalayas, both species reaching to the north-west to c. 27°N in Darjeeling. *A. heterophylla*, a species with a large range, reaches north into the southern provinces of China and Taiwan, also providing for the southernmost localities in NW. and N. Australia, and Queensland (to c. 20°S), and reaching east towards the Solomon Islands.

The generalized areas of the 6 sections are given in the figs. 5a-f.

The area of the section which is by me regarded as the most primitive, viz. sect. *Microblepharis*, is composed of 15 widely spaced species areas, the section as a whole ranging from SW. Africa to Indo-China and NW. Malesia, and with 1 species in Central Madagascar: Fig. 5a. *A. wightiana* is with two subspecies represented in respectively E. Africa and in S. India and Ceylon.

It is supposed that the section occupies an old disintegrated area composed of the relic areas of the species.

The sections *Adenia* and *Blepharantes* are considered as the next in relative primitiveness.

Section *Adenia* is distributed with 3 species in (North-) East Africa, and with 20 species in Madagascar (fig. 5b).

Section *Blepharantes*, comprising 34 species, has its centre in Africa, with subcentres for the *A. lobata*-group in the West and Central African forest region, and for the *A. huillensis*-group (series *Nanae* with HARMS) in southern Central Africa, and with the remaining majority of the species in East Africa. Two species of this section occur in S. Asia, viz. *A. hondala* in the SW. Deccan Peninsula and Ceylon, and *A. trilobata* in NE. India, East Pakistan and northern Burma. None of the species of this section occurs in Madagascar.

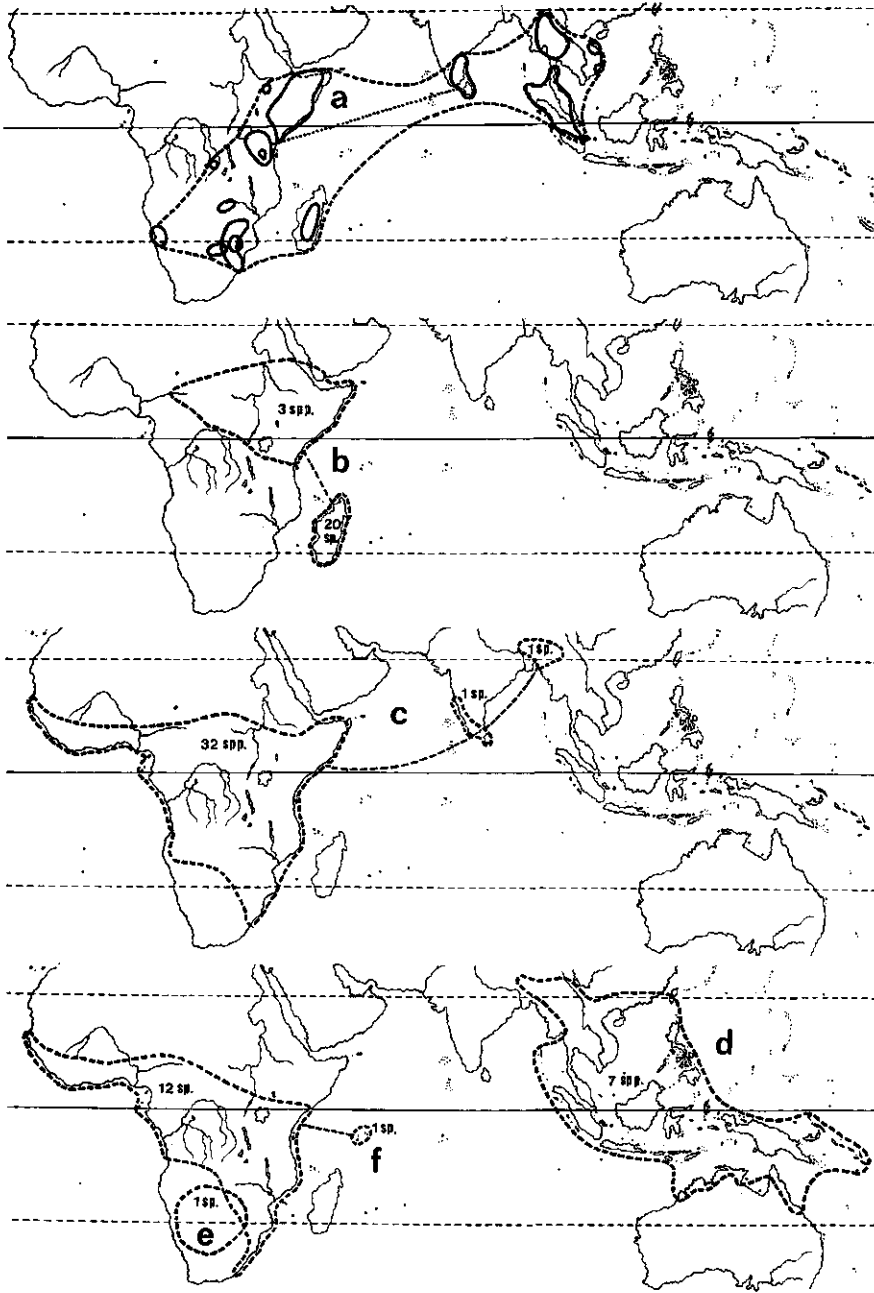


FIG. 5. Ranges of a. sect. *Microblepharis*, b. sect. *Adenia*, c. sect. *Blepharantes*, d. sect. *Erythrocarpus*, e. sect. *Paschanthus* and f. sect. *Ophiocaulon*.

The last three sections *Paschanthus*, *Erythrocarpus* and *Ophiocaulon* are for various reasons considered as relatively derived, as pointed out in a previous chapter.

Section *Paschanthus*, composed of 1 species, *A. repanda*, occupies a fairly large area in dry southern Africa.

Section *Erythrocarpus*, with 7 species, is exclusively distributed in the Indo-Malesian area, either in the dense forest region or in regions with a seasonal climate (*A. heterophylla*) or in mountainous forest (*A. cardiophylla*).

Section *Ophiocaulon*, with 12 species, is centered in the West and Central African forest region, with an outlier, *A. gummifera*, in eastern and south-eastern Africa and the Seychelles; it does not occur in Madagascar. Its area shows a striking resemblance to that of the *A. lobata*-group in sect. *Blepharantes*.

In conclusion it may be assumed that the 'archimatrix' from which the respective sections have been developed occupied in ancient times an area roughly covering Madagascar, eastern Africa and part of southern India and Ceylon, i.e. a part of the hypothetical ancient Gondwanaland.

The three sections which are regarded as derived, namely the sections *Paschanthus*, *Erythrocarpus* and *Ophiocaulon*, and possibly also the *A. lobata*-group of sect. *Blepharantes*, have migrated or developed into areas bordering the 'primitive area', viz. the arid part of southern Africa, the Indo-Malesian region and the West and Central African forest region.

The habitat of predominantly (rain) forest belonging to the latter two mentioned regions is assumed to be a relatively new habitat for the genus.

A similar origin in a part of 'Gondwanaland' for the genus *Capparis*, at least partly, was assumed by JACOBS (1965). According to this author (l.c., p. 399) also for this genus the rain forest is supposed to be a relatively new habitat for a few species in Central Malesia.

Fossil leaf remains from the Oligocene and Miocene, reminiscent of *Passiflora* leaves, but lacking the petioles with the characteristic glands, have been found in Germany (Sachsen) and France. Fossil *Passifloras* are also found in America (see HARMS, 1925).

The fossil seeds from the Tertiary from Germany, described by MAI (1960, 1967) as *Passiflora kirchheimeri* and also found in Czechoslovakia (CZECZOTT & SKIRGIELLO, 1967) may, however, in my opinion, represent seeds of *Adenia* as well.

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DESCRIPTION OF THE GENUS ADENIA

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(Sub)ligneous to herbaceous, perennial climbers with tendrils, sometimes erect herbs or shrublets mostly without tendrils, often with a rootstock or tuber, or a pachypodous main stem. *Leaves* either simple, entire, lobed, or palmately parted, or rarely palmately compound, glabrous or pubescent. Glands (0-)1-2 at the blade-base at or near the apex of the petiole, and with or without glands elsewhere on the lower surface or the margin of the blade. *Stipules* minute, narrowly triangular or reniform. *Tendrils* axillary. *Inflorescences* axillary, cymose, the middle (or the first three) flower(s) often replaced by (a) tendril(s). *Bracts* and bracteoles minute, triangular to subulate. *Flowers* dioecious or rarely monoecious, bisexual or polygamous, campanulate or urceolate to tubular or infundibuliform, mostly greenish to yellowish. Flower stipe articulate at base. *Hypanthium* saucer- or cup-shaped or tubular. *Sepals* (4-)5(-6), free or partially connate into a calyx tube, imbricate, persistent. *Petals* (4-)5(-6), free, included in the calyx, mostly fimbriate or laciniate. *Corona* annular, or consisting of 5 cap-shaped parts, or of a laciniate rim or membrane, or of a row of filamentous processes or hairs, or absent. *Disk-glands* 5, lingulate or strap shaped, truncate or capitate, inserted at or near the base of the hypanthium, alternating with the petals, or absent. *Male flowers*: *Stamens* (4-)5(-6), hypogynous or perigynous (variably inserted in the hypanthium), free or partially connate into a tube. *Anthers* basifixed, oblong to linear, acute or obtuse, often apiculate or mucronate, 2-locular, opening, introrsely to latrorsely with longitudinal slits. Vestigial ovary minute. *Female flowers* mostly smaller than the male flowers, with smaller petals. *Staminodes* ± subulate. *Ovary* superior, shortly stipitate or sessile, globular to oblong, 1-celled, with 3(-5) parietal placentas; ovules usually numerous, anatropous, with 2 integuments; styles 3(-5), free or partially united; stigmas mostly reniform to subglobular, laciniate or plumose to densely woolly-papillate. *Fruit* a stipitate 3(-5)-valved capsule, the pericarp (woody-) coriaceous to rather fleshy (and hence the fruit ± berry-like), greenish to yellow or bright red. *Seeds* ± compressed, with crustaceous pitted testa, enclosed in a membranous to pulpy (juicy) aril; endosperm horny; embryo large, straight; cotyledons foliaceous.

KEY TO THE SECTIONS

1. Sepals and petals free, both inserted on the rim of the hypanthium (except in *A. tricosata*, sp.92).
 2. Hypanthium about as wide as or wider than long. Flowers \pm campanulate.
 3. Corona 0, or as a fleshy rim. Disk glands 0. Stigmas sessile. Gland at blade base 1, on a spatulate to semicircular median appendage with narrow insertion. Spp. 81-92.
 6. Sect. **Ophiocaulon**
 3. Corona membranous or consisting of filaments, rarely 0. Disk glands present, rarely 0. Stigmas on wholly or partially free style arms. Gland(s) at blade base otherwise. Spp.1-15.
 1. Sect. **Microblepharis**
 2. Hypanthium much longer than wide. Flowers tubular-infundibuliform. Spp. 16-38.
 2. Sect. **Adenia**
1. Sepals partially connate into a calyx tube. Petals either free or partially adnate with the calyx tube.
 4. Filaments inserted at the base of the hypanthium. Disk glands mostly present.
 5. Corona mostly present. Petals either free or mostly inserted in the lower half of the calyx tube. Spp. 39-72. 3. Sect. **Blepharantes**
 5. Corona 0; hypanthium not marked off from the calyx tube. Petals inserted in the upper half or near the throat of the calyx tube. Spp. 73-79. 4. Sect. **Erythrocarpus**
 4. Filaments inserted (well above the base) in the flower tube. Corona 0. Disk glands 0. Sp.80. 5. Sect. **Paschanthus**

KEY TO THE SPECIES

1. Gland at blade-base on a single, distinct, median, hemispherical to spatulate narrowly attached appendage. Corona 0, or as 5 fleshy cap-shaped parts, or as a (sinuate) fleshy rim, never lacinate or composed of hairs. Disk glands 0. Sepals mostly free.
 2. Leaves strictly 3-5-plinerved.
 3. Leaves 3-plinerved, ovate to oblong. Venation distinctly trabeculate. Sepals of male flowers partially connate. **92. *A. tricostata***
 3. Leaves 5-plinerved, (broadly) ovate to orbicular. Venation \pm trabeculate to coarsely reticulate. Sepals of male flowers free.
 4. Blade glands only approximate to the axils of the nerves, or absent. Corona in male flowers \pm well developed, consisting of 5 cap-shaped parts. Filaments over half way connate **82c. *A. bequaertii* ssp. *occidentalis***
 4. Blade glands scattered or submarginal, or absent. Corona in male flowers 0 or inconspicuous. Filaments at most half way connate. **90. *A. reticulata***
 2. Leaves 3-plinerved, with in addition one or more pairs of main nerves from the midrib, the lowest pair emerging at least from 2-20 mm above its base.
 5. Leaves, at least those sustaining the inflorescence, elliptic to oblong, \pm pinninerved.
 6. Leaves sustaining the inflorescences-bearing twigs (broadly) ovate, with one pair of additional nerves from the midrib. Blade glands 0. Corona in male flowers 0. **89. *A. poggei***
 6. Those leaves elliptic to oblong, with (1-)2-3(-4) pairs of nerves from the midrib. Blade glands mostly present. Corona in male flowers well developed.
 7. Blade glands mostly many, scattered. Filaments connate over half way **84. *A. cynanchifolia***
 7. Blade glands submarginal, or absent. Filaments free, or connate up to the lower third. **86b. *A. gracilis* ssp. *pinnata***
5. Leaves all (broadly) ovate or \pm 3-5-angular or -lobed, subpalmately nerved.
 8. Blade glands very close to the axils of the nerves, or absent. Leaves generally $\frac{1}{2}$ -1 $\frac{1}{2}$ cm acuminate.
 9. Blade glands close to the axils of the nerves. Anthers 4-5 mm, E. Africa; 1500-2500 m. **82a. *A. bequaertii* ssp. *bequaertii***
 9. Blade glands absent. Anthers c. 5 $\frac{1}{2}$ mm long. Central African Republic; c. 400 m. **82b. *A. bequaertii* ssp. *macranthera***
 8. Blade glands never restricted to the nerve axils, sometimes absent. Leaf apex blunt, acute or acuminate.
 10. Corona in male flowers well developed. Female flowers small: calyx lobes 2 $\frac{1}{2}$ -5 mm. Fruits 1-2(-2 $\frac{1}{2}$) cm long. Blade glands submarginal or absent.
 11. Calyx not punctate. Male flowers including stipe, 12-16 mm long. Fruits subglobular to ovoid, 1-2 cm long. **87. *A. guineensis***
 11. Calyx punctate.
 12. Male flowers (incl. stipe) (10-)12-15 mm long. Fruits (1 $\frac{1}{2}$ -)2-3 $\frac{1}{2}$ cm long, broadly ovate to ellipsoid **83. *A. cissampeloides***
 12. Male flowers (incl. stipe) 9-13 mm long. Fruits ovoid to ellipsoid-oblong, $\frac{3}{4}$ -1 $\frac{1}{2}$ (-1 $\frac{3}{4}$) cm long. **86. *A. gracilis***
 10. Corona in male flowers 0, or inconspicuous, or (as in *A. cissampeloides*) consisting of 5 cap-shaped parts. Calyx lobes in female flowers (4-)5-9 mm. Fruits (1 $\frac{1}{2}$ -)2-4 $\frac{1}{2}$ cm long. Blade glands scattered or submarginal, or absent.
 13. Leaves beneath with well-visible, finely netted, closed areolae between the large veins; on upper surface these reticulations well distinct. S. or E. Africa.
 14. Leaves broadly ovate to orbicular, not lobed. Nerves neatly arching towards the apex of the blade. Kenya(?), SW. Tanzania; 1000-2000 m. . . . **91. *A. stolzii***

14. Leaves broadly ovate, orbicular or \pm triangular, often bluntly 3-lobed. Nerves \pm straight, the upper pair ending in marginal glands, which are in lobed leaves the tips of the lobes. E. and S. Africa; 0–1800 m. **88a. *A. gummifera* var. *gummifera***
13. Veins on lower surface of leaf distinctly less regularly and finely netted, with coarser areolae of larger and less equal size; on upper surface reticulations only for a small part discernible.
15. Filaments free, or up to halfway connate.
16. Male flowers, including the 5–8 mm long stipe, 15–20 mm long. Leaves \pm rhomboid to 3-lobed, with cuneate to subtruncate base. Plant distinctly glaucous by a waxy cover **88b. *A. gummifera* var. *cerifera***
16. Male flowers, including the $1\frac{1}{2}$ – $4\frac{1}{2}$ mm long stipe, 7–15 mm long. Leaves with cordate, rounded or truncate base. Plant not distinctly glaucous.
17. Blade glands c. 2–4, within and bound to the angle of the upper nerves rather remote from the nerve axils, rarely absent. Leaves entire, suborbicular to bluntly 5-angular; upper nerves straight, ending in a marginal gland. Fruits mostly smooth **83. *A. cissampeloides***
17. Blade glands scattered or submarginal, sometimes absent. Leaves entire or lobed, variously shaped; upper nerves straight or arching towards the apex. Fruits rugose or finely warty.
18. Leaves variously shaped, 2–11 by $1\frac{1}{2}$ –10 cm; blade glands 0, or up to 30, scattered or submarginal. Peduncle of male inflorescence $\frac{1}{2}$ –5 cm. Anthers 3–4 mm. Calyx lobes and petals punctate. **90. *A. reticulata***
18. Leaves ovate-elliptic, 10–15 by 7–10 cm; blade glands 15–45, scattered. Peduncle of male inflorescence (5–)10–12 cm. Anthers c. $4\frac{1}{2}$ – $5\frac{1}{2}$ mm. Calyx lobes not or indistinctly punctate; petals not punctate. **81. *A. adenifera***
15. Filaments entirely connate, or nearly so. Leaves entire, broadly ovate, sometimes hastate. Higher nerves curved towards the apex of the blade, not ending in the leaf margin. Blade glands scattered **85. *A. dinklagei***
1. Gland(s) at blade-base 0–2, (sub)sessile, never on a distinct spatulate appendage with narrow insertion. Corona 0, or membranous, or laciniate, or consisting of (woolly) hairs. Disk glands present or not. Sepals free or partially connate into a calyx tube.
19. Sepals free, or nearly so; sepals and petals inserted at or at about the same level. Anthers wholly or for a large part extending beyond the hypanthium. Asia, Africa, or Madagascar.
20. (Male) flowers small, including the stipe 3–8(–10) mm long.
21. Stems climbing with tendrils, not pachypodous. Gland at blade-base 1, on the subpeltate leaf-base **10. *A. wightiana***
21. Stems without tendrils, erect, short, shrubby, arising from a swollen, lumpy base. Glands at blade-base 2, sessile **9. *A. pachuëllii***
20. (Male) flowers including stipe over 10 mm long.
22. Stem thorny or prickly.
23. Leaves more than 1 cm long, not early caducous. Corona present. Calyx lobes much longer than the remainder of the flower.
24. Stem thorny (by metamorphosed twigs). Leaves fleshy, glaucous, always entire, with obscure venation. **8. *A. spinosa***
24. Stem prickly. Leaves not fleshy and glaucous, with strongly prominent, dense venation. **4. *A. aculeata***
23. Leaves up to 8 mm long, caducous. Corona absent. Calyx lobes (much) shorter than the remainder of the flower.
25. Female flowers c. 30 mm long. Stigmas and placentas 5. Ovules 25–30 per placenta; c. 150 per ovary. Fruit, excluding the 10–11 mm long stipe (gynophore) c. 3.9 cm long. NE. Somalia **36. *A. ballyi***
25. Female flowers (6–)8–12 mm long. Stigmas and placentas 3. Ovules 2–9 per placenta; 6–30 per ovary. Fruit, excluding the 1–3 mm long stipe, 1.2–2.8 cm long. Tanzania, Kenya, Somalia. **37. *A. globosa***

22. Stem unarmed.

26. Male flowers slender; calyx lobes about as long as or shorter than the remainder of the flower. Hypanthium narrow, about as long as to much longer than wide, mostly very gradually passing into the long stipe. Most Madagascan species and *A. venenata* from Africa.

27. Leaf-scars in dried specimens not raised; branches not distinctly knobby.

28. Gland or glands at blade-base 1–2, relatively large, situated on or partially on the apex of the petiole or sometimes on a small, \pm fleshy, median appendage, or on two lateral auricles; not exclusively on the \pm membranous peltate part of the blade. Blade-base not or slightly peltate. Filaments inserted at, or near the base, or near the throat in the hypanthium.

29. Gland at blade-base 1.

30. Leaves distinctly (3–)5–7-lobed. Corona 0. Filaments inserted mostly distinctly above the base in the hypanthium. Africa 38. *A. venenata*

30. Leaves entire or faintly 3-lobed. Corona present. Filaments inserted at the base of the hypanthium. Madagascar. 35. *A. olaboensis*

29. Glands at blade-base 2.

31. Leaves primarily deeply 5-parted. Filaments inserted at or near the throat of the hypanthium. Disk glands 0. 25. *A. perrieri*

31. Leaves entire or 3-(rarely 5)-lobed, or 3-parted.

32. Filaments inserted at or near the base in the hypanthium. Disk or disk glands distinct. Sepals \pm erect or spreading.

33. Leaves subsessile.

34. Plants without tendrils. Leaves $1\frac{1}{2}$ –6 cm long; petioles $1\frac{1}{2}$ –6 mm. Anthers c. 3 mm, obtuse, non-apiculate. 23. *A. pyromorpha*

34. Plants with tendrils. Leaves $1-1\frac{1}{2}(-2\frac{1}{2})$ cm long; petioles $\frac{1}{2}$ –1 mm. Anthers 4–6 mm, acute, up to 0.2 mm apiculate. 24. *A. subsessilifolia*

33. Petioles at least as long as $\frac{1}{3}$ of the length of the blade.

35. Leaf-blades small, up to $3\frac{1}{2}$ (–4) cm long, with rounded apex, entire or mostly deeply 3-lobed or 3-partite; the lobes entire or often once more 3-partite or -lobed. Petioles about as long as the blade. 18. *A. elegans*

35. Leaf-blades larger, with rounded to acute apex, entire or 3(–5)-lobed; the lobes entire. Petioles usually shorter than the blade.

36. Stipe of male flowers 3–9 mm, occupying less than $\frac{1}{3}$ of the total length of the flower; male flowers 27–36 mm long. 16. *A. antongilliana*

36. Stipe of male flowers ($6\frac{1}{2}$ –)10–24 mm, occupying about half of the total length of the flower; male flowers 19–55 mm long.

37. Inflorescences axillary to normal leaves, mostly peduncled, mostly provided with a tendril. Leaf-blades usually less than 7 cm long.

38. Male flowers 19–25(–30) mm. Filaments included in the hypanthium.

39. Glands at blade-base situated entirely on the apex of the petiole, not extending on the narrowly peltate, membranous blade-base. Stigmas sessile. Fruits ovoid, 6–7 cm long. 19b. *A. firingalavensis* var. *stylosa*

39. Basal glands situated partially on the apex of the petiole, partially on the \pm thickened semi-circular or \pm bilobed subpeltate blade-base. Stigmas on distinct free style arms. Fruits ellipsoid, 4–4 $\frac{1}{2}$ cm.

20. *A. isaloensis*

38. Male flowers 30–40 mm. Filaments usually extending considerably beyond the hypanthium. Basal glands restricted to the apex of the petiole, not extending on the ($\frac{1}{2}$ –)1–2 mm wide peltate blade-base.

21. *A. longestipitata*

37. Inflorescences mostly (sub)sessile, without tendrils, axillary to \pm reduced leaves, arranged in short shoots. Leaf-blades larger, (3–)5–20 cm.

40. Glands at blade-base wholly or largely situated on the apex of the petiole; not on auricles. Leaves greyish, whitish, or glaucous beneath, with reticu-

- late venation. Filaments distinctly extending beyond the hypanthium. Disk glands 5, lingulate, distinctly spaced.
41. Leaves with acute apex; without minute whitish appendages beneath. Male flowers very slender. Anthers 4–5½ mm. Stigmas (sub)sessile.
- 19. *A. firingalavensis***
41. Leaves mostly blunt, on the lower surface densely set with whitish scale-like appendages well visible with a lens. Male flowers less slender. Anthers 6–8(–9) mm. Stigmas on distinct free style arms.
- 17. *A. cladosepala***
40. Glands at blade-base on two semi-orbicular auricles lateral at the apex of the petiole. Leaves greenish beneath, with trabeculate venation between the main nerves. Filaments and a part of the anthers included in the hypanthium. Disk consisting of an entire ring, or of 5 contiguous parts.
- 22. *A. sphaerocarpa***
32. Filaments inserted above the middle, mostly near the throat of the hypanthium. Disk glands 0, or rarely very inconspicuous. Sepals recurved or reflexed.
42. Plants erect, without tendrils. **31. *A. ecirrosa***
42. Plants climbing, provided with tendrils.
43. Fruits ± ovoid, excluding the stipe c. 5 cm long **27. *A. monadelpha***
43. Fruits long fusiform, c. 13 cm long **26. *A. epigea***
28. Peltate part of blade-base distinct, membranous (not thickened), 1½–8 mm wide, bearing 1–3 rather small glands; rarely glands at blade-base 0. Filaments inserted at about halfway or in or near the throat in the hypanthium.
44. Leaves entire. Blade glands distinct, (1–)2, sometimes absent. Gland at blade-base 1. Leaves membranous. **28. *A. boivinii***
44. Leaves entire or lobed. Blade glands 0, or in lobed leaves 1–2, small. Glands at blade-base (0–)1–3.
45. Gland at blade-base (0–)1. Filaments inserted at about halfway in the hypanthium, connate for the larger part, or free. Stigmas on distinct, 1–2(–3) mm long, free styles. Leaves mostly ± coriaceous. **30. *A. refracta***
45. Glands at blade-base 2–3, rarely 0. Filaments inserted in the throat of the hypanthium, free. Stigmas ± sessile. Leaves ± membranous **29. *A. peltata***
27. Leaf-scars in dried specimens distinctly raised, wart-like, giving the branches a knobby appearance.
46. Leaves (elliptic-)oblong, with acute base; leaf index more than 2. Basal glands 2 on a small wart-like median appendage at the apex of the petiole.
- 34. *A. pachyphylla***
46. Leaves ovate to elliptic with obtuse or rounded base; index 2 or less. Basal gland(s) 1 or 2, situated on the slightly peltate blade-base.
47. Leaves obtuse to acutish; blade-base c. 1 mm peltate, bearing 1 or 2, mostly contiguous gland(s) which partially extend on the petiole. Stipe of female flowers 2½–3½ mm. **33. *A. fasciculata***
47. Leaves acute-acuminate. Blade-base 1–2 mm peltate with a small, single, median gland on or just below the margin. Stipe of female flowers c. 1 mm **32. *A. acuta***
26. Male flowers less slender; calyx lobes about as long as or longer than the remainder of the flower. Hypanthium narrow to wide, mostly well marked off from the stipe. Asia, Africa, 1 species from Madagascar.
48. Flowers large, 18–37 mm long, the hypanthium (5–)6–14 mm wide; pinkish red, sessile, developing on short-shoots and apparently fascicled. Madagascar.
- 15. *A. densiflora***
48. Flowers smaller, up to 20 mm long, the hypanthium up to 5 mm wide, ± greenish, sessile or in stalked inflorescences. Asia or Africa.
49. Leaves entire, ovate to elliptic, rarely lanceolate, (sub)palmately nerved; or leaves lobed or deeply digitately incised; leaf-base peltate or not.
50. Gland at blade-base 1.

51. Leaves entire. Hypanthium about as wide as long, 2–3 mm wide. Corona membranous, entire. **4c. *A. aculeata* ssp. *inermis***
51. Leaves entire or digitately (2–)3–5-compound. Hypanthium wider than long, 2½–4 mm wide. Corona consisting of laciniae or woolly hairs. **5. *A. fruticosa***
50. Glands at blade-base 2(–4), separate, sometimes approximate.
52. Gland-bearing auricles connate, fleshy. Main nerves strictly palmate. Lobe apices mostly obtuse.
53. Hypanthium wider than long, 3–5 mm wide. Corona consisting of woolly hairs. Disk glands well developed. **7. *A. karibaensis***
53. Hypanthium longer than or about as long as wide, 2–3 mm wide. Corona consisting of non-woolly hairs. Disk glands 0. **6. *A. glauca***
52. Gland-bearing auricles separate, or if connate never fleshy. Main nerves mostly not strictly palmate. In lobed leaves lobe apices mostly acute.
54. Glands at blade-base on separate lateral auricles or wart-like excrescences. Hypanthium about as long as or longer than wide, 2½–4 mm wide. Africa.
55. Corona consisting of fine hairs. Disk glands 1–2 mm. Septa well developed. Inflorescences (½)–1–8 cm peduncled, solitary. **1. *A. gedoensis***
55. Corona 0 or consisting of a few coarse hairs and membranous appendages. Disk glands 0 or up to ¼ mm.
56. Petals 4–5 mm broad; corona ± 0. Septa well developed. Inflorescences 5–10 cm peduncled, solitary in axils of normal leaves **2. *A. latepetala***
56. Petals c. 2 mm broad; corona consisting of a few coarse hairs and membranous appendages. Septa 0. Inflorescences up to ½ cm peduncled, short, in the axils of reduced leaves on short-shoots, forming together a racemose inflorescence. **3. *A. racemosa***
54. Glands at blade-base on two more or less connate, rarely separate auricles on the ± peltate leaf-base. Hypanthium about twice as wide as long, (2½)–3½–5½ mm wide. Asia (Burma, Thailand, Laos). **14. *A. pinnatisecta***
49. Leaves entire, elliptic-oblong to lanceolate, pinninerved, with ± peltate leaf-base.
57. Leaves distinctly coriaceous, very shiny above, very dull beneath. Corona consisting of a papillate, fleshy rim. **13. *A. poilanei***
57. Leaves herbaceous to coriaceous; surfaces less different in texture. Corona membranous with finely woolly-laciniate edge, or consisting of fine woolly hairs.
58. Blade (beside one basal gland) with (1–)2 pairs of conspicuous glands 1½–2½ mm across. **11. *A. banaensis***
58. Blade (beside two basal glands) without, or with (sub)marginal glands less than ½ mm across. **12. *A. penangiana***
19. Sepals partially connate in a calyx tube which extends wholly or partially above the insertion of the petals; calyx lobes and petals not inserted at the same level, but if approximate (because of adnation of the petals with the calyx tube), than stamens (anthers) entirely enclosed in the calyx tube. Species from Asia and Africa, not from Madagascar.
59. Leaves (deeply) lobed or entire, not digitately compound.
60. Plant with tendrils, ½–30 m long.
61. Corona absent. Petals inserted at about halfway, in the upper half, or near the throat in the tube, rarely near the base.
62. Midrib not ending in a gland. Filaments inserted on the bottom of the calyx tube.
63. Leaves glabrous, mostly with entire margin (only in Asian species sometimes ± dentate).
64. Petals of male flowers entire or serrulate, not long-fimbriate. Asia.
65. Glands at blade-base flat, ± sessile on the blade, and often the auriculate extensions connate into a ± peltate blade-base. Flowers herbaceous. Petals inserted at about halfway in the calyx tube.
66. Leaves 3–5-lobed, 5-plinerved. **40. *A. trilobata***
66. Leaves entire, lanceolate, pinninerved. **12. *A. penangiana***

65. Glands at blade-base on two, mostly separate, concave, fleshy auricles on the petiole. Flowers fleshy. Petals inserted at or near the throat of the calyx tube.
67. Pericarp (width of the valve sutures) 5–20 mm thick; mesocarp in dried state spongy-fibrous. NE. India, Burma, Yunnan, Indochina.
68. Male flowers large, including the 6–12 mm long stipe 16–25 by $(4\frac{1}{2}-)5-8$ mm; calyx lobes at least $\frac{1}{3}$ as long as the calyx tube. Anthers c. 5 by 1 mm. Venation prominent beneath, distinctly trabeculate. Gland-bearing auricles free. 800–2000 m. 73. *A. cardiophylla*
68. Male flowers including the 3–8 mm long stipe $(10-)-13-19$ by $2\frac{1}{2}-5(-7)$ mm; calyx lobes about $\frac{1}{3}$ as long as the calyx tube, or less. Anthers c. $2\frac{1}{2}-5$ by $\frac{3}{4}$ mm. Dry leaves dull; venation \pm netted, not distinctly raised-trabeculate. Gland-bearing auricles \pm peltately connate. 0–400 m. 75. *A. viridiflora*
67. Pericarp (width of the valve sutures) 1–3 mm thick; mesocarp in dried state not discernible. Male flowers $1\frac{1}{2}-5(-7\frac{1}{2})$ mm wide; calyx lobes less than $\frac{1}{3}$ as long as the calyx tube. Venation \pm reticulate. 0–1000(–2000) m. S. China and Indochina. to Queensland.
69. Calyx lobes $(1-)-1\frac{1}{2}-3$ mm, reflexed in anthesis. Leaves entire or lobed, sub-orbicular to lanceolate in outline, with cordate to acute base, 5–25 cm long. Gland-bearing auricles shallowly concave, more or less adnate to the blade, sometimes \pm peltately connate.
70. Stipe of male flowers 4–15 mm; male flowers including stipe $(10-)-15-25$ (–30) by $1\frac{1}{2}-5(-7\frac{1}{2})$ mm. Flower buds oval to obovate. Fruits ellipsoid to oblong; dry pericarp coriaceous. Leaves entire or lobed. S. China to Queensland, Java; not in the Malay Peninsula, Sumatra, and Borneo.
74. *A. heterophylla*
70. Stipe of male flowers 1–4(–8) mm. Flower buds ovate. Fruits subglobular or \pm fusiform; dry pericarp woody. Leaves entire. Malay Peninsula, Sumatra, Borneo, W. Java.
71. Male flowers including the $1\frac{1}{2}-4(-8)$ mm long stipe 9–15 by $2-3\frac{1}{2}$ mm. Anthers $(4-)-4\frac{1}{2}-7$ by $\frac{3}{4}-1\frac{1}{4}$ mm. Leaves suborbicular, ovate or obovate, to oblong-lanceolate, palmate- to pinninerved, with acute-acuminate to rounded base and obtuse to acute, up to c. 1 cm acuminate apex; when dry green to dark brown above, pale brownish or greenish, to whitish beneath. Glands at blade-base restricted to the auricles. Fruits globular or \pm fusiform; the valves $\frac{1}{2}-3$ mm thick. 0–1000 m, on Mt. Kinabalu up to 1500 m.
77. *A. macrophylla*
71. Male flowers including the $1-1\frac{1}{2}$ mm long stipe 7–9 by $4(-5)$ mm. Anthers 3–4 by 1 mm. Leaves ovate to ovate-elliptic, sub-3–5-pinnerved, with cordate to broadly rounded base and $\frac{1}{2}-1\frac{1}{2}$ cm acuminate apex; when dry dark brown at both surfaces. Glands at blade-base large, extending beyond the auricles on the blade. Fruits globular, with c. 3 mm thick valves. Sabah (Mt. Kinabalu), NE. Sarawak; 1500–1800 m 76. *A. kinabaluensis*
69. Calyx lobes 1–2 mm, erect in anthesis. Leaves entire, ovate to oblong, with deeply cordate to subtruncate base, $2\frac{1}{2}-10(-17)$ cm long. Gland-bearing auricles semiglobular, deeply concave, \pm separate from the blade, not peltately connate.
72. Fruits fusiform, \pm 3(–6)-angular; valves when dry hard-coriaceous, $1-1\frac{1}{2}$ mm thick. Male flowers including the 10–20 mm long stipe 18–35 by $1\frac{1}{2}-3(-4)$ mm. Sumatra, Malay Peninsula, Borneo, W. Java 78. *A. cordifolia*
72. Fruits globular, not ribbed; dry valves \pm woody $(1-)-1\frac{1}{2}-2\frac{1}{2}$ mm thick. Male flowers including the 9–10 mm long stipe 16–18 by $2\frac{1}{2}-3$ mm. Philippines (Mindanao: Zamboanga Prov.), Sulu Is. 79. *A. crassa*
64. Male flowers not known, but if found, petals most likely long-fimbriate. Africa. 53. *A. lindensis*
63. Leaves pubescent, sometimes only on the nerves, rarely glabrous. Leaf-margin

- dentate. Petals (of male flowers) entirely long-fimbriate. Africa.
73. Margin of calyx lobes subentire to serrulate. Anthers reaching to about the throat of the calyx tube.54. *A. schliebenii*
73. Margin of calyx lobes long and densely woolly-fimbriate. Anthers reaching to about halfway the calyx tube56. *A. ellenbeckii*
62. Midrib ending in a (sub)apical gland. Filaments inserted on the calyx tube, above the base. Africa. 80. *A. repanda*
61. Corona present, consisting of hair-like appendages. Petals inserted at the same level as the corona, or up to halfway in the calyx tube.
74. Glands at blade-base 1 or 2, sessile on the blade, or on the peltate or (sub)spathulate blade-base, or on two \pm flat auricles which are free or more or less adnate over the top of the petiole. Hypanthium wide to narrow, but narrow (less than 5 mm wide) when the auricles are free.
75. Glands at blade-base on two free, or more or less adnate auricles, or on a peltate or subspathulate blade-base. Africa.
76. Hypanthium wider than long, 5–12 mm wide, the base stunted or broadly rounded, about as wide as the calyx tube. Leaves entire to deeply lobed.
77. Plants pubescent. Leaf-margin coarsely dentate. Blade-base not or slightly peltate. 55. *A. stricta*
77. Plants glabrous. Leaf-margin entire.
78. Blade-base 4–15 mm deep peltate. Calyx tube 10–18 mm, much longer than the lobes; filaments (including filamental tube) much longer than the anthers. 52. *A. staudtii*
78. Blade-base slightly (1–2 mm) peltate. Calyx tube $1\frac{1}{2}$ –3 mm, much shorter than the lobes; filaments (including filamental tube) much shorter than the anthers. Natal (South Africa) 47. *A. natalensis*
76. Hypanthium about as long as, or longer than wide, 3–6 mm wide, tapering to the base. Leaves entire.
79. Leaves 3–7-pinnerved, or \pm pinnerved, without submarginal glands.
80. Calyx tube of male flowers 5–12 mm wide; petals 10–45 mm, long feathery fimbriate.
81. Male flowers including stipe 20–35 mm. Highlands around Nairobi, Kenya. 50. *A. metriosiphon*
81. Male flowers including stipe 40–75 mm. S. Tanzania, Mozambique. 49. *A. dolichosiphon*
80. Calyx tube of male flowers 3–5 mm wide; petals 5–9 mm. Male flowers including stipe 13–30 mm.
82. Leaves with cordate, truncate or hastate base. Petals of male flowers linear, long-fimbriate or not. S. Mozambique, Swaziland, Republic of South Africa. 51. *A. hastata*
82. Leaves with acute to rounded base. Petals of male flowers lanceolate, entire to serrulate. S. Sudan, Uganda, Kenya, Tanzania, NE. Zambia, Malawi. 59. *A. lanceolata*
79. Leaves pinnerved, oblong-lanceolate, on each side with 4–10 small submarginal glands. 53. *A. lindiensis*
75. Glands at non-peltate blade-base, not on distinct auricles. S. India, Ceylon. 39. *A. hondala*
74. Glands at blade-base 2, in two concave, entirely free auricles lateral at the apex of the petiole. Hypanthium much wider than long, 5–15 mm wide, about as wide as the calyx tube.
83. Plants robust, up to 30 m long, with terete, angular or tubercled stems. Leaves ovate to \pm orbicular, leaf-index c. $1\frac{1}{2}$, mostly cordate at base. Fruits with rounded apex.
84. Anthers (5–)6–11 mm, much longer than the filaments. Male flowers 10–35 mm long. Fruits globular or pear-shaped.
85. Anthers blunt, not or up to c. $\frac{1}{2}$ mm apiculate; if longer apiculate, then petals

- lanceolate, not spatulate. Fruits (sub)globular, 1-3 per inflorescence. Leaves often lobed.
86. Petals of male flowers lanceolate-linear, long laciniate-fimbriate; petals of female flowers similar but smaller. Anthers not or shortly apiculate. Fruits $3\frac{1}{2}$ -7 by $2\frac{1}{2}$ -6 cm, (5-)-7-15 mm stiped. Pericarp fleshy, 5-15 mm thick. Leaves entire to deeply 3-5(-7)-lobed. Older stems densely tubercled. **43. A. lobata**
86. Petals of male flowers broadly spatulate, short lacerate-fimbriate; petals of female flowers lanceolate, not or short fimbriate only near the apex. Anthers not apiculate. Fruits $2\frac{1}{2}$ - $3\frac{1}{2}$ by $2\frac{1}{2}$ -3 cm, 2-5 mm stiped. Pericarp not or slightly fleshy, 2-3 mm thick. Leaves entire to shallowly 3-lobed. Stems relatively slender, terete. **44. A. panduraeformis**
85. Anthers bluntish to acute, $\frac{1}{2}$ -2 mm apiculate; petals spatulate. Fruits globular or pear-shaped, 1-8 per inflorescence. Leaves only rarely (shallowly) lobed.
87. Fruits small, (sub)globular, 2-3(- $3\frac{1}{2}$) by $1\frac{1}{2}$ -3 cm, not or up to 2 mm stiped, 2-8 on each (sub)sessile inflorescence. Pericarp $1\frac{1}{2}$ -3 mm thick. Flowers small, 10-20 by 5-8(-10) mm. **42. A. letouzeyi**
87. Fruits pear-shaped, $3\frac{1}{2}$ -8 by ($1\frac{1}{2}$ -) $2\frac{1}{2}$ - $4\frac{1}{2}$ cm, 3-6 mm stiped, 1-3 per stalked or subsessile inflorescence. Pericarp 4-10 mm thick. Flowers (10-)-15-35 by 7-15 mm. **45. A. rumicifolia**
84. Anthers $3\frac{1}{2}$ -5 mm, shorter than the filaments. Male flowers 8-15(-20) mm long. Fruits subglobular to ellipsoid, $3\frac{1}{2}$ -5 by $2\frac{1}{2}$ -4 cm, 5-10 mm stiped. **46. A. schweinfurthii**
83. Plants slender, up to c. 5 m long, with terete stems. Leaves elliptic-oblong, leaf-index 2 or more, acute to rounded at base. Fruits fusiform, acute at both ends, $2\frac{1}{2}$ - $3\frac{1}{2}$ by $1\frac{1}{2}$ -2 cm. **41. A. mannii**
60. Plant (sub)erect, herb- or shrub-like, without tendrils; 0.1- $1\frac{1}{2}$ m tall.
88. Leaves glabrous, with entire margin. Flowers infundibuliform. Calyx lobes subentire to serrulate. Anthers $1\frac{1}{2}$ - $5\frac{1}{2}$ mm.
89. Leaves (oblong-)lanceolate to linear, 0.2-5(-6) cm broad.
90. Glands at blade-base 2.
91. Flowers (1-)-3-5 together, erecto-patent.
92. Flowers (including stipe) slender, (25-)-30-52 by 2-5 mm. Petals inserted at about- or above halfway in the calyx tube.
93. Leaves oblong-lanceolate to oblanceolate, 4-9 by 0.8- $1\frac{1}{2}$ cm. Anthers slender, 4- $5\frac{1}{2}$ by $\frac{1}{2}$ mm, not apiculate. Corona 0 **69. A. malangeana**
93. Leaves linear. 12-20 by 0.2-0.4 cm. Anthers 4 by 1 mm, $\frac{1}{2}$ mm apiculate, not papillate. Corona consisting of scattered hairs in the lower half of the calyx tube. **66. A. erecta**
92. Flowers 10-26 by 3- $7\frac{1}{2}$ mm. Petals inserted at about the same level as the corona. Anthers with (mostly) papillate apiculum. **67. A. goetzei**
91. Flowers solitary, pendent. **72. A. tuberifera**
90. Glands at blade-base absent.
94. Anthers 3- $3\frac{1}{2}$ mm long, excluding the acute, not papillate, apiculum; filaments more or less in the same whorl alternating with corona-filament-like appendages. Plants c. 30 cm tall. **68. A. huillensis**
94. Anthers $1\frac{1}{2}$ - $2\frac{1}{2}$ mm long, excluding the blunt, distinctly papillate, apiculum; filaments not alternating with appendages. Plants 5-10 cm tall. **71. A. tisserantii**
89. Leaves ovate to suborbicular, 7-14 by 5-12 cm. Anthers with papillate apiculum. **70. A. ovata**
88. Leaves mostly pubescent, with dentate margin, or lobed or laciniate. Calyx lobes (of male flowers) long-woolly fimbriate on the margin. Anthers (5-)-6-12 mm.
95. Male flowers urceolate, 8-18(-20) mm wide. Corona present.
96. Leaves entire, dentate, more or less peltate. Glands at blade-base 2, sessile. Anthers 6-7 mm. **57. A. keramanthus**
96. Leaves 3-7-lobed, very rarely subentire, not peltate. Glands at blade-base 2, each

- on a small auricle. Anthers 8–12 mm. 58. *A. volkenii*
95. Male flowers long-tubular, 20–50 by 3–6 mm. Corona absent. Leaves lobed, rarely entire. Basal glands 2, sessile or sometimes on 2 small auricles. Anthers 5–7(–8) mm. Plants mostly with tendrils. 56. *A. ellenbeckii*
59. Leaf-blade digitately dissected to the base, the lobes or leaflets mostly more or less to distinctly stalked.
97. Hypanthium (at least of male flowers) 6–12 mm wide. Tendrils present. 48. *A. stenodactyla*
97. Hypanthium or basal part of calyx narrow, up to c. 5 mm wide.
98. Erect herbs up to c. 50 cm tall, without tendrils. Leaves palmately (5–)7-parted. South Africa (Transvaal), only in the Lydenburg district 65. *A. wilmsii*
98. Climbing herbs 1–5 m long, with tendrils. Leaves palmately 3–5-parted. S., Central, or E. Africa.
99. Anthers \pm curved, connate at apex, 3–5(–6) mm long (rarely anthers \pm free, but then less than 4 mm long). Filaments connate about halfway or more. Corona mostly present. Zambia, S. Rhodesia, Bechuanaland, South Africa, Mozambique, Angola? 60. *A. digitata*
99. Anthers straight, free (also in bud), 4–8 mm long. Filaments connate for about halfway or less, or free.
100. Stipe much longer than the proper male flower. Corona absent. S. Kenya, E. Tanzania, Zanzibar. 61. *A. kirkii*
100. Stipe much shorter than the proper male flower. Corona present.
101. Anthers c. 4 mm, petals obtusish, calyx lobes obtuse. Androgynophore. Mozambique (Prov. Moçambique). 62. *A. mossambicensis*
101. Anthers 5–8 mm, petals acute, calyx lobes acutish. Androgynophore whether or not present.
102. Male flower 20–25 mm long. Androgynophore. Filaments connate less than halfway. Anthers c. 5 mm. Fruits c. 3 by 2½ cm, 2–3 mm stiped. Leaflets 3(–5), acute to obtusish. Angola (Cuanza Norte), W. Tanzania? 63. *A. trisecta*
102. Male flowers (20–)25–38 mm long. Gynophore. Filaments connate about halfway, inserted laterally on the hypanthium, above the insertion of the gynophore. Anthers 7–8 mm. Fruits c. 6–7 by 3 cm, 15–30 mm stiped. Leaflets (3–)5, at least the central leaflets \pm acuminate. Angola (Cuanza Norte), Congo (S. Léopoldville prov.). 64. *A. welwitschii*

1. SECT. MICROBLEPHARIS (W. & A.) ENGL.

Bot. Jahrb. 14 (1891) 376; Harms in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84; *ibid.*, Nachtr. 1 (1897) 255; *ibid.* ed. 2, 21 (1925) 492; De Dalla Torre & Harms, Gen. Siph. 3 (1903) 331; Hall. f., Med. Rijksherb. 42 (1922) 8, p.p. — *Modecca* subg. *Microblepharis* W. & A., Prod. Fl. Penins. Ind. Or. (1834) 353; Meisner, Pl. Vasc. Gen. 1 (1838) 123. — *Microblepharis* (W. & A.) Roem., 1846. — *Modecca* sect. *Microblepharis* (W. & A.) Endl., Gen. Pl. (1839) 928; Miq., Fl. Ind. Bat. 1, 1 (1856) 702, quoad bas., excl. spec.; Benth. & Hook. f., Gen. Pl. 1 (1867) 813; Mast. in Hook. f., Fl. Brit. Ind. 2 (1879) 601. — Type species: *Modecca wightiana* Wall. ex W. & A. = *A. wightiana* (Wall. ex W. & A.) Engl.

Echinothammus Engl., 1891. — Type species: *Echinothammus pechuëlii* Engl. = *A. pechuëlii* (Engl.) Harms.

Adenia 'groupe I' Perrier de la Bâthie, Not. Syst. 9 (1940) 47; Fl. Madag. et des Com., fam. 143 (1945) 6. — Base: *Modecca densiflora* Baker = *A. densiflora* (Bak.) Harms.

1. *Adenia gedoensis* de Wilde, *sp. nov.* — Fig. 6.

Scandens, c. 8 m alta. *Folia* integra vel (2-)3-lobata, suborbiculata vel late ovata, basi (sub)cordata, apice acuta, usque ad $\frac{1}{2}$ cm acuminata, 3-16 cm longa, 3-17 cm lata; lobi acuti vel acuminati, usque ad 10 cm longi. *Glandulae* 2 (vel 4) basales lateraliter petioli apice instructae. *Stipulae* late reniformes, laciniatae, $\frac{1}{2}$ -1 mm longae. *Inflorescentiae* (0-)1-cirrhiferae, pedunculo 1-8 cm longo instructae; cirrhi 2-4 cm longi. *Flores* ♂ ignoti. *Flores* ♀ stipite $3\frac{1}{2}$ -6 mm longo incl. 11-20 mm longi, 2-4 $\frac{1}{2}$ mm lati. Hypanthium $1\frac{1}{2}$ -2 $\frac{1}{2}$ mm longum. Calycis tubus nullus. Sepala (6-)7-11 mm longa. Petala $3\frac{1}{2}$ -7 $\frac{1}{2}$ mm longa, $1\frac{1}{2}$ -2 mm lata. Septa $\frac{3}{4}$ -2 mm alta. Corona e pilis $\frac{1}{4}$ - $\frac{3}{4}$ mm longis constituta. Disci glandulae 1-2 mm longae. Pistillum 7-13 mm longum. Gynophorium 1-2 $\frac{1}{2}$ mm longum. Ovarium obovato-oblongum, \pm fusiforme, 5-10 mm longum, 2 $\frac{1}{2}$ -5 mm latum. Styli 3 vel 5, liberi, c. $\frac{1}{2}$ mm longi. Stigmata papillata, \pm recurvata, 1 $\frac{1}{2}$ -3 $\frac{1}{2}$ mm longa. *Fructus* ignotus.

Climber up to 8 m. Fertile branches 2-4 mm; internodes 1-10 cm. *Leaves* herbaceous, dark green above, pale glaucous green, not punctate beneath, either simple, ovate to oblong or palmately (2-)3-lobed, suborbicular to broadly ovate or rarely rhomboid in outline, base cordate, rarely rounded, apex acute up to $\frac{1}{2}$ cm acuminate, 3-16 by 3-17 cm, (3)-5-subplinerved and with 2-8 pairs of nerves from the midrib, reticulation rather distinct, margin entire or with minute teeth; lobes triangular to ovate-elliptic, acute-acuminate, up to 10 cm; petiole 1-6 cm. *Glands* at blade-base 2(-4), 1-2 mm \varnothing , on 2(-4) small auricles lateral at the apex of the petiole; blade glands 0; marginal glands

tooth-like, whitish, scattered, c. $\frac{1}{4}$ mm. Stipules broadly reniform, lacinate, $\frac{1}{2}$ (-1) by 2 mm. *Inflorescences* peduncled for 1-8 cm, 2-4(-6)-flowered in ♀; tendrils (0-)1, 2-4 cm. Sterile tendrils simple up to 15 cm. Bracts and bracteoles (narrowly) triangular, acute, ± serrulate, 1-2 mm. ♂ *fl.* not known. ♀ *fl.* tubular-campanulate, incl. the $3\frac{1}{2}$ -6 mm long stipe 11-20 by 2-4 $\frac{1}{2}$ mm, sepals opening in anthesis to c. 8 mm wide. Pedicel 3-10 mm. Hypanthium cup-shaped, slightly 5-saccate, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ mm, calyx tube 0, sepals lanceolate, obtuse, (6-)7-11 mm, subentire. Petals lanceolate, acute $3\frac{1}{2}$ -7 $\frac{1}{2}$ by 1 $\frac{1}{2}$ -2 mm, 3-5-nerved, up to 0.2 mm serrulate in the upper half. Staminodes 2-4 $\frac{1}{2}$ mm, connate for $\frac{3}{4}$ -2 mm, inserted at the base of the hypanthium. Septa $\frac{3}{4}$ -2 mm. Corona hairs fine, dense, $\frac{1}{4}$ - $\frac{3}{4}$ mm. Disk glands 1-2 mm. Pistil 7-13 mm. Gynophore 1-2 $\frac{1}{2}$ mm. Ovary obovate-oblong, ± fusiform, 5-10 by 2 $\frac{1}{2}$ -5 mm. Styles 3-5, (0-) $\frac{1}{2}$ mm, free, reflexed. Stigmas longly reniform, papillate, each 1 $\frac{1}{2}$ -3 $\frac{1}{2}$ mm long. Placentas 3-5; 15-20 ovules per placenta. *Fruit* not known.

ETHIOPIA. Shoa Prov., Gedo, c. 2000 m: *de Wilde 11725*, ♀ fl. (WAG, type).

ECOLOGY. Montane gallery forest; 1800-2000 m. Flowers in the greenhouse in April, July and December. Only once found, in spite of prolonged search.

NOTES. 1. Only known from a ♀ specimen cultivated in the greenhouse of the Wageningen botanical garden, grown from cuttings collected in Ethiopia.

2. Fresh leaves are distinctly pale, glaucous beneath; flowers pale green.

3. The 3-5-merous pistil is noteworthy; 5-merous pistils are also found in *A. ballyi*.

2. *Adenia latepetala* de Wilde, *sp. nov.* — Fig. 6.

Scandens, c. 8 m alta. *Folia* integra vel profunde 3-lobata, ovato-elliptica vel late ovata, basi truncata vel acuta, apice acuta, 5-9 cm longa, 4-8 cm lata; lobi usque ad 6 cm longi. *Glandulae* 2 basales, auriculae parvae folii margine transitione ad petiolum sitae. *Stipulae* triangulares, c. 1 mm longae. *Inflorescentiae* 1-cirrhiferae, pedunculo 7-10 cm longo instructae. *Flores* ♂ stipite c. 5 mm longo incl. 15-18 mm longi, 2 $\frac{1}{2}$ -4 mm lati. Hypanthium 1-1 $\frac{1}{2}$ mm longum. Calycis tubus nullus. Sepala 9-13 mm longa. Petala 9-12 mm longa, 4-5 mm lata. Antherae subacutae, c. $\frac{1}{2}$ mm apiculatae, 7-7 $\frac{1}{2}$ mm longae. Septa 1-1 $\frac{1}{2}$ mm alta. Corona nulla vel annulo inconspicuo c. 0.2 mm alto indicata. *Disci glandulae* inconspicui, c. $\frac{1}{4}$ mm longi. *Flores* ♀ ac *fructus* ignoti.

Climber to c. 8 m. Fertile branches 2-3 mm; internodes 2-6 cm. *Leaves* ± herbaceous, brownish-green above, distinctly pale greyish-green, finely scabrous, not punctate beneath, entire to deeply 3-lobed, ovate-elliptic to broadly ovate, base truncate to acute, apex acute, 5-9 by 4-8 cm, 5-plinerved and with 2-5 pairs of nerves from the midrib, reticulation rather distinct, margin entire; lobes elliptic-oblong, acute, up to 6 cm; petiole 1-2 cm. *Glands* at blade-base 2, 1-1 $\frac{1}{2}$ mm ∅, on two auricles 1-2 $\frac{1}{2}$ mm ∅ on the blade-margin at the transi-

tion to the petiole; blade glands 0–2, c. 1 mm \varnothing , submarginal. Stipules broadly triangular, \pm acuminate, c. 1 mm. *Inflorescences* peduncled for 7–10 cm, 4–12-flowered in δ ; tendril 1, $1\frac{1}{2}$ –3 cm. Sterile tendrils up to 15 cm. Bracts and bracteoles lanceolate, acute, 1–2 mm. δ *fl.* narrowly campanulate, incl. the c. 5 mm long stipe 15–18 by $2\frac{1}{2}$ –4 mm, sepals spreading in anthesis to 16 mm. Pedicel 3–10 mm. Hypanthium broadly cup-shaped 1– $1\frac{1}{2}$ mm, calyx tube 0, sepals oblong-lanceolate, obtuse, 9–13 mm, entire. Petals elliptic-oblong, (sub) acute, 9–12 by 4–5 mm, 7–9-nerved, less than 0.1 mm serrulate in the upper half. Filaments 2– $3\frac{1}{2}$ mm, connate for c. $1\frac{1}{2}$ mm, inserted at the base of the hypanthium. Anthers 7– $7\frac{1}{2}$ by 1– $1\frac{1}{4}$ mm, subacute, bluntly c. $\frac{1}{2}$ mm apiculate. Septa 1– $1\frac{1}{2}$ mm. Corona 0 or an inconspicuous rim, c. 0.2 mm. Disk glands 0 or inconspicuous c. $\frac{1}{4}$ mm. Vestigial ovary c. $\frac{3}{4}$ mm, gynophore $\frac{3}{4}$ –1 mm. φ *fl.* and *fruit* not known.

REP. OF THE CONGO. Bas Katanga, Terr. Manono, Kiala: *Thiébaud 413*, δ fl. (BR, type).

ECOLOGY. Forest in forest-savanna mozaic region; c. 800 m. Flowers in January.

NOTE. 1. Dry flowers greenish; resembling the flowers as found in the section *Ophiocaulon*.

3. *Adenia racemosa* de Wilde, *sp. nov.* — Fig. 6.

Scandens, usque ad 8 m alta. *Folia* (3–)5(–7)-lobata, 3–10 cm longa, 3–10 cm lata, lobi acuti vel obtusi, usque ad 5 cm longi. *Glandulae* 2 basales, auriculis parvis margine laminae transitione ad petiolum instructae. *Stipulae* triangulares, acutae, c. 1 mm longae. *Inflorescentiae* subsessiles, ecirrhosae, secus brachyblastos 1–3 cm longos dispositae. *Flores* δ stipite 5–7 mm longo incl. 12–19 mm longi, 2– $2\frac{1}{2}$ mm lati. Hypanthium 2–3 mm longum. Calycis tubus nullus. Sepala 6–9 mm longa. Petala $5\frac{1}{2}$ –9 mm longa, $1\frac{3}{4}$ –2 mm lata. Antherae subobtusae, 3–4 mm longae, $\frac{1}{2}$ – $\frac{3}{4}$ mm apiculatae. Septa nulla. Corona e pilis paucis crassis $\frac{1}{4}$ – $\frac{1}{2}$ mm longis constituta. Disci glandulae c. $\frac{1}{4}$ mm longae. *Flores* φ stipite 1– $1\frac{1}{2}$ mm longo incl. 7–8 mm longi, $2\frac{1}{2}$ mm lati. *Fructus* ovoideo-ellipsoideus, gynophorio c. $2\frac{1}{2}$ mm longo excl. 2–3 cm longus, $1\frac{1}{2}$ –2 cm latus. Semina c. 6 mm diam.

Subligneous climber to 8 m. Fertile branches greyish or pruinose, 3–5 mm; internodes 3–10 cm. *Leaves* membranous, (dark) green above, dull glaucous green beneath, not punctate, (3–)5(–7)-lobed, suborbicular to broadly ovate in outline, base cordate to truncate, apex acute to obtuse, 3–10 by 3–10 cm, 5-plinerved, reticulation distinct, margin entire; lobes triangular to elliptic, acute to rounded, up to 5 cm; petiole $1\frac{1}{2}$ – $5\frac{1}{2}$ cm. *Glands* at blade-base 2, c. 1 mm \varnothing , on two small auricles on the blade-margin at the transition to the petiole; blade-glands (0–)2–4, c. $\frac{1}{2}$ mm \varnothing , submarginal. Stipules broadly triangular, acute, c. 1 mm. *Inflorescences* in the axils of tricuspid much reduced leaves c.

2 mm arranged in short shoots 1–3 cm, peduncled for 0.05–0.4 cm, 3–7-flowered in ♂, 1–3-flowered in ♀; tendrils 0. Sterile tendrils simple, 8–12 cm. Bracts and bracteoles triangular to oblong, acute-acuminate, c. 1 mm. ♂ fl. tubular-campanulate, incl. the 5–7 mm long stipe 12–19 by 2–2½ mm, sepals spreading in anthesis to c. 8 mm. Pedicel 1–3 mm. Hypanthium cup-shaped 2–3 mm, calyx tube 0, sepals lanceolate-linear, subobtuse to subacute, 6–9 mm, entire. Petals lanceolate, subobtuse to acute, 5½–9 by 1¾–2 mm, (3–)5-nerved, subentire. Filaments (2½–) 3–5 mm, connate for (½–)1–2 mm, inserted at the base of the hypanthium. Anthers 3–4 by ¾ mm, subobtuse, ½–¾ mm apiculate. Septa 0. Corona consisting of a few thick 'hairs' ¼–½ mm and 5 membranous appendages, ½–1¼ mm, acute, opposite the petals. Disk glands 0.2–¼ mm. Vestigial ovary incl. gynophore ¾–1 mm. ♀ fl. campanulate, incl. the 1–1½ mm long stipe 7–8 by 2½ mm. Pedicel c. 1 mm. Hypanthium cup-shaped 1–1½ mm, calyx tube 0, sepals oblong-lanceolate, obtuse, c. 5 mm, entire. Petals oblong-lanceolate, acute, c. 3 by ¾ mm, subentire. Staminodes c. 2 mm, connate for ¼–½ mm, inserted at the base of the hypanthium. Septa 0. Corona a ± lobed rim, c. ¼ mm. Disk glands c. ¼ mm. Pistil 4½–5½ mm. Gynophore c. ½ mm. Ovary ovoid, c. 3 by 2 mm. Styles c. 2 mm, free. Stigmas subglobular to reniform, papillate, each c. 1½ mm ∅. Fruit 1 per inflorescence, up to 5 in a short-shoot, ovoid-ellipsoid, excl. the c. 2½ mm long gynophore 2–3 by 1½–2 cm. Pericarp ± woody-coriaceous, c. ½ mm. Seeds c. 20 per capsule, broadly ovate, c. 6½ by 5½ by 3 mm, coarsely banded or pitted, 6–7 pits ∅; funicles 2–3 mm; embryo c. 4 mm; cotyledons suborbicular c. 3½ by 3½ mm.

TANZANIA. Central Prov. (T5), Kongwa, Forest Res. Sta., 3400 ft.: *Matimya* 74, fr. (EA) Wigg EAH. 13734, ♂ fl., ♀ fl., fr. (EA, type).

ECOLOGY. Creeping or climbing herb in regenerating bush; c. 1000 m. Flowers and fruits in January and May.

NOTES 1. The inflorescences-bearing short shoots develop from the serial bud in the axil of the sterile tendrils. Similar short-shoots are found e.g. in *A. venenata* and *A. globosa*.

2. Flowers probably monoecious, with male- and female inflorescences mixed in one short-shoot.

3. Ill-known species; collecting of more material in the type-locality is highly recommended.

4. The fruit is reported as red.

4. *Adenia aculeata* (Oliv.) Engl., Bot. Jahrb. 14 (1891) 375; Harms, Bot. Jahrb. 15 (1893) 572; in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84, fig. 29; *ibid.*, ed. 2, 21 (1925) 491; Bot. Jahrb. 24 (1897) 168; Ann. R. Istit. Bot. Roma 7 (1897) 98; Engl., Veg. der Erde 9, Pfl. welt Afr. 1, 1 (1910) 176, fig. 144; *ibid.* 3, 2 (1921) 603, fig. 268; Chiov., Fl. Som. 2 (1932) 220; Hutch. & Bruce, Kew Bull. (1941) 98. — *Modecca aculeata* Oliv. in Hook. f., Ic. Pl. 14 (1880) 11–12, tab. 1317 — Type: Kirk s.n.

Climber up to 20 m, up to 12 cm thick at base, stems strongly prickly or unarmed, leafless during the greater part of the year. Branches with inflorescences-bearing twigs 2–10 mm; internodes 1–8 cm. Prickles (not in young shoots and ssp. *inermis*) $(0.2-)\frac{1}{2}$ –2 cm, acute, simple or antler-like up to twice forked, \pm arranged in 4–5 rows, the rows becoming more apart with secondary growth. *Leaves* membranous to subcoriaceous, pale green or grey-glaucous green, sometimes \pm scabrous especially beneath, punctate or not, entire or up to halfway 3–5 (–7) lobed, suborbicular to ovate-elliptic, base subacute to cordate, apex broadly obtuse to subacute, up to $\frac{1}{2}$ mm mucronate, sometimes retuse, 1–7(–16) by 1–7 $\frac{1}{2}$ (–11) cm, 5-plinerved, reticulation distinct, mostly raised beneath, margin entire; lobes up to 3 cm; petiole $\frac{3}{4}$ –5 cm. *Gland* at blade-base 1, 1–2 $\frac{1}{2}$ mm \varnothing , partly on the slightly peltate base and partly on the petiole-apex; blade glands 0–4(–6), $\frac{1}{2}$ –1 mm \varnothing . Stipules (broadly) triangular, acuminate, sometimes serrulate, 1–1 $\frac{1}{2}$ mm. *Inflorescences* small, (sub)sessile, grouped in small fascicles axillary to normal leaves (or scars) or in fascicles axillary to much reduced wart-like leaves along special inflorescences-bearing twigs up to 10 cm, 2–6(–40)-flowered in σ , 1–3-flowered in ρ ; tendrils 0. Sterile tendrils simple, 5–10 cm. Bracts and bracteoles narrowly triangular, acute, 1–2 mm. σ *fl.* tubular-campanulate, incl. the 1 $\frac{1}{2}$ –4 mm long stipe 10–18 by 2–4(–5) mm, lobes spreading in anthesis to c. 12 mm. Pedicel 0–1 mm. Hypanthium \pm broadly cup-shaped, 1 $\frac{1}{2}$ –3 mm, calyx tube 0, calyx lobes lanceolate, obtuse, 7–12 mm, subentire. Petals lanceolate, acute to obtuse, 7–9 by 1 $\frac{1}{2}$ –2 mm, 5-nerved, 0.1 mm serrulate in upper $\frac{1}{4}$. Filaments 4–5 $\frac{1}{2}$ mm, 2–3 $\frac{1}{2}$ mm connate, inserted at the base of the hypanthium. Anthers 3–4 by $\frac{3}{4}$ –2 mm, obtuse, not- or up to 0.2 mm apiculate. Septa c. 2 mm high. Corona membranous, $\frac{1}{3}$ –1 mm, with irregular sinuate-laciniate rim. Disk glands 0.2– $\frac{1}{3}$ mm. Vestigial ovary, incl. gynophore $\frac{1}{2}$ –1 mm. ρ *fl.* narrowly campanulate, incl. the 0–1 mm long stipe 5 $\frac{1}{2}$ –12 by 1 $\frac{1}{2}$ –3 mm, lobes spreading in anthesis to 8 mm. Pedicel 0–1 mm. Hypanthium broadly cup-shaped, c. 1 mm, calyx tube 0, calyx lobes lanceolate to linear, \pm obtuse, 4 $\frac{1}{2}$ –10 mm, entire. Petals ovate to oblong, subacute 1 $\frac{1}{2}$ –4 by $\frac{3}{4}$ –2 mm, 3–5 nerved, \pm serrulate in the upper $\frac{1}{2}$. Staminodes 2–3 $\frac{1}{2}$ mm, $\frac{1}{2}$ –1 $\frac{1}{2}$ mm connate. Septa $\frac{1}{2}$ – $\frac{3}{4}$ mm high. Corona membranous, 0.1– $\frac{1}{2}$ mm, with irregularly sinuate margin. Disk glands 0.1–0.2 by $\frac{1}{2}$ mm. Pistil 5–7 mm. Gynophore $\frac{1}{2}$ –1 mm. Ovary ovate-ellipsoid, (2–)3–4 by 2–3 mm. Styles connate for $\frac{1}{2}$ mm, style-arms $\frac{1}{2}$ –1 $\frac{1}{2}$ mm. Stigmas \pm reniform, papillate, each 1 $\frac{1}{2}$ –2 mm \varnothing . *Fruit* 1–2 per inflorescence, subglobular to broadly ovate-ellipsoid, sometimes $\frac{1}{2}$ mm apiculate, excl. the 1–1 $\frac{1}{2}$ mm long gynophore 1–1 $\frac{1}{2}$ by 0.8–1.3 cm. Pericarp thinly coriaceous. Seeds 10–15 per capsule, suborbicular, 3 $\frac{1}{2}$ –5 by 3–5 by 1 $\frac{1}{2}$ –2 mm, 4–7(–8) pits across the diameter; funicles 1–1 $\frac{1}{2}$ mm; embryo 3–4 mm; cotyledons suborbicular with rounded to truncate apex, 2 $\frac{1}{2}$ –3 $\frac{1}{2}$ by 3 $\frac{1}{2}$ –4 mm.

DISTRIBUTION. E. Ethiopia, Somalia, NE. Kenya. — Fig. 6.

ECOLOGY. Dry scrub; 0–1600 m.

NOTES. 1. In two of the three subspecies the stems are conspicuously prickly.

These prickles are emergences, probably comparable e.g. with the soft protuberances of the stem in *A. lobata*, not with the true thorns as found in *A. globosa* or *A. spinosa*.

2. HOOKER mentions in the original description the curious entire large umbraculiform stigma. This is, however, doubtlessly observed in a young female flower in which the stigmas are not yet fully developed; in anthesis the style is distinctly 3-partite, bearing 3 stigmas.

KEY TO THE SUBSPECIES

1. Stems not prickly. Leaves entire c. ssp. **inermis**
1. Stems (except young shoots) densely prickly. Leaves 3-7-lobed.
 2. Prickles $\frac{1}{2}$ -1 cm, with much broadened 2-5 mm wide base. Leaves suborbicular to ovate in outline, 3-7-lobed; blade-glands present; blade not punctate a. ssp. **aculeata**
 2. Prickles $\frac{3}{4}$ -2 cm, 1-2(-3) mm wide at base. Leaves suborbicular in outline, 5-lobed; blade glands absent; blade finely purplish-brown punctate beneath. b. ssp. **manganiana**

a. ssp. **aculeata** — Fig. 6.

Stems prickly; prickles $\frac{1}{2}$ -1 cm with much broadened 2-5 mm wide base. *Tuber* absent. *Leaves* suborbicular to ovate in outline, 3-7-lobed, 2-7(-16) by 2-7 $\frac{1}{2}$ (-11) cm, sometimes distinctly scabrous beneath by fine whitish protuberances on the small veins, not punctate. Blade glands submarginal. *Inflorescences* grouped in fascicles along 1-10 cm long short-shoots. ♂ *fl.* incl. stipe 11-18 mm. ♀ *fl.* 8-12 mm. *Seeds* 3 $\frac{1}{2}$ -4 by 3 $\frac{1}{2}$ by 1 $\frac{1}{2}$ (-2) mm.

ETHIOPIA. Harrar Prov., Galla, Gobelli R., 4200 ft.: *Burger 3314*, st. (K); between Harrar and Jijiga, c. 1600 m: *J. de Wilde 6490*, st. (WAG), 7373, ♀ *fl.* (WAG), 7374, ♂ *fl.* (WAG); Ogaden, Werder (Wardere): *Hummel 140*, st. (EA); Bale Prov., E. of Gimir, 1300 m: *J. de Wilde 7318*, ♂ *fl.* (WAG).

SOMALI REP. Northern (form. Brit.), Sheik Pass: *Bally 4001*, ♂ *fl.* (EA, K); Sheik Hills, 4000 ft.: *Puk 141*, ♀ *fl.* (EA); Golis Range: *Drake-Brockman 330*, st. (K); Buramo, 3900 ft.: *Gillett 4888*, fr. (FI, K); Soksoda: *Phillips s.n.*, st. (BM); Las Anod, 750-2300 ft: *Bally 11900*, st. (EA, K), *Henning 2190*, st. (EA, K), *Peck 30*, ♂ *fl.* (EA, K). — Southern, 2°N: *Kirk s.n.*, ♂ *fl.*, fr. (K, type); MilMil: *Ruspoli 959*, ♂ *fl.* (FI); Hamara sul Ganana: *Ruspoli 1230*, st. (FI); Giliiale: *Scassellati 19*, fr. (FI).

KENYA. NE. Prov. (K1) Tafilil-Dandau, 2500 ft.: *Gillett 12609*, ♂ *fl.* (B, BM, BR, EA, FI, K, LISC, P, S, W).

ECOLOGY. Dry scrub, stony places, gypsum hills, lime stone, according to PECK in 'localities with high insolation, among Aloes or other shelter'; 100-1600 m. Flowers found in Jan., March and Aug., fruits in Jan. and Feb.

USES. Acc. to *Peck 30* (EA) grazed by sheep when in leaf.

NOTE. 1. The flowers are reported as green.

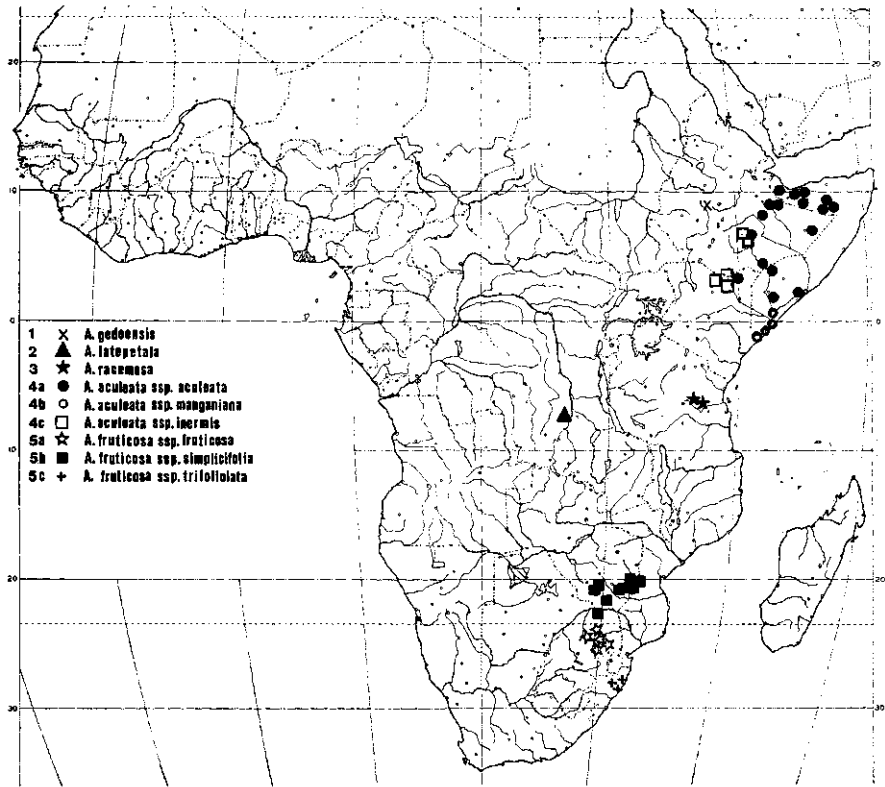


FIG. 6. Localities of species 1-5.

b. ssp. manganiana (Chiov.) de Wilde, *stat. nov.* — *A. manganiana* Chiov., Result. Sc. Miss. Stefan.-Paoli Somal. Ital. 1, Append. (1916) 212. — Type: *Mangano s.n.* — Fig. 6.

Stems prickly, prickles $\frac{3}{4}$ -2 cm, 1-2(-3) mm wide at base. *Tuber* absent. *Leaves* suborbicular in outline, 5-lobed, 1-5 by 1-5 $\frac{1}{2}$ cm, not scabrous, densely purplish-brown punctate beneath. Blade glands absent. *Inflorescences* in fascicles on up to c. 5 cm long short-shoots. Flowers and fruits not known.

SOMALI REP. Kisimaio Distr.: *Gorini 435*, st. (FI), *Mangano s.n.*, st. (FI, type), *Scassellati s.n.*, st. (FI).

KENYA. NE. Prov. (K1), Kiunga: *Bally 5951*, ♂ fl. (EA).

ECOLOGY. Coastal scrub; 0-100 m.

c. ssp. *inermis* de Wilde, ssp. nov. — Fig. 6.

Scandens, c. 10 m longa; rami aculeis carentes. *Folia* ovata ad elliptica, integra, 3–6 cm longa, 2–4 cm lata. *Inflorescentiae* sessiles, fasciculatae. *Flores* ♂ stipite incl. 10–11 mm longi. *Flores* ♀ 5–6 mm longi. *Fructus* 1–1½ cm longus, 0.8–1.3 cm latus. *Semina* 4–5 mm diam.

Stems not prickly. *Tuber* c. 25 × 7 cm, subterraneous. *Leaves* ovate-elliptic, entire, 3–6 by 2–4 cm, not scabrous, not punctate. Blade glands absent. *Inflorescences* in fascicles axillary to normal leaves or tendrils. ♂ *fl.* incl. stipe 10–11 mm. ♀ *fl.* 5–6 mm. *Fruit* 1–1½ by 0.8–1.3 cm. *Seeds* 4–5 by 4–5 by 2 mm.

ETHIOPIA. Bale Prov., SE. of Ginner, c. 1300 m: *J. de Wilde* 7319, ♀ fl., fr. (WAG), 7321 ♂ fl. (WAG, type).

KENYA. (K 1), Moyale Distr., 3300–3600 ft.: *Bally B.* 12660 p.p., fr. (K), *Gillett* 13611, ♂ fl. (BR, FI, K), 13698 fr. (EA, K).

ECOLOGY. Dry montane scrub, limestone; 1000–1300 m. Flowers in Jan., July, fruits in August.

NOTES. 1. The flowers are reported as green. The plants are leafless and inconspicuous at the time of flowering.

2. According to J. J. F. E. DE WILDE this taxon is specifically distinct from *A. aculeata*. It is a tiny, glabrous climber, growing from a subterraneous tuber, whereas *A. aculeata* may become a large liana with densely spiny stem and apparently without a tuber in the ground.

5. *Adenia fruticosa* Burt Davy, Man. Flow. Pl. and Ferns Transv & Swazil. 1, 36 (1926) 221; Bremekamp, Vegetationsbilder 23, 3 (1932) 6, pl. 18; Liebenberg, Bothalia 3, 4 (1939) 538, 528, 532, pl. 1, 2; Dyer c.s., Wild Flow. Transv. (1962) 225. — Type: *Pole-Evans* H. 15723.

Shrub or shrubby tree up to 6 m, main stem mostly thick, soft-woody, ± branched or not, up to 2 by 0.6 m, branches shrubby or lianoid, up to 5 m, bark smooth, (grey-)green. Fertile branches 2–4(–5) mm; internodes 1½–6 cm. *Leaves* (sub)coriaceous, green or grey- or glaucous green, finely punctate or not, simple or 3–5-foliolate, ovate to suborbicular in outline, base (sub)cordate, 1–8 by ¾–8 cm, (1–)3–5-plinerved; petiole (0.3–)1–5 cm; leaflets (or lobes) orbicular, ovate or obovate, base rounded to acute, apex subacute to broadly rounded, rarely retuse, 1–6 by 1–4(–6) cm, nerves 3–5 pairs, reticulation distinct or not, margin entire; petiolule 0–5(–7) mm. *Gland* at blade-base single, 1–3 mm ø, on a fleshy, ± upward curved, lobelet 1½–3 mm ø at the apex of the petiole; no other glands. *Stipules* narrowly triangular, c. ½ mm. *Inflorescences* either solitary in the axils of normal leaves, or in the axils of much reduced leaves in short-shoots up to 1 cm, peduncled for up to 0.7 cm, 2–5-flowered in ♂, 1–3-flowered in ♀; tendrils 0. Sterile tendrils simple, 3–12 cm, sometimes breaking off and leaving a thorn-like structure. Bracts and bracteoles triangular

to oblong, \pm serrulate, 1-2 $\frac{1}{2}$ mm. δ fl. campanulate, 5(-6)-merous, incl. the $\frac{1}{2}$ -5 mm long stipe 9-17 by 2 $\frac{1}{2}$ -4 $\frac{1}{2}$ mm, sepals opening in anthesis to c. 12 mm. Pedicel 1-6 mm. Hypanthium 1-2 $\frac{1}{2}$ mm, calyx tube 0, sepals lanceolate, obtuse, 7-9(-10) mm, (sub)entire. Petals oblong to lanceolate, acute, 4-8 by 1 $\frac{1}{2}$ -2 mm, 3-nerved, 0.1-0.2 mm serrulate. Filaments 1 $\frac{1}{2}$ -4 mm, connate for $\frac{1}{2}$ -2 mm, inserted at the base of the hypanthium. Anthers 3-6 $\frac{1}{2}$ by $\frac{3}{4}$ -1 mm, obtuse, up to 0.1 mm apiculate. Septa 1-2 mm high. Corona consisting of fine hairs $\frac{1}{4}$ - $\frac{1}{2}$ (-1) mm, sometimes partly membranous. Disk glands $\frac{1}{4}$ - $\frac{3}{4}$ mm, or absent. Vestigial ovary incl. gynophore 1(-2) mm. ♀ fl. campunulate, incl. the $\frac{1}{2}$ -1 mm long stipe 7-9 by 2 $\frac{1}{2}$ -3 $\frac{1}{2}$ mm, sepals spreading in anthesis to c. 8 mm. Pedicel 1-4 mm. Hypanthium 1-1 $\frac{1}{2}$ mm, calyx tube 0, sepals lanceolate, obtuse, 5-7 mm, entire. Petals lanceolate, acute, 3-4 by $\frac{1}{2}$ -1 mm, 1-nerved, serrulate towards the apex. Staminodes 2-4 mm, connate for 1-2 mm. Septa 1(-2) mm high. Corona consisting of fine hairs 0.2- $\frac{1}{2}$ mm, or nearly absent. Disk glands 0- $\frac{1}{2}$ mm. Pistil 5-8 mm. Gynophore 1 $\frac{1}{2}$ -3 mm. Ovary subglobular 2 $\frac{1}{2}$ -4 by 2-3 $\frac{1}{2}$ mm. Styles connate for $\frac{1}{2}$ - $\frac{3}{4}$ mm, style arms $\frac{1}{2}$ -1 mm. Stigmas subglobular, papillate, each 1-1 $\frac{1}{2}$ mm \varnothing . Fruit 1-2 per inflorescence, subglobose(-ellipsoid), excl. the 2-5 mm long gynophore 1-2 by 0.8-1.8 cm. Pericarp coriaceous, c. $\frac{1}{4}$ mm, smooth. Seeds 3-6 per capsule, broadly ovate to orbicular, c. 6-6 $\frac{1}{2}$ by 6-6 $\frac{1}{2}$ by 2 $\frac{1}{2}$ mm, 6-9 pits \varnothing ; funicles 1-2 mm; embryo 5 $\frac{1}{2}$ -6 mm; cotyledons broadly ovate, apex obliquely truncate-emarginate, c. 5-5 $\frac{1}{2}$ by 5-5 $\frac{1}{2}$ mm.

DISTRIBUTION. S. and E. South Rhodesia, Rep. of South Africa (Transvaal, Natal). — Fig. 6.

ECOLOGY. Dry savanna, bushveld; sandy soils, granite; 100-1400 m. Flowers and fruits from Sept. to Nov.

Three more or less allopatric subspecies are recognized.

KEY TO THE SUBSPECIES

1. Leaves 3-5-foliolate; petiolule of leaflets 2-5(-7) mm. Anthers c. 3 mm.
 - a. ssp. **fruticosa**
1. Leaves simple or 3-foliolate; leaflets sessile. Anthers 4-5 $\frac{1}{2}$ mm.
 2. Hypanthium of δ fl. broadly cup-shaped, \pm 5-saccate; corona hairs $\frac{1}{2}$ -1 mm; disk glands present. Leaves simple or 3-foliolate.
 - b. ssp. **simplicifolia**
 2. Hypanthium of δ fl. cup-shaped, tapering, not saccate; corona hairs up to $\frac{1}{2}$ mm or partly absent; disk glands 0. Leaves 3-foliolate.
 - c. ssp. **trifoliolata**

a. ssp. **fruticosa** — Fig. 6.

Leaves 3-5-foliolate, 2-8 by (2-)2 $\frac{1}{2}$ -8 cm; petiole 1-5 cm; leaflets suborbicular to obovate, base acute to rounded, apex broadly rounded, rarely retuse, 1-6 by 1-4(-6) cm; petiolules 2-5(-7) mm. δ fl. incl. the c. $\frac{1}{2}$ mm long stipe

9 by $2\frac{1}{2}$ –3 mm, opening to c. 7 mm. Hypanthium cup-shaped, not distinctly saccate, c. 1 mm, sepals 7–8 mm. Petals c. 4 by $1\frac{1}{2}$ –(2) mm. Filaments c. $1\frac{1}{2}$ mm, connate for $\frac{1}{2}$ mm. Anthers c. 3 by $\frac{3}{4}$ mm, obtuse. Septa c. $\frac{1}{2}$ mm high. Corona partly consisting of fine hairs up to $\frac{1}{2}$ mm, partly membranous. Disk glands c. $\frac{1}{4}$ mm. ♀ fl. incl. the $\frac{1}{2}$ –1 mm long stipe 7–9 by $2\frac{1}{2}$ – $3\frac{1}{2}$ mm, opening in anthesis to c. 8 mm. Hypanthium c. $1\frac{1}{2}$ mm, sepals 5–7 mm. Petals 3–4 by $\frac{1}{2}$ –1 mm. Staminodes 3–4 mm, connate for 1–2 mm. Septa 1–2 mm high. Corona consisting of fine hairs up to $\frac{1}{4}$ mm. Disk glands 0. Pistil $6\frac{1}{2}$ –8 mm. Gynophore 2–3 mm. Ovary 3–4 by 3 – $3\frac{1}{2}$ mm. Styles connate for $\frac{3}{4}$ mm, style arms $\frac{1}{2}$ – $\frac{3}{4}$ mm. Stigmas c. 1 mm \varnothing .

REP. OF SOUTH AFRICA. Transvaal, Pietersburg Distr., Molepo Reserve: *Gerstner 5591*, st. (PRE); Chumiespoort: *Obermeyer & Verdoorn 10*, st. (PRE), *Pole Evans H. 15723*, ♂ fl. (K, type; PRE); Pathlele's Location: *Pole Evans H. 19467*, fr. (PRE); Lydenburg Distr., Sukukuniland: *Barnard 454*, st. (PRE), *454 B*, st. (PRE), *Codd s.n.*, fr. (PRE); Penge Mine (N. of Burgersfort): *Codd 6683*, st. (PRE); Steelpoort Valley: *Dyer* (EA, photograph only), *Pole Evans 4697*, st. (PRE); Kasparsnek: *Rauh & Schlieben 9649*, ♀ fl. (PRE), *Strey 3693*, st. (PRE).

ECOLOGY. Bushveld, dry stony slopes; dry sandy loam soil, granite; 800–1400 m. Flowers in August and Sept., fruits in Oct. and Nov.

USES. Recorded as 'medicinal'.

NOTE. 1. Fresh flowers are greenish.

b. ssp. simplicifolia de Wilde, ssp. nov. — Fig. 6.

Frutex scandens. *Folia* simplicia vel (2–)3-foliolata, 1–6 cm longa, $\frac{3}{4}$ –5 cm lata. Foliola sessilia. Petioli (0.3–) $\frac{1}{2}$ – $2\frac{1}{2}$ cm longi. *Flores* ♂ stipite 3–4 mm longo incl. 13–15 mm longi, 4– $4\frac{1}{2}$ mm lati. Hypanthium late crateriforme, \pm 5-saccatum, c. 2 mm longum. Calycis tubus nullus. Sepala 8–10 mm longa. Petala 7–8 mm longa, $1\frac{1}{2}$ –2 mm lata. Antherae subobtusae, 5– $5\frac{1}{2}$ mm longae. Septa 1–2 mm alta. Corona e pilis tenuibus $\frac{1}{2}$ –1 mm longis composita. Disci glandulae $\frac{1}{2}$ – $\frac{3}{4}$ mm longae.

Leaves simple, ovate, or (2–)3-foliolate, 1–6 by $\frac{3}{4}$ –5 cm; petiole (0.3–) $\frac{1}{2}$ – $2\frac{1}{2}$ cm; leaflets suborbicular to elliptic, or ovate, or rhomboid, base acute to rounded, apex obtuse to subacute, 1–5 by 1–3(–4) cm; petiolules \pm 0. ♂ fl. incl. the 3–4 mm long stipe 13–15 by 4– $4\frac{1}{2}$ mm, opening in anthesis to c. 10 mm. Hypanthium broadly cup-shaped, 5-saccate, c. 2 mm, sepals 8–10 mm. Petals 7–8 by $1\frac{1}{2}$ –2 mm. Filaments 3–4 mm, connate for 1–2 mm. Anthers 5– $5\frac{1}{2}$ by $\frac{3}{4}$ mm, (sub)obtuse. Septa 1–2 mm high. Corona of densely set fine hairs $\frac{1}{2}$ –1 mm. Disk glands $\frac{1}{2}$ – $\frac{3}{4}$ mm. ♀ fl. incl. the $\frac{1}{2}$ – $\frac{3}{4}$ mm long stipe 7–8 by $2\frac{1}{2}$ – $3\frac{1}{2}$ mm, opening in anthesis to c. 6 mm. Hypanthium 1– $1\frac{1}{2}$ mm, calyx lobes 5–6 mm. Petals 3–4 by $\frac{3}{4}$ mm. Staminodes 2– $2\frac{1}{2}$ mm, connate for 1 mm. Septa c. 1 mm high. Corona hairs c. $\frac{1}{2}$ mm. Disk glands $\frac{1}{4}$ – $\frac{1}{2}$ mm. Pistil 5– $6\frac{1}{2}$ mm. Gynophore $1\frac{1}{2}$ –2 mm. Ovary $1\frac{1}{2}$ –3 by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Styles connate for $\frac{1}{2}$ – $\frac{3}{4}$ mm, style arms $\frac{1}{2}$ –1 mm. Stigmas c. $1\frac{1}{2}$ mm \varnothing .

SOUTH RHODESIA, Eastern, Melsetter Distr.: *Chase 1321 (24099)*, ♂ fl. (BM, K, LISC; SRGH, type); Chikwizi R., 2400 ft.: *Chase 8090*, st. (LISC, SRGH, WAG); Sabi Valley (Muwushu Res.), 2500 ft.: *Davies 2526*, fr. (K); Melsetter Junction, 2300 ft.: *Leach 9446*, ♂ fl. (SRGH) — Southern, Buhera Distr., W. of Birchenough Bridge: *Chase 8363*, st. (SRGH, WAG); Nuanetsi Distr., Chipinda, 1200 ft.: *Davies 2191*, ♂ fl. (K, SRGH); Bikita Distr. (N. of Birchenough Bridge): *Noel 2447*, fr. (COI, K, SRGH); Gwanda Distr. (Juli R.): *Norris-Rogers 485*, st. (SRGH), *545*, st. (SRGH); Ndanga Distr., Chipinda Pools: *Wormald 88/51 (36054)*, fr. (K, SRGH).

REP. OF SOUTH AFRICA, Transvaal, Zoutpansberg, Dongola Res., Messina: *Pole-Evans 3747*, ♀ fl. (PRE).

ECOLOGY. Thorn-bushveld, rocky places, also near hot springs; sandy soils, basalt rock; 400–1000 m. Flowers and fruits from Sept. to Nov.

NOTE. 1. Fresh flowers are reported as creamy-yellow or yellow, fruits as green berries, whitish striped.

c. *ssp. trifoliolata* de Wilde, *ssp. nov.* — Fig. 6.

Frutex scandens. *Folia* 3-foliolata, $1\frac{1}{2}$ –3 cm longa, $1\frac{1}{2}$ – $2\frac{1}{2}$ cm lata. Foliola sessilia. Petioli $\frac{1}{2}$ – $1\frac{1}{2}$ cm longi. *Flores* ♂ stipite c. 5 mm longo incl. 14–17 mm longi, 4–5 mm lati. Hypanthium deorsum attenuatum, c. $2\frac{1}{2}$ mm longum. Calycis tubus nullus. Sepala $6\frac{1}{2}$ –8 mm longa. Petala c. 5 mm longa, $1\frac{1}{2}$ mm lata. Antherae obtusae, 4– $4\frac{1}{2}$ mm longae. Septa 1– $1\frac{1}{2}$ mm alta. Corona ± membranacea, hic inde absens, vel e pilis usque ad $\frac{1}{2}$ mm longis constituta. Disci glandulae nullae.

Leaves 3-foliolate, $1\frac{1}{2}$ –3 by $1\frac{1}{2}$ – $2\frac{1}{2}$ cm; petiole $\frac{1}{2}$ – $1\frac{1}{2}$ cm; leaflets suborbicular, base and apex rounded to subacute, $\frac{1}{2}$ –2 by $\frac{1}{2}$ – $2\frac{1}{2}$ cm; petiolules ± 0. ♂ fl. incl. the c. 5 mm long stipe c. 14–17 by 4–5 mm, sepals spreading in anthesis to c. 12 mm. Hypanthium cup-shaped, tapering, not saccate, c. $2\frac{1}{2}$ mm, sepals $6\frac{1}{2}$ –8 mm. Petals c. 5 by $1\frac{1}{2}$ mm. Filaments 3– $3\frac{1}{2}$ mm, connate for $1\frac{1}{2}$ mm. Anthers c. 4– $4\frac{1}{2}$ by $\frac{3}{4}$ –1 mm, obtuse. Septa 1– $1\frac{1}{2}$ mm high. Corona hairs up to $\frac{1}{2}$ mm, sometimes partly membranous or partly absent. Disk glands 0. ♀ fl. and Fruit not seen.

REP. OF SOUTH AFRICA. Natal, Ntonganeni Distr., Mkumbaan Valley (NW. of Ntonganeni), 2500 ft.: *Acocks 12937*, ♂ fl. (P; PRE, type); Wlahlabatini Distr., 750 ft.: *Ward 4378*, ♂ fl. (K; PRE, *n.v.*); Hlabisa Distr. (Game Res.), 400 ft.: *Ward 4475*, st. (fr.) (PRE); Zululand (Natal), Mbombo Distr.: *Gerstner 5241*, st. (K; PRE, *n.v.*).

ECOLOGY. Extratropical. Sandy bushveld; sandstone; locally frequent; 100–900 m. Flowers and fruits in Sept. and Oct.

NOTE. 1. On the field label *Gerstner 5241* is noted: 'no succulent underground stem, has several tubers'. In the field the leaves are reported as glaucous green, the flowers as greenish-yellow, the fruits as: 'almost globose, mottled green when immature, darker towards base, becoming orange-green when ripe' and 'very dark green with light green veins'.

6. *Adenia glauca* Schinz, Bot. Jahrb. 15, Beibl. 33, 1 (1892) 1; Engl., Pfl. welt Afr. 3,2 (1921) 605; Burt Davy, Man. Flow. Pl. and Ferns Transv. & Swazil. (1926) 222; Steyn, Tox. Pl. South Africa (1934), 314, fig. 43B, 46, 47B; Liebenberg, Bothalia 3,4 (1939) 539, 523, 532, fig. 6-8, pl. 4-5; Dyer c.s., Wild Flow. Transv. (1962) 225, tab. 112; Watt & Breyer-Brandwijk, Med. Pois. Pl. ed. 2 (1962) 828. — *Modecca glauca* Schinz ex Engl., Bot. Jahrb. 14 (1891) 393, *nom. nud.*; Schinz, Bot. Jahrb. 15, Beibl. 33, 1 (1892) 1. — Syntypes: *Rehmann* 4799, 4870. — Fig. 7.

Climber sometimes shrub-like, up to $3\frac{1}{2}$ m, the basal part thickened c. 1 by 0.4 m, tapering, \pm fleshy, smooth, greenish, passing into the branches up to 3 m. Fertile branches grey-green, $1\frac{1}{2}$ -4 mm; internodes 1-7 cm. *Leaves* herbaceous to coriaceous, greyish, glaucous or purplish-grey, sometimes punctate, 5-parted to the base, suborbicular in outline, base cordate, 2-12 by $2\frac{1}{2}$ -12 cm, 5-plinerved; petiole ($\frac{1}{2}$ -)1-5 cm; leaf-parts (ob)ovate to oblong, base acute or subacute, apex (sub)obtuse, sometimes retuse, 1-7 by $\frac{1}{2}$ - $3\frac{1}{2}$ (- $4\frac{1}{2}$) cm, nerves 4-8 pairs, reticulation rather distinct, margin entire. *Glands* at blade-base 2, contiguous, 1-2 mm \varnothing , on two \pm connate, \pm fleshy, brownish, auricles forming the slightly peltate blade-base; blade glands 1-3(-5), c. $\frac{1}{4}$ mm \varnothing , apical or subapical at the apex of the nerves. *Stipules* (narrowly) triangular, acute, 1- $1\frac{1}{2}$ mm. *Inflorescences* peduncled for up to 1(-2) cm, 2-5-flowered in δ , 1-3-flowered in φ ; tendril (0-) 1, 2-6 cm. Sterile tendrils up to 10 cm. Bracts and bracteoles narrowly triangular, acute, $\frac{1}{2}$ -2 mm. δ *fl.* (tubular-)infundibuliform, incl. the 3-7 mm long stipe (13-)15-30 by 2-4 mm, the sepals spreading in anthesis to c. 20 mm. Pedicel 2-20 mm. Hypanthium (1-)2-4 mm, calyx tube 0, sepals lanceolate, obtuse, (8-)10-18(-20) mm, entire. Petals 5(-6), lanceolate, narrowed to the base, apex acute to obtuse, 6-11 by $1\frac{1}{2}$ - $2\frac{1}{2}$ mm, 1-3-nerved, 0.1-0.3 mm serrulate. Filaments (3-) $4\frac{1}{2}$ -7 mm, connate for ($1\frac{1}{2}$ -) $2\frac{1}{2}$ -4 mm, inserted at the base of the hypanthium. Anthers 5(-6), 3- $5\frac{1}{2}$ by 1 mm, subacute, 0.1- $\frac{1}{2}$ mm apiculate. Septa (1-) $2\frac{1}{2}$ -4 mm high. Corona consisting either of sparse thick hairs c. $\frac{1}{2}$ mm, or of a fringe thinner hairs $\frac{1}{2}$ -1 mm. Disk glands 0. Vestigial ovary incl. gynophore $\frac{1}{2}$ - $1\frac{1}{4}$ mm. φ *fl.* tubular-infundibuliform, incl. the $1\frac{1}{2}$ -4 mm long stipe (9-)10-15 by 2-3 mm, sepals spreading in anthesis to c. 10 mm. Pedicel 2-5 mm. Hypanthium $1\frac{1}{2}$ -2 mm, calyx tube 0, sepals lanceolate, obtuse, 7-9 mm, (sub)entire. Petals lanceolate, acute, sometimes up to 0.3 mm acuminate, 4-5 by $\frac{1}{2}$ -1 mm, 1-nerved, irregularly 0.1-0.2 mm serrulate towards the apex. Staminodes 2- $3\frac{1}{2}$ mm, connate for $1\frac{1}{2}$ -2 mm. Septa 1-2 mm high. Corona of sparse, thick hairs $\frac{1}{2}$ -1 mm. Disk glands 0. Pistil 6-8 mm. Gynophore 1-2 mm. Ovary subglobose, $2\frac{1}{2}$ - $4\frac{1}{2}$ by $2\frac{1}{2}$ -4 mm. Styles connate up to $\frac{1}{2}$ mm, style arms 1- $1\frac{1}{2}$ mm. Stigmas subglobose, papillate, each c. $1\frac{1}{2}$ mm \varnothing . *Fruit* 1-2 per inflorescence, (subglobose-)ellipsoid, excl. the 3-5 mm long gynophore 1.8- $2\frac{1}{2}$ by $1\frac{1}{2}$ -2 cm. Pericarp thickly coriaceous, c. $\frac{1}{4}$ - $\frac{1}{2}$ mm. Seeds 3-5 per capsule, orbicular to heart-shaped, $5\frac{1}{2}$ - $7\frac{1}{2}$ by $5\frac{1}{2}$ - $7\frac{1}{2}$ by $2\frac{1}{2}$ -3 mm, 8-11 pits \varnothing ; funicles c. 2 mm; embryo 5-6 mm; cotyledons suborbicular, base cordate, apex obliquely emarginate, 4-5 by $4\frac{1}{2}$ - $6\frac{1}{2}$ mm.

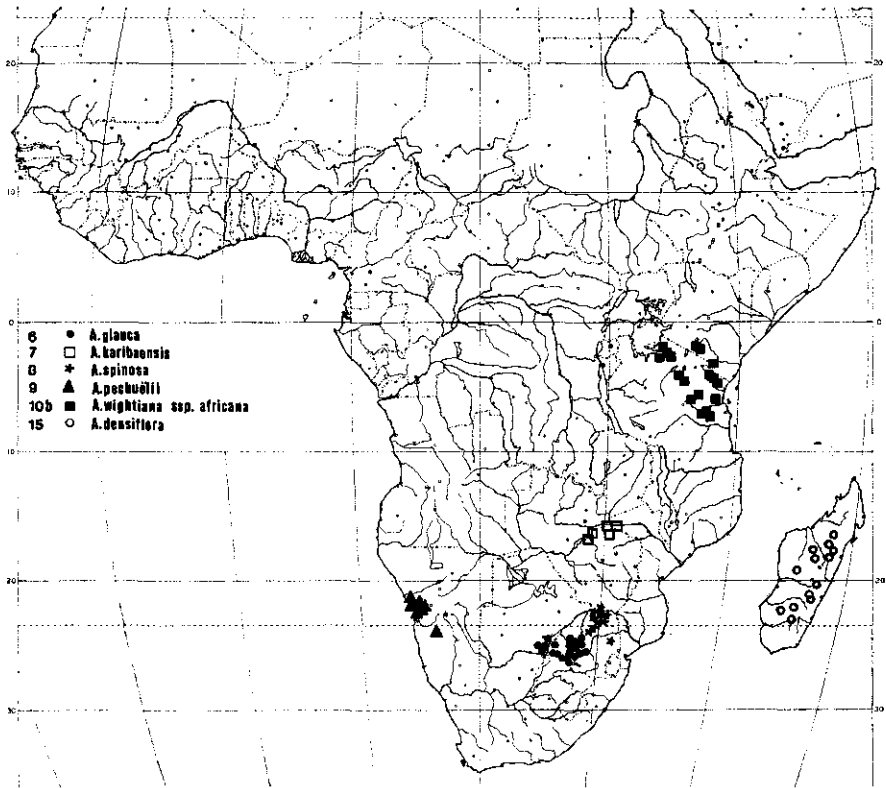


FIG. 7. Localities of species 6-9, 10b, 15.

BOTSWANA. Kanye Distr., Polukwe Hill, 4000 ft.: *Hillary & Robertson 503*, ♂ fl. (PRE); between Ramoutsa and Gabarones: *Louw 611*, ♂ fl. (PRE); Kanye, E. of Pharing, 4100 ft.: *Miller B1508*, ♂ fl. (K, PRE); N. of Pharing, 4000 ft.: *Miller B1530, I & II*, ♂ fl. (PRE); Ranthabana Hill, 4200 ft.: *Miller B1655*, ♀ fl. (PRE).

REP. OF SOUTH AFRICA. Transvaal, Baviaanspoort: *Meebold 13208*, ♂ fl. (M); between Kameelpoort and Elandsrivier: *Rehmann 4799*, ± st. (Z, lectotype *Adenia glauca*); Menaarsfarm: *Rehmann 4875*, ± ♀ fl. (K; Z, syntype *A. glauca*); Cult. Hort. Bot. WAG.: *de Wit s.n.* ♂ fl. (WAG, also spirit mat.) — Rustenburg Distr., S. of Matabas, 3600 ft.: *Codd 4433*, ♂ fl. (PRE) — Potgietersrus Distr., Naboomspruit: *Galpin 11605*, ♂ fl. (PRE); Temby Downs, 3900 ft.: *Galpin 13197*, fr. (PRE) — Nylstroom Distr.: *Repton 3843*, ♂ fl. (PRE) — Warmbad Distr., Waterberg and vicinity, c. 4000 ft.: *Acocks 13923*, ♂ fl. (PRE), *Burt Davy 2622*, ♀ fl. (PRE), *van Dam 13191*, st. (PRE), *13715*, ♀ fl. (PRE), *Galpin 9164*, ± ♂ fl. (PRE), *11606*, ♂ fl. (K, PRE), *13195*, st. (PRE), *Gerstner 5300*, st. (PRE), *Hutchinson 1888*, st. (K), *Repton 96*, ♂ fl. (PRE), *Rogers T. 20816*, ♂ fl. (PRE), *T. 23617*, ♂ fl. (Z), *Sidey 1348*, ♂ fl. (PRE), *Theron 2035*, ♀ fl. (M) — Pretoria Distr., 3500-4700 ft., Rust der Winter: *Codd 2241*, ♀ fl., fr. (PRE); Wonderboom: *van Dam T. 25042*, st. (PRE); Magaliesberge: *Herre 9508*, ♀ fl. (PRE), *Mogg s.n.*, ♀ fl., fr. (L), *11130*, ♂ fl., ♀ fl., fr. (PRE), *Smith 6271*, ♂ fl. (PRE), *6841*, ♂ fl. (PRE); Onderste Poort: *Liebenberg 3222*, ♀ fl. (PRE); Silverton: *Phillips 3021*, fr. (PRE); Derde Poort: *Mogg (15386) 7802*, fr. (PRE); Mooiplaats: *Rehm s.n.*, st. (M); Premier Mine: *Rogers 20852*, st. (PRE); Dernier Mine: *Verdoorn s.n.*, ♂ fl. (PRE); s. loc., 4000 ft.: *Menzies s.n.*, ♂ fl. (PRE), *Verdoorn s.n.*, ♂ fl. (PRE).

ECOLOGY. Extratropical. Dry bushveld, rocky places; sandy soil, quartzite rock; locally common; 1000–1600 m. Flowers mainly from Aug. to Jan., fruits in Oct. and Nov.

USES. Said to be poisonous to cattle.

NOTES. 1. SCHINZ mentions in the original description two syntypes: *Rehmann 4799* and *4870*. In the Zürich-herbarium I found only *Rehmann 4799* and *4875*, not *4870*. *Rehmann 4799* (Z) is designated as lectotype. SCHINZ mentions the disk-glands as 'inconspicuous', but in fact they are always (also in the Zürich-specimens) absent.

2. LIEBENBERG reports occasional 4-merous ovaries and fruits, and once a male flower with 6 petals and stamens.

3. According to *Smith 6841* a large black ant is a constant visitor of the plants at the flowering period, laying heavy toll on a secretion from the base of the inflorescences.

4. Guttating from the apical glands is several times reported.

5. The bottle-shaped trunk is often "polished" and reported as malachite-green. Fresh flowers are greenish-yellow, creamy or (pale) yellow; when dry often densely mottled and striked with purplish or reddish; fresh fruits are pale yellow or orange.

7. *Adenia karibaensis* de Wilde, *sp. nov.* — Fig. 7.

Arbor usque ad $4\frac{1}{2}$ m alta; truncus sursum decrescens, usque ad $2\frac{1}{2}$ m longus, basin usque ad $\frac{1}{2}$ m latus; rami \pm scandentes vel pendentis. *Folia* 5-partita, ambitu suborbiculata, 3–16 cm longa, 1–15 cm lata. *Foliola* (ob)ovata vel oblonge-lanceolata, apice plerumque obtusa, 2–11 cm longa. *Glandulae* 2 basales, auriculis carnis \pm connatis vel laminae basi bilobata subpeltata obviae. *Inflorescentiae* 0–1-cirrhiferae, subsessiles vel usque ad $2\frac{1}{2}$ cm pedunculatae, vulgo secus brachyblastos dispositae. *Flores* δ stipite $2\frac{1}{2}$ – $6\frac{1}{2}$ mm longo incl. 14–17 mm longi, c. 4 mm lati. Hypanthium \pm 5-saccatum, $1\frac{1}{2}$ –2 mm longum. Calycis tubus 0. Sepala 8–10 mm longa. Antherae $4\frac{1}{2}$ –5 mm longae. Septa 1– $1\frac{1}{2}$ mm alta. Corona e pilis gracilibus lanatis $\frac{1}{2}$ –1 mm longis formata. Disci glandulae $\frac{1}{2}$ –1 mm longae. *Flores* η stipiti c. 3 mm longo incl. c. 9 mm longi, 3–4 mm lati. *Fructus* ovalis, gynophorio 2–3 mm longo excl. $1\frac{1}{2}$ –2 cm longus, 1.2– $1\frac{1}{2}$ cm latus. Semina c. 7 mm diam.

Tree, up to $4\frac{1}{2}$ m, trunk erect, sometimes forked, tapering, grey or greenish, soft-wooded, up to $2\frac{1}{2}$ by $\frac{1}{2}$ m, passing into the half-climbing or drooping branches up to 3 m; bark with lenticels. Fertile branches reddish brown to greyish, 3–6 mm; internodes $\frac{1}{2}$ –8 cm. *Leaves* \pm coriaceous, greyish- or purplish green, not punctate, 5-parted to the base, suborbicular in outline, base cordate, 3–16 by 3–15 cm, 5-plinerved; petiole 1–8(–9) cm; leaf-parts (ob)ovate, or elliptic to oblong-lanceolate, base acute to rounded, apex obtuse (in young leaves subacute-mucronate), 2–11 by 0.8–6 cm, nerves 2–6 pairs, reticulation distinct;

margin entire. *Glands* at blade-base 2(or 4), separate or contiguous, 1–3 mm \varnothing , in two fleshy, hollowed, \pm connate auricles which make the blade-base slightly peltate; no other glands present. Stipules narrowly triangular to linear, $1\frac{1}{2}$ –2 mm. *Inflorescences* either in the axils of normal leaves, or in the axils of \pm reduced leaves crowded in short-shoots up to 3 cm, peduncled for up to $2\frac{1}{2}$ cm, up to 20-flowered in σ , 1–3-flowered in ρ ; tendrils 0–1, 1–6 cm. Sterile tendrils up to 12 cm. Bracts and bracteoles triangular, acute, $1-1\frac{1}{2}$ mm, sometimes leaf-like, up to 5 mm. σ fl. campanulate, incl. the $2\frac{1}{2}$ –6 mm long stipe 14–17 by 4 mm, sepals spreading in anthesis to c. 8 mm. Pedicel 2–8 mm. Hypanthium broadly cup-shaped, 5-saccate, $1\frac{1}{2}$ –2 mm, calyx tube 0, sepals lanceolate, obtuse, 8–10 mm, subentire. Petals lanceolate, acute, 6–7 by $1\frac{1}{2}$ –2 mm, 3–5 nerved, irregularly c. 0.1 mm serrulate. Filaments 2–3 mm, connate for $1-1\frac{1}{2}$ mm, inserted at the base of the hypanthium. Anthers $4\frac{1}{2}$ –5 by 1 mm, obtuse, up to 0.1 mm apiculate. Septa $1-1\frac{1}{2}$ mm high, narrow, separating the 5 ‘sacs’ in the hypanthium. Corona woolly, of densely set fine hairs $\frac{1}{2}$ –1 mm. Disk glands $\frac{1}{2}$ –1 by 1 mm. Vestigial ovary c. 1 mm, gynophore $\frac{1}{2}$ –1 mm. ρ fl. campanulate, incl. the c. 3 mm long stipe c. 9 by 3–4 mm. Pedicel 3–5 mm. Hypanthium broadly cup-shaped, 5-saccate, $1\frac{1}{2}$ –2 mm, calyx tube 1(–2) mm, calyx lobes (sepals) elliptic-oblong, obtuse, 2–3 mm, entire. Petals lanceolate, acute, $4-5 \times 1-1\frac{1}{2}$ mm, 3-nerved, subentire. Staminodes c. $2\frac{1}{2}$ mm, connate for $1-1\frac{1}{2}$ mm, inserted at the base of the hypanthium. Septa $1-1\frac{1}{2}$ mm high. Corona woolly, consisting of densely set fine hairs c. $\frac{1}{2}$ mm. Disk glands c. $\frac{1}{2}$ by 1 mm. Pistil not known. *Fruit* 1(–2) per inflorescence, ellipsoid, excl. the 2–3 mm long gynophore $1\frac{1}{2}$ –2 by $1.2-1\frac{1}{2}$ cm. Pericarp coriaceous. Seeds 4–10 per capsule, suborbicular, c. 7 by 7 by $2\frac{1}{2}$ mm, 7–9 pits \varnothing ; funicles 1–2 mm; embryo $5\frac{1}{2}$ mm; cotyledons suborbicular, obliquely broadly emarginate, c. 5 by 6 mm.

SOUTH RHODESIA. Kariba Distr., Bumi Escarpment: *Cannell 13*, σ fl. (SRGH, WAG); Kariba Gorge, 1500 ft.: *Goldsmith 45/59*, fr. (SRGH) — Sipolilo Distr., N. of Chenanga Camp: *Bingham 1595*, σ fl. (SRGH, WAG); Rukowakuona Escarpment, 2000–3000 ft.: *Wild 5765*, st. (COI, K, M, SRGH), *Wild & Barbosa 5907*, σ fl. (BR, COI, K, LISC, M; SRGH, type, also photographs of habit).

ECOLOGY. Dry, rocky savanna; schist outcrops, sandstone; 500–1000 m. Flowers and fruits in October.

NOTES. 1. Resembles somewhat in habit *A. glauca* and *A. fruticosa*.

2. Fresh flowers are reported as greenish, paler inside, stamens yellow, fruits mottled green and white; most flowers are produced before the leaves. The wood is reported as soft, the bark as grey-green, smooth, with lenticels, the leaves as pale green, twigs reddish brown, bracts yellow, glandular.

3. Found together with *Brachystegia*, *Pterocarpus* and *Pseudolachnostylis*.

8. *Adenia spinosa* Burt Davy, Man. Flow. Pl. and Ferns Transv. & Swazil. 1, 36 (1926) 222; Liebenberg, Bothalia 3, 4 (1939) 533, 523, 532, fig. 9, pl. 3; Dyer c.s., Wild Flow. Transv. (1962) 225. — Type: *Rogers 19299*. — Fig. 7.

Thorny shrubs up to $1\frac{1}{2}$ m, the spreading branches up to 1 m, up to 1 cm thick, arising from a grey- or yellowish green, irregularly shaped, \pm fleshy trunk up to $\frac{1}{2}$ m tall, up to $2\frac{1}{2}$ m wide. Fertile branches grey-green, 3–5 mm; internodes $\frac{1}{2}$ –4 cm. *Leaves* \pm coriaceous, grey-glaucous green, sometimes densely punctate beneath, entire, ovate to elliptic, base cordate to rounded, apex (broadly) obtuse, sometimes retuse, $1-3\frac{1}{2}$ by 0.7–3 cm, 3-plinerved and 2–4 pairs of nerves from the midrib, reticulation mostly distinct, margin entire; petiole 0.2–0.7 cm. *Glands* at blade-base 1 or 2, subreniform to orbicular, $1-2\frac{1}{2}$ mm \varnothing , sessile at the apex of the petiole; blade gland 1, subapical or apical, c. $\frac{1}{4}$ mm \varnothing , at the end of the midrib. Stipules triangular, acute, c. $\frac{1}{2}$ mm. *Thorns* $\frac{1}{2}$ –4 cm, patent, acute. *Inflorescences* solitary or in the axils of much reduced leaves in short-shoots up to 1 cm, peduncled for up to $\frac{1}{2}$ cm, 2–6-flowered in δ , 1–3-flowered in φ , tendril 0(–1), strong, 4–6 cm, mostly replaced by a thorn. Sterile tendrils simple, 4–8 cm. Bracts and bracteoles narrowly triangular, \pm serrulate, acute, 1–2 mm. δ fl. tubular-campanulate, incl. the $1\frac{1}{2}$ –3 mm long stipe (10–)12–24 by $2\frac{1}{2}$ –4 mm, the sepals spreading in anthesis to c. 12 mm. Pedicel 0–2 mm. Hypanthium (narrowly) cup-shaped, 1–3 mm, calyx tube 0, sepals lanceolate, obtuse, (8–)9–18 mm, (sub)entire. Petals lanceolate, acute, (6–)8–10 by 1–2 mm, 1–3-nerved, serrulate. Filaments $2\frac{1}{2}$ – $5\frac{1}{2}$ mm, connate for 1–3 mm, inserted at or up to $1\frac{1}{2}$ mm above the base of the hypanthium. Anthers 4–5 by $\frac{3}{4}$ –1 mm, obtuse, up to 0.2 mm apiculate. Septa 1–3 mm high. Corona consisting of a few stiff hairs $\frac{1}{2}$ –1 mm, mainly near the insertion of the petals. Disk glands 0, sometimes as callose pads up to $\frac{1}{4}$ mm. Vestigial ovary $\frac{1}{2}$ –1 mm, gynophore $\frac{1}{2}$ –1 mm. φ fl. tubular-campanulate, incl. the $1-1\frac{1}{2}$ mm long stipe 7–10 by $2-2\frac{1}{2}$ mm, in anthesis opening to c. 6 mm. Pedicel 0–1 mm. Hypanthium $1-1\frac{1}{2}$ mm, calyx tube 0, sepals lanceolate, obtuse, 5–8 mm, entire. Petals lanceolate, acute, $2\frac{1}{2}$ – $3\frac{1}{2}$ by $\frac{1}{2}$ – $\frac{3}{4}$ mm, 1-nerved, (sub)entire. Staminodes c. $1\frac{1}{2}$ mm, connate for $\frac{1}{2}$ – $\frac{3}{4}$ mm, inserted at the base of the hypanthium. Septa $\frac{1}{2}$ – $\frac{3}{4}$ mm. Corona 0 or consisting of a few stiff hairs c. $\frac{1}{4}$ mm. Disk glands 0. Pistil 4–6(–8) mm. Gynophore 1–2 mm. Ovary subglobular 2–4(–5) by $2-3\frac{1}{2}$ (–4) mm. Styles connate for c. 1 mm, style arms c. $\frac{1}{2}$ mm. Stigmas subglobular, papillate, each c. 1 mm across. *Fruit* 1–2 per inflorescence, subglobular(–ellipsoid), excl. the 3–4 mm long gynophore 1.4–2.2 by 1.2–1.8 cm. *Pericarp* thinly coriaceous. Seeds 3–6 per capsule, suborbicular, c. $6\frac{1}{2}$ by 7 by $2-2\frac{1}{2}$ mm, 9–11 pits \varnothing ; funicles 1–2 mm; embryo not known.

SOUTH RHODESIA. Southern Prov., Beitbridge Distr., Shashi R., 7 km downstream from Tuli: *Drummond* 6074, δ fl. (K, SRGH).

REP. OF SOUTH AFRICA. Transvaal, Messing, 2000 ft.: *Joung* 26933, δ fl. (PRE), *Rogers* 19299, φ fl., fr. (K, type; PRE, Z), 21664, δ fl., φ fl., fr. (K, PRE, Z), *Wall* (10), φ fl., fr. (S) — Zoutpansberg: *van der Merwe* 30270, δ fl. (PRE); Zoutpan 193: *Obermeyer* c.s. 137, st. (PRE); Seekoeipoort, 20 m. N. of Louis Trichardt: *van Vuuren* 1629, st. (PRE) — Pietersburg Distr., Naauwpoort: *Bremekamp & Schweickerdt* 469, δ fl. (PRE), 29882, δ fl. (PRE); Molsgat (near Chumiespoort): *Obermeyer* 34667 (K, PRE) — Kruger Nat. Park, Pretoriuskop, planted in rockery: *van der Schijff* 2196, δ fl. (K, PRE); Pilgrims Rest, 600 ft.: *Codd* 6187, st. (PRE, S).

ECOLOGY. Open bushland, scrub, dry rocky places, basalt rock; locally common; 200–1000 m. Flowers in Jan., May, July, Sept. and Nov., fruits in Sept. and Nov.

USES. According to *Codd 6187* 'stem apparently eaten by game'.

- NOTES. 1. The leaves are mostly soon deciduous.
2. The thorns and tendrils are homologous with the inflorescences as found in most *Adenias*; at or near the base of the thorns are two subopposite bracts, reminding of the dichasial structure of the inflorescences. The sometimes occurring inflorescences-bearing short-shoots develop from the serial bud in the axils of thorns or sterile tendrils. See also the notes under *A. globosa*.
3. The flowers resemble those of *A. glauca*; the leaves are sometimes much alike simple leaves of *A. fruticosa* ssp. *fruticosa*.
4. The tuberous main stem is reported as yellowish green, the stems pale green, the flowers cream.

9. *Adenia pechuëlii* (Engl.) Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; *ibid.* ed. 2, 21 (1925) 490, fig. 216; Engl., Pfl. welt Afr. 3, 2 (1921) 595, 600, 601, 608, fig. 267; Schreiber in Merxmüller, Prod. Fl. SW. Afr. 24, Fam. 89 (1968) 2. — *Echinothamnus pechuëlii* Engl., Bot. Jahrb. 14 (1891) 383, fig. 9; Schinz, Bot. Jahrb. 15, Beibl. 33, 1 (1892) 3; Harms in E. & P., Nat. Pfl. fam. 3, 6a (1894) 82, fig. 28; in K. Schum., Monatschr. Kakt. 5 (1895) 54–57, fig. p. 55; Bot. Jahrb. 24 (1897) 169. — Syntypes: *Pechuël-Loesche s. n.*, *Gürich 18*. — Fig. 7.

Bushy shrub up to $1\frac{1}{2}$ m, mostly leafless, the branches ligneous, erect, up to 60 cm, thorny by the subacute tips, \pm pruinose, growing from a woody-succulent subglobular or cylindrical main stem up to 1 m \varnothing , attached by a tap root. Branches grey(-green), pruinose, the older ones woody c. 10 mm thick, the younger subherbaceous, fertile, $1\frac{1}{2}$ –3 mm; internodes (0.2–) $\frac{1}{2}$ –4 cm. *Leaves* coriaceous, grey-green, minutely papillate beneath, entire or shallowly 3-lobed, ovate-oblong to lanceolate, base acute to rounded, apex (sub)acute to obtuse, 1–6 by 0.2–2(– $2\frac{1}{2}$) cm, pinninerved, nerves 2–6 pairs, reticulation indistinct, margin entire; lobes up to 3 mm; petiole 0.05–0.2 cm. *Glands* at blade-base 2, $\frac{1}{2}$ – $1\frac{1}{2}$ mm \varnothing , lateral at the very base of the midrib; blade glands 0–4, c. $\frac{1}{2}$ mm \varnothing , one pair at about $\frac{1}{3}$ – $\frac{1}{2}$ and one at $\frac{2}{3}$ from the base. *Stipules* narrowly triangular, acute, $\frac{1}{2}$ –1 mm. *Inflorescences* peduncled up to 0.2 cm, 1–2(–3)-flowered in σ and φ . *Tendrils* 0. *Bracts* and *bracteoles* triangular, acute, $\frac{1}{2}$ –1 mm. *Flowers* dioecious. σ *fl.* campanulate, incl. the c. 3 mm long stipe 8–10 by $2\frac{1}{2}$ –4 mm, the sepals in anthesis opening to c. 6 mm. *Pedicel* 1–3 mm. *Hypanthium* cup-shaped $\frac{3}{4}$ – $1\frac{1}{2}$ mm, calyx tube 0, sepals elliptic to oblong, obtuse, 3– $5\frac{1}{2}$ mm, entire. *Petals* lanceolate, acute, c. 3– $4\frac{1}{2}$ by $\frac{1}{2}$ –1 mm, 1-nerved, serrulate near the apex. *Filaments* 1– $1\frac{1}{2}$ mm, connate for $\frac{1}{2}$ – $\frac{3}{4}$ mm, inserted at the base of the hypanthium. *Anthers* c. $4\frac{1}{2}$ by 1 mm, obtuse. *Septa* $\frac{1}{2}$ – $\frac{3}{4}$ mm. *Corona* hairs fine, woolly, $\frac{1}{2}$ – $\frac{3}{4}$ mm. *Disk glands* c. 0.2 mm. *Vestigial ovary* incl.

gynophore c. $\frac{1}{2}$ mm. ♀ fl. (known from the remains at base of fruit) campanulate, incl. the 2–3 mm long stipe 7–8 by $2\frac{1}{2}$ –3 mm. Pedicel c. 2 mm. Hypanthium 1(– $1\frac{1}{2}$) mm, calyx tube c. $\frac{1}{2}$ mm, calyx lobes (sepals) oblong, obtuse, c. 4 mm, entire. Petals lanceolate, (sub)acute, up to 0.2 mm mucronate, c. $2\frac{1}{2}$ by $\frac{1}{2}$ – $\frac{3}{4}$ mm, 1-nerved, serrulate at apex, inserted c. $\frac{1}{2}$ mm below calyx lobes. Staminodes $1\frac{1}{2}$ –2 mm, connate for $\frac{1}{2}$ – $\frac{3}{4}$ mm, inserted at the base of the hypanthium. Septa $\frac{1}{2}$ – $\frac{3}{4}$ mm high. Corona consisting of thin hairs c. $\frac{1}{2}$ mm, also on the septa. Disk glands 0. Pistil c. 4 (?) mm. Gynophore c. 1 mm. Ovary ellipsoid (?), c. 2 by $1\frac{1}{2}$ mm (?). Styles connate for at least $\frac{1}{2}$ mm. Stigmas not known. *Fruit* 1 per inflorescence, subglobular to ellipsoid, excl. the 1–2 mm long gynophore 1– $1\frac{1}{2}$ by 1– $1\frac{1}{2}$ cm. Pericarp thinly coriaceous, smooth. Seeds 3–6 per capsule, ovate, c. 7 by 6 by $2\frac{1}{2}$ mm, 8–11 pits along the length; funicles 1–2 mm; mature embryo not known.

SOUTH-WEST AFRICA. Damaraland, s.l.: *Anon. s.n.*, st. (B, cult. in hort. bot. Berol.); Omaruru: *Giess 9190*, ♂ fl. (M); Aubinhoniz, Eisib R.: *Gürich 18*, ♂ fl. (B †, syntype *Echinothamnus pechuëlii*, n.v.); Carp Rocks (Walvis Bay); *Jenzen s.n.* (M, photograph); Pforte: *Anon. (Moll) s.n.*, st. (GRO, M), *Merxmüller 1758*, fr. (M); Heigamchab, near Husab: *Pechuël-Loesche s.n.*, st. (B †, syntype *Echinothamnus pechuëlii*, n.v.); Davieib: *Pechuël-Loesche s.n.*, st. (B †, syntype *Echinothamnus pechuëlii*, n.v.); Tuffkreuz, Bläszkreuz: *Volk 931*, st. (M).

ECOLOGY. (Semi)desert; marble and granite rock and sand; 200–1000 m. Flowers in December, fruits in February.

NOTE. 1. This peculiar species is according to ENGLER and others related to *A. repanda* on account of the absence of the corona and disk glands in the (male) flowers. The male flowers in *Giess 9190* and the remnants of the female flowers in the fruiting specimen *Merxmüller 1758*, however, showed distinctly a corona and disk glands only in ♂.

10. *Adenia wightiana* (Wall. ex W. & A.) Engl., Bot. Jahrb. 14 (1891) 376; Harms in E. & P., Nat. Pfl. fam. ed. 1, 3, 6a (1893) 84; ed. 2, 21 (1925) 492; Bot. Jahrb. 15 (1893) 569, 573, 574 (anatomy); Hall. f., Med. Rijksherb. 42 (1922) 11; Fischer in Gamble, Fl. Presid. Madras 1 (1935) 525; Chakravarty, Bull. Bot. Soc. Beng. 3, 1 (1951) 65; Chopra, Badhwar & Ghosh, Pois. Pl. Ind. 1, ed. 2 (1965) 400; Cusset, Adansonia 2, 7 (1967) 374, 383. — *Modecca wightiana* Wall., Cat. (1832) n. 6764, *nom. nud.*; Wight, Cat. Ind. Pl. (1833) n. 1155; W. & A., Prod. 1 (1834) 353; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Wight, Ic. 1 (1839) tab. 179; Walpers, Rep. Bot. Syst. 2 (1843) 222; Thwaites, En. Pl. Zeyl. (1859) 128, C. P. 1621; Mast. in Hook f., Fl. Brit. Ind. 2 (1879) 601; Trimen, Fl. Ceyl. 2 (1894) 240. — *Microblepharis wightiana* Roem., Syn. Mon., 2., Pepon. (1846) 133, 200. — Type: *Wallich 6764*.

Modecca diversifolia Wall., Cat. (1832) n. 6763, *nom. nudon* Schum.; W. & A., Prod. 1 (1834) 353; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Roem., Syn. Mon., 2 Pepon. (1846) 203. — Type: *Wallich 6763*.



FIG. 8. *Adenia wightiana*. — a-h. ssp. *wightiana*; a. habit, $\times \frac{2}{3}$ (Wight 1155); b. leaf, $\times \frac{2}{3}$ (Walker 52); c. detail of inflorescence with flower, $\times 4$ (Wight 1155); d. ♂ flower, $\times 6$ (Thwaites 1621); e. ditto, longitudinal section, $\times 6$ (Thwaites 1621); f. ♀ flower, longitudinal section, $\times 6$ (Wight s.n.); g. fruits, $\times \frac{2}{3}$ (Fischer 3779); h. seed, $\times 4$ (Wight s.n.). — i-k. ssp. *africana*; i. node with stipule and serial bud, $\times 6$ (Polhill & Paulo 1146); j. ♂ flower, longitudinal section, $\times 6$ (Conrad 4949); k. ♀ flower, longitudinal section, $\times 6$ (Greenway 11293).

Herbaceous or subligneous climber up to 8 m, growing from a tuberous rootstock. Fertile branches (grey-)green, sometimes pruinose, $1\frac{1}{2}$ –4 mm; internodes 2–10 cm. *Leaves* herbaceous, brown-green above, greyish-green beneath, punctate or not, entire to deeply 3–5-lobed, broadly ovate to oblong-lanceolate, or triangular or hastate, base acute to cordate or truncate, apex acute to obtuse, up to 1 mm mucronate, 2–12(–14) by $1\frac{1}{2}$ –11 cm, 3–5-pinnerved and 2–6 pairs of nerves from the midrib, nerves interlooping or ending in the margin, reticulation distinct or not, margin entire or irregularly sinuate or dentate, up to $\frac{1}{2}$ cm; lobes broadly rounded to lanceolate, obtuse, up to 3 cm; petiole $\frac{1}{2}$ –6 cm. *Gland* at blade-base 1, 1–2 $\frac{1}{2}$ mm \varnothing , on the fleshy, semicircular, peltate blade-base up to 3 mm; blade glands 0; marginal glands up to c. $\frac{1}{2}$ mm, 0–3(–4) at either side of the blade. Stipules triangular, acute, or broadly reniform, deeply dissected with minute glands at the tips, c. 1 mm. *Inflorescences* peduncled for ($\frac{1}{2}$ –)2–15 cm, rarely in African specimens sessile in short shoots up to 3 cm, up to 30-flowered, distinctly cincinnal, in δ , 2–6-flowered in φ ; tendrils 1 or 3, $\frac{1}{2}$ –1 $\frac{1}{2}$ cm; peduncle often \pm spirally. Sterile tendrils simple or 3-fid, up to 15 cm. Bracts and bracteoles narrowly triangular to lanceolate, acute, $\frac{1}{2}$ –1 $\frac{1}{2}$ mm. In Africa sometimes monoecious. δ *fl.* campanulate, incl. the $1\frac{1}{2}$ –3 mm long stipe (3–)4–6 by $2\frac{1}{2}$ –3 mm. Pedicel 1–5(–8) mm. Hypanthium cup-shaped 1–2, calyx tube 0, sepals ovate, obtuse to subacute, 1–2 mm, subentire. Petals ovate to elliptic-oblong subacute, 1–1 $\frac{1}{2}$ mm, 1(–3)-nerved, up to 0.1 mm serrulate in the upper half. Filaments $1\frac{3}{4}$ –2 $\frac{1}{2}$ mm, connate for $1\frac{1}{4}$ –1 $\frac{1}{2}$ mm, inserted at the base of the hypanthium or on an androgynophore up to $\frac{1}{2}$ mm. Anthers $\frac{1}{2}$ –1 $\frac{1}{4}$ by $\frac{1}{3}$ – $\frac{2}{3}$, obtuse. Septa 0. Corona consisting of hairs or filaments, $\frac{1}{2}$ – $\frac{2}{3}$ mm. Disk glands c. $\frac{1}{3}$ mm. Vestigial ovary $\frac{1}{2}$ –1 mm, gynophore up to $\frac{1}{2}$ mm. φ *fl.* campanulate, incl. the $\frac{1}{2}$ –2 mm long stipe $2\frac{1}{2}$ –6 by $2\frac{1}{2}$ –4 mm. Pedicel 1–5(–8) mm. Hypanthium cup- to saucer-shaped 1–2 mm, calyx tube 0, sepals ovate, subobtuse, $1\frac{1}{2}$ –2 mm, entire. Petals obovate-oblong, obtuse, 1–1 $\frac{1}{2}$ by $\frac{1}{2}$ –1 mm, 1-nerved, entire or serrulate in the upper half. Staminodes $\frac{1}{2}$ –2 mm, free, inserted at the base of the hypanthium. Septa 0. Corona consisting of filaments $\frac{1}{3}$ – $\frac{2}{3}$ mm. Disk glands c. $\frac{1}{3}$ mm. Pistil 2–4 mm. Gynophore 0.2– $\frac{1}{2}$ mm. Ovary globular to ellipsoid, $1\frac{3}{4}$ –2 $\frac{1}{2}$ by $1\frac{3}{4}$ –2 mm. Styles up to $\frac{1}{2}$ mm, free or connate. Stigmas subreniform, papillate, each 1–1 $\frac{1}{2}$ mm \varnothing . *Fruit* 1–2 per inflorescence, subglobose to ellipsoid or ovoid, excl. the 1–3 mm long gynophore $1\frac{1}{2}$ –3 by $1\frac{1}{4}$ –2 cm. Pericarp chartaceous or coriaceous, c. $\frac{1}{4}$ mm. Seeds 10–25 per capsule, obliquely ovate, 5–6 by $4\frac{1}{2}$ –5 by 2 mm, 5–7 pits along the length; funicles 1–2 mm; embryo $4\frac{1}{2}$ –5 mm; cotyledons suborbicular c. 4 by $3\frac{1}{2}$ mm.

DISTRIBUTION. S. India, Ceylon and E. Africa. — Fig. 7, 11.

NOTES. 1. Distinguished by the small flowers.

2. The Asian and E. African specimens belong to different subspecies, occurring at different altitudes.

KEY TO THE SUBSPECIES

1. Margin of blade entire, not dentate, without glands. Stipules triangular, entire. Inflorescences with 1 tendril; sterile tendrils simple. Anthers c. 1 mm. Hypanthium of ♀ fl. about as broad as long, ± fleshy, c. $1\frac{1}{2}$ –2 by 2 mm. Asia.
 - a. ssp. *wightiana*
1. Margin of blade mostly shallowly sinuate, remotely c. $\frac{1}{2}$ mm dentate; marginal glands present. Stipules broadly reniform, coarsely dissected. Inflorescences mostly with 3 tendrils; sterile tendrils mostly 3-fid. Anthers c. $\frac{1}{2}$ mm. Hypanthium of ♀ fl. much broader than long, thick fleshy, c. 1 by 2–3 mm. E. Africa.
 - b. ssp. *africana*

a. ssp. *wightiana* — Fig. 8 a-h, 11.

Leaves mostly punctate, entire to deeply 3–5-lobed, margin entire, without minute teeth or glands. Stipules (broadly) triangular, acute. *Inflorescences* with 1 tendril; sterile tendrils simple. Dioecious. ♂ *fl.* incl. the 2–3 mm long stipe 5–6 mm. Hypanthium $1\frac{1}{2}$ –2 mm, sepals $1\frac{1}{2}$ –2 mm. Petals c. $1\frac{1}{2}$ mm. Anthers c. 1 mm. ♀ *fl.* campanulate, incl. the $1\frac{1}{2}$ –2 mm long stipe 5–6 mm. Hypanthium cup-shaped, c. $1\frac{1}{2}$ –2 by 2 mm, ± fleshy, sepals $1\frac{1}{2}$ –2 mm. Petals 1– $1\frac{1}{2}$ mm. Pistil 3–4 mm.

INDIA. *Hb. Rottlerianum s.n.*, fr. (K) — Coimbatore Distr., Sholakarai: *Fischer 3779*, ♀ fl., fr. (CAL); Anamalai Hills (E. Madras): *Beddome 3226/3164B*, ♀ fl. (BM); N. Arcot, Nelliput, 2000 ft.: *Gamble 1510A*, ♂ fl. (K), *Hunten (Hinter?) s.n.*, ♀ fl. (K); Nellore Distr., Veligonda Hills: *Ramaswami 1362*, fr. (CAL); S. Arcot: *Barber 814*, fr. (K); Chingleput Distr., Kambakkam Hills: *Anon. 8857*, ♂ fl. (K); Madurai Distr., Alagar Hills, 1400 ft.: *Fischer 3194*, fr. (CAL); Ginger Hill: *Wallich 6763* (K-W, type *Modecca diversifolia*), 6764 (K-W, type *Modecca wightiana*); s. loc.: *Wight s.n.*, fr. (W); Sirra Mullay: *Wight 1155*, ♂ fl., fr. (B, E, K, L, NY, P), 1156, ♀ fl., fr. (GH, K).

CEYLON (mainly Northern): *Thwaites C.P. 1621*, ♂ fl. (BM, P, W), *C.P. 1623*, ♂ (?) fl., fr. (K), *Walker s.n.*, ♂ fl. (K), 52, ♂ fl. (E, K); Colombo: *d'Allezette s.n.*, ♂ fl. (L).

ECOLOGY. Dry hilly country in seasonal climate; up to 800 m. Flowers and fruits from July to Dec.

NOTE. 1. HARMS (1893) reports the presence of tannin in epidermal- and parenchyma cells.

b. ssp. *africana* de Wilde, *Blumea* 17 (1969) 179. — Type: *Polhill & Paulo 1146*. — Fig. 7, 8 i-k.

Leaves mostly not punctate, entire or shallowly 3–5-lobed, mostly with irregularly sinuate-dentate margin, margin mostly with scattered teeth c. $\frac{1}{2}$ mm, and with 0–3(–4) small glands at either side. Stipules broadly reniform, deeply coarsely dissected with minute glands at the tips. *Inflorescences* with 3 tendrils, sterile tendrils 3-fid, rarely simple. Dioecious or monoecious. ♂ *fl.* incl. the $1\frac{1}{2}$ –2 mm long stipe 3–5 mm. Hypanthium c. 1 mm, sepals $1\frac{1}{2}$ –2 mm. Petals

1-1½ mm. Anthers c. ½ mm. ♀ fl. broadly campanulate, incl. the ½-1 mm long stipe c. 3 mm. Hypanthium thick-fleshy, broadly cup- to saucer-shaped c. 1 by 2-3 mm. Sepals 1-1½ mm. Petals 1-1½ mm. Pistil 2-3 mm.

KENYA. Machakos Distr. (K4), Nairobi, 5500 ft.: *Greenway 5990*, ♀ fl. (EA), *Nattrass s.n.*, ♀ fl., fr. (EA, K), *Wilson H. 120/51*, fr. (EA) — Southern Prov. (K 6), Chyulu foothills, 4000 ft.: *Bally 8002*, ♀ fl., fr. (EA, K).

TANZANIA. Tanganyika, Gegera Forest: *Faulkner 3824*, fr. (BR, K, WAG) — Lake Prov. (T 1), near Ukerewe I.: *Conrads 4949*, ♂ fl., fr. (EA, K), *5259*, fr. (EA, K), *5316*, fr. (EA, K), *5783*, ♂ fl. (EA, K) — Northern Prov. (T 2), Mbulu Distr., Lake Manyara Nat. Park: *Greenway & Kanuri 11293*, ♂ fl. ♀ fl., fr. (EA, K) — Tanga Prov. (T 3), Lushoto Distr., Soni, 1150 m: *Drummond & Hemsley 2529* (EA, K, SRGH); Pare Distr., Ngulu, c. 3500 ft.: *Haarer 1505*, st. (EA, K), *Peter 54618*, ♀ fl., fr. (B) — Central Prov. (T5), Kolo, 15 miles N. of Kondoa, 5050 ft.: *Polhill & Paulo 1146*, ♀ fl., fr. (BR, EA; K, type; LISC, P) — Eastern Prov. (T6), Morogoro Distr., above Morningside, 1400 m: *Drummond & Hemsley 1747*, ♀ fl., fr. (BR, EA, K); Uluguru Mts., 1150 m: *Schlieben 2705*, ♂ fl. (B, BM, BR, P); Suriani, Manyangu Forest Res.: *Semsei 2408*, fr. (EA, K); Mpwapwa, 3500 ft.: *Hornby 593*, fr. (EA, K); Maskati Mission, 6°04 S, 37°28 E., 5000 ft.: *Robertson 387*, ♂ fl. (EA); Mandéra: *Sacleux 910*, fr. (P).

ECOLOGY. Scrub savanna, forest fringes; 1000-1800 m. Flowers and fruits mainly from March to May.

NOTES. 1. The leaves resemble sometimes those as found in sect. *Ophiocaulon*, but differ by the not spathulate gland at the blade-base.

2. Sometimes monoecious plants, with ♂ and ♀ flowers mixed in one inflorescence, are found.

3. Fresh flowers are reported as (pale) green, pale yellow, or yellowish, anthers yellow, stigmas orange. Fruits pale green, turning bright red.

11. *Adenia banaensis* Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 138, t. 2, fig. 4; t. 6, fig. 1-5; t. 7 fig. 4.; Bull. Soc. Bot. Fr. 115 (1968) 49-50, fig. 1, 7. — Type: *Poilane 29195* — Fig. 11.

Subherbaceous climber, 2-5 m. Fertile branches (pale) greenish, 1½-3 mm; internodes 3-10 cm. Leaves subcoriaceous, (brown-)green above, pale green to glaucous green, not punctate beneath, entire, oblong to lanceolate, base rounded to acute, apex acute up to 1 cm acuminate, 9-18(-20) by (3-3½-5(-8) cm, pinninerved, nerves (4-)5-7 pairs, reticulation rather distinct, margin entire; petiole 1-3½ cm. Gland at blade-base 1, ½-1 mm ∅ on the rounded or sometimes ± bi-lobed 2-3 mm broad peltate blade-base; blade glands conspicuous, 1½-2½ mm ∅, one pair just above the insertion of the petiole, and mostly 1(-2) pair(s) at about ¼ or ⅓ from the apex. Stipules (broadly) triangular, ± lacerate, c. ½ mm. Inflorescences peduncled for 6-10½ cm, up to 30-flowered in ♂, 2-3 flowered in ♀; tendril 1, 1½-3½ cm. Sterile tendrils up to 12 cm. Bracts and bracteoles narrowly triangular, acute, c. 1(-1½) mm. ♂ fl. ± campanulate (-infundibuliform), incl. the 9-10 mm long stipe 16-19 by 3-3½ mm. Pedicel (1-) 2-6 mm. Hypanthium broadly cup-shaped 1(-1½) mm, calyx tube 0, sepals elliptic(-oblong), obtuse, 6-7½ mm, subentire. Petals obovate, apex obtuse-

-truncate, shortly mucronate or not, $4\frac{1}{2}$ –5 by $2\frac{1}{2}$ –3 mm, 3(–5)-nerved, margin irregularly 0.1(–0.3) mm dentate (-lacerate). Filaments $2\frac{1}{2}$ (–3) mm, connate for 1(– $1\frac{1}{2}$) mm, inserted at the base of the hypanthium. Anthers c. 3(– $3\frac{1}{2}$) by 1 mm, subobtuse, up to 0.2 mm apiculate. Septa c. 1 mm high. Corona membranous at base, fimbriate-laciniate in the upper half, $\frac{1}{3}$ – $\frac{1}{2}$ mm. Disk glands $\frac{1}{3}$ – $\frac{1}{2}$ mm, largely adnate with the hypanthium. Vestigial ovary incl. gynophore c. 1 mm. ♀ fl. not known; stipe in fruit 6–14 mm. Fruit 1–2 per inflorescence, oblong, ± fusiform, excl. the 9–18 mm long gynophore 5– $6\frac{1}{2}$ by $1\frac{3}{4}$ – $2\frac{1}{2}$ (–3) cm. Pericarp coriaceous c. $\frac{1}{2}$ (–1) mm. Seeds 15–25 per capsule, circular to subtriangular, c. $8\frac{1}{2}$ –9 by $4\frac{1}{2}$ mm, 9–13 pits \emptyset ; funicles 7–8 mm; embryo c. 9 mm; cotyledons broadly ovate, apex broadly obliquely emarginate, c. 9 by 8 mm.

SOUTH VIETNAM. Hué Prov., Bach Ma: Vidal 1073 (P). — Da Nang Prov., Ba Na: Clemens 3922, fr. (K, NY, P), Poilane 1527, fr. (P); 1000–1200 m: Poilane 29150, fl. buds (P), 29195, ♂ fl. (P, type).

ECOLOGY. Forest near stream (Clemens), very poor granite soil (Poilane); 1000–1500 m. Flowers in March, fruits in May–July.

NOTES. 1. Characterized by the conspicuous blade-glands; in the general leaf shape it may be confused with *A. penangiana* and certain forms of *A. heterophylla*.

2. CUSSET erroneously described the disk glands as adnate with the corona.

12. *A. penangiana* (Wall. ex G. Don) de Wilde, Blumea 15 (1967) 266. — *Passiflora penangiana* Wall., Cat. (1829) n. 1233, *nom. nud.*; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 55; Mast., Trans. Linn. Soc. Lond. 27 (1871) 631. — *Anthactinia penangiana* Roem., Syn. Mon., 2 Pepon. (1846) 192. — *Disemma* ? *penangiana* Miq., Fl. Ind. Bat. 1, 1 (1856) 700. — Type: Wallich 1233.

Modecca nicobarica Kurz in Trim., J. Bot. 13 (1875) 326; J. As. Soc. Beng. 44–45, 2 (1876) 132; Mast. in Hook. f., Fl. Brit. Ind. 2 (1879) 603. — *Adenia nicobarica* King, Mat. Fl. Mal. Pen. 3, in J. As. Soc. Beng. 71, 2, 1902 (1903) 52; Ridl., Fl. Mal. Pen. 1 (1922) 840 (*pro majore parte*); Hall. f., Med. Rijksherb. 42 (1922) 9; Henderson, Gard. Bull. S. S. 4 (1928) 264, p.p.; Craib, Fl. Siam. En. 1 (1931) 747; Merr., Contr. Arn. Arb. 8 (1934) 110; Henderson, J. Str. Br. R. As. Soc. 17 (1939) 47, p.p.; Chakravarty, Bull. Bot. Soc. Bengal 3 (1951) 65. — Type: Kurz *s.n.*

A. nicobarica var. *obliqua* Craib, Fl. Siam. En. 1 (1931) 747. — Type: Kerr 15242.

A. catharinae Merr., Contrib. Arn. Arb. 8 (1934) 110, t. 7. — Type: W.N. & C. M. Bangham 729.

Slender subherbaceous climber or creeper, up to 6 m, growing from a tuberous rootstock. Fertile branches pale greenish, $\frac{3}{4}$ –3 mm; internodes 1–10 cm.

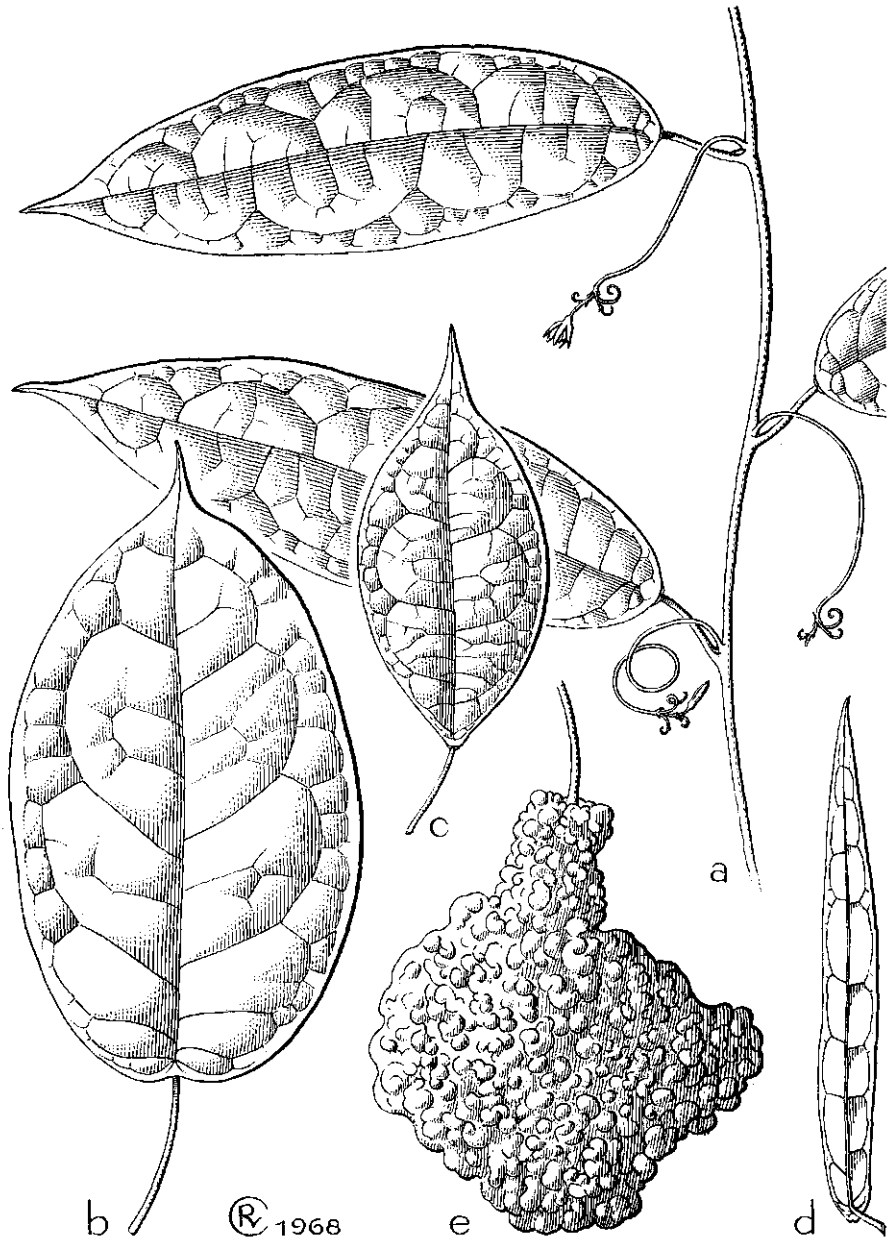


FIG. 9. *Adenia penangiana*. — a-c. var. *penangiana*; a. habit, $\times \frac{1}{2}$ (Rahmat si Toroes 2329); b. leaf, $\times \frac{1}{2}$ (Maradjo 158); c. leaf, $\times \frac{1}{2}$ (Beccari 4409). — d-e. var. *parvifolia*; d. leaf, $\times \frac{1}{2}$ (Haniff & Nur 7497); e. tuber, $\times \frac{1}{2}$ (Henderson s.n.).

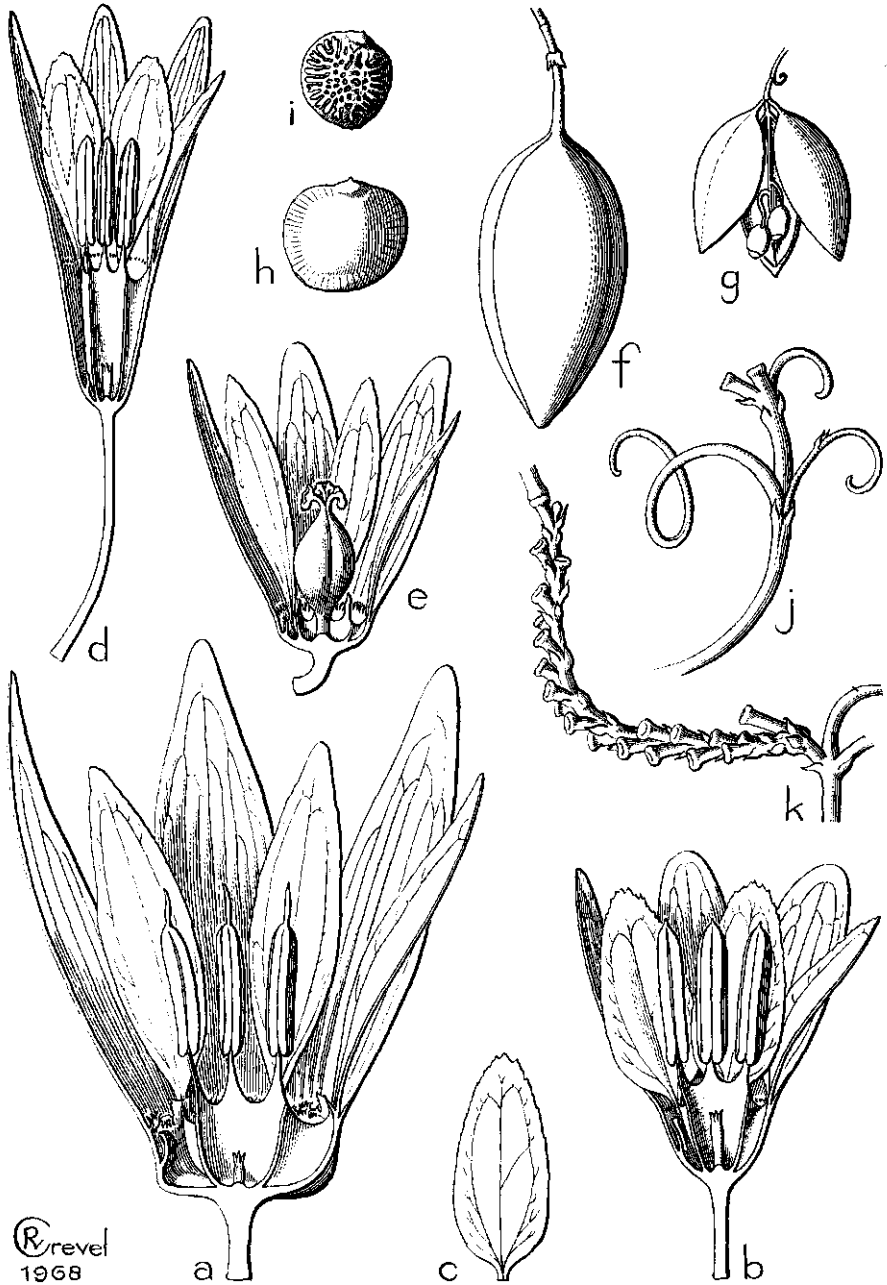


FIG. 10. *Adenia penangiana*. — a-c, e-f, h, j-k. var. *penangiana*; a. ♂ flower, longitudinal section, $\times 6$ (Lörzing 6832); b. ♂ flower, longitudinal section, $\times 6$ (Rahmat si Toroës 2329); c. ditto, petal, $\times 6$ (Rahmat si Toroës 2329); e. ♀ flower, longitudinal section, $\times 6$ (Meijer 3196); f. fruit, $\times \frac{2}{3}$ (Jelinek 148, lectotype *A. nicobarica*); h. seed, $\times 2$ (Haniff 3909); j. detail of inflorescence with tendrils, $\times 4$ (Rahmat si Toroës 2329); k. detail of inflorescence, $\times 4$ (Curtis 3504). — d, g, i. var. *parvifolia*; d. ♂ flower, longitudinal section, $\times 6$ (Haniff & Nur 7497); g. fruit, $\times \frac{2}{3}$ (Corner SF 37889); i. seed, $\times 2$ (Corner SF 37889).

Leaves herbaceous to coriaceous, (brownish-) green, paler beneath, not punctate, entire, (broadly) ovate-elliptic to linear, base rounded to subtruncate, rarely subacute, apex acute, up to 2 cm acuminate, $(1\frac{1}{2}-)2-16$ by $(\frac{1}{4}-)\frac{1}{2}-7\frac{1}{2}$ cm, pin-nerved, nerves 5-12 pairs, reticulation mostly distinct, margin entire; petiole $(\frac{1}{3}-)\frac{1}{2}-3\frac{1}{2}$ cm. *Glands* at blade-base 2, sometimes contiguous, $\frac{1}{2}-1\frac{1}{2}$ mm \varnothing , on the mostly slightly bi-lobed up to 5 mm broad peltate blade-base; marginal glands $\frac{1}{4}-\frac{1}{2}$ mm \varnothing , 0-9 on either side of the blade, sometimes \pm submarginal. *Stipules* subtriangular, obtuse, sometimes lacerate, c. $\frac{1}{2}$ mm. *Inflorescences* either in the axils of normal leaves, peduncled for $\frac{1}{2}-10$ cm, or in the axils of much reduced leaves in short-shoots up to 3 cm, subsessile, up to 30-flowered, often cincinnate, in σ , 1-3-flowered in ρ ; tendrils 0-3, $\frac{1}{2}-1$ cm. Sterile tendrils simple or 3-fid, 1-10 cm, sometimes ending in adhesive discs. Bracts and bracteoles triangular to oblong, acute, $\frac{1}{2}-1\frac{1}{2}$ mm. Dioecious or monoecious. σ *fl.* (tubiform-)campanulate, incl. the 1-7 mm long stipe 8-17 by 1-4 mm, sepals spreading in anthesis to 10 mm. Pedicel $\frac{1}{2}-3$ mm. Hypanthium (longly) cup-shaped 1-2(-3) mm, calyx tube 0(-2) mm, sepals (or calyx lobes) oblong to lanceolate-linear, acute to obtuse, $4\frac{1}{2}-15$ mm, entire. Petals elliptic to oblong, \pm unguiculate, obtuse to subacute, 4-10 by $1\frac{1}{4}-3$ mm, 3-nerved, c. 0.1 mm serrulate, inserted at the same level as the corona. Filaments $2\frac{1}{2}-3\frac{1}{2}$ mm, connate for 1-2 $\frac{1}{2}$ mm, inserted at the base of the hypanthium. Anthers 2-3 $\frac{1}{2}$ by $\frac{1}{2}-\frac{3}{4}$ mm, obtuse to subacute, up to 1 mm apiculate. Septa 1-2 mm high. Corona composed of (woolly) filaments or a woolly deeply lacinate membrane 0.1- $\frac{1}{2}$ mm. Disk glands $\frac{1}{2}-1$ mm. Vestigial ovary incl. gynophore $\frac{1}{2}-1$ mm. ρ *fl.* narrowly campanulate, incl. the 1-3(-5) mm long stipe 6-16 by 1-2 $\frac{1}{2}$ mm. Pedicel $\frac{1}{2}-2$ mm. Hypanthium cup-shaped $\frac{1}{2}-1\frac{1}{2}$ mm, calyx tube 0, sepals oblong to lanceolate-linear, acute to obtuse, 4-10 mm, entire. Petals elliptic to oblong, obtuse, 2-5 by $\frac{3}{4}-1\frac{1}{4}$ mm, \pm serrulate. Staminodes 1-1 $\frac{1}{2}$ mm, connate for $\frac{1}{4}-\frac{1}{2}$ mm, inserted at the base of the hypanthium. Septa $\frac{1}{4}-\frac{1}{2}$ mm high. Corona composed of hairs $\frac{1}{4}-\frac{1}{2}$ mm. Disk glands c. $\frac{1}{2}$ mm. Pistil 3 $\frac{1}{2}-6$ mm. Gynophore c. $\frac{1}{2}$ mm. Ovary ellipsoid to oblong, 2-3 by $1\frac{1}{4}-1\frac{1}{2}$ mm. Styles connate for up to $\frac{1}{2}$ mm, style arms 1-2 mm. Stigmas subglobular, woolly-papillate, each c. 1 mm \varnothing . *Fruit* 1 per inflorescence, ellipsoid to oblong, apex obtuse or subacute, excl. the 2-25 mm long gynophore $(1\frac{3}{4}-)2-5\frac{1}{2}(-6)$ by $1\frac{1}{4}-3$ cm. Pericarp coriaceous, $\frac{1}{4}-\frac{1}{2}$ mm, smooth. Seeds (3-)5-15 per capsule, variable, subglobular or flattened, or subtriangular, 5-11 by 5-11 by 3-4 mm, smooth or grooved or variously pitted; funicles (4-)5-10 mm; embryo 5-9 mm; cotyledons suborbicular, sometimes (obliquely) truncate, 5-9 by 5-8 mm.

DISTRIBUTION. Nicobar I., Peninsular Thailand, Malay Pen., N. & C. Sumatra. — Fig. 11.

ECOLOGY. Rocky places, scrub, forest; often on limestone; 0-1200 m.

NOTES. 1. Beside inflorescences in the axils of normal leaves sometimes subsessile inflorescences arranged in short-shoots are found. These short-shoots develop from the serial bud in the axils of the sterile tendrils and are later on often growing through into normal branches.

2. Sometimes monoecious specimens, with male- and female flowers in different inflorescences, are found in var. *parvifolia*.
3. A variable species in which two not sharply distinct varieties are recognized; most of the specimens from limestone in Peninsular Thailand belong to var. *parvifolia*.

KEY TO THE VARIETIES

1. Fruit 3–6 cm, gynophore 4–25 mm. Seeds flattened, $7\frac{1}{2}$ –11 mm \varnothing , shallowly pitted. Hypanthium $1\frac{1}{2}$ – $3\frac{1}{2}$ (–4) mm wide, calyx tube 0. Corona filaments (0.1–) $\frac{1}{2}$ mm. Anthers ($2\frac{1}{2}$ –)3– $3\frac{1}{2}$ mm, up to 1 mm apiculate. Leaves elliptic-oblong to (ob)lanceolate. Nicobar I., Malaya, N. & C. Sumatra.

a. var. **penangiana**

1. Fruit $1\frac{3}{4}$ –4 cm, gynophore 2–5 mm. Seeds subglobular to \pm flattened, 4–7 mm \varnothing , smooth or shallowly pitted. Hypanthium 1–2 mm wide, calyx tube 0–2 mm. Corona filaments 0.1– $\frac{1}{3}$ mm. Anthers 2–3(– $3\frac{1}{2}$) mm, up to 0.2 mm apiculate. Leaves ovate-oblong to lanceolate-linear. Peninsular Thailand, NW. Malaya b. var. **parvifolia**

a. var. **penangiana** — Fig. 9 a-c, 10 a-c, e-f, h, j-k, 11.

Subherbaceous climber up to 6 m. *Leaves* broadly ovate-elliptic to lanceolate, base rounded, rarely subacute, apex mostly distinctly acuminate, $3\frac{1}{2}$ –16 by 1– $7\frac{1}{3}$ cm. (Sub)marginal glands present or not. *Inflorescences* in the axils of normal leaves, peduncled for $\frac{1}{2}$ –10 cm. δ fl. incl. the 1–5 mm long stipe 8–17 by $1\frac{1}{2}$ –4 mm. Hypanthium $1\frac{1}{2}$ –2 mm, calyx tube 0, sepals oblong to lanceolate, 5–13 mm. Petals 4–10 mm. Filaments $2\frac{1}{2}$ – $3\frac{1}{2}$ mm, connate for 1–2 mm. Anthers ($2\frac{1}{2}$ –)3– $3\frac{1}{2}$ mm, up to 1 mm apiculate. Corona filaments $\frac{1}{3}$ – $\frac{1}{2}$ mm. φ fl. incl. the 1–5 mm long stipe 6–16 by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Hypanthium 1– $1\frac{1}{2}$ mm, calyx tube 0, sepals oblong to lanceolate 5–9 mm. *Fruit* excl. the 4–25 mm long gynophore 3–6 by $1\frac{1}{2}$ –3 cm. Seeds flattened, nearly smooth or shallowly grooved or pitted, $7\frac{1}{2}$ –11 mm \varnothing .

INDIA. Nicobar Is., Katchall: *Kurz s.n.* (Comm. King), fr. (K, type *A. nicobarica*); Nicobar I.: *Jelinek 148* (exp. Novara), fr. (W).

THAILAND. Surāt, Kaw Tao: *Kerr 12820*, fr. (BM, K); Kanchanadit: *Kerr 13072*, fr. (BM); Puket, Pang-Nga, 100–400 m: *Kerr 17558*, fr. (K, SING), *19361*, φ fl. (K), *19370*, st. (BM, K); Kao Sung, 900 m: *Kerr 15242*, δ fl. (BM, K, type *A. nicobarica* var. *obliqua*) — Nakawn Srītamārāt, Padang Besar, 50 m: *Kerr 13593*, δ fl. (BM, K); S. of Tēpa: *Kerr 14862*, δ fl. (BM, E, K); Khao Pong Hill: *Haniff SF. 3844*, φ fl. (SING), *SF. 3909*, fr. (SING) — Pattani: *Lakshnakara 380*, st. (K), *Kerr 7833*, δ fl. (BM, C, E, K, L).

SUMATRA. Atjeh, Takingeun, 3600 ft.: *W. & C. Bangham 729*, δ fl. (A, type *A. catharinae*) — West Coast: *Korthals 682*, st. (L); Mt. Sago, 1100 m: *Bunnemeijer 3669*, fl. (BO), *Maradjo 158*, fr. (L), *Meijer 3196*, φ fl. (BO) — East Coast, Sibolangit, 350 m: *Lörzling 6832*, δ fl. (BO, L); Rantau-parapat (Bila): *Rahmat si Toroes 2329*, δ fl. (MICH, NY), *4315*, st. (NY); Asahan, 250 ft.: *Hamel 1246*, st. (MICH), *Yates 2053*, δ fl. (MICH) — Palembang: *Buurman van Vreedden 255*, fr. (BO).

MALAY PENINS. Kedah: *Vesterdal* 172, fr. (C), 222, fl. (C) — Perak: *Ridley s.n.*, fr. (SING), *Scortechini* 633, st. (BM, K, L, P); Grik: *Burkill SF. 12413*, fl., fr. (BRI, SING); Waterfall Hill: *Wray* 651, fr. (K, SING); Taiping Hill: *Haniff SF. 2352*, fr. (SING), *Henderson SF. 10120*, fr. (SING), *Ridley s.n.*, fr. (SING); Larut: *King's Coll. 2439*, ♂ fl. (K) — Dindings: *Ridley s.n.*, fr. (SING), *SF. 10280*, ♂ fl. (SING) — Pahang, Cameron Highlands: *Batten Pool s.n.*, fr. (SING); Ulu Chineras: *Haniff SF. 15728*, fr. (SING); Temerloh: *Henderson SF. 10435*, ♀ fl. (SING) — Selangor, Rantan Panjang: *Kloss s.n.*, st. (K); Kwala Lumpur: *Ridley s.n.*, fr. (SING); Klang: *Kehding (Hb. Beccari 4409)*, st. (FI) — Negri Sembilan, Setul: *Ridley s.n.*, fr. (SING) — Johore: *Ridley s.n.*, fr. (SING) — Penang, Goat Hill (Penang?): *Maingay* 670, fr. (GH, K, L); West Hill: *Curtis* 1521, fr. (BM, K, SING); Julloh Bahang: *Curtis* 3504, ♂ fl. (K, SING); *Wallich* 1233, st. (K-W, type *Passiflora penangiana*).

ECOLOGY. Forest, scrub; 0–1200 m. Flowers and fruits throughout the year. Seems to prefer a rather wet climate. Sometimes on limestone.

NOTES. 1. Fruits of most specimens have a long gynophore, at least 1 cm; specimens from Taiping (Mal. Pen.), however, often have short-stiped fruits. 2. Fresh flowers are green or greenish yellow; fruits are reported as yellowish-red to brilliant cinnamon.

b. var. parvifolia (Pierre ex Gagnep.) de Wilde, *stat. nov.* — *A. parvifolia* Pierre ex Gagnep., Bull. Mus. Hist. Nat. Paris 25, 1919 (1920) 127; Bull. Soc. Bot. France 65 (1918) 76, 77 (flower morph.); Fl. Gen. I.–C. 2, 8 (1921) 1028, fig. 113, 8–13; Craib, Fl. Siam. En. 1 (1931) 748; Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 149, t. 2 fig. 7; t. 5 fig. 13–16; Adansonia 2, 7 (1967) 373, 383. — Lectotype: *Pierre* 4498 — Fig. 9 d-e, 10 d, g, i, 11.

A. nicobarica (Kurz) King: Ridl. J. Str. Br. R. As. Soc. 59 (1911) 106; Burk. & Henderson, Flow. Pl. Taiping, Gard. Bull. S. S. 3 (1925) 378.

A. angustisepala Craib, Kew Bull. (1930) 406; Fl. Siam. En. 1 (1931) 745; Cusset, Adansonia 2, 7 (1967) 372, 383. — Type: *Kerr* 12812.

A. linearis Craib, Kew Bull. (1930) 407; Fl. Siam. En. 1 (1931) 747; Cusset, Adansonia 2, 7 (1967) 373, 383. — Type: *Kerr* 13725.

A. parvifolia var. *insularis* Craib, Fl. Siam. En. 1 (1931) 748. — Type: *Kerr* 12950.

A. parvifolia var. *nervosa* Craib, Fl. Siam. En. 1 (1931) 748. — Type: *Kerr* 14384.

Herbaceous climber or creeper up to 2 m, growing from a tuber. *Leaves* ovate-oblong to lanceolate-linear, base rounded, apex longly acute or acuminate, ($1\frac{1}{2}$ –) 2–13 by $\frac{1}{4}$ – $4\frac{1}{2}$ cm. Marginal glands absent. *Inflorescences* in short-shoots, subsessile, or in the axils of normal leaves, peduncled for $\frac{1}{2}$ –4 cm. ♂ *fl.* incl. the 3–7 mm long stipe 8–15 by 1–2 mm. Hypanthium $1\frac{1}{2}$ – $3\frac{1}{2}$ mm, calyx tube 0–2 mm, sepals (or calyx lobes) lanceolate to linear 4–8 mm. Petals 4–5 mm. Filaments $2\frac{1}{2}$ – $3\frac{1}{2}$ mm, connate for $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Anthers 2–3(– $3\frac{1}{2}$) mm, up to 0.2 mm apiculate. Corona hairs 0.1–0.3 mm. ♀ *fl.* incl. the 1–3(–5) mm long stipe 8–12 by 1–2 mm. Hypanthium 1– $1\frac{1}{2}$ mm, calyx tube 0, sepals lanceolate-linear 4–7 mm. *Fruit* excl. the 2–5 mm long gynophore $1\frac{3}{4}$ –4 by 1–2 cm. Seeds subglobular to ± flattened, smooth or shallowly grooved or pitted, 4–7 mm \varnothing .

THAILAND. Kang: *Vanpruk* 671, ♂ fl. (K) — Rāchaburi, Prachuap, 0–50 m: *Put* 252, fr. (BM, K), *Kerr* 10957, st., fl. (BM, K), 21827, ♂ fl. (K); Kaw Wieng I.: *Kerr* 11382, st., ♀ fl., ♂ fl. (BM, E, K), 11382A, ♂ fl. (BM, E, K); Bang-tapan: *Keith s.n.*, fr. (SING) — Sūrat, Bang Son: *Put* 1062, st., fr. (BM, E, K), *Haniff & Nur SF.* 4400, fr. (SING); Langsuan: *Put* 1737, fl. (K); Kantuli: *Put* 4198, ♂ fl. (K); Kao Phra Ramu, 200–250 m: *Smitinand & Sleumer* 1174A, ♂ fl., fr. (K, L), 1211, ♂ fl., fr. (C, K, L, P); Kao Meo, 50 m: *Kerr* 12472, ♂ fl. (BM, K); Pak Sai, 50 m: *Kerr* 12507, ♂ fl. (BM, K); Kaw Tao I.: *Kerr* 12812, st., ♂ fl. (BM; K, type *A. angustisepala*), 12950, ♂ fl. (BM; K, type *A. parvifolia* var. *insularis*); Kanchanadit, 5 m: *Kerr* 13073, fr. (K) — Pūket, Krabi, 0–1100 m: *Kerr* 18646, ♂ fl. (BM, K, L), 18835, st. (BM, K, L), 19370A, ♂ fl. (K), 19375, ♂ fl. (K); Sakao, sea level: *Kerr* 19409, ♂ fl. (K, L); Bang Sak: *Kerr* 19039, ♂ fl. (BM, K, L, P); Ban Kawp Kep, 200 m: *Kerr* 13355, st. (BM, K); Satul, 5 m: *Kerr* 13725, fr. (BM; K, type *Adenia linearis*); Telok Udang: *Haniff & Nur SF.* 7497, ♂ fl. (K, SING) — Nakawn Sritamarāt, Mt. Luang: *Pierre* 4498, ♂ fl., fr. (E, K; P, lectotype *Adenia parvifolia*), *Pierre s.n.*, st. (P, annotated as from S. Vietnam), *d'Alleizette s.n.*, ♂ fl. (L, probably taken from *Pierre*, annotated as from S. Vietnam, Bien-Hoa); Tong Sung: *Rabil* 115, ♂ fl. (BM, K); Kao Chum Tawng: *Kerr* 14384, st. (K, type *A. parvifolia* var. *nervosa*); Kao Soi Dao, 600 m: *Kerr* 19448, ♂ fl. (K).

MALAY PENINS. Perlis: *Ridley s.n.*, ♂ fl. (SING) — Kedah, Gunung Baling: *Best SF.* 21282, ♂ fl. (NY, SING), *Corner & Nauen s.n.*, st. (SING) — Langkawi Is., P. Tebun: *Haniff & Nur SF.* 3608, fl. (BRI, K, SING); P. Rabana, sea level: *Henderson SF.* 23087, fl., fr. (NY, SING); Langkawi I.: *Corner SF.* 37889, fr. (K, SING), *Curtis s.n.*, ♂ fl. (BM), 2542, fl. (SING), 3785, fr. (SING), 3786, ♀ fl., fr. (SING) *Henderson s.n.*, ♂ fl. (SING).

ECOLOGY. Limestone hills, ridges; 0–600 m. Flowers and fruits mostly from September to January.

NOTES. 1. Fresh flowers are recorded as greenish or greenish-yellow; fruits greenish turning bright red.

2. The record *Pierre s.n.* from South Vietnam, mentioned by GAGNEPAIN and CUSSET, most likely concerns a specimen collected by PIERRE in Thailand, and erroneously annotated as from Vietnam. For lectotypification see CUSSET, *l.c.*

13. *Adenia poilanei* Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 150–151 — Type: *Poilane* 4797. — Fig. 11.

Subligneous climber 5(–10) m with somewhat thickened base. Fertile branches dark brownish, $1\frac{1}{2}$ – $2\frac{1}{2}$ (–4) mm; internodes $1\frac{1}{2}$ –4 cm. *Leaves* coriaceous, brownish green shining above, dull, much paler, not punctate beneath, entire, elliptic (–oblong), base rounded, apex acute, up to $\frac{1}{2}$ cm acuminate, 4–8 by (1–) $1\frac{3}{4}$ –3 cm, pinninerved, nerves 4–7 pairs, reticulation rather distinct, margin entire; petiole $\frac{1}{2}$ –1(– $1\frac{1}{2}$) cm. *Glands* at blade-base 2, $\frac{1}{2}$ (–1) mm \varnothing , on the 3–4(–5) mm broad peltate, sometimes slightly bilobed blade-base; blade glands 0–2, c. $\frac{1}{2}$ mm \varnothing , at about $\frac{1}{4}$ from the base; marginal glands 0. *Stipules* \pm triangular, c. $\frac{1}{2}$ mm. *Inflorescences* peduncled for 2–3 cm, 1–3-flowered in ♀; tendrils 0–1, $\frac{1}{2}$ –1 cm. Sterile tendrils simple, 3–5 cm. Bracts and bracteoles narrowly triangular, acute, c. $\frac{1}{2}$ mm. ♂ *fl.* not known. ♀ *fl.* (only known from the remains at base of fruit) campanulate, incl. the c. $\frac{1}{2}$ mm long stipe c. 10 by 4–5 mm; sepals in anthesis opening to c. 6 mm. Pedicel 2–3 mm. Hypanthium shallowly cup-shaped 2(– $2\frac{1}{2}$) mm, calyx tube 0, sepals oblong-lanceolate, subacute, c. 7 mm,

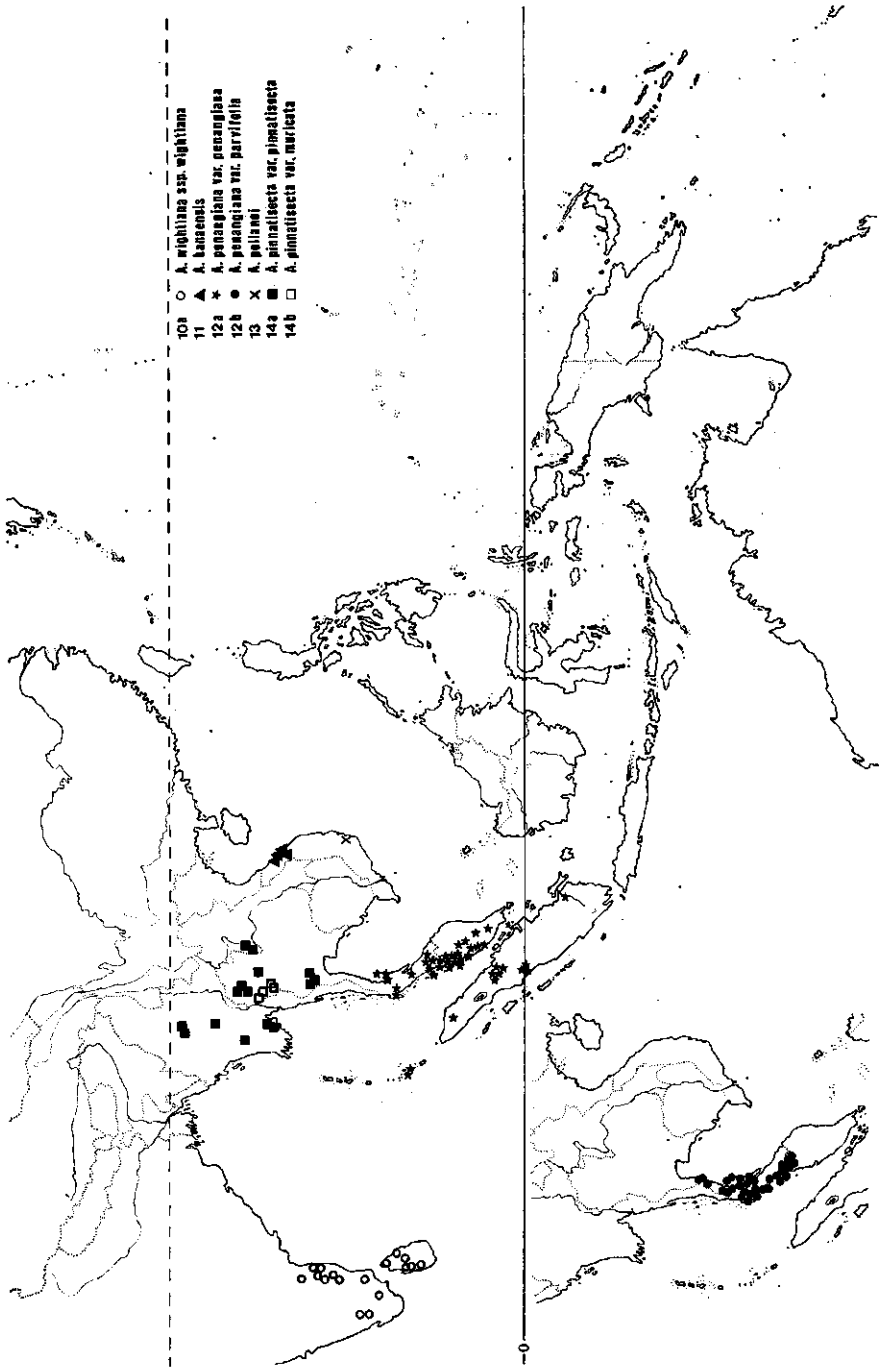


FIG. 11. Localities of species 10a, 11-14.

entire. Petals lanceolate, obtuse, c. 4 by 1 mm, 1-nerved, subentire. Staminodes c. 3 mm, connate for $1\frac{1}{2}$ mm, inserted at the base of the hypanthium. Septa c. $1\frac{1}{2}$ mm. Corona consisting of a fleshy rim c. $\frac{1}{3}$ mm, set with papilla-like short hairs c. 0.1 mm. Disk glands broad, c. $\frac{1}{2}$ by 1 mm. Pistil not known. *Fruit* 1 per inflorescence, (ellipsoid-)oblong, apex subacute, excl. the c. 12 mm long gynophore c. $4\frac{1}{2}$ by $1\frac{3}{4}$ cm. Pericarp coriaceous, c. $\frac{1}{4}$ mm. Seeds 10–15 per capsule, suborbicular, c. 7 by $7\frac{1}{2}$ by 3 mm, 10–12 pits \varnothing ; funicles c. 7 (?) mm; embryo not known.

SOUTH VIETNAM. Nha Trang Prov., Han Heo, 300 m; *Poilane* 4797, fr. (P, type).

ECOLOGY. Very rocky soil; c. 300 m. Fruits in September.

- NOTES. 1. Closely related to *A. banaensis* and *A. penangiana*, the most to the latter; all three species have elliptic to lanceolate leaves with peltate blade-base.
2. Characterized by the coriaceous leaves, shiny above, very dull beneath. The fleshy corona in the ♀ flower is noteworthy.
3. According to CUSSET the leaves are velvety hairy beneath; I examined the holotype and it appeared that the leaves are in reality entirely glabrous; also CUSSET's description of the ♀ flower is largely wrong.
4. The fresh fruit is recorded as red.

14. *Adenia pinnatisecta* (Craib) Craib, Kew Bull. (1914) 124; Gagnep., Fl. Gen. I.-C. 2 (1921) 1029; Harms in E. & P. Nat. Pfl. fam. ed. 2, 21 (1925) 492; Craib, Fl. Siam. En. 1 (1931) 749; Chakravarty, Bull. Bot. Soc. Beng. 3 (1951) 68; Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 147, t. 7, fig. 1; *Adansonia* 2, 7 (1967) 373, 382. — *Modecca pinnatisecta* Craib, Kew Bull. (1911) 56; Contrib. Fl. Siam., in Aberdeen Univ. Stud. 57 (1911) 92; Calder, Narayanaswami & Ramaswami, Rec. Bot. Surv. India 11 (1926) 92. — Type: *Kerr* 751.

Modecca furfuracea Wall., Cat. (1829) n. 1235, *nom. nud.*; Mast. in Hook. f., Fl. Brit. Ind. 2 (1879) 603 (as imperfectly known species). — Type: *Wallich* 1235.

Modecca apiculata Mast. in Hook. f., Fl. Brit. Ind. 2 (1879) 603. — *Adenia apiculata* Chakravarty, *non* (De Wild. & Dur.) Engl., Bull. Bot. Soc. Beng. 3 (1951) 67, *comb. illeg.*; Cusset, *Adansonia* 2, 7 (1967) 372, 382. — *A. craibii* Chatterjee, Bull. Bot. Soc. Beng. 5, 2, 1951 (1952) 139, *nom. nov.* — Type: *McClelland s.n.*

A. saxicola Craib, Kew Bull. (1930) 407; Fl. Siam. En. 1 (1931) 749; Cusset, *Adansonia* 2, 7 (1967) 373, 382. — Type: *Kerr* 6226.

Subherbaceous climber up to 6 m, growing from a rootstock. Fertile branches pale green or greyish- or glaucous green, 1– $3\frac{1}{2}$ mm; internodes 4–20 cm. *Leaves* herbaceous, (brownish-)green above, pale green to glaucous, not punctate beneath, entire, ovate to oblong-lanceolate, or mostly deeply 2–7-lobed or -parted, suborbicular in outline, base cordate to truncate, apex acute up to $1\frac{1}{2}$ cm acuminate, often $\frac{1}{2}$ mm mucronate, sometimes subobtusely, 3–20 by $2\frac{1}{2}$ –27

cm, 5-7 (sub)plinerved, in oblong leaves pinninerved, reticulation distinct or not, margin entire; lobes lanceolate to lanceolate-linear, 2-14 by $\frac{1}{2}$ -2 $\frac{1}{2}$ cm, pinninerved. *Glands* at blade-base 2, 1-2 mm \varnothing , on two short auricles which are more or less peltately connate; blade glands (0-)1-6, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm \varnothing , submarginal. Stipules narrowly triangular, acute-acuminate, \pm serrulate, c. 1 mm. *Inflorescences* peduncled for 3-15 cm, up to 25-flowered in σ , 2-5-flowered in ρ ; tendrils 1-3, $\frac{1}{2}$ -2 $\frac{1}{2}$ cm. Sterile tendrils simple or 3-fid, up to 15 cm. Bracts and bracteoles narrowly triangular, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm. Dioecious or monoecious. σ *fl.* campanulate, incl. the 4-7 mm long stipe 12-20 by 3 $\frac{1}{2}$ -5 $\frac{1}{2}$ mm, sepals spreading in anthesis to c. 10 mm. Pedicel 5-20 mm. Hypanthium cup-shaped, 1 $\frac{1}{2}$ -3 mm, calyx tube 0, sepals elongate triangular to lanceolate, acute to subobtuse, 8-13 mm, entire. Petals ovate-elliptic or \pm elongate triangular, obtuse, 1-1 $\frac{1}{2}$ mm unguiculate, 6-10 by 2-4 $\frac{1}{2}$ mm, 3-nerved, up to 0.2 serrulate-laciniate. Filaments 3-5 $\frac{1}{2}$ mm, connate for 1 $\frac{1}{2}$ -3 mm, inserted at the base of the hypanthium. Anthers 2-4 by $\frac{3}{4}$ -1 mm, obtuse or acute, 1-2 $\frac{1}{2}$ mm apiculate or not. Septa 1-2 mm high. Corona composed of densely set feathery-branched hairs, membrane-like, $\frac{1}{2}$ -1 mm. Disk glands $\frac{3}{4}$ -1 $\frac{1}{4}$ mm. Vestigial ovary incl. gynophore c. 1 mm. ρ *fl.* campanulate, incl. the 1-5 mm long stipe 7-15 by 2 $\frac{1}{2}$ -4 $\frac{1}{2}$ mm. Pedicel 4-7 mm. Hypanthium cup-shaped c. 1 $\frac{1}{2}$ mm, calyx tube 0, sepals elongate triangular, subacute to obtuse, 4 $\frac{1}{2}$ -8 $\frac{1}{2}$ mm. Petals elliptic to obovate, obtuse, $\frac{1}{2}$ -1 mm unguiculate, 2-3 $\frac{1}{2}$ by 1-2 $\frac{1}{2}$ mm, 3-nerved, 0.1 mm serrulate. Staminodes c. 1 $\frac{1}{2}$ mm, connate for $\frac{1}{2}$ - $\frac{3}{4}$ mm, inserted at the base of the hypanthium. Septa $\frac{1}{2}$ - $\frac{3}{4}$ mm high. Corona consisting of densely set woolly hairs, membrane-like, $\frac{1}{2}$ -1 mm. Disk glands c. $\frac{1}{2}$ mm. Pistil 4-7 mm. Gynophore $\frac{3}{4}$ -1 $\frac{1}{2}$ mm. Ovary ellipsoid, faintly 3(-6) angular, 2-4 by 1.2-2 $\frac{1}{2}$ mm. Styles connate for up to $\frac{3}{4}$ mm, style arms $\frac{1}{3}$ -1 mm. Stigmas subglobular, woolly-papillate, each 1-1 $\frac{1}{2}$ mm \varnothing . *Fruit* 1-3 per inflorescence, ellipsoid, excl. the 5-10 mm long gynophore (2 $\frac{1}{2}$ -)3-4.2 by 1-2 $\frac{1}{2}$ cm. Pericarp thinly to thickly coriaceous, $\frac{1}{4}$ - $\frac{1}{2}$ mm. Seeds 12-25 per capsule, ovoid to subcircular, 5-8 by 4 $\frac{1}{2}$ -7 by 3-3 $\frac{1}{2}$ mm, \pm smooth to muricate, 4-10 pits \varnothing ; funicles 6-10 mm; embryo 5-7 mm; cotyledons ovate, apex obliquely truncate-emarginate, 5-6 $\frac{1}{2}$ by 4 $\frac{1}{2}$ -6 mm. Plumule sometimes well-developed, 1-1 $\frac{1}{2}$ mm.

DISTRIBUTION. Burma, Thailand, Laos. — Fig. 11.

NOTES. 1. Beside apparently dioecious specimens, several times monoecious specimens have been found, either with male- and female inflorescences in one branch, or male- and female flowers mixed in one inflorescence.

2. Fresh flowers are reported greenish or creamy greenish, petals whitish; fruits greenish to red.

KEY TO THE VARIETIES

1. Leaves 5-20 by (3-)5-27 cm, if lobed all lobes \pm equal in length. Gland-bearing auricles at blade-base shortly connate. Anthers (sub)obtuse, 1-2 $\frac{1}{2}$ mm

- apiculate. Stipe of ♀ fl. $1\frac{1}{2}$ –5 mm, in fruit $2\frac{1}{2}$ –5 mm. Seeds 5–8 mm \varnothing , rather smooth, coarsely pitted. **a. var. pinnatisecta**
1. Leaves 3–9 by $2\frac{1}{2}$ – $8\frac{1}{2}$ cm, in 5-lobed leaves the lower lobes much smaller. Gland-bearing auricles at blade-base broadly connate. Anthers acute, not apiculate. Stipe of ♀ fl. c. 1 mm, in fruit 1– $1\frac{1}{2}$ mm. Seeds c. 5 mm \varnothing , finely muricately pitted. **b. var. muricata**

a. var. pinnatisecta — Fig. 11.

Leaves either entire, ovate to oblong-lanceolate, or 2–7-lobed, suborbicular, 5–20 by (3–)5–27 cm, (sub)palmately nerved; lobes acute-acuminate, rarely subobtusate, about equal in length. Gland-bearing auricles at blade-base peltately connate for (0–)1–2 mm. *Inflorescences* with 3 tendrils. ♂ *fl.*: anthers 2–4 by $\frac{3}{4}$ –1 mm, obtuse, apiculate for 1– $2\frac{1}{2}$ mm. ♀ *fl.*: stipe $1\frac{1}{2}$ –5 mm, in fruit $2\frac{1}{2}$ –5 mm. *Fruit* excl. the 5–10 mm long gynophore $2\frac{1}{2}$ –4.2 by 1– $2\frac{1}{2}$ cm. Seeds 5–8 mm \varnothing , rather smooth, 4–7 pits \varnothing .

BURMA. 'India' (?): *Buchanan Hamilton s.n.*, fr. (BM); Witmin?. *English* (in *Hb. Lace*) 151, st. (E); Rubi mines Distr.: *Lace* 6279, fr. (E, K); Maymyo Plateau: *Lace s.n.*, ♂ fl., ♀ fl. (E), 6259, ♂ fl. (E, K); Promé: *Wallich* 1235?, fr. (K-W), 1235, (K-W, specimen not present, type *Modecca furfuracea*); Pegu: *McClelland s.n.*, fr. (E; K, syntype *Modecca apiculata*); Rangoon: *McClelland s.n.*, fr. (E; K, syntype *Modecca apiculata*).

THAILAND. Pâyap, Chiangmai, 700–1150 m: *Kerr* 751, ♀ fl., ♂ fl., fr. (BM; K, type *Modecca pinnatisecta*; L), *Kerr* 6226, ♂ fl., ♀ fl., fr. (BM, E; K, type *Adenia saxicola*; L.), *Sørensen, Larsen & Hansen* 6022, fr. (K) — Mahārat, Me Ban: *Franck* 297, ♂ fl., fr. (C, 3 sheets; P) — Rāchaburi, Khwae Noi River Basin, 200–300 m: *Kostermans* 1203, ♀ fl. (L), 1396, fr. (A, L); Kānburi, 200 m: *Marcan* 2404, fr. (K).

LAOS. Sayaboury Prov., Pak Lay: *Thorel s.n.*, st. (P).

ECOLOGY. Open mixed forest for est, rocks; 100–800 m. Flowers in the rainy season: April–Sept., fruits July–Dec.

b. var. muricata de Wilde, var. nov. — Fig. 11.

Scandens, herbacea, parva. *Folia* 3–9 cm longa, $2\frac{1}{2}$ – $8\frac{1}{2}$ cm lata, integra vel 2–5-lobata, lobis infimis quam lobi mediani multo brevioribus. Lamina per 1–3 mm late peltata. Antherae acutae. Florum ♀ stipes c. 1 mm longus. Semina c. 5 mm diam., muricato-scribiculata.

Leaves either entire, ovate, \pm pinninerved, or 2–5-lobed, 3–9 by $2\frac{1}{2}$ – $8\frac{1}{2}$ cm; lobes obtuse to acute, in 5-lobed leaves the lower lobes markedly shorter. Gland-bearing auricles peltately connate for 1–3 mm. *Inflorescences* with 1 tendril. ♂ *fl.*: anthers 3– $3\frac{1}{2}$ by $\frac{3}{4}$ mm, subacute, apiculate for up to 0.2 mm. ♀ *fl.*: stipe c. 1 mm, in fruit 1– $1\frac{1}{2}$ mm. *Fruit* excl. the 5–7 mm long gynophore c. 4 by $2\frac{1}{2}$ cm. Seeds c. 5 mm \varnothing , finely muricately pitted, 6–10 pits \varnothing .

THAILAND. Pāyap, Keng Soi (near Me Ping Rapids): *Kerr s.n.*, fr. (BM); Meh Nam Ping (river), Om Lu Rapids: *Rock 628*, fr. (US) — Nakawnsawan, Me-Kor, Raheng, 900 ft.: *Winit 381*, ♂ fl. (K, type; L), *382*, st. (K).

ECOLOGY. Along rivers, near falls; 300–600 m.

15. *Adenia densiflora* (Bak.) Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 256; Perr., Not. Syst. 9 (1940) 48; Fl. Mad. Fam. 143 (1945) 7, fig. I, 1–6; de Wilde, *Adansonia* 2, 10 (1970) 115. — *Modecca densiflora* Bak. J. Bot. 20 (1882) 112. — Syntypes: *Kitching s.n.*, *Baron 255*. — Fig. 7.

Rather robust climber up to 10 m, up to 10 cm thick at base, not pachypodous, bark smooth, greenish. Fertile branches 2–8 mm; internodes 2–10 cm. *Leaves* when dry thinly coriaceous, (brown-)green above, pale green or whitish green, not punctate beneath, entire or faintly 3-lobed towards the apex, broadly ovate to orbicular, base cordate to truncate, apex obtuse to subacute, $3\frac{1}{2}$ –6 by $3\frac{1}{3}$ –6 cm, 3(–5)-plinerved and 1 pair of ascending nerves from the midrib 3–6 mm above its base, reticulation fine, distinct, margin entire; petiole 2–3 cm. *Glands* at blade-base 2, c. 1–1½ mm \varnothing , lateral at the apex of the petiole just extending on the blade-base; blade-glands 0–4, submarginal. Stipules narrowly triangular, $\frac{1}{2}$ (–1) mm. *Inflorescences* in the axils of much reduced leaves in short-shoots $\frac{1}{2}$ –2(–5) cm, peduncled for up to 1(–2) mm, 3–15-flowered in ♂, 1(–3?)-flowered in ♀; tendrils 0. Sterile tendrils simple, 6–15 mm. Bracts and bracteoles triangular to ellipsoid, acute, serrulate, 1–1½ mm. Flowers reddish, mostly precocious, monoecious (always?). ♂ fl. campanulate, incl. the 3–4 mm long stipe 18–30 by 6–8 mm, sepals spreading in anthesis to c. 25 mm. Pedicel c. 1 mm. Hypanthium cup- or saucer-shaped 3–6 by 6–8 mm, calyx tube 0, sepals oblong to lanceolate, subobtuse, 12–20 by 6–7 mm, subentire. Petals elliptic (–oblong), obtuse, 11–18 by 6–10 mm, 6–9-nerved, 0.2–0.3 mm denticulate. Filaments c. 8 mm, 2–3 mm connate, inserted at the base of the hypanthium. Anthers 6–7 by $\frac{3}{4}$ mm, obtuse. Septa 2–3 mm high. Corona consisting of a deeply lacinate membrane or of filaments 1–1½ mm, extending on the septa. Disk glands $\frac{1}{3}$ – $\frac{1}{2}$ mm, broad. Vestigial ovary incl. gynophore 1–1½ mm. ♀ fl. campanulate, incl. the 4–5 mm long stipe 30–37 by 8–14 mm, sepals spreading in anthesis to c. 25 mm. Pedicel c. 1 mm. Hypanthium saucer-shaped 3–5 by 6–14 mm, calyx tube 0, sepals oblong-lanceolate, obtuse to acute, 20–30 by (4–)7–9 mm, subentire. Petals elliptic-oblong, obtuse, 14–20 by 5–10 mm, 8–12-nerved, up to 0.3 mm fimbriate-denticulate. Staminodes 8–9 mm, c. 1 mm connate. Septa 1–2 mm high. Corona consisting of a deeply lacinate membrane or of filaments $\frac{1}{2}$ –1 mm. Disk glands c. 0.1 mm, sometimes consisting of a few minute wart-like excrescences. Pistil 18–22 mm. Gynophore 2–3 mm. Ovary ellipsoid-oblong, \pm 3-ribbed, c. 12 by 5 mm. Styles connate for 2(–3) mm, style arms 1(–2) mm. Stigmas \pm ellipsoid, densely papillate, each c. 3 mm \varnothing . *Fruit* 1(–2?) per inflorescence, ellipsoid-oblong, apex acute, faintly 3-angular, excl. the (6–)10–15 mm long gynophore 7–10 by $3\frac{1}{2}$ – $4\frac{1}{2}$ (–5) cm. Pericarp coriaceous

outside, 3–5 mm, smooth. Seeds 50–70 per capsule, \pm ovate, c. 7 by $5\frac{1}{2}$ –6 by $2-2\frac{1}{2}$ mm, rather smooth, 7–10 pits \oslash ; funicles c. 4 mm; embryo c. $6\frac{1}{2}$ mm; cotyledons obovate, \pm obliquely truncate, c. $5\frac{1}{2}$ –6 by 5 mm.

MADAGASCAR. Chiefly from Betsileo Land: *Baron* 255, ♀ fl. (K, lectotype *Modecca densiflora*), 258, ♀ fl. (P); Central Madagascar: *Baron* 3362, st. (K), 3366, ♀ fl. (K, P), 4871, ♀ fl. (K); s. loc.: *Herb. Jard. Bot. Tananarive* 212–2(325), ♀ fl. (P); 1136, ♂ fl. (P); Madagascar: *Kitching* s.n., ♀ fl. (K, syntype *Modecca densiflora*) — Western, Ankazoabo Distr. [W17], Ampandrandava, 1000–1200 m: *Seyring* 849, ♂ fl. (P) — Centr. (North.), Maevatanana Distr. [C(N)3], Tampoketsa d'Ankazoke: *Decary* 14381, ♂ fl. (P); between Betsiboka R. and Ikopa R.: *Humbert & Perrier de la Bâthie* 2319, ♂ fl. (P) — Centr., Ankazobe Distr. [C1], Manankazo, 1500 m: *Perrier de la Bâthie* 6739, ♀ fl. (P); Tsiroanomandidy Distr. [C2], Ankavandra: *Decary*, 7960, ♀ fl., fr. (P); 7993, ♂ fl. (P); Forêt d'Analandraisoa (Ambohitavo), 1200–1300 m: *Leandri c.s.* 1849, st. (P) — Centr. (East.), Ambositra Distr. [C(E)9]: *Perrier de la Bâthie* 6743, ♂ fl. (P) — Centr. (South.), Fianarantsoa Distr. [C(S)1]: *Perrier de la Bâthie* 12878, ♂ fl., fr. (P); Ambalavao Distr. [C(S)2], vallée de Ihosy, 850–1000 m: *Humbert & Swingle* 4909, ♂ fl. (B, P) — Eastern, Andilamena Distr. [E4], Forêt d'Analamaitso, c. 800 m: *Perrier de la Bâthie* 6748, ♂ fl. (P); Ambatondrazaka Distr. [E9], 900 m: *Cours* 716, ♂ fl. (P); Mt. Ankaroka, SE. of Lac Alaotra, 1200–1400 m: *Humbert & Cours* 17543, ♂ fl. (P).

ECOLOGY. Forests, rocky places, dry rocky forests on W. slopes; 600–1600 m. Flowers in the dry season, from July to October, precocious; fruits found in July.

NOTES. 1. Characterized by the well marked-off, broad, hypanthium; the only Madagascan species of section *Microblepharis*.

2. The inflorescences-bearing short-shoots usually develop from the serial bud in the axils of the tendrils.
3. According to PERRIER DE LA BÂTHIE monoecious with the male and female flowers developing on different shoots.
4. According to PERRIER DE LA BÂTHIE the anthers are apiculate, but I always found non-apiculate anthers.
5. Fresh flowers are reported as fleshy, red or rose, the filaments white, anthers yellow.

2. SECT. ADENIA

Engl., Bot. Jahrb. 14 (1891) 376 (sect. *Euadenia*); Pfl. welt Afr. 3, 2 (1921) 606; Harms in E. & P., Nat. Pfl. fam. 3, 6a (1893) 85; *ibid.*, Nachtr. 1 (1897) 256; *ibid.* ed. 2, 21 (1925) 492; De Dalla Torre & Harms, Gen. Siph. (1903) 331. — *Adenia* Forsk., 1775. — Type species: *A. venenata* Forsk.

Adenia sect. *Hildebrandtiothamnus* Engl., Bot. Jahrb. 14 (1891) 376; Harms in E. & P., Nat. Pfl. fam. 3, 6a (1893) 85. — Type species: *A. globosa* Engl.

Adenia 'groupe II' Perrier de la Bâthie, Not. Syst. 9 (1940) 48; Fl. Madag. et des Com., fam. 143 (1945) 8. — Base: all Madagascan species except *A. densiflora*.

16. *Adenia antongilliana* (Tul.) Schinz, Bot. Jahrb. 15, Beibl. 33, 1 (1892) 3; Perr., Not. Syst. 9 (1940) 54; Fl. Mad. Fam. 143 (1945) 24; de Wilde, Adansonia 2, 10 (1970) 113, 118, pl. 1, g. — *Modecca antongilliana* Tul., Ann. Sc. Nat. 4, 8 (1857) 51. — Type: *Richard 28*. — **Fig. 12.**

Climber up to 5 m, base of stem cylindrical, not thickened. Fertile branches $1\frac{1}{2}$ –3 mm; internodes 2–10 cm. *Leaves* thinly coriaceous, (brownish-)green above, much paler greenish beneath, with scattered whitish, waxy, thick hairs which easily break off, not punctate, entire or 3-lobed in the upper half, broadly ovate to suborbicular, base cordate, apex acute or subacute, 3–6 by 3–6 cm, 5(–7)-subplinerved, reticulation fine, distinct, margin entire; lobes ovate-triangular, $\frac{1}{2}$ –2 cm; petiole (1–)1 $\frac{1}{2}$ –3 $\frac{1}{2}$ cm. *Glands* at blade-base 2, $\frac{1}{2}$ –1 mm \varnothing , laterally at the apex of the petiole, not extending on the membranous (1–)2 mm broad peltate blade-base; blade glands (0–)2, c. $\frac{1}{2}$ mm \varnothing , submarginal in lobed leaves. Stipules narrowly triangular c. $\frac{1}{2}$ mm, caducous. *Inflorescences* peduncled for ($\frac{1}{2}$ –)1–6 cm, sometimes in short-shoots 1–2 cm, (sub)sessile, 4–10-flowered in σ ; tendrils 0–1, 2–3 cm. Sterile tendrils simple, 5–8 cm. Bracts and bracteoles narrowly triangular, $\frac{1}{2}$ (–1) mm. σ fl. narrowly tubular-infundibuliform, incl. the 3–9 mm long stipe 27–36 by 2 $\frac{1}{2}$ (–3) mm, sepals spreading in anthesis to c. 25 mm. Pedicel (0–)1–4 mm. Hypanthium longly cup-shaped (3–)4–6 mm, calyx tube 0, sepals linear, obtuse, 15–23 by 2–2 $\frac{1}{2}$ (–3) mm, (sub)entire. Petals (lanceolate-)linear, subacute, 13–20 by 3 mm, 5(–7)-nerved, subentire, erect (not reflexed). Filaments 6–10 mm, 1–5 mm connate, inserted at the base of the hypanthium. Anthers 5 $\frac{1}{2}$ –9 by $\frac{1}{3}$ – $\frac{1}{2}$ mm, obtuse, sometimes c. 0.1 mm apiculate. Septa 0. Corona 0 or consisting of minute scales or membranous up to 0.1 mm. Disk glands 1–1 $\frac{1}{2}$ mm. Vestigial ovary incl. gynophore 1–1 $\frac{3}{4}$ mm. φ fl. & fruit not known.

MADAGASCAR. North, Diégo-Suarez Distr. [N1], Ambavahibe: *Perrier de la Bâthie s.n.*, σ fl. (P); Port Leven: *Boivin 2569*, st. (P) — East(North.), Sambava Distr. [E(N)2], Côte N.-Est: *Perrier de la Bâthie 6741*, σ fl. (P); Antalaha Distr. [E(N)4], Angontsi: *Richard 10*, σ fl. (P) — East, Maroantsetra Distr. [E1], Antongil: *Richard 28*, σ fl. (P, type).

ECOLOGY. Coastal dunes. Flowers in Sept.-Nov.

NOTES. 1. This species, known from 5 collections, is probably most related to *A. longestipitata*, from which it differs by the short stipe in the ♂ flowers, the long anthers, the acute or subacute leaf-apex and the presence of blade glands in both lobed- and entire leaves.

2. The lower surface of the blade bears scattered whitish, waxy, appendages, only well visible with a lens. They are easily breaking off or caducous. Similar appendages but much more significant, occur e.g. in *A. cladosepala* and in some species of the section *Ophiocaulon* from the African continent.

3. *Boivin 2569* is more or less deviating. It has stalked inflorescences with flower-scars, no flowers. The leaves are entire or faintly 3-lobed, suborbicular, 5–8 by 5–8½ cm, base deeply cordate, apex subobtuse to rounded; petioles relatively long, 5½–7½ cm. It has with true *A. antongilliana* the stalked inflorescences and the similar position of the glands at the blade-base and the blade glands in common, but resembles, on the other hand, also *A. firingalavensis* and *A. longestipitata*.

17. *Adenia cladosepala* (Baker) Harms in E. & P., Pfl. fam. 3, 6a, Nachtr. 1 (1897) 256; Perr., Not. Syst. 9 (1940) 56; Fl. Mad. Fam. 143 (1945) 28; de Wilde, Adansonia 2, 10 (1970) 122, pl. 1, h. — *Modecca cladosepala* Baker, J. Linn. Soc. Bot. 25 (1890) 317. — Type: *Baron 5705*. — Fig. 12.

Adenia ambongensis Clav., Ann. Mus. Col. Marseille 2, 7 (1909) 49; Perr., Not. Syst. 9 (1940) 55; Fl. Mad. Fam. 143 (1945) 24. — Syntypes: *Perrier 1795, 1473-bis, 1969, 17838*.

Rather robust climber up to 10 m, stem base cylindrical, not thickened, with a thin greenish resinous or waxy layer. Fertile branches 2–3(–5) mm; internodes (½–)2–10 cm. *Leaves* thinly to thickly coriaceous, green above, whitish-green or grey, densely set with whitish waxy thick hairs well visible with a lens beneath, not punctate, entire or mostly shallowly 3-lobed in the upper part, suborbicular to ovate in outline, base cordate to truncate, apex acute to obtuse, 3–14 by 2–13½ mm, 5(–7)-plinerved and 1–3 pairs of nerves from the midrib, reticulation fine, distinct, margin entire; lobes triangular to ovate, mostly obtuse, up to 5 cm; petiole 1½–5½ cm. Glands at blade-base 2, 1–2 mm ∅, laterally at the apex of the petiole largely extending on the thickened, ± bilobed or semi-circular c. 1 mm broad peltate blade-base; blade glands 0 or 2, ½(–1) mm ∅, submarginal. Stipules linear ½(–1) mm, whitish, caducous. *Inflorescences* in the axils of reduced leaves in short-shoots up to 10 cm, peduncled up to 0.5 cm, 1–5-flowered in ♂, ♀ fl. solitary; tendrils 0. Sterile tendrils 6–17 cm. Bracts and bracteoles triangular, ± serrulate, ½–1 mm. Flowers dioecious or monoecious. ♂ fl. narrowly tubular-infundibuliform, incl. the 14–30 mm long stipe 35–55 by 2–3½(–4½) mm, sepals ± reflexed in anthesis, to c. 25 mm wide. Pedicel ½–2 mm. Hypanthium longly cup-shaped, 5–6½ mm, calyx tube 0, sepals (lanceolate-)linear, obtuse, 13–22 by 2(–3) mm, (sub)entire. Petals lanceolate(-linear),

subacute, 11–15 by 2–3 mm, 5–7-nerved, c. 0.1 mm serrulate towards the apex, straight or \pm reflexed in the upper half. Filaments $5\frac{1}{2}$ –9 mm, connate for $\frac{1}{2}$ – $3\frac{1}{2}$ mm, inserted at or up to $1\frac{1}{2}$ mm above the base of the hypanthium. Anthers 6–8(– $9\frac{1}{2}$) by $\frac{1}{2}$ – $\frac{3}{4}$ (– $\frac{3}{4}$) mm, obtuse. Septa 0–2 mm high. Corona \pm 0 or consisting of a low membrane or of a row of fleshy appendages or thick hairs $\frac{1}{2}$ (– $\frac{3}{4}$) mm. Disk glands $\frac{3}{4}$ – $1\frac{1}{4}$ mm, inserted near the base of the hypanthium. Vestigial ovary incl. gynophore 1– $1\frac{1}{2}$ mm. ♀ fl. campanulate-infundibuliform, incl. the $6\frac{1}{2}$ –26 mm long stipe 35–57 by $3\frac{1}{2}$ –6 mm, sepals straight or slightly reflexed, opening to 20(–25) mm. Pedicel 0–2 mm. Hypanthium cup-shaped, 3–6 mm, calyx tube 0, sepals (lanceolate-)linear, obtuse, 20–24 by $2\frac{1}{2}$ – $3\frac{1}{2}$ (–4) mm, subentire. Petals lanceolate (-linear), obtuse or subobtuse, 18–21 by 3– $3\frac{1}{2}$ mm, 5-nerved, serrulate-denticulate towards the apex. Staminodes $1\frac{1}{2}$ –3 mm, free. Septa 0. Corona a lobed membrane or rim up to $\frac{1}{2}$ mm. Disk glands c. $\frac{1}{2}$ mm. Pistil 15–20 mm. Gynophore 2– $2\frac{1}{2}$ mm. Ovary ellipsoid-oblong, \pm fusiform, faintly 3(–6) ribbed, c. 7–10 by 4 mm. Styles connate for c. 4 mm, style arms $1\frac{1}{2}$ –2 mm. Stigmas reniform-ellipsoid, papillate, each 3–4 mm \varnothing . Fruit solitary, ovoid-ellipsoid, \pm fusiform, excl. the c. 5 mm long gynophore 5–7 by $2\frac{1}{2}$ –3 cm. Pericarp thickly coriaceous, smooth, $\frac{1}{2}$ –1 mm. Seeds c. 50 per capsule, ovoid, c. 6 by 5 by 3 mm, rather smooth, 7–10 pits \varnothing ; funicles c. 3 mm; embryo c. 5 mm; cotyledons ovate to suborbicular, obliquely truncate, c. $4\frac{1}{2}$ by $4\frac{1}{2}$ mm.

MADAGASCAR. ?Androna, NW. de l'Imerina: Baron 5705, ♀ fl., fr. (K, type *Modecca cladosepala*; P); s. loc.: *Herb. Jard. Bot. Tananarive 1188*, \pm fl. (P) — East, Mandritsara Distr. [E2]: Bosser 16665, ♂ fl. (P, identification slightly doubtful) — West, Soalala Distr. [W4]: Decary 15674, fr. (P); Ambongo: Perrier de la Bâthie s.n., ♀ fl. (K); Manongarivo (Ambongo): Perrier de la Bâthie 1473-bis, ♂ fl., ♀ fl., fr. (P, syntype *A. ambongensis*), 1795, ♀ fl., fr. (P, syntype *A. ambongensis*); Tampoketsa (Ambongo): Perrier de la Bâthie 1969, ♂ fl. (P, syntype *A. ambongensis*); Soalala: Perrier de la Bâthie 17838, ♂ fl. (P); Belo sur Tsiribihina Distr. [W10]: Decary 15540, ♂ fl. (P); Morondava Distr. [W12], Morondava: Grève 222a(p.p.), ♂ fl. (P); Mahabo Distr. [W13], Menabe, near the Sakena R.: Perrier de la Bâthie 6747, ♂ fl. (P) — West (South), Tulear Distr. [W(S)1], Moyen Fiherena R., 400 m: Perrier de la Bâthie 16600, fr. (P) — Central (West), SW. Betsileo, 800 m: Perrier de la Bâthie 16537, ♂ fl. (P).

ECOLOGY. Tropophilous forest, xerophytic scrub; rocks, alluvial soils; 0–800 m. Flowers from August to Dec., fruits from Sept. to Dec.

NOTES. 1. This species is, beside *A. sphaerocarpa*, one of the more robust members of a group of related species to which also belong *A. firingalavensis*, *A. isaloensis*, *A. antongilliana* and *A. longestipitata*.

2. The leaves are mostly strikingly pale beneath, caused by numerous whitish waxy appendages visible with a lens in dry leaves. Similar appendages are also known e.g. in *A. reticulata* var. *cinerea* from Africa.

3. Flowers dioecious or monoecious with male- and female flowers on different shoots.

4. According to PERRIER DE LA BÂTHIE sometimes specimens with 4–5-valved fruits are found.

5. Repeatedly reported as having a cylindrical, not swollen, main stem.

6. Fresh flowers are reported as greenish-yellow.

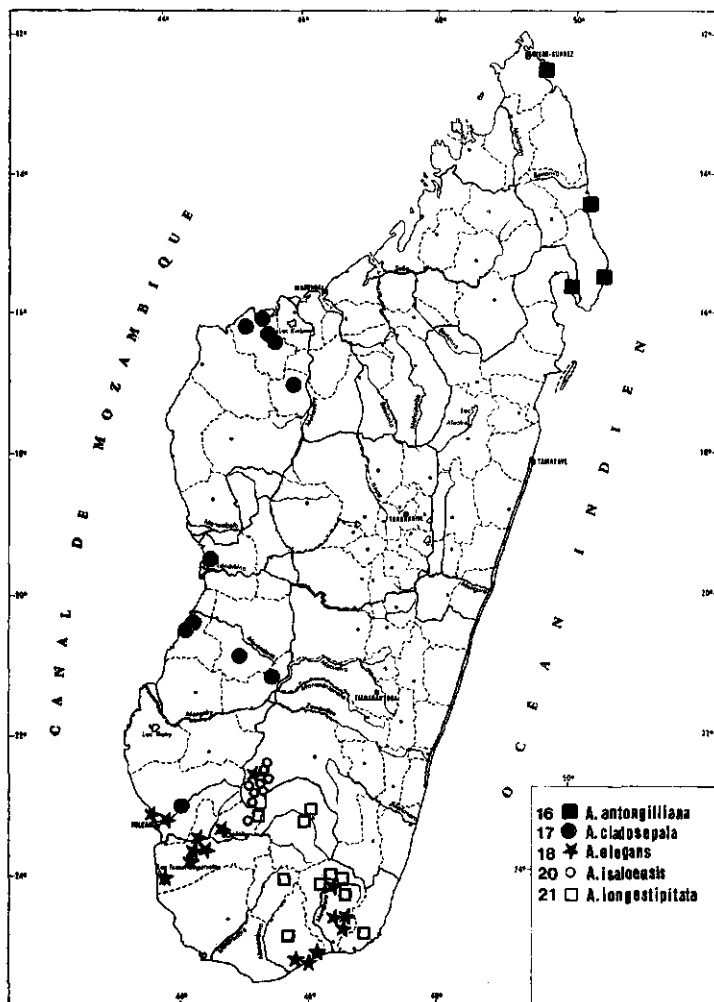


FIG. 12. Localities of species 16-18, 20-21.

18. *Adenia elegans* Perr., Not. Syst. 9 (1940) 51; Fl. Mad. Fam. 143 (1945) 17, fig. III, 7-8; de Wilde, *Adansonia* 2, 10 (1970) 116, pl. 1, b-c. — Syntypes: *Decary* 3185, 3757, 8413; *Perrier* 19112. — **Fig. 12.**

Slender climber 1-5 m, roots forming ellipsoid tubers up to 10 cm. Fertile branches grey-white or glaucous, often pruinose, 1-3 mm; internodes 1-8 cm. *Leaves* thinly to thickly coriaceous, mostly grey-green or glaucous, not punctate, entire or primarily deeply 3-lobed or -parted, broadly ovate to orbicular, base cordate to truncate but \pm cuneate towards the insertion of the petiole, apex broadly rounded to obtuse, 1-3½(-4) by 1-4 cm, 3-5-plinerved, reticulation

fine, rather distinct, margin entire; lobes entire or once more shallowly to deeply 3-5-lobed or -parted, rounded to ovate-ellipsoid; petiole ($\frac{3}{4}$ -)1-3 cm. Glands at blade-base 2, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm \varnothing , lateral at the \pm thickened apex of the petiole at the transition to the $\frac{1}{2}$ -1 mm broad peltate blade-base; no other glands present. Stipules narrowly triangular, sometimes \pm incised, c. $\frac{1}{2}$ mm. Inflorescences in short-shoots up to 6 cm or in the axils of normal leaves, peduncled for up to $\frac{1}{2}$ (-1) cm, 1-2-flowered in δ , φ fl. solitary; tendril 0(-1), up to 2 $\frac{1}{2}$ cm. Sterile tendrils simple, 2 $\frac{1}{2}$ -8 cm. Bracts and bracteoles (narrowly) triangular, $\frac{1}{2}$ (-1) mm. δ fl. narrowly tubular-infundibuliform, incl. the 14-23 mm long stipe 34-47 by 3-3 $\frac{1}{2}$ mm, sepals opening in anthesis to c. 25 mm. Pedicel 0-1 mm. Hypanthium longly cup-shaped to tubiform 4 $\frac{1}{2}$ -8 mm, calyx tube 0, sepals lanceolate to linear, obtuse, 11-18 by 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ mm, subentire. Petals (oblong-)lanceolate, obtuse to acute, 10-13 by 2-3 mm, (3-)5-7-nerved, mostly c. 0.1 mm serrulate towards the apex, sometimes reflexed in the upper half. Filaments 4-8 mm, 2-4 $\frac{1}{2}$ mm connate, inserted at or up to 2 mm above the base of the hypanthium. Anthers (5-)6-7 by ($\frac{1}{3}$ -) $\frac{1}{2}$ - $\frac{2}{3}$ mm, subobtuse to acute, up to 0.2 mm apiculate. Septa 0. Corona a minute membrane or composed of scale-like appendages up to $\frac{1}{4}$ mm. Disk glands $\frac{2}{3}$ -1 $\frac{1}{4}$ mm, inserted at or up to 3 mm above the base of the hypanthium. Vestigial ovary incl. gynophore 1-1 $\frac{1}{2}$ mm. φ fl. infundibuliform, incl. the 5-11 mm long stipe 23-32 by 5-6 mm, sepals spreading in anthesis to 15-25 mm. Pedicel 0-1 mm. Hypanthium cup-shaped 3-6 mm, calyx tube 0, sepals lanceolate(-linear), obtuse, 13-15 by 2 $\frac{1}{2}$ -4 mm, (sub)entire. Petals oblong to lanceolate, obtuse, 10-14 by 2-3 $\frac{1}{2}$ mm, 5-7-nerved, entire or c. 0.1 mm serrulate towards the apex. Staminodes $\frac{2}{3}$ -2 mm, free. Septa 0. Corona 0 or membranous, up to 0.2 mm. Disk glands up to $\frac{1}{2}$ mm. Pistil 10-15 mm. Gynophore $\frac{1}{2}$ -1 mm. Ovary ovate to ellipsoid-oblong, \pm 3-ribbed, 4 $\frac{1}{2}$ -8 by 3-5 mm. Styles connate for 2-2 $\frac{1}{2}$ mm, style arms 2-3 mm. Stigmas \pm peltate or subglobular, papillate, 2-3 mm \varnothing . Fruit 1 per inflorescence, fusiform, excl. the 2-5 mm long gynophore 5-6 by 2 $\frac{1}{2}$ -3 cm. Pericarp woody-coriaceous, $\frac{1}{2}$ -1 mm. Seeds 40-60 per capsule, ovoid-ellipsoid, c. 6 $\frac{1}{2}$ -7 by 5 by 2-2 $\frac{1}{2}$ mm, rather smooth, 7-10 pits \varnothing ; funicles c. 4 mm; embryo c. 6 mm; cotyledons elliptic, base cordate, apex rounded, c. 5 $\frac{1}{2}$ by 4 $\frac{1}{2}$ mm.

MADAGASCAR. Farigidraty (Limite NE. de l'Kudroy): *Decary 9324*, δ fl. (P) — Western (South), Tuléar Distr. [W(S)1], Belalana, Fiheremana: *Bosser 10359*, δ fl., fr. (P); Tuléar, 0-200 m: *Leandri 3700*, st. (P); Betioky Distr. [W(S)2], Sokoa R. valley: *Decary 15965*, fr. (P); near Fanjahira (Isalo-Sud), 400-600 m: *Humbert 2767*, p.p., φ fl. (K); Beahitsy: *Peltier 1433*, fr. (P); SW. of Lac Manampetsa: *Perrier de la Bâthie 19123 (19112?)*, st. (P) — Centr. (South), Ihosy Distr. [C(S)4], Isalo, 400-1000 m: *Humbert 2932*, δ fl. (P) — Southern, Ambovombe Distr. [S3], Amboasary: *Decary 3185*, δ fl. (P, syntype); Ambovombe: *Decary 3757*, δ fl. (P, lectotype); Kotoala: *Decary 8413*, δ fl. (P) — East. (South.), Amboasary Distr. [E(S)1], N. of Imonty (Haut bassin de la Mananara), 400-900 m: *Leandri & Saboureau 4200*, fr. (P), *4559*, st. (P); S. of Imonty: *Leandri & Saboureau 4266*, φ fl., fr. (P); Isomono, 400-900 m: *Humbert 12969*, fr. (P).

ECOLOGY. Scrub vegetation with *Didiereaceae* and tree-*Euphorbias*; sandy

soils, limestone and gneiss; 0–1000 m. Flowers from Oct. to April, fruits found in Oct., Nov. and Dec.

NOTES. 1. When more material becomes available it may appear that the specimens from near the coast (from sand dune areas) represent a separate form characterized by smaller, more divided leaves.

2. Fresh flowers are reported as green or yellowish-green, petals whitish green.

19. *Adenia fringalavensis* (Drake *ex* Jumelle) Harms in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 490; Perr., Not. Syst. 9 (1940) 54; Fl. Mad. Fam. 143 (1945) 22, fig. IV, 11–14; de Wilde, *Adansonia* 2, 10 (1970) 120, pl. 1, e. — *Ophiocaulon fringalavense* Drake del Castillo *ex* Jumelle, Compt. Rend. Acad. Sc. Paris 137 (1903) 206; Jumelle, Ann. Mus. Col. Marseille 2, 5 (1907) 338; Clav., Ann. Mus. Col. Marseille 2, 7 (1909) 14. — Type: *Perrier 760*.

Climber up to 15 m, trunk conical or subspherical up to 2 by $\frac{1}{2}$ m, warty, mostly with a waxy or resinous layer. Fertile branches $1\frac{1}{2}$ –3 mm; internodes (1)–2–8 cm. *Leaves* herbaceous to thinly coriaceous, brownish-green above, grey or glaucous(-green), not punctate, sometimes with remote slack whitish hairs beneath, entire to deeply 3(–5)-lobed, orbicular to ovate, base cordate, apex obtuse or acute, up to 1 cm acuminate, ($2\frac{1}{2}$ –)3–10(–17) by $2\frac{1}{2}$ –10(–18) cm, 5-(sub)plinerved, reticulation coarse to fine, distinct, margin entire; lobes triangular to oblong, up to 8 cm; petiole 2–10(–12) cm. *Glands* at blade-base 2, $\frac{1}{2}$ – $1\frac{1}{2}$ mm \varnothing , laterally at the apex of the petiole, not- or only slightly extending on the membranous $\frac{1}{2}$ –1 mm broad peltate blade-base; blade glands 0–2, small, submarginal. *Stipules* triangular to filiform, $\frac{1}{2}$ –1 mm. *Inflorescences* either in the axils of much reduced leaves in short-shoots $\frac{1}{2}$ –10(–15) cm, (sub)sessile, or peduncled for up to 7 cm, 1–5-flowered in σ , 1(–2)-flowered in φ ; tendrils 0 or 1, 2–5 cm. Sterile tendrils simple, 4–10 cm. Bracts and bracteoles narrowly triangular, acute-acuminate, $\frac{1}{2}$ (–1) mm. Flowers sometimes monoecious. σ *fl.* narrowly infundibuliform, incl. the 9–20 mm long stipe 22–55 by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, sepals \pm spreading in anthesis to 15–40 mm, not reflexed. Pedicel (0)– $\frac{1}{2}$ –4 mm. Hypanthium longly cup-shaped $3\frac{1}{2}$ – $5\frac{1}{2}$ by 1–2 mm, calyx tube 0, sepals (lanceolate-)linear, obtuse, 9–30 by $1\frac{1}{2}$ – $2\frac{1}{4}$ mm, entire. Petals lanceolate-linear, subobtuse to acute, $6\frac{1}{2}$ –16 by 1–2 mm, 3–5-nerved, less than 0.1 mm serrulate. Filaments 4– $8\frac{1}{2}$ mm, up to 1(– $1\frac{1}{2}$) mm connate, inserted at- or near the base of the hypanthium. Anthers 4– $5\frac{1}{2}$ by $\frac{1}{4}$ – $\frac{1}{3}$ (– $\frac{1}{2}$) mm, obtuse. Septa 0. Corona 0 or an inconspicuous membrane up to 0.1 mm. Disk glands $\frac{1}{3}$ –1 mm, inserted at or near the base in the hypanthium. Vestigial ovary incl. gynophore $\frac{1}{2}$ –1 mm. φ *fl.* narrowly campanulate-infundibuliform, incl. the $1\frac{1}{2}$ –8 mm long stipe 12–40 by $2\frac{1}{2}$ –5 mm. Pedicel 0–2 mm. Hypanthium cup-shaped, 2–5 mm, calyx tube 0, sepals lanceolate to linear, obtuse, 8–30 by 1–2 mm, entire, straight or \pm inflexed in the upper half. Petals lanceolate to linear, subobtuse to acute, 8–20 by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, 3–5-nerved, (sub)entire. Staminodes 1–2 mm, \pm free. Septa 0. Corona 0 or as an inconspicuous membrane up to 0.1 mm. Disk glands

0.1– $\frac{1}{3}$ mm. Pistil $6\frac{1}{2}$ –14 mm. Gynophore $\frac{1}{3}$ –2 mm. Ovary ovoid-oblong 4–8 by 2–4 mm, \pm 6-ribbed. Styles connate for 1– $2\frac{1}{2}$ mm, style arms 0– $\frac{1}{2}$ mm. Stigmas subreniform, papillate, each $1\frac{1}{2}$ –2 mm long. *Fruit* solitary, ovoid, apex acute or subobtusate but minutely pointed, excl. the 2–5 mm long gynophore 6–7 by 3–4 cm. Pericarp coriaceous, $\frac{1}{2}$ –3 mm. Seeds 30–60 per capsule, ovate to suborbicular, 6–8 by 5– $6\frac{1}{2}$ by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, 8–12 pits \varnothing ; funicles 2–3 mm; embryo 5(–6) mm; cotyledons suborbicular, base cordate, apex rounded, c. $4\frac{1}{2}$ (–5) by $4\frac{1}{2}$ mm.

DISTRIBUTION: W. and N. Madagascar — Fig. 13.

ECOLOGY. Rather common in tropophilous forest, dry deciduous forest and coastal forest; rocky places, limestone or sandy soils; 0–500 m. Flowers and fruits in the dry season, from Aug. to Dec.

NOTES. 1. PERRIER DE LA BÂTHIE observed in the field that the species is sometimes monoecious.

2. Fresh leaves are distinctly grey-glaucous beneath, the flowers greenish or whitish, reported with sometimes a 4–5-carpellate ovary.

KEY TO THE VARIETIES

1. Leaves 3–10(–17) cm long, apex acute or acuminate. Inflorescences sessile in short-shoots, without tendrils. σ fl. 30–55 mm, filaments distinctly emerging from the hypanthium. φ fl. 30–40 mm. Thickened basal part of main stem large, \pm longly conical. **a. var. *firingalavensis***
1. Leaves 3–7 cm, apex obtuse or acute. Inflorescences peduncled, on normal shoots, mostly with a tendril. σ fl. 20–30 mm, filaments almost entirely included in the hypanthium. φ fl. 12–17 mm. Thickened basal part of main stem smaller, subspherical. **b. var. *stylosa***

a. var. *firingalavensis* — Fig. 13.

Medium sized climber with large, mostly long-conical stem base. *Leaves* large, 3–10(–17) cm long, apex acute or acuminate. Petiole 2–10(–12) cm. *Inflorescences* in the axils of much reduced leaves in short-shoots $\frac{1}{2}$ –10(–15) cm, (sub)sessile, (mostly) without tendrils. σ fl. incl. the 12–20 mm long stipe 30–55 mm; hypanthium $3\frac{1}{2}$ – $5\frac{1}{2}$ mm, sepals 15–30 mm, petals 11–16 mm. Filaments $4\frac{1}{2}$ – $8\frac{1}{2}$ mm, mostly distinctly emerging from the hypanthium. Anthers 4– $5\frac{1}{2}$ mm. φ fl. incl. the 5–8 mm long stipe 30–40 mm; hypanthium 4–5 mm, sepals (15–)20–30 mm, petals (15–)17–20 mm. Pistil 12–14 mm; gynophore $1\frac{1}{2}$ –2 mm, ovary c. 7–8 by (2–) 3–4 mm, styles connate for $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Dry pericarp coriaceous, c. $\frac{1}{2}$ mm thick.

MADAGASCAR. s. loc.: *Thompson s.n.*, st. (BM) — Northern, Diégo-Suarez Distr. [N1], Plateaux de l'Ankarana, 100–250 m: *Humbert 18910-bis*, st. (P) — Sambirano, Helville Distr.

(Nossi-Bé) [Samb. 1], Lokobe: *Perrier de la Bâthie* 18713, ♂ fl., ♀ fl. (P); Ambanja Distr. (Samb. 2), Sambirano R. valley: *Perrier de la Bâthie* 6751, fr. (P) — West (North), Port Bergé Distr. [W(N)3], Bemarivo R. basin (Boina): *Perrier de la Bâthie* 6759, st. (P) — West, Marovay Distr. [W2], Ankarafantsika (Boina): *Perrier de la Bâthie* 6760, st. (P), 15866, st. (P), *Service Forestier* 24, ♂ fl. (P); Besalampy Distr. [W6], Forêt de Kasiza, Plateaux du Tampukitsa (Ambongo): *Perrier de la Bâthie* 2278, ♂ fl. (K, P); Androfiamisitra (Ambongo): *Perrier de la Bâthie* 6761, ♂ fl. (P); Morondava Distr. [W12], Befandriana Sud, 150 m: *Appert* 27, ♂ fl. (Z); near Morondava: *Grevé* 222 a, p.p., ♂ fl. (P), 222 b, st. (P); Forêt de Marofadelia (Morondava to Tsiribihina), 10–20 m: *Humbert* 11406, ♀ fl. (P); Morombé Distr. [W15], Morombé: *Decary* 18767, st. (P) — Centr. (North), Maevatanana Distr. [C(N)3], Firingalava: *Perrier de la Bâthie* 760, ♂ fl., fr. (P, type) — East (North), Sambave Distr. [E(N)2], Samabve, 1–5 m: *Humbert & Capuron* 24392, st. (P).

NOTE. 1. The wax-like resinous layer on the trunk is reported as up to 1 cm thick; according to PERRIER DE LA BÂTHIE it is absent in certain specimens from the Sambirano district.

b. var. *stylosa* (Perr.) de Wilde, *Adansonia* 2, 10 (1970) 121, pl. 1, f. — *Adenia epigea* var. *stylosa* Perr., *Not. Syst.* 9 (1940) 53; *Fl. Mad. Fam.* 143 (1945) 22. — Type: *Perrier* 6756. — Fig. 13.

Small climber with smaller, ± spherical stem base. *Leaves* 3–7 cm long, apex rounded to acute. *Petiole* 2–5 cm. *Inflorescences* in the axils of normal leaves, peduncled for ($\frac{1}{3}$ –)1–7 cm, tendril (0–)1. ♂ *fl.* incl. the 9–12 mm long stipe 22–27 mm; hypanthium $3\frac{1}{2}$ –4 mm, sepals 9–11 mm, petals $6\frac{1}{2}$ –9 mm. Filaments c. 4 mm, included in the hypanthium. Anthers 4– $4\frac{1}{2}$ mm. ♀ *fl.* incl. the $1\frac{1}{2}$ –6 mm long stipe 12–17 mm; hypanthium c. 2 mm, sepals 8–10 mm, petals c. 8 mm. Pistil $6\frac{1}{2}$ –8 mm; gynophore c. $\frac{1}{3}$ mm, ovary c. 4–5 by 2– $2\frac{1}{2}$ mm, styles connate, c. 1 mm. Dry pericarp coriaceous, $1\frac{1}{2}$ –3 mm thick.

MADAGASCAR. North, Diégo-Suarez Distr. [N1], Sakaramy, Mt. des Français: *Homolle* 292, ♂ fl. (P), 308, ± ♂ fl. (P), 324, ♂ fl. (P), 357, fr. (P); Collines et Plateaux calcaires de l'Ankarana, 100–250 m: *Humbert* 18910-ter, st. (P); Ambondrofo to Ambodimagodro, 250 m: *Humbert* 18990-bis., st. (P) — South. (North), Vohemar Distr. [E(N)1], Valleys of Loky R. and Manankolala: *Perrier de la Bâthie* 6756, ♀ fl., fr. (P, type).

ECOLOGY. Tropophilous forest; rocky places, limestone, gneiss; 100–250 m.

NOTES. 1. This variety was originally described by PERRIER DE LA BÂTHIE under *A. epigea*. As already appears from PERRIER'S own comments the taxon does not fit there, and is better treated under *A. firingalavensis*.

2. The thickened base of the main stem is reported as more or less spherical, sometimes with a prolonged neck, and covered with a thin resinous layer.

20. *Adenia isaloensis* (Perr.) de Wilde, *Adansonia* 2, 10 (1970) 119, pl. 1, d — *Adenia sphaerocarpa* Clav. ssp. *isaloensis* Perr., *Not. Syst.* 9 (1940) 56; *Fl. Mad. Fam.* 143 (1945) 27. — Lectotype: *Humbert* 2767. — Fig. 12.

Slender, rarely robust climber, sometimes shrub-like, up to 4 m, the stems growing from a tuber. Fertile branches often pruinose, $1\frac{1}{2}$ –3 mm; internodes $1\frac{1}{2}$ –7 cm. *Leaves* mostly coriaceous, mostly distinctly grey-glaucous at both surfaces, rarely greenish, not punctate beneath, entire or sometimes shallowly 3–5-lobed, broadly ovate to suborbicular in outline, base cordate, apex rounded, sometimes retuse or subobtusate, $(1-1\frac{1}{2}-7(-9))$ by $(1-1\frac{1}{2}-7(-8))$ cm, 5(–7)-plinerved and mostly 1–2 pairs of ascending nerves from the midrib, reticulation fine, mostly distinct, margin entire; lobes rounded, up to $1\frac{1}{2}$ cm; petiole $\frac{1}{2}$ –3(– $3\frac{1}{2}$) cm. *Glands* at blade-base 2, $1(-1\frac{1}{2})$ mm \varnothing , at the transition of the petiole and the median bulging, \pm thickened, $\frac{1}{2}$ –1 mm broad peltate blade-base; blade glands 0 or 2(–4), c. $\frac{1}{3}$ mm \varnothing , submarginal. Stipules narrowly triangular, acute, $\frac{1}{2}$ (–1) mm. *Inflorescences* in the axils of normal leaves or sometimes in short-shoots up to 3 cm, peduncled for $(0-10.1-1(-3))$ cm, 1–6-flowered in σ , 1(–2)-flowered in φ ; tendril 0–1, $1-3\frac{1}{2}$ cm. Sterile tendrils 3–7 cm. Bracts and bracteoles (narrowly) triangular, acute, c. $\frac{1}{2}$ mm. Flowers dioecious or monoecious. σ fl. narrowly tubular-infundibuliform, incl. the $6\frac{1}{2}$ –12 mm long stipe $19-28$ by $1\frac{1}{2}-2(-2\frac{1}{2})$ mm, sepals in anthesis opening to c. 10 mm, not reflexed. Pedicel 1–5 mm. Hypanthium cup-shaped to tubiform, $4-6\frac{1}{2}$ by $1\frac{1}{2}-2$ mm, calyx tube 0, sepals (lanceolate-)linear, obtuse, $7-10(-13)$ by $1\frac{1}{2}-2\frac{3}{4}$ mm, (sub)entire. Petals lanceolate(-linear), obtuse, $5-8(-9)$ by $1\frac{3}{4}-2\frac{1}{2}$ mm, 5–7 nerved, c. 0.1 mm serrulate near the apex, straight or slightly curved, not reflexed. Filaments $4-5\frac{1}{2}$ mm, up to $\frac{1}{2}(-1\frac{1}{2})$ mm connate, inserted at or up to 1 mm above the base of the hypanthium. Anthers 4–5 by $\frac{1}{4}-\frac{1}{3}$ mm, obtuse to subacute. Septa 0. Corona 0 or membranous c. 0.1 mm or consisting of small lobes up to $\frac{1}{2}$ mm. Disk glands $\frac{1}{3}-1$ mm, inserted near the base of the hypanthium. Vestigial ovary incl. gynophore $1-1\frac{1}{2}$ mm. φ fl. narrowly campanulate, incl. the 2–6 mm long stipe $15-19$ by $4\frac{1}{2}$ mm, sepals in anthesis opening to 15 mm. Hypanthium cup-shaped, $2-2\frac{1}{2}$ mm, calyx tube 0, sepals lanceolate, subobtusate, $9-10$ by $2\frac{1}{2}-3$ mm, 7-nerved, entire. Petals elliptic-oblong, obtuse, c. 6 by $2\frac{1}{2}-3$ mm, 5(–7)-nerved, subentire. Staminodes c. $1\frac{1}{2}$ mm, free. Septa 0. Corona very inconspicuous, c. 0.1 mm. Disk glands c. 0.2 mm. Pistil c. 9 mm. Gynophore c. $\frac{1}{2}$ mm. Ovary ellipsoid, c. $6\frac{1}{2}$ by $3\frac{1}{2}-4$ mm. Styles connate for c. 1 mm, style arms c. 1 mm, reflexed. Stigmas subglobular to reniform, papillate, each $1\frac{1}{2}(-2)$ mm \varnothing . *Fruit* 1 per inflorescence, ellipsoid(-oblong), apex subacute, excl. the $3\frac{1}{2}-6$ mm long gynophore $4-4\frac{1}{2}$ by $2-2\frac{1}{2}$ cm. Pericarp coriaceous, smooth, $\frac{1}{4}-\frac{1}{2}$ mm. *Seeds* c. 50 per capsule, ovoid-ellipsoid, c. 6 by $4-4\frac{1}{2}$ by 2 mm, rather smooth, 8–12 pits \varnothing ; funicles (1–)2 mm; embryo $3\frac{1}{2}-4$ mm; cotyledons orbicular $3-3\frac{1}{2}$ by $3-3\frac{1}{2}$ mm.

MADAGASCAR. Centr. (South.), Ihosy Distr. [C.(S)4], Isalo Mts., 300–1300 m.: *d'Alleizette 2608 b*, σ fl. (L), *Decary 15937*, st. (P), *15941*, σ fl. (P), *16311*, fr. (P), *16388*, st. (P), *Keraudren 1115*, st. (P), *Leandri & Saboureau 3918*, σ fl., φ fl. (P), *3934*, σ fl. (P); near Fanjahira: *Humbert 2767*, σ fl., φ fl., fr. (K, p.p.; P, lectotype); W. of Ranohira: *Humbert 19355*, σ fl. (P); Manombo: *Peltier 1269*, σ fl. (P); Col des Tapia: *Humbert 11220*, σ fl. (P), *Perrier de la Bâthie 16619*, σ fl. (P).

ECOLOGY. Dry forest and scrub; on rock, sandstone, and siliceous soils; locally common; 300–1200 m. Flowers and fruits Oct. to Dec.

NOTES. 1. Characterized by the mostly distinctly grey-glaucous leaves. *Perrier de la Bâthie 16619* and *Herb. d'Alleizette 2608 b. (specimens 1 & 2)* deviate in having thinner brownish-green, not glaucous, leaves; in *Perrier 16619*, moreover, the leaves are unusually deeply (3–)5-lobed.

2. According to **PERRIER DE LA BÂTHIE** the flowers are dioecious or monoecious with apparently the male- and female flowers on different shoots.

3. Fresh flowers are reported as greenish yellow, the petals as white, the fruits as green; plant once reported as with a large tuber.

21. *Adenia longestipitata* de Wilde, *Adansonia* 2, 10 (1970) 120, pl. 1, a. — Type: *Humbert 6712*. — Fig. 12.

Small climber up to 5 m, stem not swollen at the base. Fertile branches later on greyish, $1\frac{1}{2}$ –4 mm; internodes 2–6 cm. *Leaves* herbaceous to thinly coriaceous, brownish green above, greyish-green, not punctate beneath, entire or sometimes shallowly 3-lobed, broadly ovate to orbicular, base cordate to truncate, apex rounded, $1\frac{1}{2}$ – $6\frac{1}{2}$ by $1\frac{1}{2}$ – $6\frac{1}{2}$ cm, 5–7-plinerved, and with 0–1(–2) pairs of nerves from the midrib, reticulation fine, distinct, margin entire; lobes rounded, up to 1 cm; petiole $\frac{3}{4}$ – $3\frac{1}{2}$ cm. *Glands* at blade-base 2, $\frac{1}{2}$ – $1\frac{1}{2}$ mm \varnothing , lateral at the apex of the petiole, not or hardly extending on the membranous 1(–2) mm broad peltate blade-base; blade glands 0 or 2, c. $\frac{1}{3}$ mm \varnothing , submarginal. *Stipules* narrowly triangular, c. $\frac{1}{2}$ mm, caducous. *Inflorescences* peduncled for ($\frac{1}{2}$ –)1–4 cm, 1–5-flowered in δ ; tendril (0–)1, 2–5 cm. Sterile tendrils simple, 4–8 cm. Bracts and bracteoles narrowly triangular to lanceolate, 1–2 mm. δ fl. tubular-infundibuliform, incl. the 13–18 mm long stipe 28–40 by 2–3(–5) mm, sepals \pm spreading in anthesis to 15(–20) mm. Pedicel 1–6(–10) mm. Hypanthium longly cup-shaped, (3–)4– $6\frac{1}{2}$ mm, calyx tube 0, sepals (lanceolate-)linear, obtuse, 12–16 by 2–3 mm, (sub)entire. Petals lanceolate, subobtuse to subacute, $8\frac{1}{2}$ –11 by 2–3 mm, 5–7-nerved, up to 0.1 mm serrulate, mostly \pm reflexed in the upper half. Filaments ($4\frac{1}{2}$ –)5–7 mm, free or up to 1(–2) mm connate, inserted at or up to 1 mm above the base of the hypanthium. Anthers $4\frac{1}{2}$ –7 by $\frac{1}{4}$ – $\frac{1}{3}$ (– $\frac{1}{2}$) mm, obtuse to acute. Septa 0. Corona \pm 0 or consisting of a wiry membrane up to 0.1(–0.2) mm. Disk glands $\frac{1}{2}$ – $1\frac{1}{4}$ mm, inserted up to 2 mm above the base of the hypanthium. Vestigial ovary incl. gynophore $\frac{1}{2}$ – $1\frac{1}{2}$ mm. φ fl. & fruit not known.

MADAGASCAR. Centr. (South), Ihosy Distr. [C(S)4], Isalo: *d'Alleizette 2608 b.*, δ fl. (L); Betroka Distr. [C(S)5], Ihosy R. valley, 800–1000 m: *Humbert 3018*, δ fl. (P); N. of Betroka: *Humbert 11621*, δ fl. (P) — South, Bekely Distr. [S1], Bekely to Tsivory: *Seyring 102 & 102 B*, δ fl. (P); Ambovombe Distr. [S3], Antanimoro: *Decary 3266*, δ fl. (P); East (South), Amboasary Distr. [E(S)1], Col du Vavara, 700–1200 m: *Humbert 6712*, δ fl. (P; L, type); Mt. Amboahany, near Esira, 1000–1150 m: *Humbert 6832*, δ fl. (P, L); near Isomono, 400–900 m: *Humbert 12963*, δ fl. (P), *13119*, δ fl. (P); Fort Dauphin Distr. [E(S)2], Fort Dauphin: *Cloisel 46*, δ fl. (P).

ECOLOGY. Scrub vegetation, xerophilous forest; rocky slopes, gneiss; 400–1200 m. Flowers Sept. to Jan.

NOTES. 1. Many specimens of this recently described species were formerly included in *A. sphaerocarpa* ssp. *isaloensis*. It belongs to a group of coherent species to which belong also: *A. elegans*, *A. firingalavensis*, *A. antongilliana*, *A. isaloensis*, *A. cladosepala* and *A. sphaerocarpa*. The present species seems most related to *A. isaloensis* and *A. antongilliana*.

2. Once mentioned on a field label that the stem was cylindrical at the base, not swollen. The presence of a subterranean tuber is not known.

3. Fresh male flowers are reported as yellowish or greenish-yellow, petals white or yellowish-white, anthers as yellow.

22. *Adenia sphaerocarpa* Clav., Ann. Mus. Col. Marseille 2, 7 (1909) 38; Perr., Not. Syst. 9 (1940) 55; Fl. Mad. Fam. 143 (1945) 26; de Wilde, Adansonia 2, 10 (1970) 123, pl. 1, j. — Lectotype: *Perrier 15865-bis*. — Fig. 13.

Adenia sphaerocarpa Clav. ssp. *mandrarensis* Perr., Not. Syst. 9 (1940) 56; Fl. Mad. Fam. 143 (1945) 27. — Syntypes: *Humbert & Swingle 5665*, *Decary 4716*.

Robust climber up to 15 m, base of stem cylindrical, not swollen, up to 12 cm thick. Fertile branches greenish, $1\frac{1}{2}$ –5 mm; internodes $1\frac{1}{2}$ –10 cm. *Leaves* (thinly) coriaceous, green above, some paler, not- or very remotely set with minute caducous scale-like appendages beneath, not punctate, entire or 3–5-lobed, or in sapling shoots variously lobed or -divided, broadly ovate to suborbicular, base cordate, apex acute or subacute, rarely obtuse, 4–20 by $3\frac{1}{2}$ –20 cm, 5–7-subplinerved and 1–3 pairs of nerves from the midrib, reticulation distinct, \pm trabeculate between the nerves, margin entire; lobes triangular to ellipsoid, (sub)acute, up to 7 cm; petiole 2–12 cm. *Glands* at blade-base 2, ($\frac{1}{2}$ –)1– $1\frac{1}{2}$ mm \varnothing , on two fairly large semi-circular auricles c. 3 mm \varnothing laterally at the apex of the petiole, auricles connate for $\frac{1}{2}$ –1 mm making the blade-base slightly peltate; blade glands 0–4, c. 1 mm \varnothing , submarginal. Stipules narrowly triangular, c. $\frac{1}{2}$ –1 mm, caducous. *Inflorescences* mostly in the axils of \pm reduced leaves in simple or branched short-shoots up to 15 cm, peduncled for up to $\frac{1}{2}$ (–1) cm, 1–5-flowered in σ , 1(–2)-flowered in ρ ; tendrils 0. Sterile tendrils simple, 7–18 cm. Bracts and bracteoles (narrowly) triangular, $\frac{1}{2}$ (–1) mm. Flowers dioecious or monoecious. σ fl. narrowly tubular-infundibuliform, incl. the 15–24 mm long stipe 28–47 by 2–3(– $4\frac{1}{2}$) mm, sepals \pm reflexed in anthesis to 15–25 mm wide. Pedicel $\frac{1}{2}$ –2 mm. Hypanthium longly cup-shaped, 6–8 mm, calyx tube 0, sepals (oblong-)lanceolate, obtuse, 10–25 by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, (sub)entire. Petals oblong to lanceolate(-linear), subobtuse, $6\frac{1}{2}$ –10 by 2–3 mm, 5–7-nerved, 0.1–0.2 mm denticulate towards the apex, \pm reflexed. Filaments 3–6 mm, (1–) $2\frac{1}{2}$ –4 mm connate, inserted at or up to 2(–4) mm above the base of the hypanthium. Anthers 7–9 by $\frac{2}{3}$ –1 mm, obtuse, partly included in the hypanthium. Septa 0. Corona 0 or an inconspicuous membrane up to 0.1 mm. Disk glands

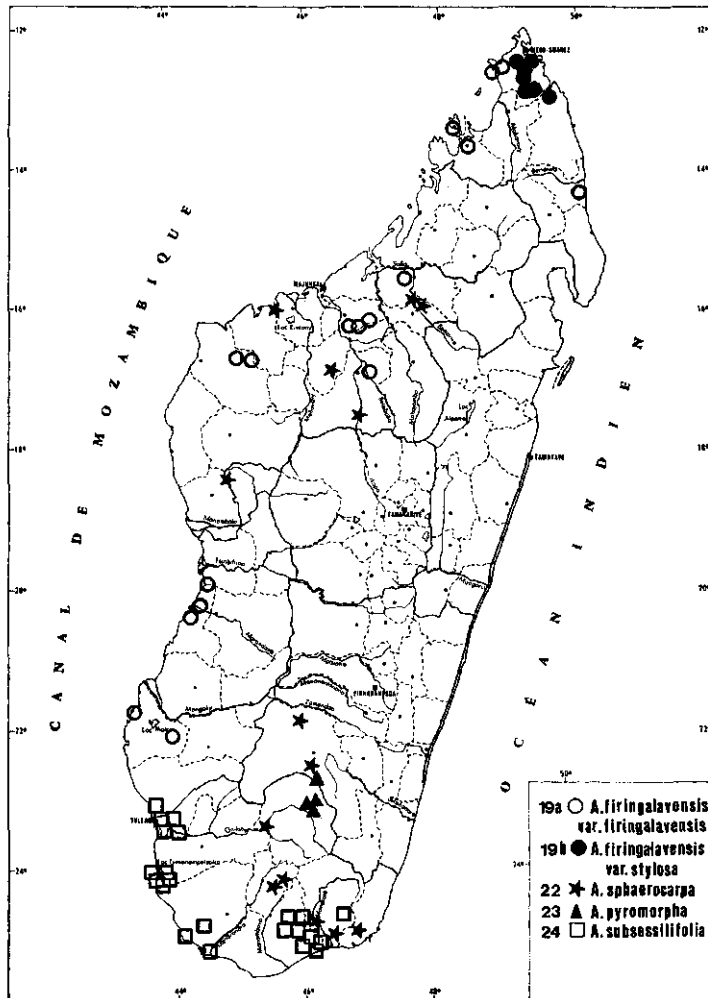


FIG. 13. Localities of species 19, 22-24.

5, contiguous, or mostly an uninterrupted fleshy ring $\frac{1}{3}$ – $\frac{3}{4}$ mm. Vestigial ovary incl. gynophore $1\frac{1}{2}$ –5 mm. ♀ *fl.* narrowly campanulate-infundibuliform, incl. the $8\frac{1}{2}$ –15 mm long stipe 22–36 by 5 mm, sepals opening in anthesis up to 20 mm. Pedicel 0–2 mm. Hypanthium cup-shaped 3–5 mm, calyx tube 0, sepals lanceolate, obtuse, 10–17 by 3–4 mm, subtire. Petals (ovate-)oblong, obtuse, 8–10 by 4–5 mm, 5–7-nerved, c. 0.1 mm denticulate towards the apex. Staminodes $1\frac{1}{2}$ –2 mm, free. Corona 0. Septa 0. Disk consisting of an uninterrupted ring $\frac{1}{4}$ – $\frac{3}{4}$ mm. Pistil 12–15 mm. Gynophore 1– $1\frac{1}{2}$ mm. Ovary ellipsoid-oblong 6–9(–10) by $2\frac{3}{4}$ –4(– $4\frac{1}{2}$) mm. Styles connate for 2–3 mm, style arms $\frac{1}{2}$ –1 mm. Stigmas ± ellipsoid, papillate, each c. $3\frac{1}{2}$ mm ∅. *Fruit* solitary, ellip-

soid (-oblong), \pm fusiform, sometimes \pm beaked, excl. the c. 5 mm long gynophore c. 6 by $2\frac{1}{2}$ –3 cm. Pericarp coriaceous, smooth, ($\frac{1}{4}$ –) $\frac{1}{2}$ mm. Seeds c. 50 per capsule, suborbicular, c. $5\frac{1}{2}$ by 5 by 2 mm, rather smooth, 9–12 pits \varnothing ; funicles c. 3 mm; embryo not known.

MADAGASCAR. s. loc.: *Herb. Jardin Bot. Tananarive 1187*, ♀ fl. (P) — West, Soalala Distr. [W4], near Soalala: *Waterlot 184*, ♂ fl. (P); Ambato Boeni Distr. [W5], Ankirihitra (Boina): *Perrier de la Bâthie 1504*, st. (P, syntype *A. sphaerocarpa*); Antsalova Distr. [W9], Réserve de Bemaraka, Antsalova to Tsiandro: *Petit s.n.*, ♂ fl. (P, L) — Centr. (North), Mampikony Distr. [C(N)1], Bebakoly R., tributary of the Bemarivo R. (Boina): *Perrier de la Bâthie 15865 (13865)*, ♂ fl. (P, syntype *A. sphaerocarpa*), *15865-bis*, st. (P, lectotype *A. sphaerocarpa*), *15865-ter*, st. (P, syntype *A. sphaerocarpa*), *15866-bis*, ♂ fl. (P, syntype *A. sphaerocarpa*); Maevatanana Distr. [C(N)3], vicinity of Andriba: *Perrier de la Bâthie 1473*, ♂ fl., fr. (P, ? syntype *A. sphaerocarpa*) — Centr. (South.), Ihosy Distr. [C(S)4], Ihosy: *Descoings 3628*, ♂ fl. (P); valley of the Ihosy R. (Mangoky basin), 800 m: *Perrier de la Bâthie 6744*, ♂ fl., fr. (P) — South, Bekily Distr. [S1], vicinity of Ampandrandava (Bekily to Tsivory): *Seyrig s.n.*, st. (P); *866 B*, ♂ fl. (P) — East (South), Amboasary Distr. [E(S)1], Behara: *Humbert & Swingle 5665*, ♀ fl. (K; P, lectotype *A. sphaerocarpa* ssp. *mandrarensis*); Vallée de Moyen Mandrare: *Decary 4716*, fr. (P, syntype *A. sphaerocarpa* ssp. *mandrarensis*); Fort Dauphin Distr. [E(S)2], Fort Dauphin: *Hb. Cambessèdes s.n.*, st. (MPU), *Commerson s.n.*, st. (P).

ECOLOGY. Trophophilous forest; gneiss-rock and sandy soils; 200–800 m. Flowers from July to Nov., fruits found in August.

NOTES. 1. According to PERRIER DE LA BÂTHIE (Fl. Mad., 1945) the fruits are ellipsoid to subspherical, but I found no evidence for this.

2. The species resembles *A. cladosepala*; for distinguishing characters see under that species and the key.

3. Fresh flowers are reported as green or dark green with whitish petals. The plants seem to be leafless in the dry season.

23. *Adenia pyromorpha* (Perr.) de Wilde, Adansonia 2, 10 (1970) 116. — *A. subsessilifolia* Perr. forma *pyromorpha* Perr., Not. Syst. 9 (1940) 51; Fl. Mad. Fam. 143 (1945) 17. — Syntypes: *Humbert 11599, 11712*. — Fig. 13.

Suberect herb to 60 cm, several stems growing from a tuberous rootstock; no tendrils. Fertile branches 1–2 mm; internodes 2–6 cm. *Leaves* subcoriaceous, grey-glaucous at both surfaces, not punctate, deeply 3-parted or sometimes subentire, (1–) $1\frac{1}{2}$ –6 by 1–5 cm, 3-plinerved, reticulation fine, distinct or not, margin entire; parts (or subentire leaves) oblong-lanceolate to linear, apex acute, up to 6 cm; petiole 0.15–0.6 cm. *Glands* at blade-base 2, $\frac{1}{2}$ –1 mm \varnothing , at both sides of the apex of the petiole. No other glands present. Stipules linear, c. $\frac{1}{2}$ mm, soon withering. *Inflorescences* peduncled for up to 1 cm, 1–3(–5)-flowered in ♂, 1-flowered in ♀; tendrils 0. Bracts and bracteoles narrowly triangular, acute, $\frac{1}{2}$ – $\frac{3}{4}$ mm. ♂ fl. narrowly tubular-infundibuliform, incl. the 9–10 mm long stipe 18–19 by $2\frac{1}{2}$ mm, sepals spreading in anthesis to c. 7 mm, not reflexed. Pedicel 1–3 mm. Hypanthium longly cup-shaped c. 3 mm, calyx tube 0, sepals oblong-lanceolate, obtuse, c. 6 by 2 mm, \pm entire. Petals oblong,

obtuse, c. 5 by 2 mm, 5(-7)-nerved, \pm entire. Filaments c. $3\frac{1}{2}$ mm, connate for c. $\frac{1}{2}$ mm, inserted c. $\frac{1}{2}$ mm above the base of the hypanthium. Anthers c. 3 by $\frac{1}{3}$ - $\frac{1}{2}$ mm, obtuse. Septa 0. Corona inconspicuous, consisting of a sinuate membrane or scale-like appendages c. 0.1 mm. Disk glands c. $\frac{1}{2}$ mm, inserted c. $\frac{1}{2}$ mm above the filaments. Vestigial ovary incl. gynophore c. 1 mm. ♀ fl. infundibuliform, incl. the 3-5 mm long stipe 12-17 by 3 mm, sepals spreading in anthesis to c. 10 mm. Pedicel c. 1 mm. Hypanthium cup-shaped $1\frac{1}{4}$ -2 mm, calyx tube 0, sepals lanceolate, subobtuse, 8-10 mm, subentire. Petals oblong-lanceolate, obtuse or subacute, $5\frac{1}{2}$ - $6\frac{1}{2}$ by 2- $2\frac{1}{4}$ mm, 5(-7)-nerved, subentire. Staminodes: $1\frac{1}{2}$ - $1\frac{3}{4}$ mm, free, inserted at the base of the hypanthium. Septa 0. Corona consisting of a lobulate membrane or of scale-like appendages $\frac{1}{4}$ - $\frac{1}{2}$ mm. Disk glands 0.2- $\frac{1}{2}$ mm. Pistil 6- $6\frac{1}{2}$ mm. Gynophore 1(-2) mm. Ovary ellipsoid-oblong, 3-4 by $1\frac{3}{4}$ - $2\frac{1}{2}$ mm. Styles connate for c. $\frac{1}{2}$ mm, style-arms c. 1 mm. Stigmas subglobular, papillate, each c. 1 mm \varnothing . *Fruit not known.*

MADAGASCAR. Centr. (South), Betroka Distr. [C(S)5], S. of Betroka: *Bosser 13914*, ♂ fl., ♀ fl. (P); Haute vallée de l'Onilahy, 800 m: *Humbert 11599*, \pm fr. (P, syntype *Adenia subsessilifolia* forma *pyromorpha*); N. of Betroka (Mt. Vohipolaka), 1200 m: *Humbert 11712*, ♂ fl. (B; P, syntype *A. subsessilifolia* forma *pyromorpha*); Betroka to Ihosy, 1000 m: *Lam & Meeuse 5529*, ♀ fl. (L).

ECOLOGY. (Apparently regularly burnt) grass steppes on lateritic soils; 800-1200 m. Flowers in Nov. and Dec.

NOTES. 1. PERRIER DE LA BÂTHIE recognized the present taxon as a pyromorphic form of *A. subsessilifolia*. It deserves, however, the status as species because of various differentiating characters e.g. the smaller habit, the absence of tendrils, the larger, longer petioled leaves, the more developed corona, the smaller obtuse (not acute-apiculate) anthers, and a different distributional area at higher altitudes. It is endemic in the vicinity of Betroka.

2. The parsnip-shaped rootstocks are rusty-brown. The leaves are distinctly (glaucous-)grey. Fresh flowers are reported as brownish- or yellowish green with purple-brown spots, the petals as white or pale yellow.

24. *Adenia subsessilifolia* Perr., Not. Syst. 9 (1940) 50; Fl. Mad. Fam. 143 (1945) 16, fig. IV, 4-10; de Wilde, Adansonia 2, 10 (1970) 116. — Syntypes: *Decary s.n.*, 8369, 8458, 8527, 8563, 8573, 8836, *Perrier 19114*. — Fig. 13.

Slender climber up to $1\frac{1}{2}$ m, several greyish stems growing from a tuber-like root-stock up to 30 cm \varnothing . Fertile branches $1\frac{1}{3}$ -3 mm; internodes 2-6 cm. *Leaves* \pm coriaceous, (glaucous-) grey or whitish at both surfaces, not punctate, 3-parted, broadly ovate in outline, 0.7- $1\frac{1}{2}$ (- $2\frac{1}{2}$) by 0.7- $1\frac{1}{2}$ cm, 3-plinerved, reticulation indistinct, margin entire; the parts or lobes obovate to oblong or (ob)lanceolate, entire or the middle-part 3-5-dentate or -lobed, obtuse to subacute, $\frac{1}{2}$ - $1\frac{1}{2}$ (- $2\frac{1}{2}$) cm; petiole 0.05-0.1 cm. *Glands* at blade-base 2, $\frac{1}{2}$ - $\frac{3}{4}$ mm \varnothing , lateral at the thickened petiole; no other glands present. Stipules \pm triangu-

lar, c. $\frac{1}{3}$ mm, soon withering. *Inflorescences* peduncled for up to 2 cm, 2–8-flowered in ♂, ♀ fl. solitary; tendril (0–)1, only in ♂, 2–4 cm. Sterile tendrils simple, 3–6 cm. Bracts and bracteoles narrowly triangular, acute, c. $\frac{1}{2}$ mm. Flowers dioecious or monoecious. ♂ fl. narrowly tubular-infundibuliform, incl. the 12–19 mm long stipe 22–33 by $1\frac{1}{2}$ –2(– $2\frac{1}{2}$) mm, sepals spreading in anthesis to 10–15 mm, not reflexed. Pedicel 0–1 mm. Hypanthium tubiform, (3–)4–7 mm, calyx tube 0, sepals oblong-lanceolate, obtuse, $5\frac{1}{2}$ –9(–10) mm, entire. Petals lanceolate, obtuse, 5–6 $\frac{1}{2}$ by $1\frac{1}{2}$ mm, 3–5-nerved, subentire. Filaments (2–)3–4 mm, free, inserted $\frac{1}{2}$ –1 $\frac{1}{2}$ (–2) mm above the base of the hypanthium. Anthers 4–5(–6) by $\frac{1}{3}$ – $\frac{1}{2}$ mm, acute, up to 0.2 mm apiculate. Septa 0. Corona 0. Disk glands $\frac{1}{2}$ – $\frac{3}{4}$ mm, in the axils of the filaments. Vestigial ovary incl. gynophore $\frac{1}{2}$ – $\frac{3}{4}$ mm. ♀ fl. infundibuliform, incl. the c. 7 cm long stipe c. 23 by 4 mm. Pedicel c. 5 mm. Hypanthium cup-shaped c. 5 mm, calyx tube 0, sepals lanceolate-linear, subobtuse, c. 12 by $2\frac{1}{2}$ mm. Petals lanceolate, subacute, c. 9 by $2\frac{1}{2}$ mm, 3–5-nerved. Staminodes c. 1 mm, free. Corona 0. Disk glands c. 0.2 mm. Pistil not known; young fruits sometimes with 4 carpels and placentas. *Fruit* 1 per inflorescence, obovoid-ellipsoid, apex subacute, excl. the 6–10 mm long stipe $4\frac{1}{2}$ –6 by 2–3 cm. Pericarp thinly coriaceous, c. $\frac{1}{4}$ mm, smooth. Seeds 30–40 per capsule, ovate, 6–7 by 4–5 by $2\frac{1}{2}$ –3 mm, rather smooth, 8–15 pits \emptyset ; funicles 2–3 mm; embryo 4–4 $\frac{1}{2}$ mm; cotyledons ellipsoid, base cordate, apex rounded, $3\frac{1}{2}$ –4 by 3 mm.

MADAGASCAR. West (South), Tuléar Distr. [W(S)1], St. Angustin: *Azelius s.n.* ♂ fl. (S), *Decary 18574*, ♂ fl. (P); near Beleboka St.: *Déquaire 27400*, ♂ fl. (P); estuary of the Onilahy R. (N. coast): *Humbert & Capuron 29546*, ♀ fl., fr. (P, L); La Table (near Tuléar): *Léandri c.s. 3666*, st. (P); Betioky Distr. [W(S)2], Vicinity of Lake Tsimanampetsotsa (Manampetsa), 0–100 m: *Keraudren 1396*, ♂ fl. (P), *Leandri 4006*, fr. (P), *4015*, fr. (P), *4047*, fr. (P), *4066*, fr. (P), *Perrier de la Bâthie 19144* (2 sheets), ♂ fl., fr. (P, syntype *Adenia subsessilifolia*) — South, Ampanihy Distr. [S2], Androka to Ampanihy: *Bosser 14233*, ♂ fl. (P); Bevoalavo to Ankazondranto (near the mouth of Menarandra R.): *Humbert 29381*, st. (P); Ambovombe Distr. [S3], Ambovombe: *Decary 3595*, fr. (P), *8458*, ♂ fl. (P, syntype), *8527*, ♂ fl. (P, syntype), *8536*, fl., fr. (P, syntype), (*3573*) *8573*, ♂ fl. (P, syntype), *8836*, ♂ fl. (P, syntype) — East (South), Amboasary Distr. [E(S)1], Behara: *Decary 8369*, ♂ fl. (L; P, syntype); N. of Behara (Betroka valley): *Decary 9459*, ♂ fl. (P, syntype); Imonty, Res. Nat. 12: *Keraudren 1522*, st. (P).

ECOLOGY. Xeromorph scrub with tree-*Euphorbias* and *Didiereaceae*, forest edges; lime soils and granitic soils; 0–300 m; fairly common. Flowers from Oct. to April, fruits from Nov. to April.

USES. The tubercles are reported as bitter and non-edible; the pounded stems are used as a remedy on wounds.

NOTES. 1. Once described on a field-label as a tufty plant, c. 50 cm tall.

2. Fresh flowers are yellowish-green or yellow.

3. According to PERRIER DE LA BÂTHIE the plants are either dioecious or monoecious.

25. *Adenia perrieri* Clav., Ann. Mus. Col. Marseille 2, 7 (1909) 44; Perr., Not. Syst. 9 (1940) 50; Fl. Mad. Fam. 143 (1945) 14, fig. III, 1–6; de Wilde, Adan-

sonia 2, 10 (1970) 113. — Syntypes: *Perrier 6737; 6757; 6758*. — Fig. 14, 15 a-d.

Large climber, the basal part thickened 2–4 m long, up to 30 cm thick, tapering in a cylindrical stem. Fertile branches $2\frac{1}{2}$ –4(–8) mm; internodes 5–10 cm. *Leaves* herbaceous, greenish above, pale green or grey-green, not punctate beneath, deeply 5-lobed or -parted, suborbicular in outline, base cordate, 4–15 by 5–17 cm, 5-plinerved, reticulation rather indistinct, margin entire; lobes or parts entire or in sterile shoots variously pinnilobed, ovate-oblong to lanceolate, base tapering to the nerve, apex obtuse to acute, up to 11(–12) by 5(–6) cm; petiole $1\frac{1}{2}$ –15 cm. *Glands* at blade-base 2, $1-1\frac{1}{2}$ mm \varnothing , on a median, small, fleshy, bilobed auricle at the transition of petiole to blade; blade glands 2–4 (–10), $\frac{1}{2}$ –1 mm φ , submarginal. *Stipules* triangular, base \pm broadened, serrulate near the apex, 1–2 mm. *Inflorescences* either clustered on short-shoots on the old wood, (sub)sessile, tendril 0, or in the axils of normal leaves, peduncled for up to 12 cm, tendril 1, 2–4 cm; 1–5-flowered in δ . Sterile tendrils 10–16 cm. Bracts and bracteoles triangular to lanceolate, denticulate, 1–4 mm. δ *fl.* narrowly tubular-infundibuliform, incl. the 6–12 mm long stipe 24–35 by 2(– $2\frac{1}{2}$) mm, sepals recurved in anthesis 10–20 mm wide. Pedicel 1–3 mm. Hypanthium tubiform, gradually passing into the stipe, 8– $13\frac{1}{2}$ by 2 mm, calyx tube 0, sepals lanceolate, obtuse, (8–)10–12 by 3–4 mm, entire. Petals (ob)lanceolate, (sub) obtuse, 6–9 by 2–4 mm, 3-nerved, denticulate near the apex, \pm reflexed. Filaments 3–5 mm, inserted 2– $2\frac{1}{2}$ mm below the throat of the hypanthium, but seemingly 1–2 mm, free, inserted at the throat. Anthers 6– $6\frac{1}{2}$ by $\frac{3}{4}$ –1 mm, obtuse. Septa very narrow, 2–4 mm high. Corona consisting of a row of scale-like appendages or thick hairs or of a deeply incised membrane $\frac{1}{4}$ – $\frac{1}{2}$ mm. Disk glands 0. Vestigial ovary incl. gynophore c. $\frac{1}{2}$ mm. φ *fl.* not known. *Fruit* 1 per inflorescence, fusiform, excl. the (10–)15–30 mm long gynophore 10–15 by $2\frac{1}{2}$ –5 cm. Pericarp coriaceous, $\frac{1}{2}$ –1 mm. Seeds c. 60 per capsule, ovate, c. 7 by 6 by 3 mm, muricate, 6–9 pits \varnothing ; funicles c. 5 mm, embryo c. $5\frac{1}{2}$ mm; cotyledons suborbicular, base cordate, obliquely truncate-emarginate, c. 5 by 5 mm.

MADAGASCAR. West, Moravoay Distr. [W2], Maroudalo, left bank of Betsiboka R.: *Perrier de la Bâthie 1811-bis*, fr. (P, syntype); Mitsinjo Distr. [W3], Boina: *Perrier de la Bâthie 16782*, fr. (P); Soalala Distr. [W4], Manongarivo (Ambongo): *Perrier de la Bâthie 6737*, fr. (P, syntype), 6757, δ fl. (P, lectotype), 6758, st. (P, syntype); Ankazoabo Distr. [W17], Ankazoabo: *Bosser 17291*, fr. (P); Malio R. valley, near Ambalabe, 400–450 m: *Humbert 19449*, δ fl. (L, P).

ECOLOGY. Forest on sandy soils and basalt-rock; 0–450 m; not common. Flowers found from Nov. to Jan., fruits found in Oct. and Jan.

NOTES. 1. Inflorescences in cauliflorous short-shoots as well as longly peduncled in the axils of the leaves.

2. According to PERRIER DE LA BÂTHIE leaves with lobed leaf-segments are only found on shoots newly developed after burning of the vegetation.

26. *Adenia epigea* Perr., Not. Syst. 9 (1940) 52; Fl. Mad. Fam. 143 (1945) 21, fig. IV, 1-3; de Wilde, *Adansonia* 2, 10 (1970) 114. — Syntypes: *Perrier* 6755, 6754. — Fig. 14.

Slender climber up to 5 m, growing from a conical to rounded tuber above the ground. Fertile branches $1\frac{1}{2}$ –3 mm; internodes 3–10 cm. *Leaves* herbaceous to thinly coriaceous, brown-green above, dull and \pm glaucous not punctate beneath, deeply 3-lobed, broadly ovate to broadly triangular in outline, base deeply cordate, apex subobtusate to acute, up to $\frac{1}{2}$ cm acuminate, $2\frac{1}{2}$ –5 by 3–6 cm, 3(–5)-plinerved, reticulation fine, rather distinct, prominent beneath, margin entire; lobes ovate to elliptic-oblong, acute-acuminate, up to $4\frac{1}{2}$ cm; petiole $1\frac{1}{2}$ –7 cm. *Glands* at blade-base 2, $1-1\frac{1}{2}$ mm \varnothing , situated on two \pm fleshy partly connate auricles at the apex of the petiole; blade-glands mostly 2–4, c. $\frac{1}{4}$ mm \varnothing . Stipules triangular to broadly rounded, $\frac{1}{2}$ –1 mm. *Inflorescences* peduncled for 4–7 cm, 1–5-flowered in δ , 1–2-flowered in φ ; tendril 1, 2– $4\frac{1}{2}$ cm. Sterile tendrils simple, 5–10 cm. Bracts and bracteoles oblong-lanceolate, acute, $1\frac{1}{2}$ –2 mm. δ fl. narrowly tubular-infundibuliform, incl. the c. 5 mm long stipe 25–28 by $1\frac{1}{2}$ –2 mm, sepals reflexed in anthesis to 10–15 mm wide. Pedicel 0–2 mm. Hypanthium tubiform 12–13 mm, gradually passing into the stipe, calyx tube 0, sepals lanceolate, obtuse, c. 10 by 2 mm, entire. Petals oblong, obtuse, c. 6 by $1\frac{1}{2}$ mm, 3-nerved, less than 0.1 mm denticulate, reflexed. Filaments c. 3–4 mm, inserted 2–3 mm below the throat of the hypanthium, but seemingly c. $\frac{3}{4}$ mm, free, inserted near the throat. Anthers c. 7 by $\frac{1}{2}$ – $\frac{3}{4}$ mm, subobtusate. Septa narrow, 2–3 mm high. Corona consisting of a row of fleshy appendages c. $\frac{1}{4}$ mm. Disk glands 0. Vestigial ovary incl. gynophore c. $\frac{1}{2}$ mm. φ fl. infundibuliform, incl. the 2–3 mm long stipe 11–15 by $2\frac{1}{2}$ mm, sepals spreading in anthesis to c. 8 mm. Pedicel 0–1 mm. Hypanthium cup-shaped 2–3 mm, calyx tube 0, sepals oblong-lanceolate, obtuse, 7–8 by 2– $3\frac{1}{2}$ mm, entire. Petals oblong-lanceolate, subacute, $3\frac{1}{2}$ –5 by $1\frac{1}{2}$ mm, 3-nerved, serrulate near the apex. Staminodes $\frac{3}{4}$ –1 mm, free, inserted 1–2 mm above the base of the hypanthium. Septa 0. Corona consisting of a few fleshy appendages c. $\frac{1}{4}$ mm. Disk glands 0. Pistil 7–8 mm. Gynophore c. 2 mm. Ovary ovoid-oblong, c. 3– $3\frac{1}{2}$ by $1\frac{1}{4}$ mm. Styles connate for c. 1 mm, style arms c. $\frac{1}{2}$ mm. Stigmas subglobular, woolly, c. 1 mm \varnothing . *Fruit* 1 per inflorescence, narrowly fusiform, excl. the mostly curved c. 15 mm long gynophore c. 13 by (2–) $2\frac{1}{2}$ –3 cm. Pericarp (thinly) coriaceous, smooth. Seeds c. 50 per capsule, suborbicular, c. 5–6 by 4–5 by 2– $2\frac{1}{4}$ mm, 6–8 pits \varnothing ; funicles c. 2 mm; embryo not known.

MADAGASCAR. Eastern (North), Vohemar Distr. [E(N)1], near Ambararata (Loky R.): *Perrier de la Bâthie* 6754, φ fl., fr. (P, syntype); Antsahabe, Manankolala R. basin: *Perrier de la Bâthie* 6755, δ fl. (P, syntype).

ECOLOGY. Dry forest, gneiss and volcanic rock; 0–100 m. Flowers and fruits Sept. – Nov.

NOTES. 1. Differs in flowers and habit but slightly from *A. monadelpha*, but seems quite distinct by the slender, c. 13 cm long fruit. Other differences with

A. monadelpha are the presence of blade glands, the more distinct, less connate auricles at the blade-base, the longer petioles and mostly longer peduncles. The anthers are c. 7 mm long, in *A. monadelpha* 5–6½ mm. The flowers differ further only in minute characters. The distributional areas of both species are wide apart.

2. PERRIER DE LA BÂTHIE mentions the absence of wax-like resin on the epigeic tuber and the stems.

27. *Adenia monadelpha* Perr., Not. Syst. 9 (1940) 48; Fl. Mad. Fam. 143 (1945) 10, fig. II, 1–2; de Wilde, *Adansonia* 2, 10 (1970) 114. — Syntypes: *Decary 9288, Humbert 2722*. — **Fig. 14.**

Slender climber 1–5 m; presence of tuber or rootstock not known. Fertile branches often ± flexuose, 1–3 mm; internodes 1½–7 cm. *Leaves* herbaceous to subcoriaceous, brownish green above, some greyer beneath, not punctate, entire or deeply 3-lobed or -parted, orbicular to broadly ovate in outline, base cordate, apex acute-acuminate, rarely subobtuse, 2–4(–7½) by 2½–6(–9) cm, 3(–5)-plinerved and 0–2 pairs of nerves from the midrib, reticulation fine, distinct, prominent beneath, margin entire; lobes (triangular-) elliptic to lanceolate, entire or 3–5-lobed, much narrowed at the base, apex acuminate, up to 3(–5) cm, ± pinninerved; petiole 1–4(–5) cm. *Glands* at blade-base 2, separate or contiguous, 1–1½ mm ∅, on a median ± upward curved, bilobed or wart-like appendage, 2–3 mm, at the transition of blade and petiole; no other glands. *Stipules* narrowly triangular, ½–1 mm. *Inflorescences* peduncled for ½–5 cm, often monochasial and up to 10-flowered in ♂, 1–3-flowered in ♀; tendril (0–)1, 1–2 cm. Sterile tendrils 3–7 cm. Bracts and bracteoles linear, acute, sometimes toothed, 4(–5) mm. ♂ *fl.* narrowly tubiform, incl. the 5–16 mm long stipe (15–) 18–39 by 1½–3 mm, sepals reflexed in anthesis to 10–15 mm wide. Pedicel ½–4 mm. Hypanthium tubiform 5½–12½ mm, gradually passing into the stipe, calyx tube 0, sepals (oblong-) lanceolate, obtuse, (6–)7–9 by (2–)2½–3½ mm, subtentire. Petals oblong(-oblanceolate), obtuse, (5–)6–8½ by 2–3 mm, 3–5-nerved, less than 0.1 mm denticulate in the upper half, reflexed. Filaments (¼–)½–4 mm, free, or up to 3 mm connate, inserted in or up to 4 mm below the throat of the hypanthium. Anthers 4½–6½ by ¾–1 mm, obtuse. Septa 0–3 mm high. Corona ± 0, or consisting of a rim of thick hairs up to 0.1 mm or of some scale-like lobulate appendages up to ¾ mm. Disk glands 0. Vestigial ovary incl. gynophore ½–1 mm. ♀ *fl.* campanulate-infundibuliform, incl. the ½–1½ mm long stipe 11–15 by 2½–3½ mm, sepals spreading in anthesis to 15 mm. Pedicel 0–1 mm. Hypanthium cup-shaped 2–2½ mm, calyx tube 0–1 mm, sepals (calyx lobes) oblong-lanceolate, obtuse, 7–10 by 2½–3½ mm, entire. Petals lanceolate, subobtuse, c. 5 by 1–1¼ mm, 3-nerved, less than 0.1 denticulate towards the apex. Stamino-odes 1–1½ mm, free, inserted at or near the base of the hypanthium. Septa 0. Corona consisting of wart-like appendages or a lobulate rim up to ¼ mm. Disk glands 0. Pistil 7–8 mm. Gynophore 1½–2 mm. Ovary ovate(-oblong) c. 3½ by

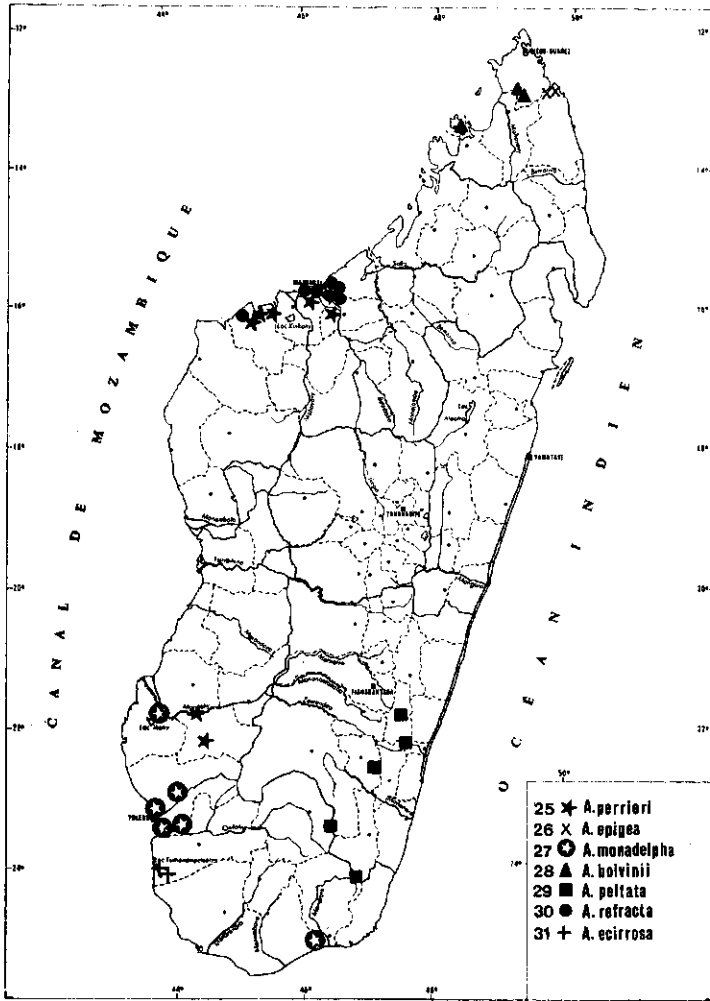


FIG. 14. Localities of species 25-31.

2 mm. Styles connate for c. $\frac{1}{2}$ mm, style arms c. 1 mm. Stigmas subglobular, woolly, c. $1\frac{1}{2}$ mm \varnothing . Fruit 1 per inflorescence, ovate(-oblong), base \pm rounded, apex subacute, excl. the straight or curved 5-15 mm long gynophore (4-)4 $\frac{1}{2}$ -5 $\frac{1}{2}$ by 2-3 $\frac{1}{2}$ cm. Pericarp coriaceous, $\frac{1}{4}$ - $\frac{1}{2}$ mm, smooth. Seeds 30-50 per capsule, ovate, 7-8 by 4 $\frac{1}{2}$ -5 $\frac{1}{2}$ by 2-2 $\frac{1}{2}$ mm, 6-9 pits \varnothing ; funicles c. 4 mm; embryo 5-6 mm; cotyledons ellipsoid, base cordate, 4 $\frac{1}{2}$ -5 by 3-4 mm.

MADAGASCAR. West, Morombe Distr. [W15], Nosy-Ambositra: *Appert* 209, δ fl. (Z) — West (South), Tuléar Distr. [W(S)1], Betanimena: *Déquaire* 27431, δ fl. (P); Tongobory, 100-300 m: *Humbert* 2722, δ fl., φ fl., fr. (K; P, syntype); Sakaraha (150 km NE. of Tuléar),

600–800 m: *Leandri 3880*, st. (P); Manoroaka to St. Angustin: *Peltier 1362*, fr. (P) — South, Ambovombe Distr. [S3], Antsohivelo: *Decary 9288*, ♂ fl., ♀ fl. (P, syntype).

ECOLOGY. Shrub vegetation and thickets with tree-*Euphorbias* and *Didiereaceae*; limy soils; 100–300 m. Flowers and fruits in Oct. and Nov.

NOTES. 1. Closely related to *A. epigea* from N. Madagascar, which differs in minor-characters but essentially by the long slender fruit; see also under that species.

2. According to PERRIER DE LA BÂTHIE the species is monoecious.

3. HUMBERT describes the plant as a somewhat fleshy-stemmed liana, the flowers with green calyx and white-rosa petals; according to fieldnotes by DÉQUAIRE the calyx is dark green, petals white, anthers golden.

4. *Leandri 3880* shows a striking dimorphism in the leaves: beside normal leaves also much-divided leaves, apparently from young shoots, are found. These divided leaves resemble much the leaves of juvenile shoots of *A. perrieri*.

28. *Adenia boivinii* de Wilde, Adansonia 2, 10 (1970) 124. — Type: *Boivin s.n.* — Fig. 14.

Climber up to 10 m, presence of tuberous rootstock not known. Fertile branches 2–3½ mm; internodes 2–15 cm. *Leaves* often in short-shoots up to 1 cm, herbaceous, (brown-)green above, pale green or ± grey-glaucous green, not punctate beneath, entire, broadly ovate to ovate-oblong, base ± rounded to truncate, apex acute, up to 0.2 cm acuminate, 2–6½ by 2–3½ cm, 3 or 5 (sub)plinerved and with 0–3 pairs of nerves from the midrib, venation ± coarse, not very distinct, margin entire; petiole 2–3½ cm. *Gland* at blade-base 1, ½–1 mm ∅, median at or just below the margin of the membranous 1–2 mm broad peltate blade-base; blade glands (0–1)–2, conspicuous, ½–1 mm ∅, rather close to the axils of the strongest basal nerves. Stipules minute, narrowly triangular, c. ½ mm. *Inflorescences* (known only with flower scars) peduncled for up to 6 cm, few-flowered; tendril 1, up to 4 cm. Sterile tendrils simple, 4–10 cm. *Fl.* and *fruit* not known.

MADAGASCAR. North, Diégo-Suarez Distr. [N1], Plateaux calcaires de l'Ankarana, 300–350 m: *Humbert 18983-bis* (p.p.), st. (P), *19068-bis*, st. (P) — Sambirano, Helville (Nossi Bé Distr.) [Samb. 1], Loncobé: *Boivin s.n.*, st. (P, type).

ECOLOGY. Tropicophilous forest on limestone; 300–350 m.

NOTES. 1. Known only in sterile state, but recognized by the leaves mostly with characteristic blade glands. Apparently allied to, but allopatric with *A. peltata* and *A. refracta*.

2. Named after L. H. BOIVIN (1808–1852), who made important collections (1846–1852) in E. Africa, several islands in the Indian Ocean and Madagascar.

29. *Adenia peltata* (Bak.) Schinz, Bot. Jahrb. 15, Beibl. 33, 1 (1892) 3; Perr.,

Not. Syst. 9 (1940) 52; Fl. Mad. Fam. 143 (1945) 18, fig. III, 9-10; de Wilde, *Adansonia* 2, 10 (1970) 115. — *Modecca peltata* Bak., J. Linn. Soc. Bot. 21 (1884) 345. — Type: *Baron 2827* — Fig. 14.

Modecca hederaefolia Bak., J. Linn. Soc. Bot. 22 (1887) 479. — *Adenia hederaefolia* Schinz, Bot. Jahrb. 15, Beibl. 33, 1 (1892) 3. — Type: *Baron 3875*.

Slender climber up to c. 10 m, not pachypodous. Fertile branches slender, pale greenish to reddish-brown, 1-3 mm; internodes 2-12 cm. *Leaves* herbaceous, green to brown-green above, pale green, not punctate beneath, entire or deeply (2-)3-lobed or -parted, oblong to broadly ovate, base rounded or \pm narrowed or with 2 narrow lobes, 2-10 mm wide peltate, apex acute or slightly acuminate, (3-)5-15 by (1 $\frac{1}{2}$ -)2 $\frac{1}{2}$ -13 cm, (3-)5(-7)-subplinerved to \pm pinninerved, reticulation distinct, margin entire; lobes elliptic to oblong, up to 12 cm; petiole (1 $\frac{1}{2}$ -) 2-6 $\frac{1}{2}$ cm. *Glands* at blade-base (0-2)-3, $\frac{1}{3}$ - $\frac{1}{2}$ mm \varnothing , on the peltate part of the blade, connected by distinct nerves with the insertion of the petiole; blade glands 0-2, c. $\frac{1}{2}$ mm \varnothing . *Stipules* lanceolate, less than $\frac{1}{2}$ mm, soon withering. *Inflorescences* peduncled for up to 12 cm, 1-3(-5)-flowered in σ , 1-2-flowered in ρ ; tendrils 0-1, 1 $\frac{1}{2}$ -3 cm. Sterile tendrils simple, up to 15 cm. *Bracts* and bracteoles narrowly triangular, 1-1 $\frac{1}{2}$ mm. σ *fl.* narrowly tubiform, incl. the 10-12 mm long stipe 30-35 by 2 $\frac{1}{2}$ -3 mm, sepals reflexed in anthesis to 15-20 mm wide. Pedicel 5-10 mm. Hypanthium 7-10 mm, calyx tube 0, sepals lanceolate-linear, broadly obtuse, 10-17 by 2 $\frac{1}{2}$ -4 mm, (sub)entire. Petals lanceolate, obtuse, 8-10 by 2-2 $\frac{1}{2}$ mm, 3-nerved, less than 0.1 mm serrulate, reflexed in the upper half. Filaments 2 $\frac{1}{2}$ -4 mm, inserted c. 1 $\frac{1}{2}$ mm below the throat of the hypanthium, but seemingly 1-2 $\frac{1}{2}$ mm, free, inserted in the throat. Anthers c. 8 by $\frac{3}{4}$ mm, obtuse. Septa narrow, c. 1 $\frac{1}{2}$ mm high. Corona consisting of rather few, \pm dilated appendages or thick hairs $\frac{1}{2}$ -1 mm. Disk glands 0. Vestigial ovary incl. gynophore 1-2 mm. ρ *fl.* narrowly campanulate, incl. the c. 7 mm long stipe c. 20 by 4(-5) mm. Pedicel 2-5 mm. Hypanthium cup-shaped c. 4 mm, calyx tube 0, sepals oblong-lanceolate, obtuse, c. 9 by 4 mm, entire, \pm reflexed. Petals obovate-oblong, obtuse, c. 6 $\frac{1}{2}$ by 3 $\frac{1}{2}$ mm, \pm entire. Stamines c. 2 mm, \pm free, inserted at the base of the hypanthium. Septa 0. Corona consisting of rather few, thick, appendages c. $\frac{1}{3}$ mm. Disk glands 0. Pistil not known. *Fruit* 1 per inflorescence, ellipsoid-oblong, \pm fusiform or apex subobtuse, excl. the 10-35 mm long gynophore 6 $\frac{1}{2}$ -12 by 3-5 cm. Pericarp thinly coriaceous outside, \pm spongy inside, 2-3 mm, smooth. Seeds 30-50 per capsule, suborbicular, c. 8 $\frac{1}{2}$ -9 by 8 by 2 $\frac{1}{2}$ -3 mm, muricate, 8-12 pits \varnothing ; funicles 5-7 mm; embryo c. 7 mm; cotyledons ovate, broadly truncate-emarginate at one side, c. 6 $\frac{1}{2}$ by 6 $\frac{1}{2}$ mm.

MADAGASCAR. Mamdraka (?): *d'Alleizette 1010*, st. (P); Central Madagascar: *Baron 2827*, σ fl. (K, type *Modecca peltata*; P), *3875*, fr. (K, type *Modecca hederaefolia*; P), *4506*, fr. (K, P) — Centr. (South), Mt. Kalambatitra, 1500-1600 m: *Humbert 11869*, fr. (P) — East, Fort Carnot Distr. (?) [E21], Haute vallée de la Rienana (bassin du Matitanana), 1000-1400 m: *Humbert 3489*, σ fl. (P); Farafangana Distr. [E24], Vondrozo to Ivohibe: *Decary 5372*, σ fl. (P) — East (South), Fort Dauphin Distr. [E(S)2]: *Decary (in Hb. d'Alleizette) s.n.*, σ fl. (L).

ECOLOGY. Open forest, montane forest; 800–1600 m. Flowers Sept. to Jan., and March; fruits found in Nov.

NOTE. 1. According to field notes (PERRIER DE LA BÂTHIE) a slender liana, base not pachypodous, without resinous cover; flowers greenish with whitish petals.

30. *Adenia refracta* (Tul.) Schinz, Bot. Jahrb. 15, Beibl. 33, 1 (1892) 3; Perr., Not. Syst. 9 (1940) 48; Fl. Mad. Fam. 143 (1945) 8, fig. I, 7–11; de Wilde, *Adansonia* 2, 10 (1970) 115. — *Modecca refracta* Tul., Ann. Sc. Nat. Bot. 3 (1857) 52. — Type: *Pervillé 535*. — Fig. 14.

Climber $\frac{3}{4}$ –4 m growing from an irregular subterranean tuber. Fertile branches often flexuose, reddish-brown, 2–2½ mm; internodes 2–8 cm. *Leaves* membranous to subcoriaceous, brownish green above, very pale green, not punctate beneath, entire to variously deeply 3–5(–7)-lobed, ovate to ovate-oblong, base \pm cordate, apex acute to obtuse, 3½–13 by 2–10(–13) cm, 3–5-plinerved and 1–3(–4) pairs of nerves from the midrib, reticulation rather fine, distinct beneath, margin entire, sometimes sinuate; lobes rounded triangular to oblong, up to 6 cm; petiole 1–6 cm. *Gland(s)* at blade-base (0–)1(–2), $\frac{1}{2}$ –1½ mm \varnothing , median nearly on the margin of the 1½–4 mm broad peltate blade-base; no other glands. *Stipules* (narrowly) triangular, c. $\frac{1}{2}$ mm, soon withering. *Inflorescences* in the axils of much reduced leaves in short shoots $\frac{1}{4}$ –1 cm in the axils of tendrils, (sub)sessile, rarely \pm peduncled, 1–3(–6)-flowered in σ , 1–2-flowered in φ ; tendrils 0. Sterile tendrils 4–8 cm. Bracts and bracteoles linear, (1–)2–4 mm. σ fl. tubiform(-infundibuliform), incl. the 3–5 mm long stipe 14–19 by 2–3 mm, sepals reflexed in anthesis c. 12 mm wide. Pedicel (0–)½–3 mm. Hypanthium tubiform, 4½–6(–7) mm, calyx tube 0–1(–2) mm, sepals (calyx lobes) (oblong-)lanceolate, obtuse, 6–8½ by 1¼–1¾ mm, subentire. Petals (ob-)lanceolate, obtuse, 6–7½ by 1¼–2 mm, 5–7-nerved, serrulate-laciniate towards the apex, reflexed in the upper half. Filaments 1–2½ mm, free or 1½–2 mm connate, inserted at the throat of- or up to about halfway in the hypanthium. Anthers 3½–4 by $\frac{1}{2}$ mm, obtuse. Septa 0 or inconspicuous. Corona 0 or consisting of a few thick hairs or scales c. $\frac{1}{4}$ mm. Disk glands 0. Vestigial ovary incl. gynophore $\frac{1}{2}$ –1 mm. φ fl. narrowly campanulate, incl. the 1½–2 mm long stipe 10–12 by 2–3 mm. Pedicel c. 1 mm. Hypanthium cup-shaped 1½–2 mm, calyx tube 0(–2) mm, sepals oblong-lanceolate, (sub)obtuse, 6–8 by 2–3½ mm, subentire. Petals lanceolate, obtuse, 3–4½ by 1–1½ mm, 1(–3)-nerved, entire. *Staminodes* 1½–2 mm, connate for c. $\frac{1}{2}$ mm, inserted at the base of the hypanthium. Septa c. $\frac{1}{2}$ mm. Corona 0 or as a lobed-laciniate membrane up to $\frac{1}{2}$ mm. Disk glands \pm 0. Pistil 7–9 mm. Gynophore c. 2 mm. Ovary ovoid-oblong, faintly 3-ribbed or not, 3½–4 by 1½–2 mm. Styles connate for up to $\frac{1}{4}$ mm, style arms 1½(–3) mm. Stigmas \pm globular, longly woolly-hairy, each 1½(–2) mm \varnothing . *Fruit* 1 per inflorescence, ovoid, apex subacute, excl. the c. 10 mm long, curved gynophore c. 4 by 2 cm. Pericarp coriaceous, c. $\frac{1}{4}$ mm. Seeds c. 10 per capsule,

± ovoid, 6–7 by 4–5 by 2 mm, 6–9 pits \emptyset ; funicles 3–4 mm; embryo not known.

MADAGASCAR. West, Majunga Distr. [W1], Vicinity of Majunga: *Anon. s.n.*, ♂ fl. (P), *Perrier de la Bâthie* 6749, ♂ fl., ♀ fl. (P), 6752, ♂ fl., fr. (P), 13462, ♀ fl. (P); Majunga to Marovoay (Boina): *Perrier de la Bâthie* 15868, fr. (P); Mitsinjo Distr. [W3], Catsèpe (Katsepy): *Kaudern s.n.*, ♂ fl. (S), *s.n.*, ♀ fl. (S); Boina: *Perrier de la Bâthie* 13835 & 13835-bis, ♂ fl., ♀ fl. (P); Soalala Distr. [W4], Ambongo: *Pervillé* 535, fr. (P, type).

ECOLOGY. Dry forest, scrub, rocky places; cretaceous or eocene limestone, sandy soil near the sea; low altitudes. Flowers from Oct. to May, fruits found in Febr.

NOTES. 1. According to PERRIER DE LA BÂTHIE sometimes 4-merous flowers are found.

2. PERRIER DE LA BÂTHIE suggests that specimens under natural conditions become woody, but that plants in regularly burnt areas grow with annual shoots from the persistent tuber. The leaves of sterile shoots are generally deeply incised.

31. *Adenia ecirroza* de Wilde, *Adansonia* 2, 10 (1970) 124. — Type: *Herb. Jard. Bot. Tananarive* 1141. — Fig. 14.

Erect shrubby plant 2–3 m, main stem slightly thickened, branches few, tendrils 0. Fertile branches 2–3 mm; internodes 1–5 cm. *Leaves* membranous to subcoriaceous, brownish-green above, much paler or ± grey-green beneath, not punctate, deeply 3(–5)-lobed, suborbicular in outline, base cordate, apex obtuse to acute-acuminate, 4–9 by 4–8 cm, 3–5-plinerved, reticulation fine, distinct; lobes ovate-elliptic, entire or once more deeply 3–7-lobed, 2–6 by 1–3½ cm, pinninerved; petiole 1½–4½ cm. *Glands* at blade-base 2, c. 1(–1½) mm \emptyset , sometimes ± contiguous, on a median ± bilobed appendage c. 2 mm \emptyset at the transition of blade and petiole; no other glands. *Stipules* narrowly triangular, acute, or ± subulate, ½–1 mm. *Inflorescences* peduncled for up to ½ cm, 1–5-flowered in ♂; tendrils 0. *Bracts* and *bracteoles* lanceolate to linear, acute, 2–4 mm. ♂ *fl.* tubular-infundibuliform, incl. the c. 5 mm long stipe 19–20 by 2 mm, sepals ± recurved in anthesis, c. 15 mm wide. *Pedicel* 0–1 mm. *Hypanthium* tubiform c. 6½ mm, gradually passing into the stipe, calyx tube c. 1 mm, calyx lobes (sepals) oblong, obtuse, c. 7½ by 3–3½ mm, subentire, ± recurved. *Petals* oblong-lanceolate, apex rounded, subentire, c. 6 by 2 mm, 3–5-nerved, ± recurved in the upper half, inserted c. ½ mm below the calyx lobes. *Filaments* c. 2½ mm, inserted c. 2 mm below the throat of the hypanthium, but seemingly c. ½ mm, free, inserted in the throat. *Anthers* c. 5 by ⅔ mm, obtuse. *Septa* narrow, c. 2 mm high. *Corona* 0. *Disk glands* 0. *Vestigial ovary* incl. gynophore c. 1 mm. ♀ *fl.* & *fruit* not known.

MADAGASCAR. s. loc. (rocailles J.B.): *Herb. Jard. Bot. Tananarive* 1141, ♂ fl. (P, type) — West. (South), Betioky Distr. [W(S)2], SW. of Lac Manampetsa: *Perrier de la Bâthie* 19036, st. (P).

Meded. Landbouwhogeschool Wageningen 71-18 (1971)

ECOLOGY. Dry thicket vegetation; low altitudes. Flowers in Oct.

NOTES. 1. Insufficiently known; in flower characters the species is allied to *A. perrieri*, *A. monadelpha*, *A. epigea*, *A. refracta*, and *A. peltata*. It differs from the latter two species by the position of the basal blade glands, and from the other three species by various leaf- and flower characters. The species is apparently most related to the \pm sympatric *A. monadelpha*, but differs by the erect habit and the absence of tendrils.

32. *Adenia acuta* de Wilde, *Adansonia* 2, 10 (1970) 126. — Type: *d'Alleizette 666 m.* — Fig. 16.

Climber up to 10 m. Fertile branches 2–3 mm; internodes 1–4 cm. *Leaves* (thinly) coriaceous, brownish green, glossy above, dull, minutely purplish brown punctate or not beneath, entire, ovate-elliptic, base rounded or obtuse, apex acute or \pm acuminate, 4–5½ by 2–3½ cm, nerves 4–5 pairs, reticulation fine, distinct beneath, margin entire; petiole 1–1½ cm. Leaf-scars distinctly raised, knob-like. *Gland* at blade-base 1, c. ½ mm \varnothing , median on or near the margin of the 1–2 mm broad peltate blade-base; no other glands. Stipules less than ½ mm, withering. *Inflorescences* (only seen in fruit) 1–2(–3) together mostly developing from the serial bud in the axils of sterile tendrils, sessile, 1–3-flowered in \varnothing ; tendrils 0. Sterile tendrils simple or 2(–3)-fid, 5–6 cm. Bracts and bracteoles narrowly triangular, less than ½ mm. σ and \varnothing fl. not known. Pedicel of \varnothing fl. 1–1½ mm, stipe of \varnothing fl. 1(–1½) mm. *Fruit* 1–2(–3) together, sessile, ellipsoid (-subglobular), apex subobtuse, excl. the c. 4 mm long gynophore 2–2½ by 1½–2 cm. Pericarp thinly coriaceous, smooth, c. ¼ mm. Seeds 2–6 per capsule, suborbicular, c. 7½ by 7 by 3 mm, 8–10 pits \varnothing ; funicles 2–3 mm; embryo c. 7 mm; cotyledons suborbicular, obliquely truncate-emarginate, c. 6¼ by 6 mm.

MADAGASCAR. East, Moramanga Distr. [E13], Analamazoatra: *d'Alleizette 666 m* (P, type).

ECOLOGY. Forest; c. 1000 m. Fruits in Dec.

NOTES. 1. Related to *A. pachyphylla* and *A. fasciculata*, especially to the latter.

33. *Adenia fasciculata* de Wilde, *Adansonia* 2, 10 (1970) 125. — Type: *Cours 2086.* — Fig. 15 e-f, i-j; 16.

Climber up to 10 m. Fertile branches sometimes knotty, 3–6 mm; internodes 1–7 cm. *Leaves* coriaceous, dull greyish-green, mostly purplish-brown punctate beneath, entire, elliptic, base rounded, apex obtuse to subacute, 4–8 by 2½–6 cm, 3–5-subplinerved or \pm pinninerved, nerves 3–5 pairs, reticulation rather fine, distinct, margin entire; petiole (¾–)1–2½ cm. Leaf scars distinctly raised, knob-like. *Glands* at blade-base 1 or 2, ½–2 mm \varnothing , median at the transition

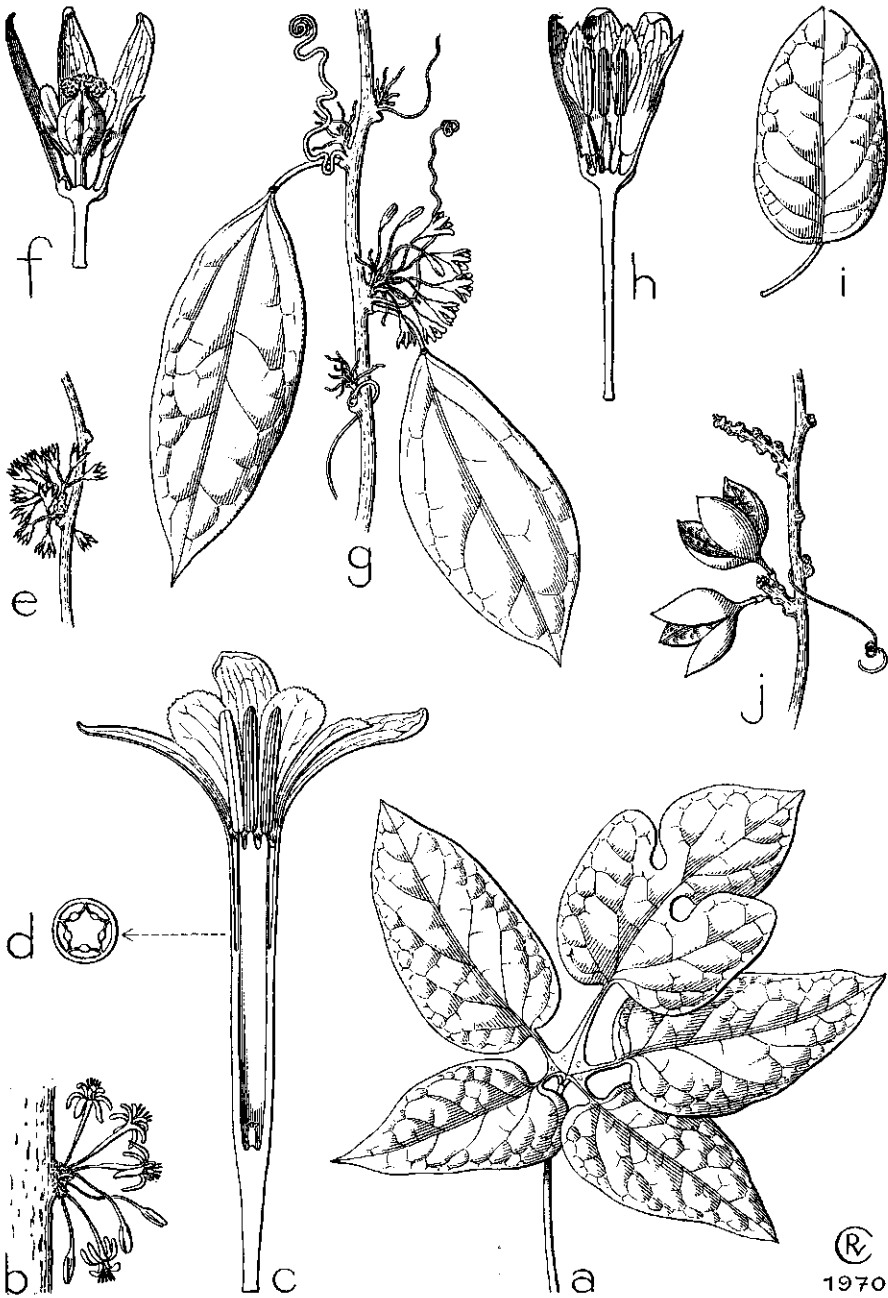


FIG. 15. a-d. *Adenia perrieri*; a. leaf, seen from above, $\times \frac{1}{2}$ (Humbert 19449); b. cauliflorous inflorescences, $\times \frac{1}{2}$ (Junelle s.n.); c. ♂ flower, longitudinal section, $\times 3$ (Humbert 19449); d. ditto, cross-section through the hypanthium showing septa, $\times 6$ (Humbert 19449). — e-f, i-j. *Adenia fasciculata*; e. ♀ inflorescence, $\times \frac{1}{2}$ (Bossler 17551); f. ♀ flower, longitudinal section, $\times 3$ (Bossler 17551); i. leaf, $\times \frac{1}{2}$ (Cours 2086, type); j. fruits, $\times \frac{1}{2}$ (Cours 2086, type). — g-h. *Adenia pachyphylla*; g. habit, ♂ inflorescences, $\times \frac{1}{2}$ (Cours 2864, type); h. ♂ flower, longitudinal section, $\times 3$ (Cours 2864, type).

of the petiole and the c. 1 mm broad peltate blade-base; no other glands. Stipules narrowly triangular, c. $\frac{1}{2}$ mm, withering. *Inflorescences* in ♀ grouped in small bundles or along short shoots up to 2(-8) cm, often in the axils of tendrils, sessile, 1-3-flowered; tendrils 0. Sterile tendrils simple or 3-fid, 2-7 cm. Bracts and bracteoles narrowly triangular, acute-acuminate, c. $\frac{1}{2}$ mm. ♂ *fl.* not known. ♀ *fl.* (narrowly) campanulate, incl. the $2\frac{1}{2}$ - $3\frac{1}{2}$ mm long stipe 8-12 by 2-3 mm, sepals spreading in anthesis to 5-8 mm. Pedicel 1-5 mm. Hypanthium cup-shaped $1\frac{1}{2}$ - $2\frac{1}{2}$ mm, calyx tube 0, sepals oblong, subobtuse, $3\frac{1}{2}$ -6 mm, subentire. Petals oblong to obovate, obtuse or acute, ($\frac{1}{3}$ -) $1\frac{1}{2}$ -2 by ($\frac{1}{4}$ -) $\frac{1}{2}$ - $\frac{3}{4}$ mm, 1-nerved, less than 0.1 mm serrulate towards the apex. Staminodes $1\frac{1}{2}$ - $2\frac{1}{2}$ mm, $\frac{3}{4}$ -1 mm connate, inserted at the base of the hypanthium. Septa $\frac{1}{2}$ -1(- $1\frac{1}{4}$) mm. Corona \pm 0 or an inconspicuous rim up to 0.1 mm. Disk glands $\frac{1}{4}$ -2 mm. Pistil 4-6 mm. Gynophore 1- $1\frac{1}{2}$ (-2) mm. Ovary ellipsoid-globular, faintly 3(-6)-ribbed, $2\frac{1}{2}$ -3 by $2\frac{1}{4}$ -3 mm. Styles connate for up to $\frac{1}{4}$ (- $\frac{1}{2}$) mm, style arms $\frac{3}{4}$ -1 mm. Stigmas subglobular, finely woolly papillate, each c. 1 mm \varnothing . *Fruit* 1-5 together, ellipsoid to subglobular, apex subobtuse to acute, excl. the 4-8 mm long gynophore ($1\frac{3}{4}$ -)2- $3\frac{1}{2}$ by $1\frac{1}{2}$ - $2\frac{1}{2}$ cm. Pericarp thinly coriaceous, $\frac{1}{4}$ (- $\frac{1}{2}$) mm, smooth. Seeds 2-6 per capsule, suborbicular, c. $7\frac{1}{2}$ by 7 by 3 mm, 5-7(-8) pits \varnothing ; funicles 2-3 mm; embryo c. 7 mm; cotyledons (ob)ovate to orbicular, deeply obliquely emarginate, c. $6\frac{1}{4}$ by 6 mm.

MADAGASCAR. S. Ioc.: *Bosser 17551*, ♀ fl. (P) — Central, Ankazobe Distr. [C1], Manankazo, 1400 m: *Perrier de la Bâthie 6738*, fr. (P) — Eastern, Ambatondrazaka Distr. [E9], Ankaraoaka (route de Nickelville), 850 m: *Cours 2086*, fr. (P, type).

ECOLOGY. Forest on gneiss-rock; 850-1400 m.

NOTES. 1. Closely related to *A. acuta* and *A. pachyphylla*. All three taxa are not completely known.

2. In some of the female flowers of *Bosser 17551* there are, beside the normal septa, also smaller septa opposite the sepals, more or less dividing the disk glands into two parts.

3. Fresh leaves are reported as slightly fleshy, whitish-pruinose beneath. The flowers appear before the leaves. Ripe fruits are reported as green.

34. *Adenia pachyphylla* de Wilde, *Adansonia* 2, 10 (1970) 125. — Type: *Cours 2864*. — Fig. 15g-h; 16.

Rather woody climber, up to 15 m. Fertile branches pale greyish-brown, 4-6 mm; internodes $1\frac{1}{2}$ -7 cm. *Leaves* thickly coriaceous, glossy above, pale greenish at both sides, not punctate, entire, (elliptic-)oblong, base acute, apex acute, up to 1 cm acuminate, 5-12 by 2- $4\frac{1}{2}$ cm, 3(-5)-subplinerved and with 1 pair of main nerves from the midrib 5-10 mm above the base, and 1-2 pairs smaller nerves in the upper half, reticulation rather coarse, distinct, margin entire; petiole $\frac{3}{4}$ - $2\frac{1}{4}$ cm. Leaf scars distinctly raised. *Glands* at blade-base 2, $\frac{1}{2}$ -1 mm \varnothing , nearly contiguous, on a median wart-like appendage at the transition of

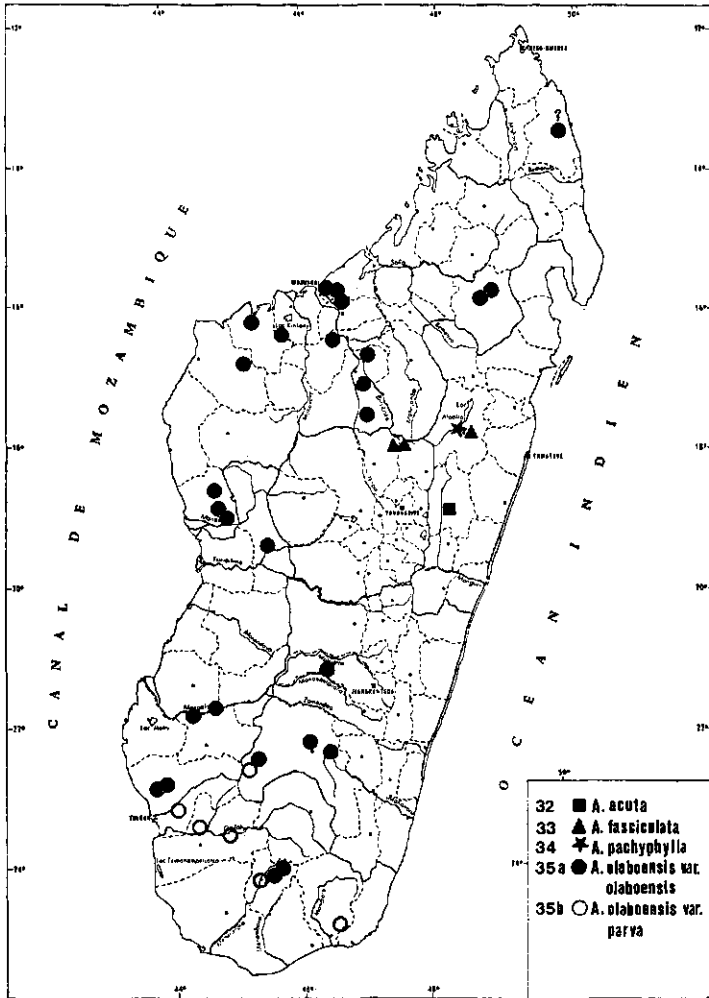


FIG. 16. Localities of species 32-35.

petiole and blade; no other glands. Stipules not seen. *Inflorescences* in ♂ grouped in small bundles or in the axils of reduced leaves on short-shoots up to $1\frac{1}{2}$ cm in the axils of the tendrils, sessile, 1-5-flowered; tendril 0. Sterile tendrils simple or 3-fid, 6-12 cm. Bracts and bracteoles narrowly triangular, c. $\frac{1}{3}$ mm. ♂ *fl.* narrowly campanulate, incl. the 10-12 mm long stipe 19-22 by $2\frac{1}{2}$ -3 mm, sepals spreading in anthesis to c. 6 mm. Pedicel 2-10 mm. Hypanthium longly cup-shaped (2-) $2\frac{1}{2}$ -4 mm, calyx tube (0-) $\frac{1}{4}$ -1(- $1\frac{1}{2}$) mm, calyx lobes (sepals) oblong, subobtuse, 4-5 by 2- $2\frac{1}{2}$ mm, (sub)entire. Petals inserted \pm in the throat of the hypanthium, oblong, subobtuse, $3\frac{1}{2}$ - $4\frac{1}{2}$ by $1\frac{1}{2}$ - $1\frac{3}{4}$, 3-nerved, 0.1-0.2 mm serrulate in the upper half. Filaments (2-) 3 - $3\frac{1}{2}$ mm, c. 1 mm connate, inserted

at the base of the hypanthium. Anthers $(3-)$ $3\frac{1}{4}$ by $\frac{2}{3}-\frac{3}{4}$ mm, subobtusate. Septa ($\frac{3}{4}-$)1 mm high. Corona 0, but hypanthium faintly contracted at the throat. Disk glands c. $\frac{1}{2}$ mm. Vestigial ovary c. 1 mm; gynophore c. 1 mm. ♀ *fl.* & *fruit* not known.

MADAGASCAR. East, Ambato Ndrzaka Distr., ? [E9], Amparihifa - rambolosy, 1200 m: *Cours 2864*, ♂ *fl.* (P, type).

ECOLOGY. c. 1200 m.

NOTES. 1. Closely related to *A. acuta* and *A. fasciculata*.

2. On a field-label described as a large liana to 15 m, with bright green rather thick leaves, entirely green flowers except for the yellow anthers.

35. *Adenia olaboensis* Claverie, *Ann. Mus. Col. Marseille* 2, 7 (1909) 26; *Perr.*, *Not. Syst.* 9 (1940) 50; *Fl. Mad. Fam.* 143 (1945) 11, fig. II, 3-7; de Wilde, *Adansonia* 2, 10 (1970) 113. — Type: *Perrier 736*.

Climber up to 5 m, the stems emerging from a thickened, tubercled, irregularly shaped trunk up to 2 by 0.3 m. Fertile branches greyish 1-2(-3) mm; internodes 1-5 cm. *Leaves* herbaceous to \pm coriaceous, dark green to brown-green above, pale- or grey-green, sometimes minutely papillate, not punctate beneath, entire or shallowly 3-lobed, reniform or \pm orbicular to broadly ovate, base cordate to truncate, apex broadly rounded to acute, 1-7 $\frac{1}{2}$ by 1 $\frac{1}{2}$ -7 $\frac{1}{2}$ cm, 5(-7) (sub)plinerved, the midrib ending below the apex; reticulation fine, distinct, margin entire; petiole $\frac{1}{2}$ -4 cm. *Gland* at blade-base single, $\frac{1}{2}$ -1 mm \varnothing , on a small median wart-like appendage at the transition of blade and petiole; blade-glands 0 or 2, small, submarginal. Stipules minute, narrowly triangular to linear, c. $\frac{1}{2}$ mm, soon withering. *Inflorescences* sessile or peduncled for up to 1(-2) cm, 1-3(-5)-flowered in ♂, 1(-2)-flowered in ♀; tendrils 0(-1), 1-1 $\frac{1}{2}$ cm. Sterile tendrils simple, 3-12 cm. Bracts and bracteoles narrowly triangular, c. $\frac{1}{2}$ mm. ♂ *fl.* tubular-infundibuliform, incl. the 8-16 mm long stipe 22-36 by 3-5 mm, sepals in anthesis \pm reflexed to 10-20 mm wide. Pedicel 2-10 mm. Hypanthium longly cup-shaped (4-)5-8 mm, calyx tube 0(- $\frac{1}{2}$) mm, sepals (oblong-)lanceolate, obtuse, 9-15 by 2-3 $\frac{1}{2}$ mm, entire. Petals ovate-oblong, subacute to subobtusate, (6-)8-9 $\frac{1}{2}$ by 2 $\frac{1}{2}$ -3 mm, 5-7-nerved, c. 0.1 mm serrulate in the upper half. Filaments 7-8 mm, free, inserted at or up to 1 mm above the base of the hypanthium. Anthers 5 $\frac{1}{2}$ -7 $\frac{1}{2}$ by $\frac{1}{3}-\frac{3}{4}$ mm, obtuse. Septa 0. Corona consisting of a (sinuate) membrane or 'line' up to $\frac{1}{3}$ mm high. Disk glands 1-1 $\frac{1}{2}$ mm, inserted about halfway in the hypanthium. Vestigial ovary 2-3(-5) mm, gynophore 1-1 $\frac{1}{2}$ mm. ♀ *fl.* narrowly campanulate, incl. the 1-5 mm long stipe 12-18 by 4 $\frac{1}{2}$ -5 mm, sepals spreading in anthesis to 10-15 mm. Pedicel 1-5(-10) mm. Hypanthium cup-shaped 3-4 mm, calyx tube 0, sepals oblong, obtuse or subobtusate, 7-10 mm, (sub)entire. Petals ovate-oblong, subobtusate to acute, c. 5-7 $\frac{1}{2}$ by 3 mm, 3-5-nerved, subentire. Staminodes 2 $\frac{1}{2}$ -4 $\frac{1}{2}$ mm, free, inserted at the base of the hypanthium. Septa 0. Corona \pm 0 or

consisting of a membrane up to 0.1 mm. Disk glands wart-like or lingulate, $\frac{1}{4}$ – $\frac{1}{3}$ mm, inserted 1– $1\frac{1}{2}$ mm above the base of the hypanthium. Pistil 6–10(–12) mm. Gynophore $1\frac{1}{2}$ –4 mm. Ovary fusiform, \pm 6-ribbed, $2\frac{1}{2}$ – $3\frac{1}{2}$ by 1–2 mm. Styles 3(–4), connate for 1–2 mm, style arms $\frac{1}{2}$ –2 mm. Stigmas subreniform, papillate, each ($\frac{1}{2}$ –)1 mm \varnothing . *Fruit* 1 per inflorescence, ovoid-ellipsoid with 4–7 mm long tapering (beaked) apex, excl. the 10–17 mm long gynophore $2\frac{1}{2}$ – $4\frac{1}{2}$ by $1\frac{1}{4}$ – $2\frac{1}{2}$ cm. Pericarp (thinly) coriaceous, smooth. Seeds 15–60 per capsule, suborbicular, 4–5 by $4-4\frac{1}{2}$ by $1\frac{1}{2}$ –2 mm, 5–8 pits \varnothing ; funicles c. 3 mm; embryo $2\frac{1}{2}$ – $4\frac{1}{2}$ mm; cotyledons ovate, sometimes obliquely emarginate, ($1\frac{3}{4}$ –)2–4 by 2– $3\frac{1}{2}$ mm.

DISTRIBUTION: Widely spread in Madagascar, except in the higher central part and the wet eastern region. — Fig. 16.

ECOLOGY. Dry forest, scrub, and grass savanna; Jurassic limestone, granitic slopes, sandy soils; 0–1000(–1500) m. Flowers in Sept. and Oct., fruits from Sept. to Jan.

USES. Planted by the Sakalaves in villages and near the graves ('plante fétiche').

NOTE. 1. Fresh flowers are reported as pale green to yellow, greenish veined. 2. A variable species in which two not sharply segregated varieties are distinguished.

KEY TO THE VARIETIES

1. Leaves suborbicular to ovate, entire or shallowly 3-lobed, apex rounded to (sub)acute, $1\frac{1}{2}$ – $7\frac{1}{2}$ by $1\frac{1}{2}$ – $7\frac{1}{2}$ cm. Fruit excl. the 12–15 mm long gynophore $3-4\frac{1}{2}$ by $1\frac{1}{2}$ – $2\frac{1}{2}$ cm. **a. var. olaboensis**
1. Leaves orbicular to reniform, entire, 1–2 by $1\frac{1}{2}$ –2 cm. Fruit excl. the 14–20 mm long gynophore $2\frac{3}{8}$ –3 by $1\frac{1}{8}$ – $1\frac{3}{8}$ cm. **b. var. parva**

a. var. olaboensis — Fig. 16.

Leaves entire or shallowly 3-lobed, suborbicular to broadly ovate, base cordate to truncate, apex rounded to (sub)acute, $1\frac{1}{2}$ – $7\frac{1}{2}$ by $1\frac{1}{2}$ – $7\frac{1}{2}$ cm. Petiole $1\frac{1}{2}$ –4 cm. ♂ *fl.* incl. stipe 25–36 mm. ♀ *fl.* incl. the 2–5 mm long stipe 12–18 mm. *Fruit* excl. the 12–15 mm long gynophore $3-4\frac{1}{2}$ by $1\frac{1}{2}$ – $2\frac{1}{2}$ cm. Seeds $4\frac{1}{2}$ –5 mm \varnothing .

MADAGASCAR. NW. Madagascar: *Baron 5697*, ♂ *fl.* (K, P); West (Mawday?): *Bosser 8372*, ♂ *fl.* (P); NW. of Anshilamena (?): *Bosser 16699*, fr. (P); Plateau de Matsiafolaka: *Douliot s.n.* (P); route de Bsalampy: *Morat 786*, ♂ *fl.* (P); Res. N. 5 (Vohiboaka ambalavao): *Rakoto (surveillant) 6519*, ♂ *fl.* (P) — East (North), Vohémar Distr. [E(N)1], Manambeko valley: *Huré s.n.*, fr. (P) — East, Mandritsara Distr. [E2], near Mandritsara: *Bosser 16668*, ♂ *fl.* (P) — Sambirano, Hellville Distr. (Nossi-Bé) [Samb.1], Andoine (cultivated, a deviating specimen, see notes): *Boivin s.n.*, st. (P) — West, Majunga Distr. [W1], Majunga: *Kaudern s.n.*, ♀ *fl.*, fr. (S); Mitsinjo Distr. (?) [W3], Andranomavo (Ambongo): *Decary 8137*, ♂ *fl.* (P);

Soalala Distr. [W4], Soalala: *Raudriamiera* 6723, ♂ fl. (P); Ambato Boeni Distr. [W5], Madirovalo (Boina): *Decary* 8199, fr. (P); Besalampy Distr. (?) [W6], Ambongo: *Perrier de la Bâthie s.n.* (*Comm. Jumelle*), fr. (K, syntype?); Antsalova Distr. [W9], Res. No. 9, Bekopaka: *Morat* 791, fr. (P), 803, ♂ fl. (P); *Miandrivazo Distr.* [W11]: *Huré s.n.*, st. (P); Manja Distr. (?), Bassin du Mangoky: *Perrier de la Bâthie* 6742, ♂ fl. (P, syntype), 12885, ♂ fl., fr. (P) — West (South), Tuléar Distr. [W(S)1], Forêt d'Amphiamy, NE. of Manombo (N. of Tuléar), 50 m.: *Humbert* 11511 (P) — Centr. (North), Maevatanana Distr. [C(N)3], Maevatanana to Andriba: *Perrier de la Bâthie* 736, fr. (P, syntype); Firingalava (Boina): *Perrier de la Bâthie* 736 *bis & ter.* (P, lectotype) — Centr. (South), Ihosy Distr. [C(S)4], Menarahaka valley, between Ihosy and Ivohibe, 600–800 m.: *Leandri c.s.* 3444, st. (P); Ranotsara: *Keraudren* 349, st. (P); Isalo Mt. (to the West), 400–1000 m.: *Humbert* 2915, fr. (P) — South, Bekely Distr. [S1], Ampandrandava (between Bekely and Tsivory), c. 1000 m.: *Seyrig* 141, 141 C., ♂ fl., fr. (P).

ECOLOGY. 50–1000(–1500?) m.

NOTE. 1. The specimen *Boivin s.n.* (P,L) from Nossi-Bé I. resembles in many respects var. *olaboensis*. It differs, however, strikingly by the presence of two, instead of one, glands at the blade-base. These glands are small, approximate, just below the edge of the c. $\frac{1}{2}$ mm wide peltate blade-base. As the characters provided by the glands at the blade-base proved to be of great diagnostic value the specimen might well represent a new taxon. According to BOIVIN the plant was found cultivated in Andoine, near huts, as a medicinal plant. According to PERRIER DE LA BÂTHIE Andoan is the place of the tombs of the kings of the Sakalaves of Nossi-Bé I.

b. var. *parva* de Wilde, var. *nov.* — Fig. 16.

Scandens, parva. *Folia* orbicularia vel reniformia, integra, 1–2 cm longa, $1\frac{1}{2}$ –2 cm lata. *Fructus* gynophorio 14–20 mm longo excl. $2\frac{1}{2}$ –3 cm longus, $1\frac{1}{3}$ – $1\frac{2}{3}$ cm latus. Semina c. 4 mm diam.

Leaves entire, suborbicular to reniform, 1–2 by $1\frac{1}{2}$ –2 cm. Petiole $\frac{1}{2}$ –2 cm. ♂ fl. incl. stipe 22–25 mm. ♀ fl. incl. the 1–2 mm long stipe 12–15 mm. *Fruit* excl. the 14–20 mm long gynophore $2\frac{1}{3}$ –3 by $1\frac{1}{3}$ – $1\frac{2}{3}$ cm. Seeds 4– $4\frac{1}{2}$ mm \varnothing .

MADAGASCAR. South: *Allnaud* (?) (96), ♂ fl. (P); calcaires d'Ambatovere: *Peltier* 1396, fr. (P) — West (South), Tuléar Distr. [W(S)1], km 28, road Tuléar to Tananarive: *Chauvet* 242, fr. (P); Betsioky Distr. [W(S)2], Onilahy valley, near Tongobory, 100–300 m.: *Humbert* 2721, ♂ fl., fr. (B, K, P) — Centr. (South), Ihosy Distr. [C(S)4], Isalo Mts., 400–1000 m.: *Humbert* 2915, ♂ fl., ♀ fl., fr. (B, BM, K, P) — East (South), Amboasary Distr. [E(S)1], Massif de l'Andohahela, S. of Imonty, 400–1900 m.: *Leandri* 4263, st. (P) — South, Bekily Distr. [S1], Bekily Rd.: *Boiteau* 377, fr. (P, type var. *parva*).

ECOLOGY. Apparently confined to the dry scrub-savanna in SW. Madagascar, 100–400(–1000?) m.

36. *Adenia ballyi* Verdcourt, Bol. Soc. Brot. 38 (1964) 102, pl. 6, fig. 1-2, pl. 7.
— Type: *Bally 10953*. — Fig. 18.

A. globosa (non Engl.) Chiov., Fl. Somalia 1 (1929) 177, tab. 43, fig. 4.

Shrub up to 2 m, consisting of strongly curved, \pm woody, \pm flexuous, sometimes pruinose, thorned stems from a woody-succulent grey-green subglobose lumpy trunk up to 1 m wide. Fertile branches 6-10 mm; internodes 1-4 cm. *Leaves* when dry coriaceous, grey-green, caducous, 3-lobed, broadly ovate in outline, base rounded, peltate, apex acute, c. $\frac{1}{4}$ mm mucronate, 0.25-0.4 by 0.2-0.3 mm, 3-plinerved, reticulation indistinct, margin entire; lobes 0.1-0.2 cm, acute; petiole 0.1-0.2 cm. *Gland* at blade-base single, reniform, c. 2 mm \varnothing , median on the peltate blade-base; no other glands present. *Stipules* narrowly triangular, c. $\frac{1}{4}$ mm. *Thorns* in the axils of leaf scars, subulate, $\frac{1}{2}$ -2 cm, 1-4 mm wide at the base. *Inflorescences* in the axils of much reduced leaves mainly consisting of the gland c. 2 mm \varnothing grouped in knotty sometimes \pm ramified short-shoots 1-4 cm in the axils of the thorns, peduncled up to 3 mm, c. 3-flowered; tendrils 0. Bracts and bracteoles not known. σ fl. not known. ρ fl. tubular-infundibuliform incl. the 9-10 mm long stipe 30-32 by 4-6 mm, sepals spreading in anthesis to c. 15 mm. Pedicel 0-2 mm. Hypanthium 9-11 mm, calyx tube 0, sepals lanceolate, obtuse, 10-12 mm, entire. Petals lanceolate, subacute, c. 4 by 1(-2) mm, 3-nerved, c. 0.1 mm serrulate in the upper half. *Staminodes* $3\frac{1}{2}$ -4 mm, free, inserted at the base of the hypanthium. *Septa* 0. *Corona* 0. *Disk glands* 1-2 mm. *Pistil* 14-16 mm. *Gynophore* 4-5 mm. *Ovary* ovoid-ellipsoid 7-8 by 5-5 $\frac{1}{2}$ mm; *placentas* 5 (not 3), each with 25-30 ovules; c. 150 ovules per ovary. *Styles* connate for 1-1 $\frac{1}{2}$ mm, style-arms 5, 1-1 $\frac{1}{2}$ mm. *Stigmas* reniform, papillate, each c. 3 mm \varnothing . *Fruit* 1 per inflorescence, ellipsoid, pendent, excluding the curved 10-11 mm long gynophore c. 3.9 by 3 cm. *Seeds* not known.

SOMALI REP. N. Province, Al Madu Range, N. of Baditir, 3700 ft: *Bally B. 10953*, ρ fl., fr. (EA, G; K, type); Al Hills, Sugli, 5250 ft: *Collenette 340*, st. (K); Costa dei Migiurtini: *Puccioni & Stefanini 656* (720 & 866), st. (FI).

ECOLOGY. Open rocky ground in subdesert steppe, found together with *Boswellia carteri*; c. 1000-1600 m. Flowers and fruits in Oct.

NOTES. 1. For the morphology of the thorns see under *A. globosa*.

2. The specimen *Puccioni & Stefanini 656* (FI) shows a distinct whitish waxy peeling cuticle on the stems.

3. Differs from *A. globosa* by the larger flowers and fruits, and by the 5 (not 3) placentas and styles, which might be, according to VERDCOURT, linked with polyploidy.

4. Apart from the character of the conspicuous thorns *A. ballyi* and *A. globosa* are closely related to *A. venenata*.

5. BALLY gives the following field notes about the type-specimen: 'root' a large globe, branches terete, pale green, longitudinally striate, branchlets reduced to spines; flowers fleshy, funnel-shaped, tube reddish-brown outside, lobes pale yellow tinged with brown outside, lemon-yellow inside; male plant

not found after prolonged search. In the field it was observed that the inflorescences and flowers, as well as the fruits differed in many characters from *A. globosa* as known from Kenya and Tanganyika.

37. *Adenia globosa* Engl., Bot. Jahrb. 14 (1891) 382, fig. 8; Harms, Bot. Jahrb. 15 (1893) 576; in E. & P., Nat. Pfl. fam. 3, 6a (1893) 85; *ibid.* ed. 2, 21 (1925) 494, fig. 228; Monatschr. Kakt. 5 (1895) 58; Engl., Pfl. welt Ost Afr. 1, A (1895) 42; Harms in Engl., Pfl. welt Ost Afr. 2, C (1895) 281; Bot. Jahrb. 24 (1897) 168; Volkens, Kilimandscharo (1897) 18, fig.; Engl., Pfl. welt Afr. 1, 1 (1910) 252, fig. 219; *ibid.* 3, 2 (1921) 595, 607–609, fig. 272; Winkler, Die Pfl. welt der Tropen, in Gotha, Das Leben der Pfl. 6 (1913) 279, fig. 14, 70–71; Harms in Mildbr., Wiss. Ergebn. Deutsch. Zentr. Afr. Exp. 1907–1908, 2 (1914) 572; Winkler in Karsten & Schenk, Veg. Bild. 14 R, Heft. 8 (1922), tab. 43, 44a; Chiov., Fl. Somal. 1 (1929) 177, tab. 43, fig. 4; *ibid.* 2 (1932) 220; Watt & Breyer-Brandwijk, Med. Pois. Pl. ed. 2 (1962) 828; Verdcourt, Bol. Soc. Brot. 38 (1964) 97, pl. 7; Hutch., Evol. and Phyl. Flow. Pl. (1969) 219, fig. 189. — Type: *Hildebrandt 2858*. — Fig. 17-18.

Shrubs or climbers up to 8 m, stems (sub)erect, curved or scandent, \pm succulent, strongly thorned, emerging from a succulent \pm warty, grey-green subglobose or irregular lumpy trunk up to $2\frac{1}{2}$ m wide. Fertile branches (2–)5–10 mm; internodes $\frac{1}{2}$ –5 cm. *Leaves* when dry coriaceous, grey-green, caducous, entire to 3-lobed, subtriangular to rhomboid or hastate, base rounded, apex acute, less than $\frac{1}{2}$ mm mucronate, 0.3–0.7 by 0.15–0.9 cm, 3(–5)-plinerved, reticulation indistinct, margin entire; lobes acute or subobtusate up to 0.3 cm; petiole 0.1–0.15 cm. *Gland* at blade-base 1, ellipsoid to reniform, 1–2 mm \varnothing , median on the peltate blade-base; no other glands present. Stipules narrowly triangular, acute, c. $\frac{1}{2}$ mm. *Thorns* in the axils of leaves or leaf-scars $\frac{1}{2}$ –8 cm, at base 2–8 mm, apex woody, acute; when young bearing halfway 2 subopposite triangular bracts c. $\frac{1}{2}$ mm. *Inflorescences* in the axils of much reduced leaves mainly consisting of the gland 1–2 mm, arranged in simple (–ramified) short-shoots $\frac{1}{4}$ –2(–5) cm which are situated terminal to the shoots or in the axils of the thorns (see the notes), or rarely on the thorns, peduncled for up to $1\frac{1}{2}$ mm, 1–5-flowered in σ , 1–3-flowered in φ , tendrils 0. Bracts and bracteoles triangular, $\frac{1}{4}$ –1 mm. σ fl. narrowly tubiform to infundibuliform, incl. the 6–10 (–14) mm long stipe 19–30(–35) by 2–5 mm, sepals spreading in anthesis to 18 mm. Pedicel 0–1 mm. Hypanthium 5–12 mm, calyx tube 0, sepals lanceolate, obtuse, 6–9 mm, entire. Petals obovate or ovate or elliptic to oblong-lanceolate, obtuse or subacute, 4– $7\frac{1}{2}$ by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, 3–5-nerved, margin up to 0.3 mm denticulate. Filaments 2–7 mm, connate for 0–1(–2) mm, inserted up to 7 mm above the base of the hypanthium. Anthers 4–8 by 1 mm, obtuse. Septa 0(–1) mm. Corona 0. Disk glands $\frac{1}{2}$ –2 mm, in the axils of the filaments, free or sometimes \pm connate. Vestigial ovary incl. gynophore $\frac{1}{2}$ – $1\frac{1}{2}$ mm. φ fl. tubular-campanulate, incl. the 1–2 mm long stipe (6–)8–12 by $2\frac{1}{2}$ –4 mm, sepals spreading in anthesis to

c. 10 mm. Pedicel 0–1 mm. Hypanthium cup-shaped (1–)1½–4 mm, calyx tube 0, sepals lanceolate, obtuse, 5–8 mm, up to 0.1 mm denticulate. Petals oblong (-lanceolate), (sub)acute, (1½–)2–3 by ¾–1 mm, 1-nerved, up to 0.1 serrulate at the apex. Staminodes 1½–3½ mm, free, inserted at- or up to 1 mm above the base of the hypanthium. Septa 0. Corona 0. Disk glands ¼–1 mm, sometimes ± connate. Pistil (4–)5–9 mm. Gynophore (½–)1–1½ mm. Ovary ovate-ellipsoid, ± 3-ribbed, 2½–4½ by 2–3(–3½) mm; ovules 6–30. Styles connate for ½–1½ mm, style-arms 1–1½ mm. Stigmas ± reniform, papillate, each 1½–2½ mm ∅. *Fruit* 1 per inflorescence, up to 10 together on a short-shoot, subglobular to ovate-ellipsoid, excl. the 1–3 mm long gynophore 1.2–2.8 by 1–2 cm. Pericarp coriaceous, smooth. Seeds 3–25 per capsule (2–10 ovules per placenta), broadly ovate, c. 7 by 5½–6 by 2½–3 mm, 6–9 pits along the length; funicles c. 1½ mm; embryo 5–5½ mm; cotyledons suborbicular with ± obliquely truncate apex c. 4½ by 4½–5 mm.

DISTRIBUTION: NE. Tanzania, S. Kenya, S. Somali Rep. — Fig. 18.

ECOLOGY. Scrub savanna; 100–1800 m.

NOTES. 1. Easily recognized species with strange habit: strongly thorny, minute caducous leaves, apparently assimilating by means of the chlorophyll in the grey-green bark.

2. The thorns develop in the axils of the leaves and are apparently homologous with a tendril or a tendril-bearing inflorescence as found in most other *Adenia* species. Young thorns bear about halfway 2 subopposite scale-like bracts reminding the dichasial ramification of the inflorescences. In the present species the inflorescences are grouped in short-shoots developing from the serial bud in the axils of the thorns, or from the apex of the shoots. In *A. venenata* the inflorescences are similarly situated.

3. The dry pericarp is, as usual in most *Adenias*, brownish-orange or yellowish, but sometimes distinctly purplish.

4. Three allopatric subspecies are recognized. The two subspecies *pseudoglobosa* and *curvata* were described by VERDCOURT (1964) under a new species *A. pseudoglobosa*. Verdcourt himself mentions already the close relationship of the three taxa. The differentiating characters as found in habit, and in the flowers and fruits are partly overlapping, but there is a fairly well marked difference in range and altitude of occurrence. Mr. J. MULLER investigated the pollen of the three taxa, but found them mutually not significantly different. According to VERDCOURT the origin of the three taxa is possibly linked with tertiary volcanic activity.

KEY TO THE SUBSPECIES

1. Main branches scandent, strongly curved, or prostrate and twisted. Thorns (1–)2–8 cm, about as long as or longer than the internodes. Inflorescences grouped in the axils of the thorns, scattered along the branches. Filaments

- inserted up to 3 mm above the base of the hypanthium. Anthers 6–8 mm. Ovules 2(–3) per placenta, 6–8 per ovary. Fruit 1.2–1.8 cm, containing 3–6 seeds; gynophore 2–3 mm. **a. ssp. globosa**
1. Main branches erect, curved or subscentent. Thorns $\frac{1}{2}$ – $2\frac{1}{2}$ cm, about as long as or shorter than the internodes. Inflorescences in the apical part of the branches. Filaments inserted in the hypanthium 2–7 mm above the base. Anthers 4– $6\frac{1}{2}$ mm. Ovules 2–9 per placenta, 7–30 per ovary. Fruit 2–2.8 cm, containing 7–25 seeds; gynophore 1–2 mm.
 2. Main branches erect or but little curved. Filaments inserted $3\frac{1}{2}$ –7 mm above the base of the hypanthium. Ovules 5–9 per placenta, 18–30 per ovary. Fruit containing 15–25 seeds. **b. ssp. pseudoglobosa**
 2. Main branches strongly curved or subscentent. Filaments inserted 2–3(–4) mm above the base of the hypanthium. Ovules 2–5 per placenta, 7–12 per ovary. Fruit containing 7–12 seeds. **c. ssp. curvata**

a. ssp. globosa — Fig. 17–18.

Main branches up to 8 m, scandent or strongly arching or prostrate and twisted. Thorns strong (1)2–8 cm, strictly patent, about as long as or longer than the internodes. *Inflorescences* in short-shoots in the axils of the thorns, scattered along the branches, not terminal. ♂ *fl.* incl. the 7–11 mm long stipe 19–30 mm. Hypanthium 5–9 mm, sepals 7–9 mm. Petals 4– $7\frac{1}{2}$ by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Filaments inserted in the hypanthium up to 3 mm above the base, $3\frac{1}{2}$ –7 mm, up to 2 mm connate. Anthers 6–8 mm. Disk glands $\frac{3}{4}$ –2 mm. Vestigial ovary incl. gynophore 1– $1\frac{1}{2}$ mm. ♀ *fl.* incl. the 1–2 mm long stipe (6–)8–12 mm. Hypanthium (1–) $1\frac{1}{2}$ –2 mm, sepals (4–)5–8 mm. Petals $1\frac{1}{2}$ – $2\frac{1}{2}$ by $\frac{3}{4}$ –1 mm. Stamens inserted at the base of the hypanthium, ($1\frac{1}{2}$ –) 2–3 mm. Disk glands ($\frac{1}{4}$ –) $\frac{3}{4}$ –1 mm. Pistil (4–)5–9 mm. Ovary 2–4 by $1\frac{3}{4}$ –3 mm; ovules 2(–3) per placenta. *Fruit* excl. the 2–3 mm long gynophore 1.2–1.8 cm. Seeds 3–6 per capsule, c. 7 by $5\frac{1}{2}$ by $2\frac{1}{2}$ mm.

s. LOC.: *Anon.*, st. (EA, drawing of twig and leaf); East Equatorial Africa: *Taylor s.n.*, st. (BM).

SOMALIA. Oltregiuba, Isola, near Alessandra: *Tozzi 401*, st. (FI, K).

KENYA. K7, Kilifi Distr., 40 km from Kilifi: *Jeffrey K. 559*, st. (EA) — Kwale Distr., between Samburu and Mackinnon Road, 350 m: *Drummond & Hemsley 4053*, ♀ fl., fr. (BR, FI, K); Kwale, 600 ft.: *Graham 2043*, ♂ fl. (EA, K) — Teita Distr., Voi, Murtha, 3000 ft.: *Higgins B. 8501*, ♂ fl. (EA); between Duruma and Teita: *Hildebrandt 2858*, ♂ fl. (B †, n.v., type); Voi: *Hucks 843*, fr. (EA), *Irwin 255*, ♀ fl. (EA); Mombassa to Teita: *Sacleux 1046*, fr. (P) — Machakos Distr. (K4), 2500–3200 ft., Makindu: *Ivens 2179*, st. (EA); *Verdcourt 2369*, fr. (EA, K); Emali, 5000 ft.: *Opiko 309*, ♂ fl. (EA); Athi R.: *Pole Evans & Erens 1106*, st. (K) — Kitui Distr., Mutomo Hill: *Bally 12797*, ♀ fl. (EA).

TANZANIA. Tanganyika, s. loc.: *Leippert 5357*, st. (EA); Lake Chala: *Gilbert D. 60*, st. (EA) — Pare Distr. (Pare Mts.), T 3, Maramba Track to Kihurio, 1500 ft.: *Greenway 6474* (EA, K); Makanya, 2800 ft.: *Haarer 1511*, fr. (EA, K); Ngurunga: *Harris 117*, st. (EA); NW. of Mombasa on Same Rd.: *Harris & Jenik 845*, st. (EA); Gonja, 2000 ft.: *Manolo 188*, st. (EA, K), *Semsei*

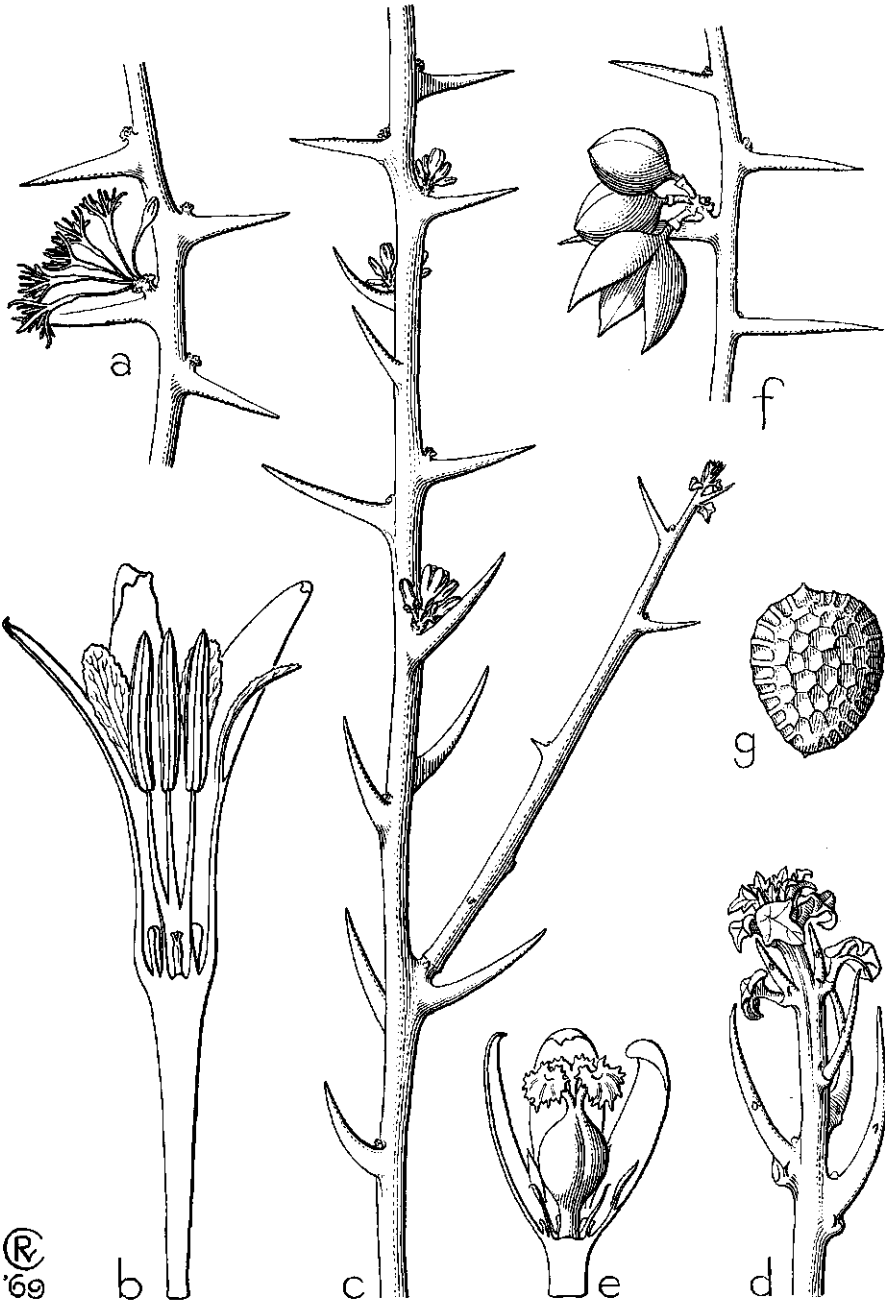


FIG. 17. *Adenia globosa* ssp. *globosa*. — a. ♂ inflorescence, $\times \frac{1}{2}$ (Opiko 309); b. ♂ flower, longitudinal section, $\times 3$ (Burt 4900); c. habit, branch with ♀ inflorescences, $\times \frac{1}{2}$ (Bally 12797); d. top of growing branch with leaves, $\times 2$ (Manolo 188); e. ♀ flower, longitudinal section, $\times 3$ (Bally 12797); f. infructescence, $\times \frac{1}{2}$ (Haarer 1511); g. seed, $\times 3$ (Drummond & Hemsley 4053).

2087, ♂ fl. (EA, K); N. of Kihuiro: *Uhlig 809*, st. (EA); Maji Kummua: *Volgens 2381*, ± st. (BM) — Handeni Distr. (T 3), Rd. to Kibaya, 2000 ft.: *Burt 4840*, fr. (K); N. of Loskitu Mt., 3000 ft.: *Burt 4900*, ♂ fl. (K); Horogwe, 1500 ft.: *Faulkner 1472*, st. (K); Kiberashi: *Hornby 2018*, ♂ fl. (EA, K); 37 km Naberea-Ngasumet, 1450 m: *Leippert 5921*, ♂ fl. (EA).

ECOLOGY. Dry rocky and stony places in scrub savanna; on sandy soil and 'blackish' soil; found together with *Acacia*, *Commiphora*, *Balanites*, *Lankea*, succulent *Euphorbias*, *Cissus quadrangularis* and *Sansevieria*; 100–1500 m. Flowers mainly from May to August, fruits from August to Oct.

NOTE. 1. On field labels is noted that the flowers are sweetly scented and much liked by insects. The flowers are greenish to yellow, the petals cream, the filaments and styles green, anthers yellow; the fruit is reported as trigonous-globose, pale green with the three angles paler green.

b. ssp. pseudoglobosa (Verdc.) de Wilde, *Blumea* 17 (1969) 180. — *A. pseudoglobosa* Verdcourt ssp. *pseudoglobosa*, *Bol. Soc. Brot.* 38 (1964) 98, pl. 1–3, 7. — Type: *Verdcourt & Hemming 2771*. — **Fig. 18.**

Main branches up to $2\frac{1}{2}$ m, erect or slightly curved. *Thorns* 0.4– $2\frac{1}{2}$ cm, erecto-patent, mostly much shorter than the internodes. *Inflorescences* in short-shoots terminal and in the axils of thorns in the apical part of the branches. ♂ *fl.* incl. the 7–10 mm long stipe 19–30 mm. Hypanthium 6–12 mm, sepals 6–9 mm. Petals $2\frac{1}{2}$ –6 by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Filaments inserted $3\frac{1}{2}$ –7 mm above the base of the hypanthium, ($2\frac{1}{2}$ –)4–6 mm, up to $\frac{1}{2}$ mm connate. Anthers 4– $6\frac{1}{2}$ mm. Disk glands $\frac{3}{4}$ –1 mm. Vestigial ovary incl. gynophore $\frac{1}{2}$ –1 mm. ♀ *fl.* incl. the 1– $1\frac{1}{2}$ mm long stipe 10–12 mm. Hypanthium 3–4 mm, sepals 6–7 mm. Petals 2–3 by $\frac{3}{4}$ –1 mm. Staminodes inserted in the hypanthium $\frac{1}{2}$ –1 mm above the base, 2– $3\frac{1}{2}$ mm. Disk glands $\frac{1}{2}$ mm. Pistil 7–8 mm. Ovary $3\frac{1}{2}$ – $4\frac{1}{2}$ by $2\frac{1}{2}$ –3 mm; ovules 5–9 per placenta. *Fruit* excl. the 1–2 mm long gynophore 2–2.8 cm. Seeds 15–25 per capsule, c. 7 by 6 by $2\frac{1}{2}$ –3 mm.

KENYA. Kiambu Distr., Limuru Escarpment, W. of Kikuyu Station, 5500 ft.: *Bogdan H. 77/60*, ♂ fl. (EA); Ndeiya grazing scheme: *Verdcourt & Mburu 2677*, fr. (EA, FI, K); near Naivasha distr. boundary, Narok Rd., 5200 ft.: *Verdcourt & Hemming 2771*, ♂ fl., ♀ fl., fr. (BR, EA, K, type, also photograph in K); Kikuyu to Narok, via Kedong, 5400 ft.: *Verdcourt 3547 (I, II)*, ♂ fl., ♀ fl., fr. (BR, EA, K) — Kajiado Distr. (K 6), Ngong Hills, 5000 ft.: *Bally 8639*, fr. (EA); near Water of Soda Comp. (1.48S–36.4E), 850 m: *Gillett 16773*, ♀ fl. (EA) — Naivasha Distr., Mt. Suswa, 5600 ft.: *Glover 3719*, st. (EA).

ECOLOGY. Stony places in dry scrub. Locally dominant in *Commiphora*-*Acacia* bushland; 850–1900 m. Flowers and fruits throughout the year.

USES. GLOVER records that a 'part of the white flesh of the tuber had been chewed by some animal'.

NOTES. 1. According to VERDCOURT the inflorescences are often covered with ants.

2. Fresh flowers are reported as greenish-yellow, fruits as green, sometimes purplish flushed and with obscure paler spots.

c. ssp. *curvata* (Verdc.) de Wilde, *Blumea* 17 (1969) 180. — *A. pseudoglobosa* Verdc. ssp. *curvata* Verdc., *Bol. Soc. Brot.* 38 (1964) 101, pl. 4-5, 7. — Type: *Williams 674* — **Fig. 18.**

Main branches strongly curved or subscandent, up to 3 m. Thorns ($\frac{1}{2}$ -)1-2 cm, patent or \pm erecto-patent, about as long as to much shorter than the internodes. *Inflorescences* in short-shoots terminal and in the axils of the thorns scattered along the apical c. 50 cm of the branches. σ fl. incl. the 8-14 mm long stipe 20-30(-35) mm. Hypanthium 8(-10) mm, sepals 6-9 mm. Petals 5-6 by $1\frac{1}{2}$ - $2\frac{1}{2}$ mm. Filaments inserted in the hypanthium 2-3(-4) mm above the base, 5-6 mm, free. Anthers $5\frac{1}{2}$ -6 mm. Disk glands $\frac{1}{2}$ -1 mm. Vestigial ovary incl. gynophore $\frac{1}{2}$ - $1\frac{1}{2}$ mm. ρ fl. incl. the 1- $1\frac{1}{2}$ mm long stipe 10-12 mm. Hypanthium 2-3 mm, sepals c. $7\frac{1}{2}$ mm. Petals 2- $2\frac{1}{2}$ by $\frac{3}{4}$ mm. Staminodes inserted at the base of the hypanthium, c. $2\frac{1}{2}$ mm. Disk glands c. $\frac{1}{4}$ mm. Pistil 7-8 mm. Ovary $3\frac{1}{2}$ -4 by $2\frac{1}{2}$ -3 mm; ovules 2-5 per placenta, 7-12 per ovary. *Fruit* excl. the 1- $1\frac{1}{2}$ mm long gynophore 2-2.8 cm. Seeds 7-12 per capsule, c. 7 by 6 by $2\frac{1}{2}$ -3 mm.

TANZANIA. Tanganyika, Mbulu Distr., between Lake Ayasi and Mbulu Escarpment at Jungu, 3700 ft.: *Bally 10620*, σ fl. (EA, K); Mongala (NE. shores of Lake Ayasi), 3900 ft.: *Verdcourt 4014 C.* (EA, photographs of habit); between Jungu and Aitjo: *Williams 674*, σ fl. (EA, type) — Masai Distr., Engaruka, foot of Mt. Loolmalasin, 3800 ft.: *Bally 10669 (I & II)*, σ fl., ρ fl., fr. (EA, K); Engaruka: *St. Clair - Thomson 333*, fr. (K).

ECOLOGY. Rocky slopes, rocky ground with *Commiphora*, 'evergreen' woodland; locally common; 1000-1300 m. Flowers and fruits in July.

NOTES. 1. This subspecies is in several respects (e.g. habit, male flowers) intermediate between ssp. *globosa* and ssp. *pseudoglobosa*. See also under the species.

2. Fresh flowers are reported as green or greenish-yellow.

38. *Adenia venenata* Forsk., *Fl. Aegypt.-Arab.* (1775) 77; Aschers. in *Baill., Dict. Bot.* 1 (1876) 47; Urban, *Jahrb. Bot. Gart. Berl.* 2 (1883) 27; Engl., *Bot. Jahrb.* 14 (1891) 378, 374-375, 380, tab. 7; Harms in E. & P., *Nat. Pfl. fam.* 3, 6a (1894) 85; *ibid.* ed. 2, 21 (1925) 492, fig. 227; Pax, in Engl., *Die Pfl. welt Ost Afr.* I, B (1895) 511; Harms, *ibid.* II, C (1895) 281; Durand & Schinz, *Ét. Fl. Congo* (1896) 140; Harms, *Bot. Jahrb.* 24 (1897) 166, 167, 168; Durand, *Sylloge Fl. Congol.* (1909) 224; Engl., *Pfl. welt Afr.* 1, 1 (1910) 142, fig. 115; *ibid.* 3, 2 (1921) 606, fig. 271; Tropea, *Ann. di Bot.* 10 (1912) 5; Chiov., *Res. Miss. Stefanini-Paoli* 1, App. (1916) 212; Blatter, *Fl. Arab.* 2 (1921) 200; Hutch. & Dalz., *Fl. W. Tr. Afr.* ed. 1,1 (1927) 173; Dalz. in Hutch. & Dalz., *Fl. W. Tr.*

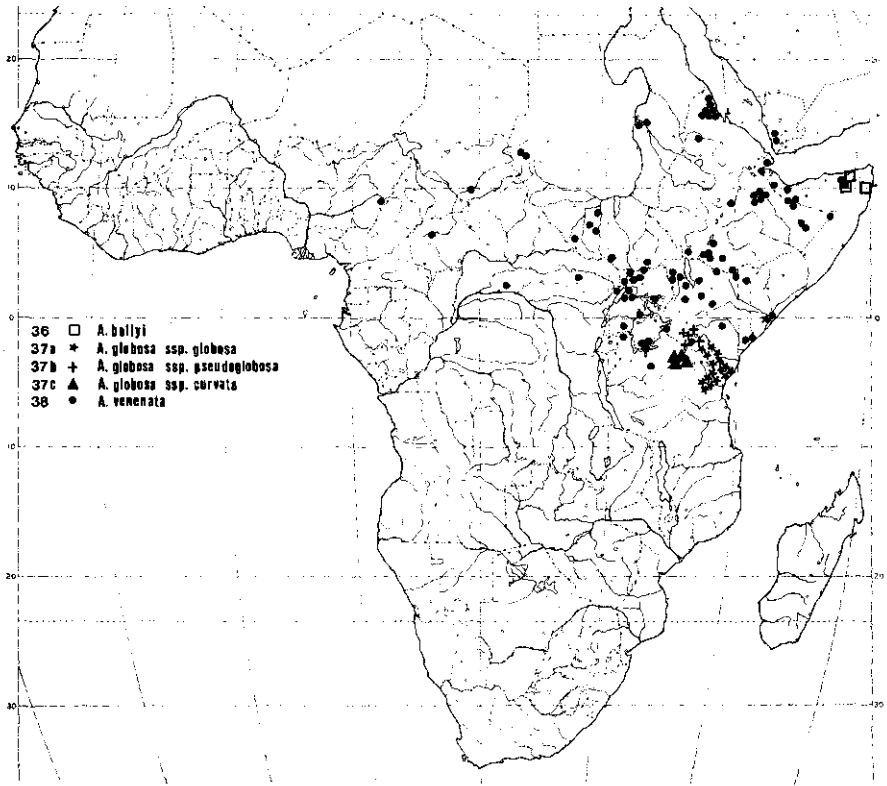


FIG. 18. Localities of species 36-38.

Afr. Append. (1937) 50; Cufodontis, Miss. Biol. Borana, Racc. Bot., Angiosp. Gymnosp. (1939) 142; Hutch. & Bruce, Kew Bull. (1941) 98; Andrews, Flow. Pl. Anglo-Eg. Sudan 1 (1950) 161, fig. p. 162; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202. Burger, Fam. Fl. Pl. Ethiopia, Exp. Stat. Bull. Oklahoma State Univ. 45 (1967) 183, fig. 45, 2. — *Modecca venenata* Greshoff, Med. Lands Pl. Tuin 29 (1900) 80, *comb. inval.*; Watt & Breyer-Brandwijk, Med. Pois. Pl. ed. 2 (1962) 828. — Type: *Forskål s.n.* — Fig. 18.

Modecca abyssinica Hochst. ex A. Rich., Tent. Fl. Abyss. 1 (1847) 297; Hochstetter, Pl. Schimp. Abyss. III n. 1672; Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 514; Martelli, Florula Bogosensis (1886) 37; Baccarini, Bull. Soc. Bot. Ital. (1908) 40 (anatomy). — Type: *Schimper Iter Abyss. n. 1572.*

Shrubs or climbers to 8 m, consisting of a \pm conical fleshy(-woody) basal part up to 2 by $\frac{1}{2}$ ($-\frac{3}{4}$) m passing into the succulent shrubby or scandent branches up to 5 cm thick; bark smooth, grey-green. Fertile branches 2-6 mm; internodes 1-10 cm. *Leaves* when dry brownish-green above, grey to glaucous beneath, not punctate, shallowly to deeply 3-5(-7)-lobed, orbicular to ovate

in outline, base cordate, apex obtuse to rounded, sometimes retuse, $1\frac{1}{2}$ –12 by $1\frac{1}{2}$ –13 cm, 5-(sub)plinerved, reticulation distinct or not, margin entire; lobes semiorbicular to lanceolate, rarely \pm 3-lobed, obtuse, up to 5 cm; petiole 1–8 cm. *Gland* at blade-base 1, reniform, 2–4 mm \varnothing , median on the \pm hemiorbicular subpeltate base; blade glands 0–6, $\frac{1}{2}$ – $1\frac{1}{2}$ mm \varnothing , submarginal; marginal glands 0. Stipules narrowly triangular $\frac{1}{2}$ –1 mm, soon withering. *Inflorescences* mostly in the axils of much reduced leaves 1–3 mm arranged in short-shoots $\frac{1}{2}$ –5(–15) cm, rarely in the axils of normal leaves, peduncled for up to $1\frac{1}{2}$ cm, (1–)3–5-flowered in δ , 1(–3)-flowered in η ; tendril 0(–1), up to 5 cm. Sterile tendrils simple, up to 12 cm, mostly strong, sometimes developed as a strong blunt thorn up to 4 by 0.4 cm. Bracts and bracteoles narrowly triangular, acute, $\frac{1}{2}$ –1 mm. δ fl. (narrowly) tubiform, incl. the ($3\frac{1}{2}$ –)15–33 mm long stipe (18–)30–56 by (1–)2–3 mm, sepals spreading in anthesis to c. 12 mm. Pedicel 0– $\frac{1}{2}$ (–3) mm. Hypanthium tubiform 9–15 mm, calyx tube 0, sepals lanceolate, obtuse, (5–)6–9 mm, entire. Petals oblong to oblong-lanceolate, obtuse or subacute, 3–6 by 1– $2\frac{1}{2}$ mm, 3–5-nerved, irregularly serrulate near the apex. Filaments 4–10 mm, free or up to 1 mm connate, inserted $\frac{1}{2}$ –5 mm above the base in the hypanthium. Anthers 4–6 by $\frac{3}{4}$ –1 mm, obtuse, up to 0.2 mm apiculate. Septa 0. Corona 0. Disk glands $\frac{1}{2}$ –1 mm, free or \pm connate into an annulus, in the axils of the filaments. Vestigial ovary incl. gynophore $\frac{1}{2}$ – $1\frac{1}{4}$ mm. η fl. narrowly infundibuliform, incl. the 4–8 mm long stipe 15–24 by 3–4 mm, sepals spreading in anthesis to c. 12 mm. Pedicel 0–2 mm. Hypanthium 5–8 mm, calyx tube 0, sepals oblong-lanceolate, obtuse, 5–8 mm, entire. Petals oblong-lanceolate, obtuse or acute, 3–4 by $\frac{1}{3}$ –1 mm, 1–3-nerved, subentire. Stamines c. 3 mm, free, inserted at- or up to 1 mm above the base of the hypanthium. Septa 0. Corona 0. Disk glands $\frac{1}{3}$ – $\frac{3}{4}$ mm, free, inserted in the axils of the stamines. Pistil 9–11 mm. Gynophore $2\frac{1}{2}$ –5 mm. Ovary ovate-oblong 4–6 by 2– $2\frac{1}{2}$ mm. Styles connate for 1–3 mm, style-arms up to $\frac{1}{2}$ mm. Stigmas subreniform, woolly-papillate, each $1\frac{1}{2}$ –3 mm \varnothing . *Fruit* 1–2 per inflorescence, ovate or ellipsoid, \pm narrowed to the apex, excl. the curved 7–12 mm long gynophore 2– $4\frac{1}{2}$ by $1\frac{1}{2}$ –3 cm. Pericarp coriaceous, smooth. Seeds 15–35 per capsule, orbicular to broadly ovate, $4\frac{1}{2}$ –6 by $4\frac{1}{2}$ –5 by 2–3 mm, 5–8 pits \varnothing ; funicles 1–2 mm; embryo 4–5 mm, cotyledons suborbicular, cordate, apex obliquely truncate-emarginate $3\frac{1}{2}$ – $4\frac{1}{2}$ by 4–5 mm.

YEMEN. s. loc.: *Deflers s.n.*, st. (MPU), *Forskål s.n.* (C, type, photograph seen); Hadjeilah, Wadi Chaba, 500–600 m: *Deflers 138*, st. (MPU, P); Hodjela: *Schweinfurth 937*, δ fl., fr. (K).

NIGERIA. Northern Reg., Yola Distr., Verre Hills, planted near village: *Dalziel 190*, η fl. (K).

TCHAD. Dar-Banda, Kaga Bongola: *Chevalier 7254*, st. (P); Chari Central., Iro region: *Chevalier 9239*, st. (P); Ialamet R. (Pays de Kabas): *Chevalier 10515*, st. (P).

CENTR. AFR. REP. Bosum (Bozoum), 900 m: *Mildbraed 9742*, st. (K).

REP. OF THE CONGO. For. Centr., Terr. Lisala, Upoto, planted near village: *Anon. s.n.*, st. (BR) — Uele, Kongoli, planted near village: *Claessens 883*, η fl. (BR); Munsu (Monbuttu Land): *Schweinfurth 3485*, δ fl. (S); Niamniam Land: *Schweinfurth 3738*, st. (K).

SUDAN. Khartoum Bot. Garden: *de Wilde 5762*, δ fl., fr. (WAG); White Nile, 5–14°N: *Peney s.n.*, δ fl. (P); Darfur Prov., Jebel Marra area, 3700–500 ft.: *Wickens 1368*, fr. (K), 3005, δ fl. (K); Bahr el Ghazal Prov., Meshra: *Schweinfurth 1278*, δ fl. (B \dagger , K, P, S); Djur R.:

Schweinfurth 111, fr. (K), *112*, ♂ fl. (K, P, S.), *1657*, st. (B †, K), *1833*, fr. (K); Ilemi Triangle, Kamathia, 2200 ft.: *Padwa 240*, ♀ fl., fr. (EA, K).

ETHIOPIA. Kolla Valley, near Djeladjeranne, 3000–5000 ft.: *Schimper 242 (207/4)*, fr. (BM, FI, G, MPU, P, S; W, type *Modecca abyssinica*); Bellagass, Mallsoa: *Schimper 1662*, fr. (P) — Eritrea, 900–1700 m — Harar Prov.: W. of Osbolli (9.°37 N, 41°40 E): *Burger 3218*, ♀ fl., fr. (K, S) Dire Dawa and vicinity; Ogaden, Warder: *Barnes s.n.*, ♂ fl., st. (EA) — Sidamo Prov., El Banno (Tertale); Terr. de Borana: *Cufodontis 98*, ♂ fl. (FI); Lago Margherita: *Vatova 1835*, fr. (FI).

FRENCH SOMALILAND. Randa: *Chedeville 242*, fr. (FI); Goda, 1000 m: *Chedeville 505*, st. (FI).

SOMALIA. Northern (ex British), 500–1300 m — Southern, Giumbo: *Paoli 274*, ♂ fl. (FI); 792, fr. (FI).

UGANDA. Northern Prov., 1000–1400 m — Western Prov., E. Shore L. Albert: *Bagshawe 1407*, ♀ fl., fr. (BM); Ankole, Ruizi R., 4300 ft.: *Jarrett 480*, ♂ fl. (EA, K); Bunyoro. Bujenje, 3500 ft.: *Purseglove 1290*, ± st. (EA, K) — Buganda Prov., Entebbe: *Bagshawe 795*, ♀ fl. (BM) — Eastern Prov., Teso, Kyere: *Chandler 1134*, st. (BR, EA, K).

KENYA. Northern Prov., 1000–1400 m — NW. Prov., Loro, Lodwar Area, 3000 ft.: *Paulo 955*, ♂ fl. (BR, EA, K) — Rift Valley Prov. (K3): Kerio Valley, 3500 ft.: *Bally 12351*, ♀ fl., fr. (K) — Nyanza Prov. (K5), Boni, Kui I.: *Rawlins 372*, ♀ fl., fr. (EA, K); Homa Bay, 3600 ft.: *Turner 6607*, ♀ fl. (EA) — Southern Prov., Ololkisalie Nat. Park, 60 km SW. of Nairobi, 3300 ft.: *Harmsen 6476*, ♂ fl., fr. (EA, WAG) — Coastal Prov. (K7): 30 km N. of Lamu: *Rawlins 109*, ♂ fl., fr. (EA, K).

TANZANIA. Tanganyika, Lake Prov. (T1), Ukerewe I.: *Conrads 5205*, ♀ fl. (EA, K), *5417*, ♀ fl. (EA), *5658*, st., ♀ fl., fr. (BR, EA, K), *EAH. 13305*, ♂ fl. (EA, K); Shinyanga: *Koritschoner 1848*, ♂ fl. (EA, K); Nyashozi, Karagwe, 5000 ft.: *Haarer 2460*, ♂ fl. (EA, K).

ECOLOGY. Savanna and steppe, open stony places, scrub, found on a variety of soils: sand, clay, volcanic soils, basalt and limestone; 0–1700 m. Flowers mainly from Febr. to June, fruits from Febr. to August.

USES. Several times reported as cultivated because of medicinal properties: the specimens from Congo, Centr. Afr. Republic, Tchad and Nigeria are mostly found cultivated near villages and apparently introduced. *Claessens 883* mentions it as a remedy for intestinal worms in Congo; the plants are propagated there by means of cuttings. According to FORSKÅL the plant is poisonous, but ASCHERSON already assumed that this statement is probably due to a confusion with the very poisonous *Adenium obesum* with the same Arabian vernacular name 'aden'.

NOTES. 1. In the original description the flowers are described as 6-merous. Already ENGLER supposed that this was observed in an anomalous flower; 4- and 6-merous flowers occur occasionally in other species.

2. The species is provided with a peculiar swollen trunk, which is also found in several other *Adenia* species.

3. The lobe-apexes of leaves of juvenile specimens are often more or less acute; in mature plants they are always obtuse.

4. Fresh flowers are reported as creamy to (greenish-)yellow, often reddish or purplish mottled, petals white, anthers (orange-)yellow; the fruits are yellow or whitish- or greyish green, often conspicuously veined with green, brick-red or purple.

3. SECT. BLEPHARANTHES (W. & A.) ENGL.

Bot. Jahrb. 14 (1891) 375; Harms in E. & P., Nat. Pfl. fam. 3, 6a (1893) 83; *ibid.*, Nachtr. 1 (1897) 255; *ibid.* ed. 2, 21 (1925) 491 (incl. series *Nanae* & *Scandentes*); De Dalla Torre & Harms, Gen. Siph. (1903) 331; Engl., Pfl. welt Afr. 3, 2 (1921) 603 (as sect. *Blepharanthus*); Hall. f., Med. Rijksherb. 42 (1922) 8; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 670 (incl. series *Nanae* & *Scandentes* Harms). — *Modecca* Lamk., 1797. — *Blepharanthus* J. E. Smith, 1821, nom. illeg. (as a substitute for *Modecca*). — *Modecca* subg. *Blepharanthus* W. & A., Prod. Fl. Penins. Ind. Or. 1 (1834) 353; Meisner, Pl. Vasc. Gen. 1 (1838) 123. — *Modecca* sect. *Blepharanthus* (W. & A.) Endl., Gen. Pl. (1839) 928; Miq., Fl. Ind. Bat. 1, 1 (1856) 703 (pro min. parte); Benth. & Hook. f., Gen. Pl. 1 (1867) 813 (as sect. *Blepharanthus*); Mast. in Hook. f., Fl. Brit. Ind. 2 (1879) 602. — *Modecca* subg. '*Modeccae verae*' Miq., Fl. Ind. Bat. 1, 1 (1856) 702 (pro min. parte). — *Modecca* sect. *Eumodecca* Baill., Hist. Pl. (1885) 476. — Type species: *Modecca palmata* Lamk. = *A. hondala* (Gaertn.) de Wilde.

Kolbia P. Beauv., 1807. — Type species: *Kolbia elegans* P. Beauv. = *A. lobata* (Jacq.) Engl.

Clemanthus Klotzsch, 1861. — Type species: *Clemanthus senensis* Klotzsch = *A. digitata* (Harv.) Engl.

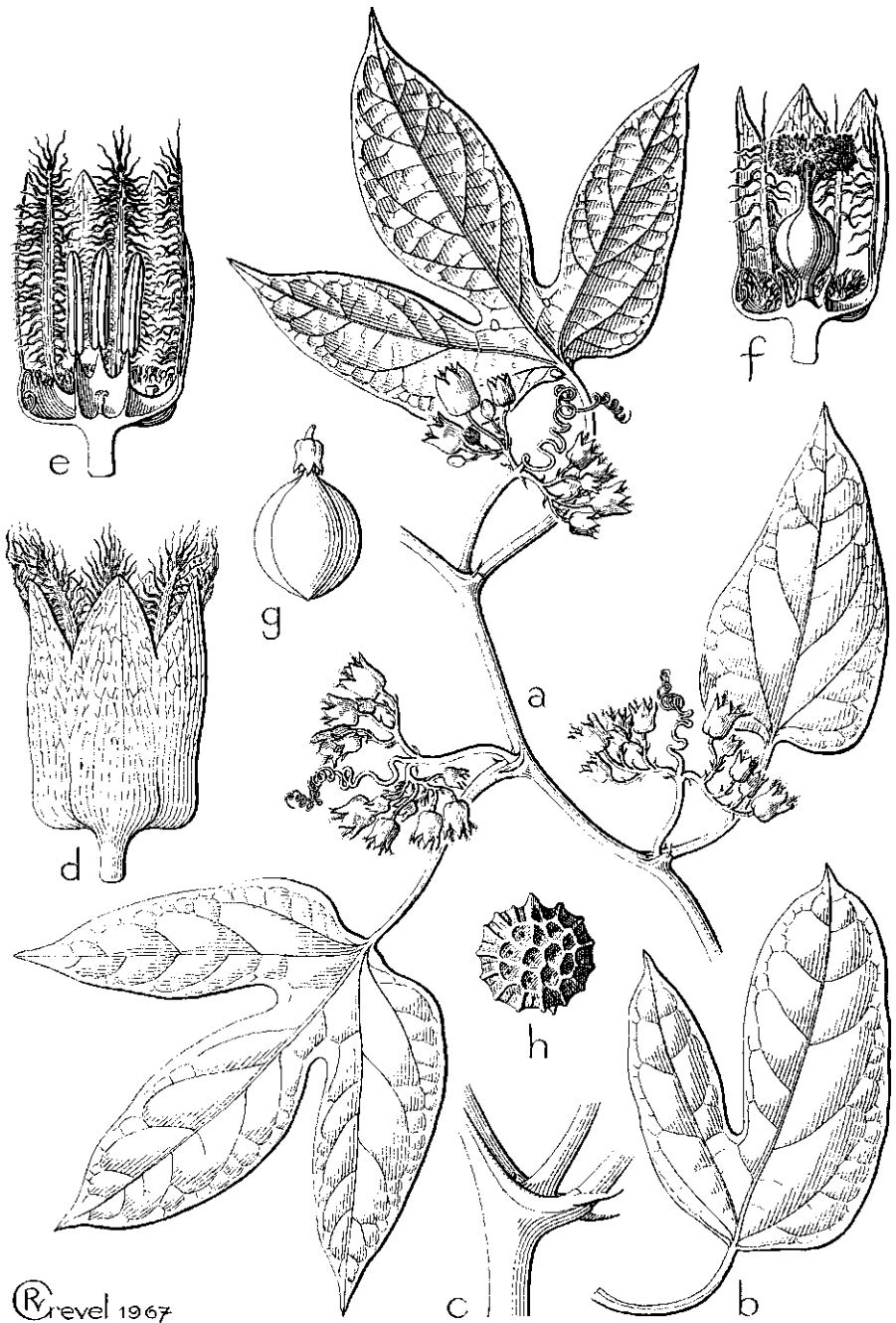
Machadoa Welw. ex Benth. & Hook. f., 1867. — Type species: *Machadoa huillensis* Welw. ex B. & H. = *A. huillensis* (Welw.) A. & R. Fernandes.

Keramanthus Hook. f., 1876. — *Modecca* sect. *Keramanthus* (Hook. f.) Baill., Hist. Pl. 8 (1885) 476. — *Adenia* sect. *Keramanthus* (Hook. f.) Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; *ibid.* ed. 2, 21 (1925) 492; De Dalla Torre & Harms, Gen. Siph. (1903) 331; Engl., Pfl. welt Afr. 3, 2 (1921) 605. — Type species: *Keramanthus kirkii* Hook. f. = *A. keramanthus* Harms.

39. *Adenia hondala* (Gaertn.) de Wilde, Blumea 15 (1967) 265. — *Granadilla hondala* Gaertn., De Fruct. 2 (1791) 480, t. 180, fig. 10; Hall. f., Rec. Trav. Bot. Neerl. 15 (1918) 62. — *Passiflora hondala* Steud., Nom. ed. 1 (1821) 595 ('*itondala*'); *ibid.* ed. 2, 2 (1841) 275; Roemer, Syn. Mon., 2 Pepon. (1846) 185; Mast., Trans. Linn. Soc. Lond. 27 (1871) 639. — Type: *Hermann s.n.* (L, apparently lost) — Fig. 19–20.

Bryonia palmata L., Sp. Pl. 1 (1753) 1012 p.p., lectotypo excl.; Sp. Pl. 2 (1763) 1438, p.p., lectotypo excl. — [*Hondala Allahonda*, Clematis indica..., *Bryonia Zeylanica folio quinquepartito...* etc. Hermann, Mus. Zeyl. (1717) 41, 62; '*Bryonia Zeylanica folio quinquepartito...*' etc. Burman, Thes. Zeyl. (1737) 49; '*Bryonia foliis palmatis...*' etc. Linné, Fl. Zeyl. (1748) 167] — Type: *Hermann s.n.*, p.p.; lectotype: *Hermann s.n.* (BM) = *Diplocyclos palmatus* (L.) Jeffrey (Cucurb.).

Convolvulus paniculatus (non L.) var. β . Burman f., Fl. Ind. (1768) 45, p.p.;



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FIG. 19. *Adenia hondala*. — a. habit of branch with ♂ inflorescences, $\times \frac{1}{2}$ (Wight 321, sheet III); b. leaf, seen from above, $\times \frac{1}{2}$ (Walker 1086); c. node with stipules, basal parts of petiole and peduncle, and serial bud, $\times 2$ (Hamilton 1504); d. ♂ flower, $\times 2$ (Wight 321, sheet III); e. ditto, longitudinal section, $\times 2$ (Wight 321, sheet III); f. ♀ flower, longitudinal section, $\times 2$ (Wight 321, sheet II); g. fruit, $\times \frac{1}{2}$ (Ritchie 1853); h. seed, $\times 2$ (Ritchie 1763).

Linn., Mant. 2 (1771) 336; Pers., Syst. Veg. ed. 15 (1797) 209 (as var. β *Modecca*). — *Modecca tuberosa* Roxb., Hort. Beng. (1814) 49; Fl. Ind. (1832) 134; Moon, Cat. Indig. & Exotic Pl. Ceyl. (1824) 48. — [*'Modecca'* Rheede, Hort. Mal. 8 (1688) 39, t. 20; Breyn., Prodr. 2 (1689) 48; Ray, Hist. Pl. 3 (1704) 343. — '*Passiflora spuria bryonoides quinquefido folio Malabarensi*' Plukenet, Almag. (1720) 283. — '*Modecca fructu majore...*' etc. Linné, Fl. Zeyl. (1748) 230, p.p.] — Type: *Rheede's description and t. 20.*

[*'Palmodecca'* Rheede, Hort. Mal. 8 (1688) 41, t. 21; Breyn, Prodr. 2 (1689) 48; Ray, Hist. Pl. 3 (1704) 344. — '*Passiflora spuria bryonoides Malabarensis folio trifido et quinquefido*' Plukenet, Almag. (1720) 283] — Type: *Rheede's description and t. 21.*

[*'Motta-Modecca'* Rheede, Hort. Mal. 8 (1688) 43, t. 22; Breyn., Prodr. 2 (1689) 49; Ray, Hist. Pl. 3 (1704) 344. — '*passiflora spuria bryonoides Malabarensis, foliis variis scissis, fructu diverso*' Plukenet, Almag. (1720) 283] — Type: *Rheede's description and t. 22.*

Modecca palmata Lamk., Encycl. Méth. 4 (1797) 209; Vahl, Skriv. Naturh. Selsk. Kjöbenh. 6 (1810) 103; Sprengel, Syst. Veg. 3 (1826) 45; Wallich, Cat. 6762 A & B (1832); DC., Prodr. 3 (1828) 336 (α *Narola*, β *Palmodecca*, γ *Motta*); Wight, Cat. Ind. Pl. (1833) n. 1156; G. Don, Gen. Syst. Gard. & Bot. 3 (1834) 59; W. & A., Prodr. 1 (1834) 353; Spach, Hist. Nat. Vég. Phan. (1838) 283; Wight, Ic. (1839) t. 201; Roemer, Syn. Mon., 2 Pepon. (1846) 203; Miq., Fl. Ind. Bat. 1, 1 (1856) 703; Thwaites, Enum. Pl. Zeyl. (1859) 128; C. P. 1627; Dalzell & Gibson, Bomb. Fl. (1861) 104; Mast. in Hook f., Fl. Brit. Ind. 2 (1879) 603; Trim., Syst. Cat. Flow. Pl. & Ferns Ceyl. (1885) 37; Fl. Ceyl. 2 (1894) 241; McMillan, Trop. Agric. Ceyl. 45, 4 (1915) 267 (photograph); Trop. Gard. & Planting ed. 3 (1925) 387; ed. 4 (1935) 366, 371 (photograph); Kirtikar & Basu, Ind. Medic. Pl. (1918) t. 441; Hall. f., Rec. Trav. Bot. Néerl. 15 (1918) 62. — *Adenia palmata* Engl., Bot. Jahrb. 14 (1891) 375; Harms in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84; ed. 2, 21 (1925) 492; Koord., Exk. Fl. Java 2 (1912) 637; Hall. f., Med. Rijksherb. 42 (1922) 8; Fischer in Gamble, Fl. Pres. Madras 1 (1935) 525; Kirtikar & Basu, Ind. Medic. Pl. ed. 2, 2 (1935) 1101; Chakravarty, Bull. Bot. Soc. Bengal 3 (1951) 69; Chopra c.s., Poison. Pl. Ind. 1, ed. 2 (1965) 399, fig. 94; Cusset, Adansonia 2, 7 (1967) 372, 383. — Type: *Rheede's descriptions and t. 20, 21, 22.*

[*'Orela-Modecca'* Rheede, Hort. Mal. 8 (1688) 45, t. 23; Ray, Hist. Pl. 3 (1704) 344.] — *Modecca integrifolia* Lamk., Encycl. Méth. 4 (1797) 209; Spreng., Syst. Veg. 3 (1826) 45; DC., Prodr. 3 (1828) 336; Wall., Cat. (1832) 6765; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Hassk., Cat. Hort. Bog. (1844) 187; Roem., Roem., Syn. Mon., 2 Pepon. (1846) 203. — *Modecca palmata* Lamk. var. *integrifolia* Miq., Fl. Ind. Bat. 1, 1 (1856) 703. — Type: *Rheede's description and t. 23.*

Climber up to 25 m, stem ligneous in the older parts, up to 8 cm thick, growing from a thick, tapering, soft-woody trunk up to $1\frac{1}{2}$ by $\frac{3}{4}$ m, bark smooth or scaly, whitish- or greyish green. Fertile branches (greyish-)green, often \pm

pruinose, often \pm flexuous, (2-)3-6 mm; internodes 3-15 cm. *Leaves* herbaceous, brown-green above, much paler, punctate beneath, entire to deeply (2-) 3-5-palmately lobed, ovate-oblong to suborbicular in outline, base cordate, apex acute, up to 2 cm acuminate, (6-)8-20 by (3½-)9-23 cm, 3-5-plinerved; lobes elliptic to oblong-lanceolate, \pm narrowed at the base, apex acute-acuminate, 4½-16 by 2-7 cm, nerves 3-8 pairs, reticulation rather distinct, margin entire; petiole (1-)3-9 cm. *Glands* at blade-base 2, flat, 1½-4½ mm \varnothing , lateral of the insertion of the petiole; blade glands (0-)1-4, 1½-4½ mm \varnothing , submarginal. *Stipules* narrowly triangular to subulate, 3-4½ mm, persistent, becoming \pm coriaceous. *Inflorescences* peduncled for (½-)2-8 cm, up to 25-flowered in σ , 1-7-flowered in φ ; tendril (0-)1, 3-15 cm. Sterile tendrils up to 20 cm. *Bracts* and bracteoles narrowly-triangular to lanceolate, acute, 1-2½ mm. σ *fl.* campanulate to broadly tubiform, incl. the 3-6 mm long stipe 15-28 by 8-12 mm, calyx lobes in anthesis suberect. Pedicel 5-15 mm. Hypanthium 5-saccate, 2-4 mm, calyx tube 4-11 mm, calyx lobes triangular, subacute, 5-7 mm, entire. Petals linear, acute, 7-12 by 1(-1½) mm, 3-5-nerved, densely 1-4 mm fimbriate, inserted at the same level as the corona. Filaments 3-4½ mm, connate for 1½-3 mm, inserted at the base of the hypanthium. Anthers (5-)6-8 by ¾-1½ mm, obtuse. Septa 1-2 mm high. Corona hairs 1-1½ mm. Disk glands 1-2 mm. Vestigial ovary incl. gynophore 1-1½ mm. φ *fl.* campanulate, incl. the 1½-3 mm long stipe 12-17 by 6-9 mm. Pedicel 3-10 mm. Hypanthium 5-saccate, 2-3 mm, calyx tube 5-8 mm, calyx lobes triangular, subacute, 4-7 mm, entire. Petals linear, acute, 5-8 by ½ mm, 1(-3)-nerved, sparsely fimbriate 2-3 mm, inserted at the same level as the corona. *Staminodes* 2-4 mm, connate for c. ½ mm, inserted at the base of the hypanthium. Septa c. ½ mm high. Corona hairs 1½-2½ mm, corona sometimes membranous at the base. Disk glands 1-2 mm. Pistil 8-12 mm. Gynophore 1½-2 mm. Ovary ellipsoid to subglobose, c. 3 by 2½-2¾ mm. Styles connate for c. 1 mm, style arms 2½-3½ mm. Stigmas lacinate, subglobular, woolly-papillate, each c. 3 mm \varnothing . *Fruit* 1-2(-4) per inflorescence, globose to ellipsoid, excl. the 5-15(-20) mm long gynophore 3½-5 by 2½-4 cm. Pericarp coriaceous, ½-1 mm, sometimes finely spotted. Seeds 15-30 per capsule, suborbicular, c. 7-8 by 6½-8 by 3½ mm, 4-5 pits \varnothing ; funicles c. 5 mm; embryo c. 6½ mm; cotyledons suborbicular, apex obliquely truncate, c. 6 by 6-7 mm.

INDIA. s.loc: *Anon. s.n.*, fl. (BM); Hügel 3473, σ fl. (W); *Hb. Planchon 1525*, σ fl. (MPU); *Hb. Schinz s.n.*, φ fl. (Z); Wallich 6762, fr. (K-W, 'Momordica racemosa'), 6762 β , σ fl., fr. (K-W); Cult. in Hort. Bot. Calc. (introduced from Cochin, Kerala): *Hb. Francis (Buchanan) Hamilton 1504*, fr. (E), Wallich 991, φ fl. (BM, type? *Mordeca tuberosa*; F1), 6765, φ fl. (K-W); Kanara Forest: Bell 4082, φ fl. (K); Sandwele, Chandwar: *Ritchies s.n.*, fl., fr. (E), 1763, fr. (GH, K); Patanas, near Madugoda: Simpson 8793, fr. (BM); Serra Mullay: Wight 1155, σ fl. (K, P) — Western Ghats, Concan (S. of Bombay): Kahn 4170, fr. (K), *Stocks s.n.*, φ fl. (GH, K, P) — Travancore, Alappadi Hills: Calder & Ramaswami 526, fr. (CAL); Tenmalai: do. 828, fl. (CAL); Trichoor: Gamble 14832, fr. (CAL, K) — Tinnevely Distr., Courtallum: Barber 3322, σ fl. (K), Bourne s.n., fr. (K), *Hb. Rottlerianum s.n.*, σ fl. (K), *Hb. Wight 321*, φ fl., σ fl., fr. (E, sheet I, II, III), 1155, φ fl., σ fl., fr. (C, GH, K, L, MEL, W), 1156, σ fl., fr. (E, K, NY, P); Kenmikatti: Barber 436, σ fl. (K); Anamallay forest, Tinnevely Hills: Beddome 3164, φ fl. (BM);

Mundanthorai, 700 ft.: *Fischer 4038*, ♂ fl. (CAL); Mundandurai, 700 ft.: *Hooper & Ramaswami 39305*, fr. (CAL).

CEYLON. *Brodie 176*, st. (E), *Burman 179*, ± st. (G), *Burman(?) 183*, ± st. (L), *König in Hb. Vahl*, ♂ fl. (C), *Thwaites C. P. 1627*, ♂ fl. (BM, FI, K, P, W), *Walker s.n.*, ♂ fl. (K), *176*, ♂ fl. (K), *1086*, ♂ fl. (E); Hantane (Hantem?), 2300 ft.: *Gardn. 491*, fl. (BM, K).

ECOLOGY. Moist hilly country, with a seasonal climate; 0–1000 m. Flowers and fruits mainly in the rainy season: March to Sept., but flowers found also in Jan., fruits in Oct. and Febr.

USES: Various medicinal properties; the roots, stems and fruit are known as strongly poisonous, the latter having caused death.

NOTES. 1. Erroneously recorded for Java by HASSKARL, MIQUEL, and KOORDERS, caused by confusion about certain forms of *A. heterophylla*.

2. The species was formerly commonly known as *A. palmata*; for a discussion see *Blumea* 15 (1967) 265.

3. *Wight 1155* and *Wight 1156* have been mixed up in the past; in various herbaria they may represent either *A. wightiana* or *A. palmata* (= *A. hondala*).

4. Fresh flowers are greenish-white, greenish-creamy or pale yellowish, tinged with pink or spotted reddish; the petals are reported as creamy-white or greenish-white; once reported as odourless. The fresh fruits are yellow, orange or scarlet, ± fleshy.

5. The only distinctly pachypodous species from Asia.

40. *Adenia trilobata* (Roxb.) Engl., *Bot. Jahrb.* 14 (1891) 375; Harms in *E. & P. Nat. Pfl. fam. ed. 1, 3, 6a* (1893) 84; *ibid.* ed. 2, 21 (1925) 492; *Bot. Jahrb.* 15 (1893) 566, 567, 573 (anatomy); Solereder, *Über den syst. Wert der Holzstruktur* (1895) (anatomy); *Anat. Dicotyl.* (1899) 434, 438 (anatomy); King, *Mat. Fl. Mal. Pen., J. As. Soc. Beng.* 71, 2, 1 (1903) 52 (*excl. spec. Andam.*); Hall. f., *Med. Rijksherb.* 42 (1922) 8; Chakravarty, *Bull. Bot. Soc. Beng.* 3 (1951) 68 (*excl. spec. Andam.*); Cusset, *Adansonia* 2, 7 (1967) 372, 382. — *Modecca trilobata* Roxb., *Hort. Beng.* (1814) 49, *nom. nud.*; *Cor. Pl.* 3 (1820) 94, t. 297; *Fl. Ind.* 3 (1832) 132; Sprengel, *Syst. Veg.* 3 (1826) 45; Wall., *Cat.* (1829) n. 1234; Roem., *Syn. Mon.*, 2 Pepon. (1846) 203; Kurz., *J. As. Soc. Beng.* 2 (1877) 95; Mast. in Hook. f., *Fl. Brit. Ind.* 2 (1879) 602; Lubbock, *Seedlings* 1 (1892) 584, 591 fig. 379; Prain, *Bengal Pl.* 1 (1903) 513; Kanjilal & Das, *Fl. Assam* 2 (1938) 323. — Type: *Wallich 1234*. — **Fig. 4 g, 20.**

Subligneous climber up to 20 m, bark ash-coloured. Fertile branches 2½–5 mm; internodes 3–15 cm. *Leaves* herbaceous, green above, pale- or whitish green, not punctate beneath, deeply 3(–5–7)-lobed, rarely entire, suborbicular to elliptic in outline, base cordate-hastate, apex acute, up to 1½ cm acuminate, 10–25 by 8–25 cm, 5-plinerved; lobes oblong to lanceolate, acute-acuminate, nerves 4–6 pairs, reticulation distinct or not, margin entire; petiole 4–12 cm. *Glands* at blade-base 2, 1½–3 mm ∅, on two largely connate (often ruptured when dry) yellowish-brown auricles which make the blade ± peltate; blade

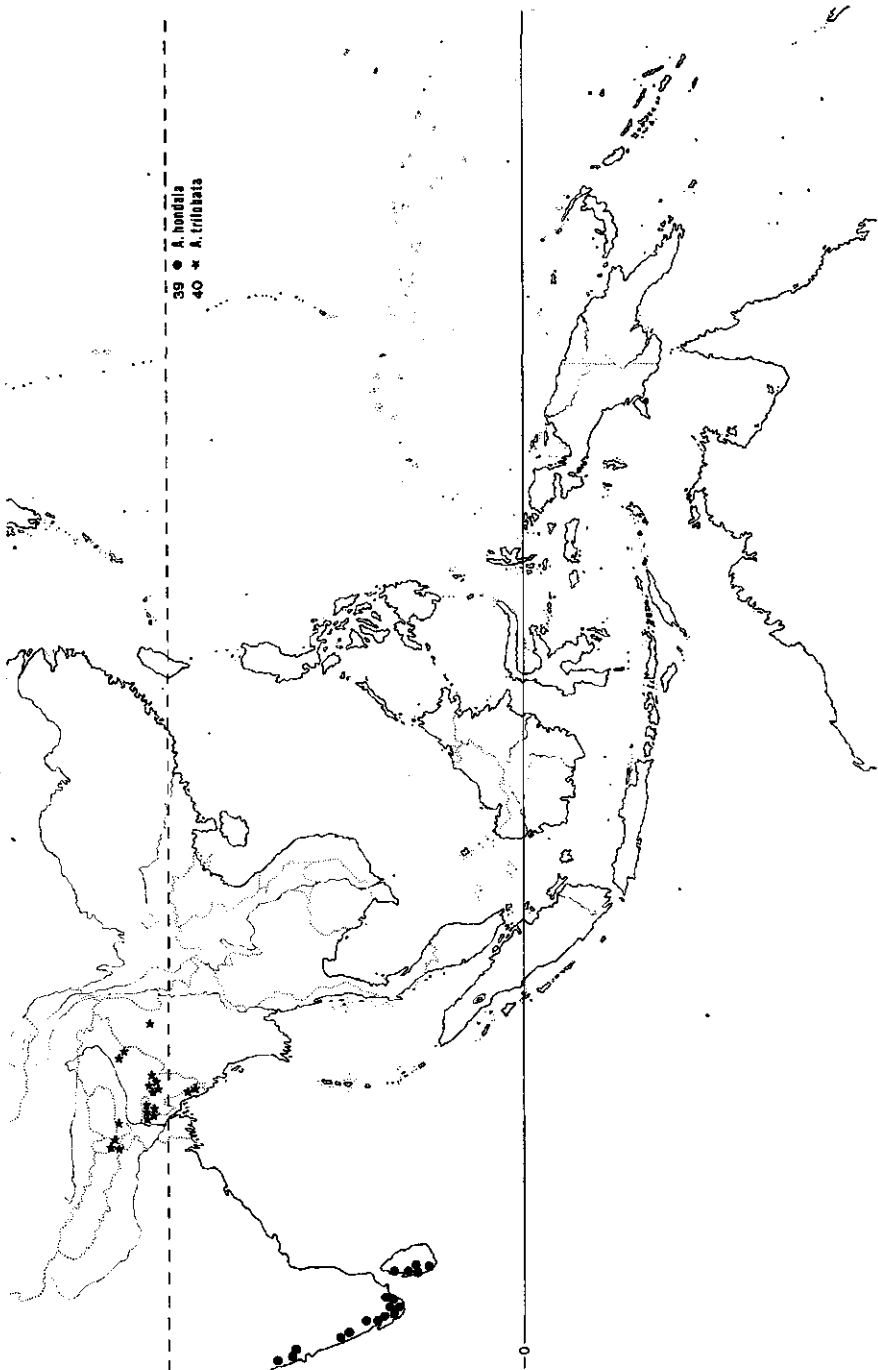


Fig. 20. Localities of species 39-40.

glands (0-)2(-6), 2-5 mm \varnothing , submarginal. Stipules broadly triangular to reniform, rounded $\frac{1}{2}$ - $\frac{3}{4}$ mm, withering. *Inflorescences* peduncled for 5-20 cm, up to 50-flowered in σ , 4-8-flowered in ρ ; tendrils 1-3, 1-3(-6) cm. Sterile tendrils up to 20 cm. Bracts and bracteoles narrowly triangular, acute, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm. Dioecious, sometimes monoecious. σ fl. tubular, incl. the 2-4 mm long stipe 10-19 by 2-4 $\frac{1}{2}$ mm, calyx lobes suberect. Pedicel 2-7 mm. Hypanthium (incl. calyx tube) 6-10 mm, \pm 5-saccate at the base, calyx lobes elongate-triangular to oblong, (sub)obtuse, 3 $\frac{1}{2}$ -5 mm, subentire. Petals obovate to oblong-lanceolate, obtuse, 6-8 $\frac{1}{2}$ by 2-2 $\frac{1}{2}$ mm, 3-5-nerved, $\frac{1}{4}$ - $\frac{1}{2}$ mm serrulate-laciniate, inserted 3-5 mm above the base of the hypanthium. Filaments (5-) 6-9 mm, connate for 2 $\frac{1}{2}$ -5 mm, inserted at the base of the hypanthium. Anthers 3 $\frac{1}{2}$ -4 by $\frac{3}{4}$ -1 mm, subacute, 0.2-0.3 mm apiculate. Septa 2 $\frac{1}{2}$ -4 $\frac{1}{2}$ mm high. Corona 0. Disk glands 1 $\frac{1}{2}$ -2 mm. Vestigial ovary incl. gynophore c. 1 mm. ρ fl. tubular-campanulate, incl. the $\frac{1}{4}$ -1 mm long stipe 9-11 by 3-5 mm. Pedicel 2-5 mm. Hypanthium (incl. calyx tube) 5-6 $\frac{1}{2}$ mm, calyx lobes triangular, sub-obtuse, 2 $\frac{1}{2}$ -5 mm, entire. Petals elliptic-oblong, obtuse, c. 3-4 by 1 $\frac{1}{2}$ mm, 3(-5)-nerved, c. 0.1 mm serrulate, inserted 3-4 mm above the base of the hypanthium. Staminodes 2-2 $\frac{1}{2}$ mm, connate for c. 1 mm, inserted at the base of the hypanthium. Septa $\frac{1}{2}$ -1 mm high. Corona 0. Disk glands 1-1 $\frac{1}{2}$ mm. Pistil 8-9 mm. Gynophore 1-2 mm. Ovary ellipsoid-oblong, c. 4 $\frac{1}{2}$ by 2 $\frac{1}{2}$ mm. Styles connate for $\frac{1}{2}$ -1 mm, style arms $\frac{1}{2}$ -1 mm. Stigmas subglobular, densely papillate, each 1 $\frac{1}{2}$ -2 mm \varnothing . *Fruit* 1-2(-3) per inflorescence, oblong, \pm fusiform, faintly 3-angled, excl. the 15-20 mm long stipe 5-8 by 2-3 $\frac{1}{2}$ cm. Pericarp coriaceous, c. $\frac{1}{2}$ mm. Seeds c. 30 per capsule, suborbicular to obliquely triangular, 7-10 by 7-10 by 3-4 mm, 6-9 pits \varnothing ; funicles 8-15 mm; embryo 6 $\frac{1}{2}$ -9 mm; cotyledons suborbicular-obovate, apex obliquely truncate-emarginate, 6-9 by 6-8 $\frac{1}{2}$ mm.

BHUTAN. Mirichana, 3500 ft.: *Cooper & Bulley 1075*, st. (BM).

INDIA. *Anon. s.n.*, st. (HBG), *Anon. 815*, st. (MEL) — Eastern Himalaya, 2000 ft.: *Cave s.n.*, σ & ρ fl. (E) — West Bengal, Darjeeling, 2000 ft.: *Clarke 11827 A, D, F, G*, σ fl. (BM, E, FI, K), *Cowan s.n.*, ρ fl. (E); Kalimpong, Riki valley, 3000 ft.: *Haines 882*, st. (E), *882 BB*, σ fl. (K); Bot. Gard. Calcutta (introduced from Chittagong, East Pakistan): *C.B.D. s.n.*, fl. (E) — East Bengal: *Griffith 2519/1*, st. (P) — Assam: *Jenkins s.n.*, σ fl. (BO, M, NY), *Mann s.n.*, fl. (L), *Masters s.n.*, σ fl. (K, L, M, MEL), *Hb. Planchon s.n.*, fl. (MPU); Goalpara: *Hamilton 2127*, σ fl. (E), *Wallich 1234 III*, fl. (K-W, syntype); Golaghat Distr.: *King's Coll. s.n.*, σ fl. (P, U); Pengaree: *Barnard E.P.J.6*, σ fl. (BM); N. Cachab, 2675 ft.: *Craib 197*, ρ fl. (CAL); Cachor Hills, 2500 ft.: *Craib s.n.*, σ fl. (K), *Keenan s.n.*, σ fl. (K); Looshai Hills: *Prager s.n.*, σ fl. (CAL); Nambar Forests: *Watt 11384*, fl. (CAL, U), *11956*, fl. (E); Naga Hills, 4000 ft.: *Bor 4496*, σ fl. (K); Khasi Hills, 2500-4000 ft.: *Clarke 38161 A*, σ fl. (US), *38161 D*, σ fl. (FI), *44957 B*, fl. (BM), *45121 A*, σ fl. (CAL), *Hooker & Thomson s.n.* (specim. div.), σ fl., fr. (K, P), *274*, σ fl. (BM, C, CAL, FI, L, M, S, W), *482*, σ fl. (K), *Koelz 29525*, σ fl. (L, MICH), *Rup Chand 5481*, σ fl. (K, MICH), *5881*, fr. (MICH) — Manipur, Kowpom, 5000 ft.: *Meebold 5906*, fr. (S).

EAST PAKISTAN. Sylhet: *Wallich 1234* (K-W, 3 specimens, syntype; K); Chittagong, Kodala Hills: *King's Coll. s.n.*, fr. (BO, FI), *519*, fr. (BM, CAL); Jainka (?) foot hills, 1200 ft.: *Kingdon-Ward 16036*, fr. (BM).

BURMA. Myit Kyina, 1200 ft.: *Maungrily 2980*, σ fl. (CAL).

ECOLOGY. Moist forest, thickets; 100–1600 m. Flowers in the rainy season, April–Nov., fruits June–Nov.

NOTES. 1. The records of KING (1903) and CHAKRAVARTY (1951) for the Andaman Is. relate to *A. heterophylla*.

2. Sometimes monoecious with male- and female flowers mixed in one inflorescence.
3. The seedlings are described by LUBBOCK (1892).
4. Some anatomical features are given by SOLEREDER and by HARMS.
5. Fresh flowers are recorded as white, creamy-white or pale yellow, the petals as whitish, fresh fruits are more or less fleshy, polished, orange to scarlet.

41. *Adenia mannii* (Mast.) Engl., Bot. Jahrb. 14 (1891) 375; Engl., Pfl. welt Afr. 3, 2 (1921) 603; Harms, Notizbl. Berl.-Dahl. 8 (1923) 295; Hutch. & Dalz., Fl. W. Tr. Afr. ed. 1, 1 (1927) 173; Keay in Hutch. & Dalz., *ibid.* ed. 2, 1, 1 (1954) 202. — *Modecca mannii* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 516. — Type: *Mann s.n.* — Fig. 21–22.

Adenia oblongifolia Harms in E. & P. Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; Bot. Jahrb. 26 (1899) 236; Hutch. & Dalz., Fl. W. Tr. Afr. ed. 1, 1 (1927) 173; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202. — Type: *Staudt 621*.

Modecca tenuispira Stapf, J. Linn. Soc. 37 (1905) 102. — *Adenia tenuispira* Engl., Pfl. welt Afr. 3, 2 (1921) 603; Harms, Notizbl. Berl.-Dahl. 8 (1923) 295; Hutch. & Dalz., Fl. W. Tr. Afr. ed. 1, 1 (1927) 173; Kew Bull. (1928) 214; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202. — Type: *Whyte s.n.*

Modecca nigricans A. Chev., Expl. Bot. Afr. Occ. Fr. 1 (1920) 287, *nom. nud.*

Slender subherbaceous climber up to 5 m. Fertile branches terete, smooth, 2(–3) mm; internodes (3–)5–15 cm. *Leaves* herbaceous, when dry often blackish brown above, paler, not punctate beneath, entire, elliptic to oblong(-lanceolate), base acute to slightly cordate, apex obtuse to acute, up to $1\frac{1}{2}$ cm acuminate, 4–17 by 2–7(–8) cm, nerves 3–6(–8) pairs, the lower sometimes stronger, reticulation mostly distinct, margin entire; petiole $\frac{1}{2}$ – $2\frac{1}{2}$ cm. *Glands* at blade-base 2, 1–2 mm \varnothing , on two \pm hollowed auricles $1\frac{1}{2}$ –3 mm \varnothing lateral at the apex of the petiole; blade glands $\frac{1}{2}$ –1 mm \varnothing , submarginal, (0–)1–8 at either side of the blade. Stipules narrowly triangular, $\frac{1}{4}$ – $\frac{1}{2}$ mm, withering. *Inflorescences* peduncled for up to 12 cm, up to 30-flowered in σ , up to 10-flowered in ρ ; tendrils (0–)1 or 3, $\frac{1}{2}$ –15(–20) cm. Sterile tendrils up to 20 cm. Bracts and bracteoles oblong, acute, sometimes serrulate, $\frac{1}{2}$ – $1\frac{1}{2}$ mm. σ fl. tubiform, incl. the $\frac{1}{2}$ –3 mm long stipe 15–23 by 5–8 mm, calyx lobes in anthesis suberect, to c. 12 mm wide. Pedicel 5–20 mm. Hypanthium broadly cup-shaped, \pm 5-saccate, $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, calyx tube 8–12 mm, calyx lobes (elongate-)triangular, subobtuse to acute, 4–10(–12) mm, (sub)entire. Petals linear to oblong, sometimes spatulate or longly-unguiculate, obtuse, $6\frac{1}{2}$ –12 by ($\frac{1}{2}$ –)1– $2\frac{1}{2}$ mm, (1–)3–

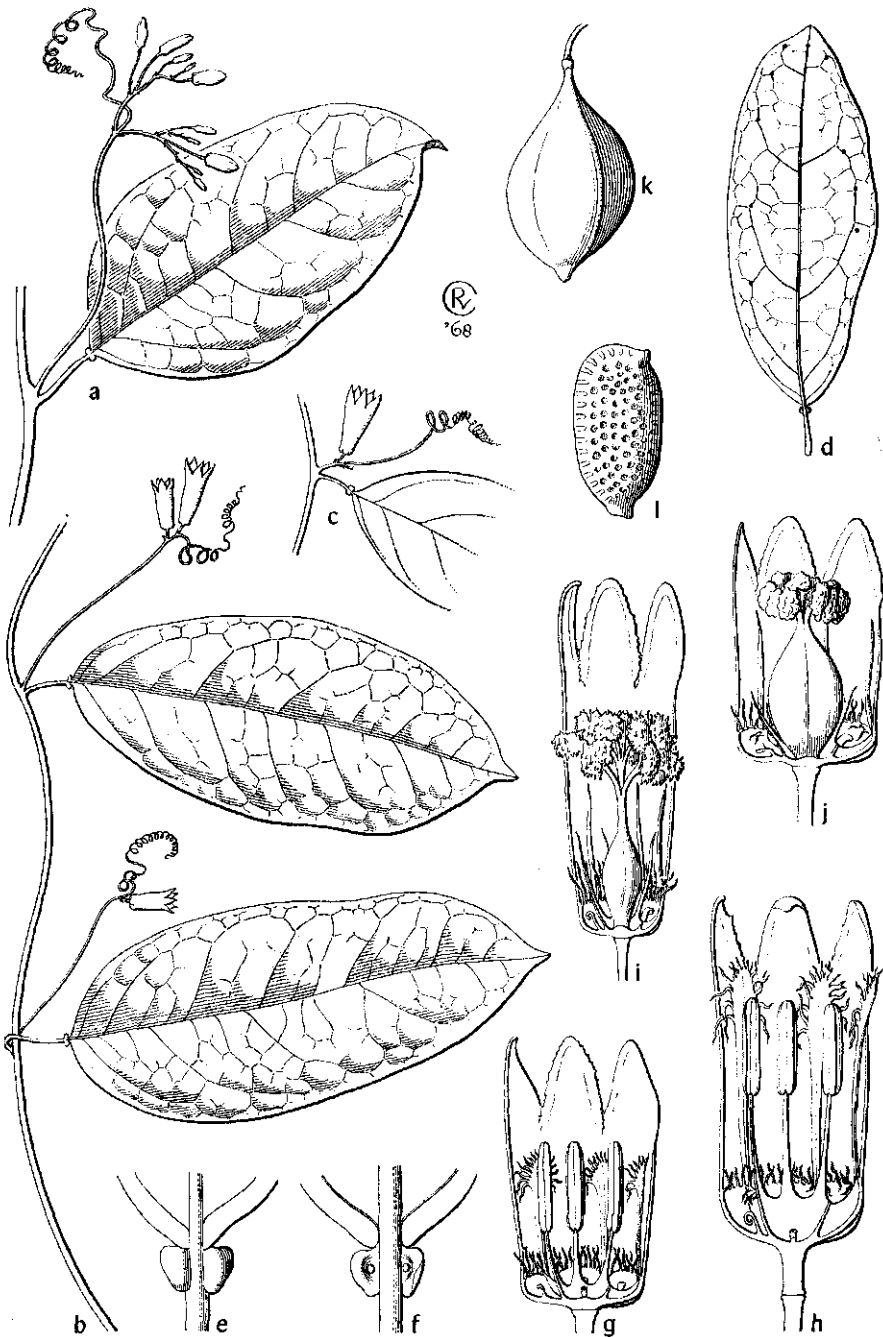


FIG. 21. *Adenia mannii*. — a. ♂ inflorescence, $\times \frac{1}{2}$ (de Wilde 3822); b. branch with ♀ inflorescences, $\times \frac{1}{2}$ (Oldeman 381); c. ♀ inflorescence, $\times \frac{1}{2}$ (Oldeman 136); d. leaf, seen from beneath, $\times \frac{1}{2}$ (de Wilde 285); e-f. basal leaf glands, seen from above and beneath, $\times 2\frac{1}{2}$ (de Wilde 2797); g. ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (de Wilde 25); h. ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (de Wilde 3822); i. ♀ flower, longitudinal section, $\times 2\frac{1}{2}$ (Oldeman 381); j. ♀ flower, longitudinal section, $\times 2\frac{1}{2}$ (de Wilde 2797); k. fruit, $\times 1$ (Louis 3125); l. seed, $\times 4$ (Louis 3125).

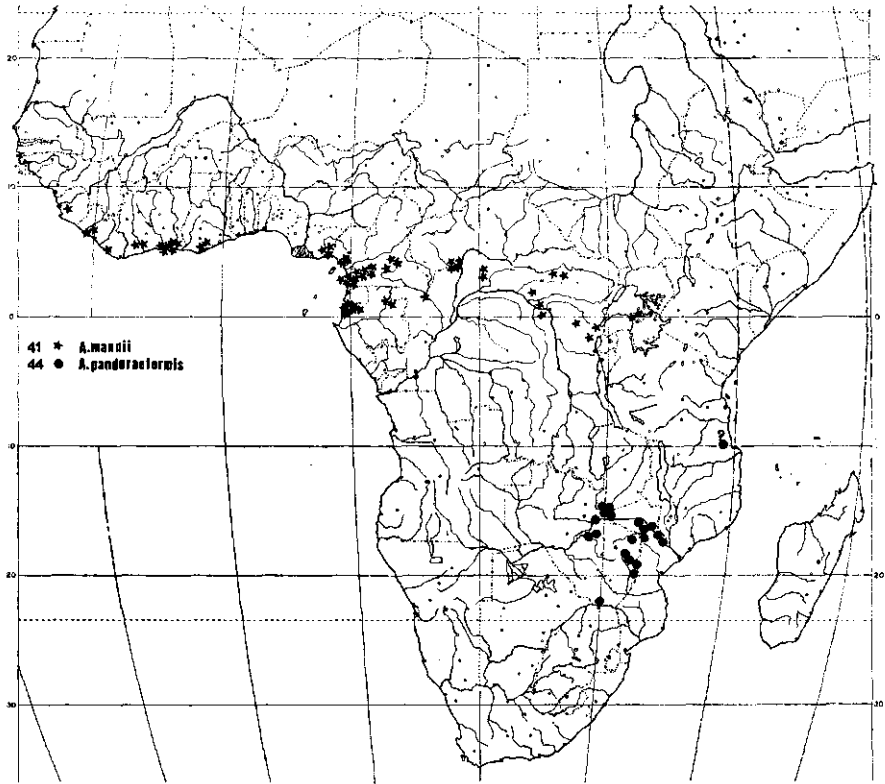


FIG. 22. Localities of species 41, 44.

nerved, $\frac{1}{2}$ –4 mm long fimbriate, inserted at the same level as the corona. Filaments 4–7 mm, connate for up to $1\frac{1}{2}$ mm, inserted at the base of the hypanthium. Anthers 5–6 by 1 mm, obtuse to subacute, up to $\frac{1}{3}$ mm apiculate. Septa up to $1\frac{1}{2}$ mm high. Corona filaments fine, 1–2 mm. Disk glands $1-1\frac{1}{2}$ (–2) mm. Vestigial ovary incl. gynophore c. $\frac{1}{2}$ mm. ♀ fl. tubiform, incl. the 0– $\frac{1}{2}$ mm long stipe 13–24 by (5–)7–9 mm. Pedicel 2–10 mm. Hypanthium broadly cup-shaped, c. 2 mm, calyx tube 6–15 mm, calyx lobes 5–7 $\frac{1}{2}$ mm. Petals linear, subacute, 4–10 by 0.3 mm, 1-nerved, entire, inserted at the same level as the corona. Staminodes 3 $\frac{1}{2}$ –7 mm, connate for up to $\frac{1}{2}$ mm. Septa up to $\frac{1}{2}$ mm high. Corona filaments fine, 1–2 mm. Disk glands $1-1\frac{1}{2}$ (–2) mm. Pistil 10–15 mm. Gynophore c. $\frac{1}{2}$ mm. Ovary ovoid-fusiform, 6–8 by 4 $\frac{1}{2}$ mm, \pm 3-angular. Styles connate for $\frac{1}{4}$ –2 $\frac{1}{2}$ mm, style arms 1 $\frac{1}{2}$ –2 $\frac{1}{2}$ mm. Stigmas coarsely lacerate, woolly-papillate, each 3–4 mm \varnothing . Fruit 1–6 per inflorescence, broadly fusiform, sometimes 1–2 mm beaked, excl. the c. 1 mm long gynophore 2 $\frac{1}{2}$ –3(–3 $\frac{1}{2}$) by 1 $\frac{1}{2}$ –2 cm, \pm (3–)6-angular. Pericarp \pm woody-coriaceous, 1–2 mm, blackish when dry. Seeds 20–30 per capsule, ovoid-oblong, 5–6(–7) by (2 $\frac{1}{2}$ –)3(–3 $\frac{1}{2}$) by 2 mm, 9–13

pits along the length; funicles 2–4 mm; embryo c. 5 mm; cotyledons ovate, apex obliquely truncate-emarginate, c. $4\frac{1}{2}$ by $2\frac{1}{2}$ (–3) mm.

SIERRA LEONE. Peri (Gaura): *Deighton 5241*, ± fl. (K).

LIBERIA. Harley 1405, fl. (WAG); Sinoe Basin (Greenville): *Whyte s.n.*, ♂ fl. (K, type *Modecca tenuispira*); Monrovia: *Dinklage 2189*, ♂ fl. (B), 2800, ♂ fl. (B).

IVORY COAST. Bouroukrou: *Chevalier 17002*, ♀ fl. (P, syntype *M. nigricans*); Aboisso (dans le Sanvi): *Chevalier 17812*, ♀ fl., st. (P, syntype *M. nigricans*); 56 km N. of Sassandra (E. of Béyo), c. 90 m: *Leeuwenberg 2218*, fl., fr. (BR, WAG), *de Wilde 285*, ♂ fl. (WAG); Vridi: *Roberty 15724*, fl. (G); Nièki: *Roberty 12448*, fl. (G); Mbasso (Komoë R., 50 km NE. of Abidjan): *de Wilde 599*, ♂ fl. (WAG); Vicinity of Abidjan.

GHANA. Western Prov., Assuantsi: *Irvine 1576*, ♂ fl. (K); Essiana: *Morton A. 2524*, ♂ fl. (K).

NIGERIA. Eastern, Calabar, Oban: *Keay 37730*, ♂ fl. (K), *Talbot s.n.*, ♂ fl. (K), 1754, ♂ fl. (BM).

CAMEROUN. Kribi — Kumba, Kumba: *Daramola FHI. 29837*, ♀ fl. (K) — Batouri, Bertoua: *Breteler 1201*, ± fl. (WAG), Zéndé I: *Letouzey 3113*, ♂ fl. (P) — Yaoundé: *Bates 1649*, ♂ fl. (BM); N'Kolbisson, c. 700 m: *de Wilde 1938*, fl. (WAG); Melèn, c. 700 m: *de Wilde 2797*, ♀ fl. (WAG) — Eséka, 200–250 m: *de Wilde 2686*, fr. (WAG), 3822, ♂ fl. (WAG). — Akonolinga, Dimpam: *Letouzey 4463*, ♂ fl. (P) — Victoria, Ambas Bay: *Mann s.n.*, ♀ fl. (K, type *Modecca manni*; P); Johann Albrechts-Höhe: *Staudt 621* (B†, n.v., type *A. oblongifolia*) — s. loc.: *Buchholz s.n.*, ♂ fl. (Z).

CENTR. AFR. REP. Rég. de M'Baïki, Boukoko.

GABON. Vicinity of Libreville: Como R.: *Bates 467*, ♂ fl. (K); Kango (Como R.): *Chevalier 26854*, ♂ fl. (P); Mbel (Como R.): *Hallé & Villiers 4271*, fr. (P); Bélinga, 950 m: *Hallé 3521*, ♀ fl. (P), 3948, fr. (P); SW. of Medouneu, 600 m: *Jeffrey & Davies 156*, ♂ fl. (K); Setté Cama: *Dybowski 74*, ♂ fl. (P).

CONGO. Haute Sangha, Ouesso: *Descoings 9361*, ♂ fl. (P).

REP. OF THE CONGO. — For. Centr. — Ubangi-Uele, Bambesa: *Gérard 5370*, ♂ fl. (BR); Amadi à Poko: *Lebrun 3076*, fl. (BR) — Lac Edouard et Kivu, Rutshuru: *Bequaert 516*, ♀ fl. (BR); Kalehe: *Troupin 5431*, fl. (BR).

UGANDA. Buganda Prov., Lake Shore: *Bagshawe 124*, ♂ fl. (BM); Kitubulu Forest (Entebbe): *Maitland 558*, ♂ fl. (K).

ECOLOGY. Primary and secondary forest, gallery forest, apparently with a preference for marshy forest; 0–1000 m. Flowers and fruits throughout the year.

NOTES. 1. There are certain differences between the specimens from West Africa (e.g. Liberia, Ivory Coast) and equatorial Africa (e.g. Cameroon, Gabon, Rep. of the Congo), which do not merit taxonomical recognition. In West African specimens the lower nerves are relatively weak, the inflorescences often (sub)sessile and rather pauciflorous, the pedicels relatively short, the petals in the ♂ flowers less deeply fimbriate only in the upper $\frac{1}{4}$; in specimens from equatorial Africa the basal nerves are strong, ascending to about halfway the blade, the inflorescences mostly longly peduncled, with few to many flowers, the pedicels usually longer, the petals in the ♂ flowers longly fimbriate in about the upper half.

2. Fresh fruits are reported as green, pendent; fresh flowers pale green to pale (dirty) yellow, fragile, anthers creamy, petals greenish-yellow; seeds blackish with juicy, sweet, whitish aril.

42. *Adenia letouzeyi* de Wilde, Acta Bot. Neerl. 16 (1967) 233, fig. 1; Acta Bot. Neerl. 17 (1968) 292; A. & R. Fernandes, Consp. Fl. Angol. 4 (1970) 221. — Type: *de Wilde 2285* — Fig. 4 e-f, 23.

Adenia lobata (*non* Jacq.) Exell, J. Bot. 67, Suppl. Polypet. (1929) 192, *p.p.*; Gossw. & Mendonça, Cart. Fitogeogr. Angol. (1939) 55; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 659, *p.p.*

Robust climber up to 30 m, subligneous in the older parts, stems green, terete or 2–3-angular or -soft winged, rarely \pm tuberculate. Fertile branches 3–10 (–12) mm; internodes 5–10 cm. *Leaves* herbaceous to subcoriaceous, greenish to brownish, paler beneath, not punctate, entire or rarely 3(–5)-lobed, ovate to orbicular, base cordate, apex acute up to $1\frac{1}{2}$ cm acuminate, 5–18 by 5–15(–17) cm, 5–7-subplinerved and 1–2 pairs of nerves from the midrib, reticulation rather distinct, margin entire; lobes up to 4 cm; petiole $1\frac{1}{2}$ –12 cm. *Glands* at blade-base 2, $1\frac{1}{2}$ – $2\frac{1}{2}$ mm \varnothing , in 2 hollowed auricles 4–6 mm \varnothing lateral at the apex of the petiole; blade glands $\frac{1}{2}$ –1 mm \varnothing , submarginal, 0–2 at either side of the blade. Stipules triangular, $\frac{1}{2}$ (–1) mm, withering. *Inflorescences* rather compact, (sub)sessile, rarely peduncled up to 7 cm, up to 20-flowered in σ , 2–10-flowered in ρ ; tendril 0 or 1, 6–20 cm. Sterile tendrils simple or 3–7-fid, up to 20 cm. Bracts and bracteoles triangular-oblong, acute-acuminate, 1–2 mm. σ fl. broadly tubular-campanulate, incl. the $\frac{1}{2}$ –1 mm long stipe 10–20 (–25) by 5–8(–12) mm, calyx lobes in anthesis suberect. Pedicel 3–10(–15) mm. Hypanthium saucer-shaped, \pm 5-saccate, 2– $3\frac{1}{2}$ mm, calyx tube 5–10(–15) mm, calyx lobes triangular, acute, 5–8 mm, up to 1 mm crenulate-laciniate. Petals broadly spatulate, 5–8(–9) by 3– $3\frac{1}{2}$ mm, 3(–5)-nerved, c. 1 mm fimbriate-lacerate, unguis 2–4 mm, inserted at the same level as the corona. Filaments $1\frac{1}{2}$ – $3\frac{1}{2}$ mm, connate for $\frac{1}{2}$ (–1) mm, inserted at the base of the hypanthium. Anthers 5–8 by 1(– $1\frac{1}{2}$) mm, acute, $1\frac{1}{2}$ –2 mm apiculate. Septa $\frac{1}{2}$ (–1) mm high. Corona hairs $\frac{1}{2}$ –1 mm, also partly on the septa. Disk glands c. $1\frac{1}{2}$ mm. Vestigial ovary incl. gynophore $\frac{1}{2}$ –1 mm. ρ fl. broadly tubular-campanulate, resembling the σ fl., incl. the up to $\frac{1}{2}$ mm long stipe 8–11(–20) by 5–8(–9) mm, calyx lobes in anthesis suberect. Pedicel 2–6(–15) mm. Hypanthium $1\frac{1}{2}$ –2 mm, calyx tube c. $4\frac{1}{2}$ (–6) mm, calyx lobes 5–6(–12) mm. Petals (lanceolate-)spatulate, $3\frac{1}{2}$ –4 (–5) by ($\frac{1}{2}$ –)2– $2\frac{1}{2}$ mm, (1–)3-nerved, c. $\frac{1}{2}$ mm laciniate-fimbriate towards the apex, inserted at the same level as the corona. Staminodes $1\frac{1}{2}$ –2 mm, connate for up to $\frac{1}{2}$ mm. Septa c. $\frac{1}{2}$ mm high. Corona hairs fine, $\frac{1}{2}$ –1 mm. Disk glands 1– $1\frac{1}{2}$ mm. Pistil c. 9(–16) mm. Gynophore 0– $1\frac{1}{2}$ mm. Ovary broadly ovate, $4\frac{1}{2}$ –5(–6) by 4– $4\frac{1}{2}$ mm. Styles connate for 1– $1\frac{1}{2}$ (–4) mm, style arms $1\frac{1}{2}$ –2(– $3\frac{1}{2}$) mm. Stigmas reniform, densely woolly-papillate, each c. $2\frac{1}{2}$ mm \varnothing . *Fruit* 2–8 per inflorescence, globular to ellipsoid, excl. the up to 2 mm long stipe 2–3(– $3\frac{1}{2}$) by $1\frac{1}{2}$ – $2\frac{1}{2}$ (–3) cm. Pericarp thickly coriaceous, $1\frac{1}{2}$ –3 mm, smooth, blackish when dry, slightly fleshy when fresh. Seeds 30–60 per capsule, \pm ellipsoid, 4–5 by 3–4 by ($1\frac{1}{2}$ –)2 mm, \pm rugose, c. 5 pits along the length; funicles 2–3 mm; embryo c. $3\frac{1}{2}$ mm; cotyledons suborbicular, apex obliquely emarginate, c. 3 by 3 mm.

CAMEROON. Dept. Abong-Mbang, Matcheboum: *Letouzey* 4606, st. (P) — Dept. Kribi, Kribi: *Bos* 2969, ♂ fl. (WAG), 3489, st. (WAG), 3797, fr. (WAG); 20 km S. of Kribi: *Letouzey* 9250, ♀ fl. (P, WAG) — Dept. Yaoundé, N'Kolbisson, 650 m: *de Wilde* 2285, ♀ fl. (WAG, type), 3739, fr. (WAG).

GABON. Near Libreville: *Klaine* 285, ♀ fl., fr. (BR, K, P).

CONGO. Brazzaville: *Koechlin* 2442(4532), fr. (P).

REP. OF THE CONGO. N'diango (?): *Allard* 371, fr. (BR); Kito: *Flamigni* 95 (p.p.?), ± fr. (BR) — Mayombe, Luki (INEAC): *Kuasa* 43, fr. (BR), *Toussaint* 200, fr. (BR) — Bas Congo, Kisantu: *Callens* 2883, ♀ fl. (BM, BR, K, LISC, P), *Gillet s.n.*, fr. (BR), *s.n.*, ♀ fl. (BR), *Robijns* 217, st. (BR), *Vanderyst* 13813, ♂ fl. (BR); Kinganga (Terr. Thysville): *Compère* 679, ♂ fl. (BR), 1201, fr. (BR); M'vuazi: *Devred* 441, fr. (BR, K); Lutendele: *Jans* 296, ♂ fl. (BR); Mayidi: *Jans* 370, fr. (BR); Gimbi: *Toussaint* 596, ♂ fl. (BR); Sonso: *Vanderyst* 28897, st. (BR) — For. Centr., Bombura: *Evrard* 893, fr. (BR).

ANGOLA. Cabinda, Bucu Zau: *Gossweiler* 7229, ♂ fl. (BM, LISJC, LISU) — Cuanza Norte, Granja de S. Luiz - Cazengo: *Gossweiler* 5328a (p.p.fr.), fr. (COI, LISU).

ECOLOGY. Forest edges, open secondary vegetation, marshy- and periodically inundated forest; 0–800 m. Flowers and fruits found during the whole year.

NOTES. 1. Fresh flowers pale green or greenish-yellow, the petals green with yellow veins; anthers yellow. Fruits glaucous-green, turning greenish-yellow, often paler spotted.

2. The flowers resemble in many respects those of *A. rumicifolia*; it seems that only specimens with mature fruits can be identified with certainty.

43. *Adenia lobata* (Jacq.) Engl., Bot. Jahrb. 14 (1891) 375; Harms, Bot. Jahrb. 15 (1893) 572; Engl. Pfl. welt Afr. 3, 2 (1921) 604; Hutch. & Dalz., Fl. W.Tr. Afr. ed. 1, 1 (1927) 173; Dalz. in Hutch. & Dalz., Fl. W. Tr. Afr., Append. (1937) 50; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202; Obaton, Ann. Sci. Nat. Bot. 12, 1 (1960) 141; De Wilde, Acta Bot. Neerl. 16 (1967) 233, fig. 1. — *Modecca lobata* Jacq., Fragm. Bot. (1809) 82, t. 131; Lindley, Bot. Reg. 5 (1819) t. 433; DC., Prod. 3 (1828) 336; Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 516; A. Chev., Expl. Bot. Afr. Occ. Fr. 1 (1920) 286, p.p. — Type: *Jacquin's figure*. — Fig. 23.

Kolbia elegans P. Beauv., Fl. Owar. 2 (1820) 91, t. 120. — *Modecca lobata* Jacq. var. *elegans* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 517 (pro basionym) — *Adenia lobata* (Jacq.) Engl. var. *elegans* Engl., Pfl. welt. Afr. 3, 2 (1921) 604. — Type: *P. Beauvois* in herb. Deless. (G).

Modecca diversifolia Schumacher, Beskr. Guin. Pl. 2 (1827) 209. — Type: *Thonning?*

Modecca tenuifolia Planch. ex Hook., Fl. Nigrit. (1849) 366; Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 517 ('*tamnifolia*'); Trans. Linn. Soc. Lond. 27 (1871) 600, tab. 65, fig. 1–3. — Syntype: *Vogel* 115, 140.

Modecca caricifolia A. Chev., Expl. Bot. Afr. Occ. Fr. 1 (1920) 286, *nom. nud.* — Syntype: *Chevalier* 13391, 13419.

Modecca lobata Jacq. var. *A. Chev.*, Expl. Bot. Afr. Occ. Fr. 1 (1920) 286.

Adenia mildbraedii Engl. & Harms, Pfl. welt Afr. 3, 2 (1921) 604; Harms, Notizbl. Berl.-Dahl. 8 (1923) 297. — Type: *Mildbraed* 5527.

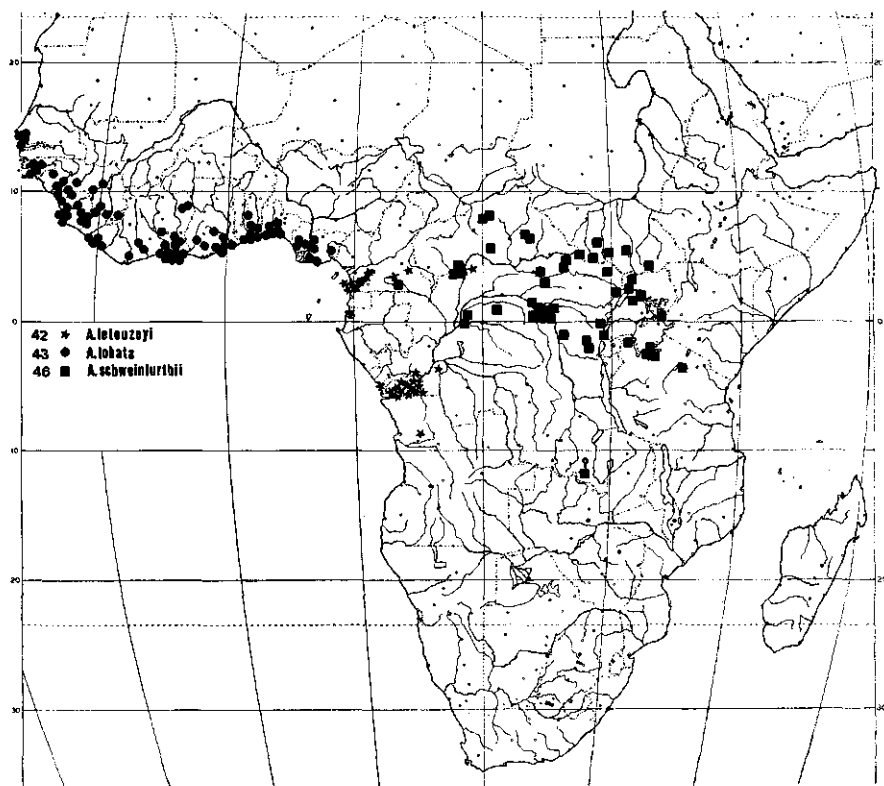


FIG. 23. Localities of species 42-43, 46.

Large climber up to 40 m, stem often \pm 5-angled, green, up to 12 cm \varnothing , \pm woody only in the older parts, mostly densely set with small soft tubercles in 5 or more rows. Fertile branches terete or tubercled, green, 3-6 mm; internodes 5-15 cm. *Leaves* herbaceous, mostly yellowish-green above, somewhat paler beneath, not punctate, entire or shallowly sinuate, to deeply palmately 3-5(-7)-lobed, (ob)ovate to orbicular, base (deeply) cordate, apex acute, up to $1\frac{1}{2}$ cm acuminate (rarely obtuse), 4-20 by 3-16 cm, 5-7-subplinerved, and mostly with 1-2(-3) pairs of nerves from the midrib, reticulation rather distinct, margin entire; lobes acute-acuminate, up to 8 cm; petiole $1\frac{1}{2}$ -10(-15) cm. *Glands* at blade-base 2, 1-2 mm \varnothing , in two auricles 2-5 mm \varnothing lateral at the apex of the petiole; blade glands $\frac{1}{2}$ - $1\frac{1}{2}$ mm \varnothing , submarginal, 0-4 at either side of the blade. Stipules triangular, $\frac{1}{2}$ (-1) mm, withering. *Inflorescences* peduncled for up to 10 cm, 5-40-flowered in δ , 1-6-flowered in η ; tendrils (0-)1-3, 1-15 cm. Sterile tendrils simple or 3-fid, up to 20 cm. Bracts and bracteoles triangular to oblong, (sub)entire, acute-acuminate, 1-2 mm. δ fl. broadly tubular-campanulate, incl. the $\frac{1}{2}$ -2 mm long stipe 15-32 by (8-)10-16 mm, calyx lobes \pm spreading or recurved in anthesis, 15-20 mm wide. Pedicel 5-20

mm. Hypanthium broadly crateriform or saucer-shaped, shallowly 5-saccate, $1\frac{1}{2}$ –4 mm, calyx tube 7–18 mm, calyx lobes (elongate) triangular, subobtusate to acute, 8–12(–15) mm, up to 1 mm crenulate-laciniate. Petals lanceolate (-linear), shortly unguiculate, subobtusate to acute, 8–16 by $1\frac{1}{2}$ –2(–3) mm, 3(–5)-nerved, 1–4 mm laciniate in the upper $\frac{2}{3}$, inserted at the same level as the corona. Filaments 3–5(–6) mm, connate for ($\frac{1}{2}$ –)1 mm, inserted at the base of the hypanthium. Anthers 7–8 $\frac{1}{2}$ by 1–1 $\frac{1}{2}$ mm, obtuse, up to $\frac{1}{2}$ (–1) mm apiculate. Septa $\frac{1}{2}$ –1 mm high. Corona consisting of a fringe of densely set woolly hairs 1–2 mm, also on the septa. Disk glands 2(–3) mm. Vestigial ovary incl. gynophore ($\frac{1}{4}$ –) $\frac{1}{2}$ mm. ♀ fl. broadly tubular-campanulate, resembling the ♂ fl., incl. the c. $\frac{1}{2}$ mm long stipe 15–20(–25) by 10–15 mm. Pedicel 5–10 mm. Hypanthium 2–2 $\frac{1}{2}$ mm, calyx tube 5–10 mm, calyx lobes 7–12 mm. Petals linear-oblong, acute, 6–9 by 1(–1 $\frac{1}{2}$) mm, 1–3-nerved, 1–3 mm fimbriate-lacerate in \pm the upper half, inserted at the same level as the corona. Staminodes 2–4 mm, connate for $\frac{1}{2}$ –1 mm, inserted at the base of the hypanthium. Septa, corona and disk glands as in ♂ fl. Pistil 12–16 mm. Gynophore 1–2 $\frac{1}{2}$ mm. Ovary ovate to obovate, 6–8 by 4–7 mm, faintly 3-ribbed. Styles connate for 1–2 mm, style arms 2–2 $\frac{1}{2}$ mm. Stigmas subreniform, densely woolly papillate, each 2 $\frac{1}{2}$ –4 mm \varnothing . Fruit 1–2(–3) per inflorescence, obovate to subglobose, excl. the (5–)7–15 mm long gynophore 3 $\frac{1}{2}$ –7 by 2 $\frac{1}{2}$ –6 cm, faintly 3-ribbed, smooth or irregularly lumpy. Pericarp thickly coriaceous; in fresh specimens \pm fleshy, 5–15 mm thick, blackish when dry. Seeds 100–200 per capsule, ellipsoid to suborbicular, c. 4–5 by 3–4 by 2–2 $\frac{1}{2}$ mm, 6–8 pits along the length; funicles 2–5 mm; placentas 5–10 mm wide; embryo 3 $\frac{1}{2}$ –4 $\frac{1}{2}$ mm; cotyledons suborbicular, apex obliquely \pm truncate-emarginate, c. 2 $\frac{1}{2}$ –3 $\frac{1}{2}$ by 2 $\frac{1}{2}$ –3 mm.

SENEGAL. Sangalkam: *Berhaud 1114*, ♂ fl. (BR, P, Z); Cercle de Thiès: *De Wailly 4653*, ♂ fl. (P).

GAMBIA. *Leprieur s.n.*, ♂ fl. (L); Boro (Senegambia): *Leprieur s.n.*, \pm fl. (P).

PORT. GUINEA. *Espirito Santo s.n.*, st. (COI); Befata to Dandum: *Espirito Santo 206*, fr. (LISC); Tébé: *Espirito Santo 573*, fl. (COI); Suzana (Praia Varela): *Espirito Santo 1253*, ♂ fl. (COI, LISC); Bedanda (Cantanhez): *Alves Pereira 3157*, fr. (K).

GUINEA. Kérédor: *Pobéguin 1115*, ♂ fl. (P); Tondou N.: *Roberty 17520*, ♀ fl. (G); Koumbia: *Adam 14771*, st. (P); Fauta Djalou, 1000–1300 m: *Chevalier 18749*, st. (P); Télimile W.: *Roberty 17612*, ♂ fl. (G); Conakry: *de Wit 7474*, ♀ fl., fr. (WAG); Friguiagbé: *Chillou 363*, st. (BR, P); Kindia: *Chevalier 13391*, \pm fl. (P, syntype *Modecca caricifolia*), *Jacques-Félix 97*, ♂ fl. (P); Faranak: *Chevalier 13419*, ♂ fl. (P, syntype *M. caricifolia*); Cercle de Guéckédou (Mt. Kouyo): *Adam 5800*, ♂ fl. (P); *Jacques-Félix 1031*, ♂ fl. (P); Kouroussa: *Pobéguin 289*, \pm fl. (P); Macenta: *Adam 5946*, ♂ fl. (P); Nzérékoré: *Schnell 3752*, fr. (P).

SIERRA LEONE. Njala: *Deighton 770*, ♀ fl., fr. (K), 1827, ♀ fl. (K); Waterloo to Russell: *Deighton 2662*, ♂ fl. (K); 6002, fr. (K); *Jordan 355*, ♂ fl. (K); Bagroo R.: *Mann 837*, ♂ fl. (K, P); E. of Hastings: *Melville & Hooker 199*, ♂ fl., ♀ fl. (K, P); Waterloo, 500 ft.: *Melville & Hooker 479*, fr. (K); 620, ♀ fl., fr. (K, P); Loma Mts.: *Morton & Gledhill SL. 1138*, ♂ fl. (K, WAG); Havelock: *Morton SL. 1204*, ♂ fl. (K, WAG); Tingi Mts. (N. Kono): *Morton & Gledhill SL. 1815*, ♂ fl. (K); *Scott-Elliot 5914*, ♂ fl. (K); Kuntaia, 400 ft.: *Thomas 414*, ♀ fl. (K); Makumri, 350 ft.: *Thomas 522*, ♂ fl. (K); Pendembu, 300 ft.: *Thomas 878*, fr. (K); Makump, 400 ft.: *Thomas 946*, fr. (K); Matotoka, 400 ft.: *Thomas 1268*, ♂ fl. (K), 1292, st. (K); Mayosso, 350 ft.: *Thomas 1443*, fr. (K, P), 1457, ♂ fl. (K); Binkolo, 570 ft.: *Thomas 1721*, ♀ fl. (K), 1866, fr. (K); Mabonto, 650 ft.: *Thomas 3687*, fr. (K); *Vogel 140*, st. (K, syntype *Modecca tammifolia*; UPS); Kambia (North. Prov.): *Roberty 17916*, ♂ fl. (G); Bo Forest Res.

(SW. Prov.): *Small 188*, ♀ fl., fr. (K, P); Loma Mts. (SE. Prov.): *Morton SL. 3620*, fr. (K).

LIBERIA. Witkin (near Monrovia): *Whyte s.n.*, ♂ fl. (K); Gran Bassa: *Dinklage 1974*, ♂ fl. (B, W), 2200, ♂ fl. (B), 3046, ♀ fl. (Z), *Vogel 115*, ♀ fl. (K, syntype *Modecca tannifolia*).

IVORY COAST. Moyenne Sassandra (Guidéko to La Zozro): *Chevalier 19069*, fr. (P); Bas Cavally (Prolo): *Chevalier 19858*, ♂ fl. (P); Niapidou (64 km N. of Sassandra): *de Wilde 248*, ♂ fl. (WAG); N. of Koutouba (Bouna Game Res.): *Geerling & Bokdam 640*, ♂ fl. (WAG); Orumba Boka (S. of Toumodi): *Bokdam 2795*, ♂ fl. (WAG); Bouna Game Res.: *Geerling & Bokdam 2552*, ♂ fl. (WAG); (N. of) Dabou: *Oldeman 666*, fr. (WAG), *Roberty 13624*, ♂ fl. (G), *de Wilde 675*, fr. (WAG); Agboville (Touroudi): *Adam 6750*, st. (P); Yapo: *Bernard 8667*, fl. (P), *Roberty 12112*, st. (G); Vicinity of Abidjan (mainly Adiopodoumé).

GHANA. Ashanti, Aininam, W. of Obuasi: *Chipp 590*, st. (K); Abonyere For. Res.: *Oldeman 797*, ♂ fl. (WAG) — Gold Coast, Dunkwa Distr.: *Foggie 4434* (K); Afram R.: *Morton A. 720*, ♂ fl. (K); Accra Plains: *Johnson 608*, ♂ fl. (K), *Morton s.n.*, fr. (K), *A. 492*, ♂ fl. (K), 7728, ♂ fl. (K, WAG), 7766, ♀ fl. (K) — E. Prov., Osino: *Jarea? 889*, fl. (K).

TOGO. Lomé: *Warnecke 105*, ♂ fl. (EA, HBG); Sifi Mts.: *Schröder 193*, ♂ fl. (B).

DAHOMÉY. *Adjanohoun 319*, st. (K), 469, st. (P), *Chevalier 2228*, ♂ fl. (P), *Estève 173 (26)*, ♂ fl. (BM), *Jungner 333*, st. (UPS).

NIGERIA. Western Reg.: *Barter s.n.*, ♀ fl. (K), 1308, ♂ fl. (K), 1661, st. (K); Benin (Ishan Distr.): *Daramola FHI. 31254*, ♂ fl. (K); Ado Rock (7.49 N, 3.25 E): *Hambler 509*, ♂ fl. (K); Ibadan Distr.: *Keay 22834*, ♂ fl. (K), *Newberry & Etim 166*, ♀ fl. (K); Lagos: *Moloney s.n.*, ± ♂ fl. (K) — Eastern Reg., Onitsha: *Killick 112*, ♂ fl. (K), *Onochie 35751* (K); Owerri: *Palisot de Beauvois s.n.*, ♂ fl. (P; G, type *Kolbea elegans*); Port Harcourt: *Stubbings 175*, ♂ fl. (K); Oban: *Talbot 1619*, st. (Z), 3319, ♂ fl. (BM); Degema: *Talbot 3795*, ♂ fl. (BM).

PRINCIPE I. *Barter 1954*, ♂ fl., ♀ fl., fr. (K, P).

CAMEROUN. Ebolowa to Sangmelima: *Mildbraed 5527*, ♂ fl. (B †, type *Adenia mildbraedii*; HBG).

ECOLOGY. Rain forest, forest edges, shrub vegetation, often in secondary vegetation; sandy soils, loam; apparently preferably not too far from the coast; 0–200(–1000) m. Flowers during the whole year, fruits mostly from July to Nov.

USES. Known as a fish-poison (Sierra Leone) and as a medicine (Ghana). The fruits are known as poisonous (Guinea).

NOTES. 1. Fresh flowers (pale)green to greenish-yellow, sometimes purplish tinged; petals creamy-yellow, greenish towards the base. Fresh fruits are glaucous green before maturity, turning lemon-yellow, rarely ± orange, when ripe; offensively smelling. The pericarp is fleshy, and turns rapidly dark purplish-black when crushed.

2. Dry leaves are often ± yellowish-green, not blackish.

44. *Adenia panduraeformis* Engl., Bot. Jahrb. 14 (1891) 376; Harms, Bot. Jahrb. 15 (1893) 573; in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84; Engl., Pfl. welt Afr. 3, 2 (1921) 604. — Type: Kirk in herb. Schweinfurth. — Fig. 22.

Climber up to 10 m, stem ± terete, not winged or knobbly. Fertile branches ± pruinose, 1½–5 mm; internodes 5–15 cm. *Leaves* (sub)herbaceous, brown or blackish when dry, entire to 3(–7)-lobed, orbicular to ovate, base cordate, rarely truncate, apex acute, up to ½ cm acuminate, 4–13 by 3–12 cm, 5(–10)-sub

plinerved to pinninerved with (3-)5-7 pairs of nerves, reticulation fine, distinct, margin entire; lobes obtuse, up to 4 cm; petiole $\frac{1}{2}$ -5(-6) cm. *Glands* at blade-base 2, 1-2 mm \varnothing , on two \pm hollowed auricles $1\frac{1}{2}$ -3 mm \varnothing lateral at the apex of the petiole; no other glands present. Stipules oblong, acute, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm. *Inflorescences* peduncled for up to 2 cm, up to 10-flowered in σ , 1-5-flowered in φ ; tendrils 0 or 1, 2-15 cm. Sterile tendrils up to 20 cm. Bracts and bracteoles lanceolate, acute, deeply serrate, ($1\frac{1}{2}$ -)2-3 mm. σ fl. broadly tubular-campanulate, incl. the $\frac{1}{2}$ -1 $\frac{1}{2}$ mm long stipe 15-22 by (8-)-10(-14) mm, calyx lobes in anthesis suberect, to c. 15 mm wide. Pedicel 5-20(-35) mm. Hypanthium \pm 5-saccate, 3-5 mm, calyx tube 4-8 mm, calyx lobes elongate-triangular, (sub)acute, 4-10 mm, finely undulate-crenate. Petals (broadly) spathulate, apex rounded to subacute, 7-8 by 3-4 mm, 3-5-nerved, $\frac{1}{2}$ -1 mm dentate-fimbriate, unguis 2-4 mm, inserted at the same level as the corona. Filaments $2\frac{1}{2}$ -3 mm, connate for $\frac{3}{4}$ -1 mm, inserted at the base of the hypanthium. Anthers $7\frac{1}{2}$ -10 by 1-1 $\frac{1}{2}$ mm, obtuse. Septa $\frac{1}{2}$ -1 mm high. Corona consisting of membranous appendages $\frac{1}{2}$ (-1) mm. Disk glands c. 1 mm. Vestigial ovary incl. gynophore c. 1 mm. φ fl. broadly tubular-campanulate, resembling the σ fl., incl. the 0-1 mm long stipe (10-) 15-20 by (7-)10 mm. Pedicel 5-15 mm. Hypanthium 2-3 mm, calyx tube 2-5 mm, calyx lobes narrowly triangular, acute, 7-14 mm, finely crenulate or not. Petals lanceolate(-linear), acute, $5\frac{1}{2}$ -7 by $\frac{1}{2}$ -1 mm, 1-nerved, finely crenulate-fimbriate towards the apex. Staminodes c. 3 mm, slightly connate. Septa c. $\frac{1}{2}$ mm high. Corona and disk glands \pm as in σ fl. Pistil 10-12 mm. Gynophore $\frac{1}{2}$ -1 mm. Ovary subglobose c. 5 by 4 $\frac{1}{2}$ mm. Styles connate for $1\frac{1}{2}$ -2 mm, style arms $1\frac{1}{2}$ -2 mm. Stigmas subglobular, densely woolly-papillate, each c. 4 mm \varnothing . *Fruit* 1-3 per inflorescence, subglobose, faintly 3-ribbed, excl. the 1-4(-5) mm long gynophore $2\frac{1}{4}$ -3 $\frac{1}{2}$ (-4) by 2-3 $\frac{1}{2}$ cm. Pericarp woody-coriaceous, $1\frac{1}{2}$ -2 $\frac{1}{2}$ mm thick, smooth, blackish when dry. Seeds 20-45 per capsule, ovoid-ellipsoid, c. 6 by 4 $\frac{1}{2}$ (-5) by 2 mm, 5-6 pits along the length; funicles 2-3 mm; embryo c. 5 mm; cotyledons ellipsoid, apex obliquely truncate-emarginate, c. 4(-4 $\frac{1}{2}$) by 3 $\frac{1}{2}$ -4 mm.

TANZANIA. Southern Prov., 40 km W. of Lindi, 240 m: *Schlieben 5893*, σ fl. (BR, Z; doubtful specimens).

ZAMBIA. Central Prov., 13 miles from Chirundu, Lusaka Rd: *Bainbridge 1024*, fr. (SRGH); Katondwe: *Fanshawe 9040*, φ fl., fr. (K), *Mutimushi 3890*, fl. (K); Bombwe: *Martin 387*, σ fl. (K); Boruma (Sambesi Mittellauf): *Menyhart 981*, σ fl. (Z); Jumbwe (Lwangwa valley): *Mutimushi 1620*, σ fl. (K, SRGH).

SOUTH RHODESIA. Northern Prov., Urungwe Distr. 10 miles S. of Kariba Gorge, 1600 ft.: *Wild 4266*, σ fl. (SRGH); Sunde Gorge, 2500 ft.: *Wild 4273*, φ fl. (K, LISC, SRGH); Mtoko Distr., N. of Ruenya R.: *Wild 7480*, σ fl. (SRGH, WAG) — Eastern Prov., Umtali Distr., 2000-2400 ft.: *Chase 4740*, fr. (BM, K, SRGH), *5345*, fr. (BM, BR, LISC), *8351*, st. (EA, SRGH, WAG); Melsetter Distr., Dokodoko, 2000 ft.: *Chase 4702*, σ fl. (BM, LISC, SRGH) — Southern Prov., Beitbridge: *Davies 2855*, σ fl. (SRGH).

MOZAMBIQUE. Tete, between Lette and Kauwabatta: *Kirk s.n.*, σ fl. (B \dagger , type; K); Tete, km 17 to Changara, 130 m: *Torre & Correia 13795*, σ fl. (LISC); km 63 to Chicoo, 300 m: *Torre & Correia 13871*, fr. (LISC); km 6 to Changara. 200 m: *Torre & Correia 15258*, fr. (LISC) — Manica e Sofala, Chemba: *Surcouf s.n.*, σ fl. (P); Caia: *Surcouf s.n.*, \pm fl. (P); Dondo: *Surcouf s.n.*, σ fl. (P).

ECOLOGY. Open dry forest, shrub vegetation, Mopane-woodland (*Colophospermum*); in the vicinity of seasonal watercourses; 100–900 m. Flowers Nov.–Febr., fruits Dec.–March.

- NOTES. 1. The plant was once reported as glaucous in all parts.
2. Fresh flowers are greenish, greenish-yellow, creamy-green or lilac-green; fruits green turning yellow.

45. *Adenia rumicifolia* Engl. & Harms, Pfl. welt Afr. 3, 2 (1921) 603; Harms, Notizbl. Berl.-Dahl. 8 (1923) 296; de Wilde, Act. Bot. Neerl. 17 (1968) 292; A. & R. Fernandes, Consp. Pl. Angol. 4 (1970) 221. — Type: Engler 3362.

Adenia megalantha Harms in Engl., Pfl. welt Ost Afr., A (1895) 92, *nom. nud.*

Adenia lobata (*non* Jacq.) Engl., Pfl. welt Ost Afr., B (1895) 216; Fries, Wiss. Ergebn. Rhod. Kongo Exp. (1914) 157; A. & R. Fernandes, Garcia de Orta 6, 2 (1958) 257; *ibid.* 6, 4 (1958) 659, *p.p.*; White, For. Fl. North. Rhod. (1962) 268.

Ophiocaulon cynanchifolius (*non* Benth.) Hiern, Cat. Afr. Pl. Welw. (1898) 385.

Adenia lobata var. *elegans* (*non* P. Beauv.) Durand, Sylloge Fl. Congol. (1909) 224, *p.p.*

Adenia lobata var. *grandiflora* Fries, Wiss. Ergebn. Rhod. Kongo Exp. (1914) 157; Engl., Pfl. welt Afr. 3, 2 (1921) 604. — Type: Fries 1048.

Robust climber up to 45 m, stem terete or \pm 5-winged or with 5 rows of coarse fleshy tubercles, woody only in the older parts, up to 10 cm \varnothing ; bark green. Fertile branches terete or knobby-winged, (2–)3–10 mm; internodes 4–20 cm. *Leaves* herbaceous to coriaceous, when dry dark green to blackish above, somewhat paler beneath, entire or rarely shallowly 3(–5)-lobed or coarsely sinuate, (ob)ovate or orbicular to oblong, base acute to deeply cordate, sometimes \pm hastate, apex acute to rounded, up to 2 cm acuminate, $3\frac{1}{2}$ –25 by $2\frac{1}{2}$ –20 cm, 5–7-subplinerved and 1–6 pairs of lesser nerves from the midrib, reticulation rather distinct, margin entire; petiole $1\frac{1}{2}$ –15 cm. *Glands* at blade-base 2, 1–3 mm \varnothing , in two \pm hollowed auricles $1\frac{1}{2}$ –6 mm \varnothing lateral at the apex of the petiole; blade glands submarginal, $\frac{1}{2}$ – $1\frac{1}{2}$ mm \varnothing , 0–6 at either half of the blade. *Stipules* triangular, $\frac{1}{2}$ –1 mm, withering. *Inflorescences* peduncled for up to 12 cm, often sessile in the lower part of the branches, up to 30-flowered in σ , 2–6-flowered in ρ ; tendril (0–)1, up to 20 cm, in sessile inflorescences tendril mostly 0. Sterile tendrils simple or 3-fid, up to 25 cm. Bracts and bracteoles triangular, acute-acuminate, mostly serrulate, 1–2 mm. σ *fl.* broadly tubular-campanulate, incl. the $\frac{1}{2}$ –2 mm long stipe 16–37 by 10–18 mm, calyx lobes in anthesis suberect to \pm reflexed, 15–25 mm wide. Pedicel 3–40(–80) mm. Hypanthium saucer-shaped, \pm 5-saccate, $2\frac{1}{2}$ –5 mm, calyx tube (5–)7–15 mm, calyx lobes (elongate) triangular, subobtusate to acute, 7–14 mm, up to 1 mm crenulate-laciniate. Petals mostly broadly spathulate, longly unguiculate, or elliptic-oblong, 4–13 by $2\frac{1}{2}$ –5 mm, 3–5-nerved, up to 1 mm lacerate-fimbriate,

inserted at the same level as the corona. Filaments 2–6 mm, connate for $\frac{1}{2}$ – $1\frac{1}{2}$ mm, inserted at the base of the hypanthium. Anthers (6–)7–12 by 1–2 mm, acute, (1–) $1\frac{1}{2}$ – $2\frac{1}{2}$ mm apiculate. Septa $\frac{1}{2}$ – $1\frac{1}{2}$ mm high. Corona consisting of a fringe of densely set woolly, sometimes feathery, hairs 1–2 mm, also on the septa. Disk glands 2–3 mm. Vestigial ovary incl. gynophore $\frac{1}{2}$ –1 mm. ♀ fl. broadly tubular-campanulate, resembling the ♂ fl., incl. the c. $\frac{1}{2}$ mm long stipe 12–25(–30) by 7–15 mm. Pedicel 3–15 mm. Hypanthium 2–3 mm, calyx tube (4–)5–10 mm, calyx lobes 7–16 mm. Petals linear to spatulate, unguiculate or not, (sub)obtuse, (4–)5–9 by ($\frac{1}{2}$ –) $\frac{3}{4}$ –4 mm, 1–3(–5)-nerved, up to 1 mm lacinate-fimbriate, inserted at the same level as the corona. Staminodes 3–6 mm, connate for $\frac{1}{2}$ –1 mm, inserted at the base of the hypanthium. Septa, corona and disk glands as in ♂ fl. Pistil 8–17 mm. Gynophore ($\frac{1}{2}$ –)1–2(– $2\frac{1}{2}$) mm. Ovary ovoid to ellipsoid, ($3\frac{1}{2}$ –)4–8 by $2\frac{1}{2}$ – $4\frac{1}{2}$ mm, faintly 3-ribbed. Styles free or connate for up to 2 mm, style arms $1\frac{1}{2}$ –5 mm. Stigmas reniform, densely woolly-papillate, each $2\frac{1}{2}$ –5 mm \varnothing . *Fruit* 1–4 per inflorescence, pear-shaped (obovate tapering into the gynophore), obtuse, excl. the 1–5 mm long gynophore 3–8 by $1\frac{1}{2}$ – $4\frac{1}{2}$ cm. Pericarp thickly coriaceous, in fresh specimens firmly fleshy, 4–10 mm thick, smooth, glossy; blackish when dry. Seeds 40–150 per capsule, ellipsoid to suborbicular, $3\frac{1}{2}$ –5(–6) by 3–4 by 2 mm, 6–9 pits along the length; funicles 2–4 mm; placentas 2–5 mm wide; embryo $3\frac{1}{2}$ –4 mm; cotyledons suborbicular, apex obliquely truncate-emarginate, c. 3 by $2\frac{1}{2}$ –3 mm.

DISTRIBUTION. Tropical Africa: Senegal (?), Port. Guinea, east to S. Ethiopia, south to Mozambique. — Fig. 24.

NOTES. 1. Two not strictly segregated varieties are recognized, the one mostly distributed in West Africa, the other in East Africa. In Central Africa not rarely more or less intermediate forms are found, which are sometimes difficult to determine especially when mature fruits are lacking.

2. In both varieties the degree of connescence of the styles is strongly variable.

In Ivory Coast the author found specimens with free styles and with the styles longly connate quite close together.

3. Fresh flowers are reported as pale green to pale yellowish, sometimes purplish tinged, the petals as yellowish-white with greenish claw and veins, the anthers (pale) yellow, the filaments as white or pinkish; fresh fruits are glaucous-green, turning greenish-yellow at maturity; fresh leaves are often reported as shiny above.

KEY TO THE VARIETIES

1. Plant robust. Leaves orbicular to broadly ovate, base mostly deeply cordate, 9–30 by 8–25 cm. ♂ fl. up to 25 mm. Fruit long-pyriform, ($3\frac{1}{2}$ –)5–8 cm, the attenuated part occupying at least $\frac{1}{3}$ of the total length of the fruit.

b. var. miedegei

1. Plant less robust. Leaves orbicular to ovate-oblong, base variable, 5–20 by

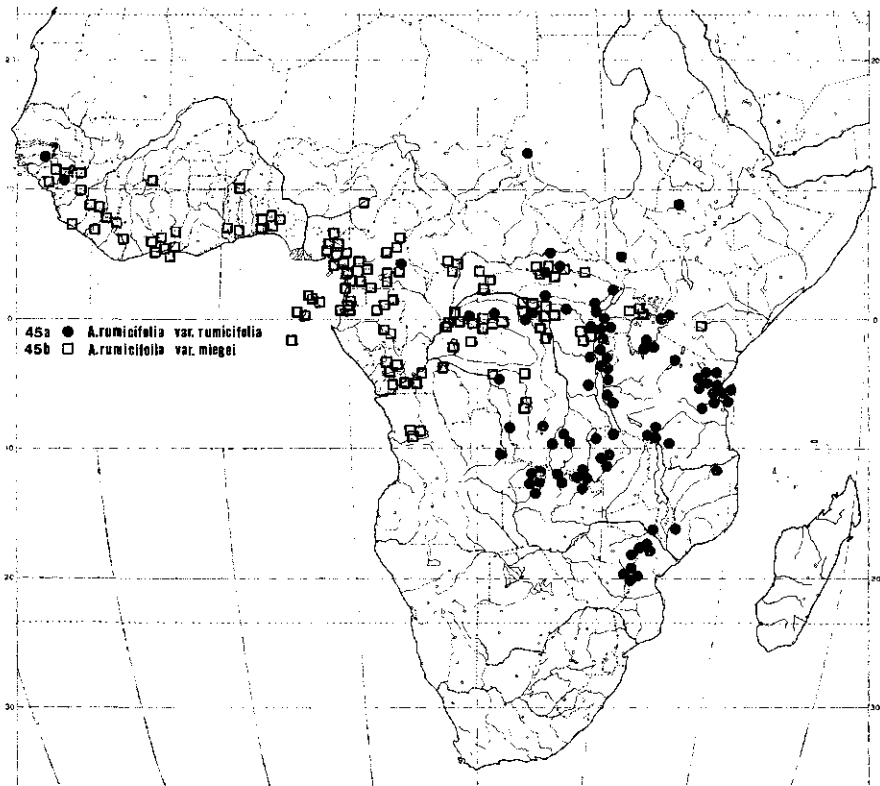


FIG. 24. Localities of species 45.

5–10 cm. ♂ fl. up to 35 mm. Fruit short-pyriform, 3–5 cm, the attenuated part occupying $\frac{1}{3}$ or less of the total length of the fruit.

a. var. *rumicifolia*

a. var. *rumicifolia* — Fig. 24.

Robust climber up to 20 m, stem terete or 3–5-angular, sometimes tuberculate, bark sometimes finely flaky when dry. Fertile branches 2–6 mm; internodes 4–10 cm. *Leaves* entire or rarely shallowly lobed or with sinuate margin, oblong-ovate to suborbicular, base acute to shallowly cordate, or hastate, $3\frac{1}{2}$ –15 (–18) by $2\frac{1}{2}$ –10 (–14) cm, 5(–7)-subplinerved and 1–6 pairs of nerves from the midrib; petiole $1\frac{1}{2}$ –10 cm. Blade glands 0–6 at either half of the blade. *In-florescences* sessile or peduncled for up to 8 cm, up to 10-flowered; tendrils 0–1, up to 10 cm. ♂ fl. 15–35 by 10–18 mm; petals broadly spatulate, up to 10 by 5 mm. *Fruit* shortly pyriform, 3–5 by $1\frac{1}{2}$ –3 cm, the attenuated part (incl. gynophore) occupying about $\frac{1}{3}$ or less of the total length of the fruit.

PORT. GUINEA. Bafatá (Madina de Mamadu Alfa): *Espirito Santo* 2910, ♀ fl. (BR, COI, LISC, P, WAG).

GUINEA. Dalabu: *Chillon & Mannoury* 93, fr. (P).

SIERRA LEONE. Sulimania, Niger: *Scott-Elliot* 5329, ♂ fl. (BM).

CAMEROUN. Bertoua, 670 m: *Breteler* 2617, st. (K, WAG).

REP. OF THE CONGO. Kasai — Bas Katanga, Tshibonde (Haut Lomami), 950 m: *Mullenders* 2264, st. (BR) — For. Centr. — Ubangui — Uele, Gwane: *Lebrun* 2892, fr. (BR) — Lac Albert, Nioka: *Bamps* 196, fr. (BR); — Lac Edouard et Kivu, Rumoka, 1600 m: *Germain* 3225, st. (K), 3816, st. (BR); Kadjedje: *Hendricks* 123B, st. (BR); Lake Kivu, Idjwi I., 5500 ft.: *Loveridge* 522, st. (K); Mushari (Rutshuru): *M. J. B.* 458, st. (BR), 490, st. (BR); Virunga, 1770 m: *Stauffer* 472, st. (BR, K, WAG, Z) — Burundi, Bubanza, Musigati, 1450 m: *Lewalle* 2203, ♂ fl. (BR, L); Kihanga, 900 m: *Lewalle* 4004, ♂ fl. (BR, L); Burundi, Murago, 1400 m: *Lewalle* 3745, st. (BR, L) — Haut Katanga, Greleo (Plateau Bianco), 1600 m: *Quarré* 6102, ♂ fl. (BR); Katuba: *Quarré* 4290, ♂ fl. (BR); Parc Nat. Upemba: *de Witte* 4257-b, ♂ fl. (BR), 4258, ♂ fl. (BR); Elisabethville (Lubumbashi) and vicinity, 4800 ft.: *Rogers* 10058, fl. (K), *Schmitz* 7453, ♂ fl. (BR), 7775, ♂ fl. (BR); Ndola to Ft. Rosebery: *Brenan and Greenway* 8019, ± fl. (FHO, K).

SUDAN. Equatoria, Juba Distr., Tabara R.: *Andrews* 965, st. (K, P); Darfur Prov., Saur (Jebel Marra), 1650 m: *de Wilde* 5427, st. (WAG).

ETHIOPIA. Wollega, Lekemti to Gimbi: sterile plants observed in gallery forest, not collected (de Wilde).

UGANDA. 4000 ft.: *Dümmer* 4449, ♂ fl. (K); Ankole, 4200 ft.: *Jarrett* 131, st. (EA).

KENYA. K5, Kakamega Forest, 5500 ft.: *Dale* 3396, ♂ fl. (EA, K); K7, Makadara (Shimba Hills), 1000 ft.: *van Someren Sh.* 97 (EA).

TANZANIA. Lake Prov., T1, Ukerewe I.: *Conrads s.n.* (EA, K), 5382, st. (EA, K), 5804, fr. (EA, K) — North. Prov., Makuyuni Distr.: *Koritschoner* 1443, ♀ fl. (EA, K) — Tanga Prov., Amani and vicinity (O. Usambara), 500–900 m: *Braun* 1945, st. (EA), *Engler* 3362 (B †, type; EA), *Grote* 3596, fr. (EA), *Harris* 262, st. (EA), *Peter* 54619, 54620, 54621, st. (B), *Zimmermann* 6578, ♂ fl. (EA, S), 6579, ♂ fl. (EA), 6580, fr. (EA) — Western Prov. — Eastern Prov., Morogoro Distr.: *Semsei* 2038, fr. (BR, EA, K) — South. Highlands, Rohudje R.: *Schlieben* 1438, ♂ fl. (BM, BR, K, P, Z); Kyimbila, 1100 m: *Stolz* 402, ♂ fl. (K), 409, ♂ fl., ♀ fl., fr. (B, BM, EA, K, P, W, Z) — Zanzibar (300 ft.).

ANGOLA. Cuanza Norte, Cazengo: *Welwitsch* 596, fr. (LISU, n.v.) — Malange, Quedas do Duque de Bragança, (LISC, n.v., LUAU, n.v.) — Lunda, Luma – Cassai: *Carisso & Mendonça* 306, ♀ fl., fr. (BM, COI, FI, M)

ZAMBIA. Western Prov. — Northern Prov., Lake Bangweulu: *Fries* 1022, st. (UPS), 1048, ♂ fl. (UPS, type *Adenia lobata* var. *grandiflora*); Abercorn: *Lawton* 281, ± fr. (FHO) — Eastern, 3000–6000 ft.

MOZAMBIQUE. Cabo Delgado, Mocondes, 750 m: *Torre & Paiva* 9838, fr. (LISC) — Zambésia, Milange, 800 m: *Torre* 4573, ♂ fl. (BR, LISC) — Manica & Sofala, 3500–4100 ft.: *Chase* 7446, fr. (K, SRGH), 7764, st. (K, SRGH).

ECOLOGY. Forest edges, thickets, (marshy) gallery forest; prefers apparently a strong seasonal climate; 0–1800 m. In Zambia in *Brachystegia* woodland, in Mozambique in *Parinari* savanna. Flowers mostly in the rainy season, mostly from Oct. to Dec., fruits from Jan. to May. Flowers several times reported as sweet-scented. The extra-floral nectaries are sometimes said to be frequently visited by small ants.

USES. According to field labels the leaves contain an antidote of arrow poison (Tanzania); in E. Congo the plant is known as a fish-poison.

NOTE. 1. Once reported as having a large woody rootstock (*Holmes* 908).

b. var. miegei (Aké Assi) de Wilde, *Acta Bot. Neerl.* 17 (1968) 292; A. & R. Fernandes, *Consp. Fl. Angol.* 4 (1970) 222. — *Adenia miegei* Aké Assi, *Bull. Jard. Bot. Brux.* 31 (1961) 311, tab. 1; de Wilde, *Acta Bot. Neerl.* 16 (1967) 233, fig. 1. — Type: *Aké Assi IA-5977*. — **Fig. 24.**

Modecca lobata var. *elegans* (non P. Beauv.) Mast. in Oliv., *Fl. Tr. Afr.* 2 (1871) 517 (*quoad specim.*); Ficalho, *Pl. Ut. Afr. Port.* (1884) 185; Hiern, *Cat. Afr. Pl. Welw.* (1898) 384.

Adenia lobata (non Jacq.) Durand, *Sylloge Fl. Congol.* (1909) 224; Exell, *J. Bot.* 67, Suppl. Polypet. (1929) 192, *p.p.*; De Wildem., *Pl. Bequaertianae* (1932) 414; Exell, *Vasc. Pl. S. Tomé* (1944) 183; *ibid.*, Suppl. *Cat.* (1956) 21; A. & R. Fernandes, *Garcia de Orta* 6, 4 (1958) 659, *p.p.*; Walker & Sillans, *Pl. Util. Gabon* (1961) 344; Berhaut, *Fl. Sénégal* (1967) 258, fig. p.254.

Robust liana up to 45 m, stems terete, smooth or up to 5-winged or with coarse; soft tubercles, bark not flaky. Fertile branches 4–10 mm; internodes 5–20 cm. *Leaves* entire or rarely shallowly 3-lobed towards the apex, ovate to (sub)orbicular, base (deeply) cordate, 5–25 by 3–20 cm, 5(–7)-subplinerved and 1–3 pairs of nerves from the midrib; petiole 2–15 cm. Blade glands 0–3 at either side of the blade. *Inflorescences* sessile or peduncled up to 12 cm, up to 30-flowered; tendril 0–1, up to 20 cm. ♂ *fl.* 15–25(–30) by 10–16 mm; petals broadly to slenderly spatulate, $4\frac{1}{2}$ –13 by $2\frac{1}{2}$ –5 mm. *Fruit* longly pyriform, ($3\frac{1}{2}$ –)5–8 by ($1\frac{1}{2}$ –)3– $4\frac{1}{2}$ cm, the attenuated part (incl. gynophore) occupying about $\frac{1}{3}$ or more of the total length of the fruit.

MALI Finnkolo: *Demange 3645*, fr. (P).

GUINEA. Cercle de Macenta, 1000 m: *Adam 4070*, ♂ *fl.* (P); Guéckedou: *Adam 5690*, st. (P); Medina: *Adam 14604*, st. (P); Labé: *Chevalier 12290*, ♂ *fl.* (P); Diaguissa (Fouta Djallon): *Chevalier 12642*, ♂ *fl.* (P).

SIERRA LEONE. Northern Prov., Kambia: *Morton SL. 1353*, ♂ *fl.* (K, WAG); Falaba: *Scott-Elliot 4463*, ± *fl.* (K) — SW. Prov., Sulima: *Scott-Elliot 5329*, ♂ *fl.* (K).

LIBERIA. *Harley 1247*, fr. (WAG); Nimba Mts., 900 m: *Adam 21662* (K, P).

IVORY COAST. Bassin du Moyen Cavally, Mt. Hiénokué, 500 m: *Chevalier 19470*, fr. (P); Mt. Tonkoui (SW. of Man): *Leeuwenberg 2941*, ♂ *fl.* (BR, K, L, LISU, P, S, WAG, Z); Bécédi (45 km N. of Dabou): *de Wilde 674A*, ♀ *fl.* (WAG), *674B*, fr. (WAG); Vicinity of Abidjan (mainly Adiopodoumé, Bingerville): *Aké Assi 1692*, ♂ *fl.* (P), *5977*, ♀ *fl.* (BR; P, type *A. miegei*); *Oldeman & de Wilde s.n.*, fr. (WAG, spirit), *de Wilde 611*, fr. (WAG); Mbaso, (50 km E. of Adzopé): *Oldeman 182*, fr. (WAG, spirit).

GHANA. Iafu Res. St.: *Morton A. 528*, ♂ *fl.* (K); Transvolta, Ho Distr.: *Morton A. 3045*, ♂ *fl.* (K).

DAHOMEY. Mt. Atacora (Notitingou to Bocorona), 400–600 m: *Chevalier 24188*, st. (P). NIGERIA. West. Region, Ibadan: *Bernardi 8807*, ♂ *fl.* (K), *Hambler 243*, ♂ *fl.* (K); Ijebu Prov., Shasha For. Res.: *Ross 184*, ♂ *fl.* (BM); Lagos: *Rowland (?) s.n.*, ♂ *fl.* (K, P) — Eastern Prov., Ogoja: *Binuyo FHI. 41252*, ♂ *fl.* (BR, K, WAG); Oban: *Talbot 1619*, ♂ *fl.* (BM, K), *1659*, ♂ *fl.* (BM); Old Calabar: *Thomson 92*, ♀ *fl.* (K) — Northern Reg., Adamawa forest, Serti: *Latilo & Daramola FHI. 34451*, fr. (K).

PRINCIPE I., 1000 ft.: *Exell 550*, fr. (BM), *Keulemans s.n.*, st. (L), *Mann s.n.*, ♀ *fl.* (K, P).

SAO THOMÉ, 1200–3500 ft.: *Exell 269*, ♂ *fl.* (BM), *Watt 7102*, ♀ *fl.* (BM).

ANNOBON. *Burton s.n.*, ♂ *fl.* (K).

CAMEROUN. s. loc.: *Preuss 1174*, ♂ *fl.* (B, P); Ngaoundéré Dept., Goumbela (20 km NW).

de Meiganga): *Letouzey 6071*, fr. (K, P); Bagodo: *Letouzey 7592*, fr. (P, WAG); Meiganga: *de Wilde 4476*, st. (WAG) — Sangmélina Dept., S. of Djouo: *Letouzey 4430*, ♂ fl. (P); Akok Bikele: *Letouzey 4478*, st. (P) — Abong Mbang Dept., Abong Mbang: *Letouzey 4606*, ♂ fl. (P) — Kribi Dept., Ebea: *Dinklage 869*, ♂ fl. (HBG), *887*, ♀ fl. (HBG); Bipindi: *Zenker 2957*, ♂ fl. (BM, BR, G, HBG, K, L, W, Z), *2957a*, ♂ fl. (BM, BR, G, HBG, K, L, M, S, W, Z), *3127*, ♂ fl. (BM, G, K) — Kumba Dept.: *Binuyo & Daramola FHI. 35650*, ♂ fl. (K, P), *Ejiofor FHI. 29337*, ♂ fl. (K), *Olorunfemi FHI. 30593*, ♀ fl., fr. (K) — Batouri Dept., SSW. of Koso: *Letouzey 5519*, ♂ fl. (BR, K, P) — Yaoundé Dept., Bitye: *Bates 1363*, ♀ fl. (BM) — Dschang Dept., Dschang: *Jacques-Félix 5177*, ♀ fl. (P) — Edea Dept., Masok: *Leeuwenberg 5346*, ♀ fl. (WAG), *5347*, ♂ fl. (WAG) — Victoria Dept., Bibundi: *Jungner 75*, ♂ fl. (S, UPS); Buea: *Brenan & Jones 9585*, ♂ fl. (K); Victoria: *Maitland 618*, ♂ fl. (K), *Winkler 388*, st. (Z).

CENTR. AFR. REP. Rég. de Mbaïki, Boukoko: *Tisserant (in Hb. Le Testu) 1041*, ♂ fl. (BM), *1262*, fr. (BR, P), *2142*, ♂ fl. (BM, P), *2251*, fr. (BM, P).

RIO MUNI: *Mann 1698*, ♂ fl. (K), *Tessmann 903*, ♂ fl. (B †, K).

GABON. Chinchoua (entrée du Kamboué): *Chevalier 27016*, ♂ fl. (P); Komo R. (Libreville): *Chevalier 27143*, ♂ fl. (P); Bélinga: *Hallé 3454*, st. (P); Libreville: *Klaine 163*, ♂ fl. (P), *163-bis*, ± fl. (K, P); Cire (Djoua): *Le Testu 134*, ♂ fl. (P); Haut Ogooué: *Le Testu 8396*, ♂ fl. (BM, P); Latourville: *Le Testu 8789*, ♂ fl. (BM, P); Woleu-Ntem: *Le Testu 9584*, ♂ fl. (BM, P).

CONGO. Komono: *Bouquet 948*, ♂ fl. (P); M'vouti (Forêt de Mayombe): *Bouquet 1897*, ♂ fl. (P); 25 W. of Sibiti: *Farron 4321*, st. (P); Centre ORSTOM: *Farron 4716*, ♂ fl. (P); Loango: *Thollon 1316*, ♂ fl. (P).

REP. OF THE CONGO. Mayombe, Luki (INEAC): *Wagemans 2421*, st. (BR) — Bas Congo, Mvuazi (Kiganga): *Devred 1251*, ♂ fl. (BR, K); Sabuka: *Laurent s.n.*, st., ♂ fl., ♀ fl. (BR); Sanda: *Verschueren 946*, st. (BR) — Kasā — Bas Katanga, Kanda-Kanda: *Lescauwaet 342*, fr. (BR) — For. Centr. — Ubangi-Uele, Amadi to Doruma: *Lebrun 3145*, ♂ fl. (BR, K); Niangara to Wamba: *Lebrun 3280*, ♀ fl. (BR, K) — Lac Edouard et Kivu, Walikale to Lubutu: *Bequaert 6638*, ♂ fl. (BR); Kaituboe (Walikale), 1550 m: *Gutzwiller 1053*, fr. (BR, SRGH); Kirambo (terr. Masisi): *Léonard 256*, fr. (BR).

UGANDA. Buganda, Mabira Forest, 4000 ft.: *Brown 451*; *Chandler 1997*, ♀ fl. (B, BR, K); Mulange, 4000 ft.: *Dümmer 4000*, ♂ fl. (BM).

KENYA. K4., Chuka: *R. E. & Th. C. E. Fries 1958a*, st. (UPS).

ANGOLA. Cuanza Norte, Granjade S. Luiz, Cazengo: *Gossweiler 5328 (p.p.)*, ♀ fl. (BM, COI, LISJC, n.v., LISU, n.v., LUA, n.v.); Golungo Alto: *Wetwitsch 869 (869b, 869c)*, st. (BM, K), *870 (fol. 2, 3)*, ♂ fl. (BM, COI, K, LISU).

ECOLOGY. (Secondary) forest, forest edges, gallery forest, periodically inundated forest, marshy forest, also on rocky outcrops; 0–1700 m. Flowers and fruits throughout the year. Flowers several times reported as odourless.

USES. Known as a fish-poison in Congo. In Congo used as rope; in Principe I. a hemp is manufactured from the bark fibres.

NOTE. 1. Some specimens from the Rep. of the Congo (*Evrard 4107-bis* and *Lescauwaet 342*) deviate in having large, solitary, subglobose fruits, excl. the 4–8 mm long gynophore measuring c. 7 by 5½ cm.

46. *Adenia schweinfurthii* Engl., Bot. Jahrb. 14 (1891) 377; Harms, Bot. Jahrb. 15 (1893) 573; in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84; *ibid.* ed. 2, 21 (1925) 491, fig. 218 G, H; Durand & Schinz, Études Fl. Congo 1 (1896) 140; Harms, Bot. Jahrb. 24 (1897) 165; Durand, Sylloge Fl. Congol. (1909) 224; Harms in Mildbraed, Wiss. Ergebn. Deutsch. Zentr. Afr. Exp. 1907–1908,

2 (1914) 573; Engl., Pfl. welt Afr. 3, 2 (1921) 603; Fries, Notizbl. Berl.-Dahl. 8 (1923) 568; Harms, Notizbl. Berl. -Dahl. 8 (1923) 296; Andrews, Flow. Pl. Anglo-Eg. Sudan 1 (1950) 162; de Wilde, Act. Bot. Neerl. 17, 2 (1968) 288, fig. 1. — Syntypes: *Schweinfurth* 2974, 3485 (lecto-). — **Fig. 23.**

A. panduraeformis (non Engl.) Durand & Schinz, Études Fl. Congo 1 (1896) 139; Durand, Sylloge Fl. Congol. (1909) 224.

Modecca koutiensis A. Chev., Fl. de l'Afr. Centr. Fr. 1 (1913) 135. — *Adenia kontiensis* (A. Chev.) Obaton, Ann. Sc. Nat. Bot. 12, 1 (1960) 142. — Syntypes: *Chevalier* 8222, 8314, 8314-bis.

Mostly robust climber up to 20 m, subligneous in the older parts, stem terete or 2-4(-5)-angular or -winged, rarely with small tubercles; dry bark often reddish-brown, sometimes \pm flaky. Fertile branches 2-5 mm; internodes (3-)5-18 cm. *Leaves* herbaceous to subcoriaceous, greenish to brown-blackish, distinctly paler beneath, not punctate, entire or rarely shallowly 3-lobed, (ob-) ovate to orbicular, base acute to cordate, apex acute, up to $1\frac{1}{2}$ cm acuminate, 5-12(-15) by ($3\frac{1}{2}$ -)4-12 cm, 5(-7)-subplinerved and 1-2 pairs of nerves from the midrib, reticulation rather distinct, \pm prominent, margin entire; petiole 2-6(-11) cm. *Glands* at blade-base 2, 1-2 mm \varnothing , in 2 hollowed auricles $2\frac{1}{2}$ -5 mm \varnothing lateral at the apex of the petiole; blade-glands c. 1 mm \varnothing , submarginal, 0-1(-2) at either side of the blade. Stipules subtriangular, $\frac{1}{4}$ - $\frac{1}{2}$ mm, withering. *Inflorescences* peduncled up to 6 cm, sessile in the basal part of the branches, 2-20-flowered in σ , 1-4(-10)-flowered in ρ ; tendrils (0-)1, up to 10 cm, sessile inflorescences without tendrils. Sterile tendrils simple, up to 20 cm. Bracts and bracteoles (narrowly) triangular, acute-acuminate, often \pm serrulate, $\frac{1}{2}$ -1 mm. σ fl. broadly tubular-campanulate, incl. the $\frac{1}{2}$ - $1\frac{1}{2}$ mm long stipe 8-15(-20) by 4-8(-10) mm, calyx lobes \pm opening in anthesis to 10(-15) mm. Pedicel 2-10 (-25) mm. Hypanthium broadly crateriform, shallowly 5-saccate, 2-3(-4) mm, calyx tube 2-4(-6) mm, calyx lobes elongate-triangular, subacute, 4-8 (-12) mm, up to 1 mm crenulate-laciniate. Petals spathulate, unguiculate, obtuse, 5-9 by 3-4 mm, 3(-5)-nerved, up to $1\frac{1}{2}$ mm laciniate-fimbriate, inserted at the same level as the corona. Filaments $3\frac{1}{2}$ -7 mm, connate for 1-2 mm, inserted at the base of the hypanthium. Anthers $3\frac{1}{2}$ -5(-6) by 1 mm, obtuse to subacute, up to 1 mm apiculate. Septa 1-2 mm high. Corona filaments fine, $\frac{1}{2}$ -1 mm, also on the septa. Disk glands c. 1 mm. Vestigial ovary incl. gynophore c. $\frac{1}{2}$ mm. ρ fl. broadly tubular-campanulate, incl. the 0- $\frac{1}{2}$ mm long stipe 10-14 by 6-8 mm. Pedicel 3-10 mm. Hypanthium c. 2 mm, calyx tube 3-4 mm, calyx lobes 5-8 mm. Petals lanceolate to narrow-spathulate, obtuse, c. 6 by 1(- $1\frac{1}{2}$) mm, (1-)3-nerved, up to $\frac{1}{2}$ mm fimbriate-lacerate towards the apex, inserted at the same level as the corona. Staminodes $3\frac{1}{2}$ -4 mm, connate for $\frac{1}{2}$ -1 mm, inserted at the base of the hypanthium. Septa $\frac{1}{2}$ -1 mm high. Corona filaments c. 1 mm. Disk glands 1-2 mm. Pistil c. 10 mm. Gynophore c. 1(- $1\frac{1}{2}$) mm. Ovary subglobular to broadly ovoid, $4\frac{1}{2}$ -5 by 4(- $4\frac{1}{2}$) mm. Styles c. 2 mm, free. Stigmas subreniform, woolly-papillate, each c. 3 mm \varnothing . *Fruit* 1-2 per inflorescence, subglobular to ellipsoid, faintly 3-ribbed, excl. the 5-10 mm long gynophore

3½–5(–6) by 2½–4 cm. Pericarp when fresh rather fleshy, (4–)5–10 mm thick, when dry thickly coriaceous with ± woody endocarp, glossy, blackish. Seeds 45–100 per capsule, orbicular to oval, c. 4–4½ by 3–3½ by 2 mm, c. 5 pits along the length; funicles 3–5 mm; placentas 3–8 mm wide; embryo c. 3 mm; cotyledons broadly ovate-orbicular, apex obliquely ± truncate-emarginate, c. 2½ by 2½ mm.

CAMEROON. Sangmelima Dept., Dja R.: *Letouzey 3828*, ♂ fl. (P, WAG).

CENTR. AFR. REP. Dar Rounga, Koudé: *Chevalier 7740*, st. (P, syntype *Modecca koutiensis*); Ndellé: *Chevalier 8222*, fl. (P); Kouti: *Chevalier 8314*, fr. (P, syntype *M. koutiensis*; K), *8314-bis*, st. (P, syntype *M. koutiensis*); Jalinga (Haute Kotto): *Le Testu 2638*, ♂ fl. (BM, P); *4610*, ♀ fl. (BM, P); Rég. de M'baiki, Boukoko: *Tisserant (Hb. Le Testu) 2067*, ♂ fl. (BM, P), *2142 p.p.*, ♂ fl. (P), *2376*, ♂ fl. (BM, P), *2815*, ♂ fl. (P).

REP. OF THE CONGO. — For. Central, Eala: *Couteaux 364*, ♂ fl. (BR), Boundou sur Maringa: *Dubois 924*, ♂ fl. (BR); Bosamba (Terr. Businga): *Evrard 700*, ♂ fl. (BR); Buta: *Lebrun 2524*, ♂ fl. (BR); Isangi, Yangambi, ± 470 m: *Louis 1244*, fr. (BR), *2266*, fr. (BR), *4248*, fr. (BM, BR, K), *4344*, fr. (BR), *7784*, fr. (BR, K), *7888*, fr. (BR), *8869*, ♂ fl. (BR, C, EA), *10681* fr. (BR, C); Angi (T. Rutschuru): *Bequaert 5715*, ♀ fl. (BR); Walikale: *Léonard 2163*, fr. (BR), *4649*, fr. (BR) — Ubangi-Uele, Bas Uele: *De Wulf 633* (BR), *819* (BR); Tukpwo: *Gérard 2786*, ♂ fl. (BR); Kurukwata (Aba): *Gérard 3046*, ♂ fl. (BR); Munza (Monbuttu Land): *Schweinfurth 3477*, fr. (B †, syntype *A. schweinfurthii*; P), *3485* (B †; K, lectotype *A. schweinfurthii*; P) — Lac Albert, Boddoh. R.: *Schweinfurth 2974*, ♂ fl. (B †, syntype *A. schweinfurthii*; K, P); Parc Nat. Albert, 1100 m: *de Witte 13030*, fl. (BR); Nioka, 1700 m: *Froment 745*, fl. (BR). — Kivu, Rutshuru R.: *Ghesquière 3930*, ♂ fl. (BR) — Haut Katanga, Keyberg (8 km SE. of Elisabethville): *Schmitz 4216*, fr. (BR, identification doubtful).

SUDAN. Equatoria, Meridi Distr., Isen R.: *Andrews A.1450*, fr. (K); Yambio: *Andrews A. 1634*, fr. (K); Inatong Mts., 6000–7000 ft.: *Andrews A.1915*, fr. (K); Lado, Yei R.: *Sillitoe 385*, ♂ fl. (K).

UGANDA. *Dümmer 2680 (2680A)*, ♂ fl. (BM, K) — West Nile Distr., Logiri: *Eggeling s.n.*, ♂ fl. (K) — Bunyoro Distr., Hoima: *Bagshawe 939*, ♂ fl. (BM), *1514*, ♂ fl. (BM); Foweira (Victoria Nile): *Bagshawe 1571*, ♀ fl. (BM).

KENYA. Nandi Distr. (K3): *Gillett 16701*, ♂ fl. (EA).

TANZANIA. Tanganyika, Lake Distr. (T1), Bukoba: *Gillman 443*, ♂ fl. (EA, K); Kome I., 3800 ft.: *Carmichael 484*, ♂ fl. (EA, K); Ukerewe I.: *Conrads 5339*, ♂ fl. (EA, K), *5524*, ♂ fl. (EA, K), *6047*, ♂ fl. (EA, K), *6297*, ♂ fl. (EA, K) — Northern Distr. (T2), M'Bulu: *Greenway & Kirrika 11067*, ♀ fl., fr. (EA, K).

ECOLOGY. Primary forest, gallery forest, periodically inundated forest; 300–1700 m. Flowers mostly Nov.–Apr., fruits found throughout the year.

NOTE. 1. In the field the following observations were made: Stem very glossy, often glaucous. Flowers green or greenish; once reported as fragrant. Fruits green, finely whitish blotched, turning yellow or apricot, glossy. Seeds with grey aril.

47. *Adenia natalensis* de Wilde, *sp. nov.* — Fig. 25–26.

Scandens, c. 4 m alta. *Folia* profunde 3–5-lobata, ambitu suborbicularia, 5–9 cm longa, 6–10 cm lata; lobi integri vel lobati, 2–6 cm longi, plerumque obtusi. *Glandulae* 2 basales, separatae vel contiguae, laminae basi 1–2 mm

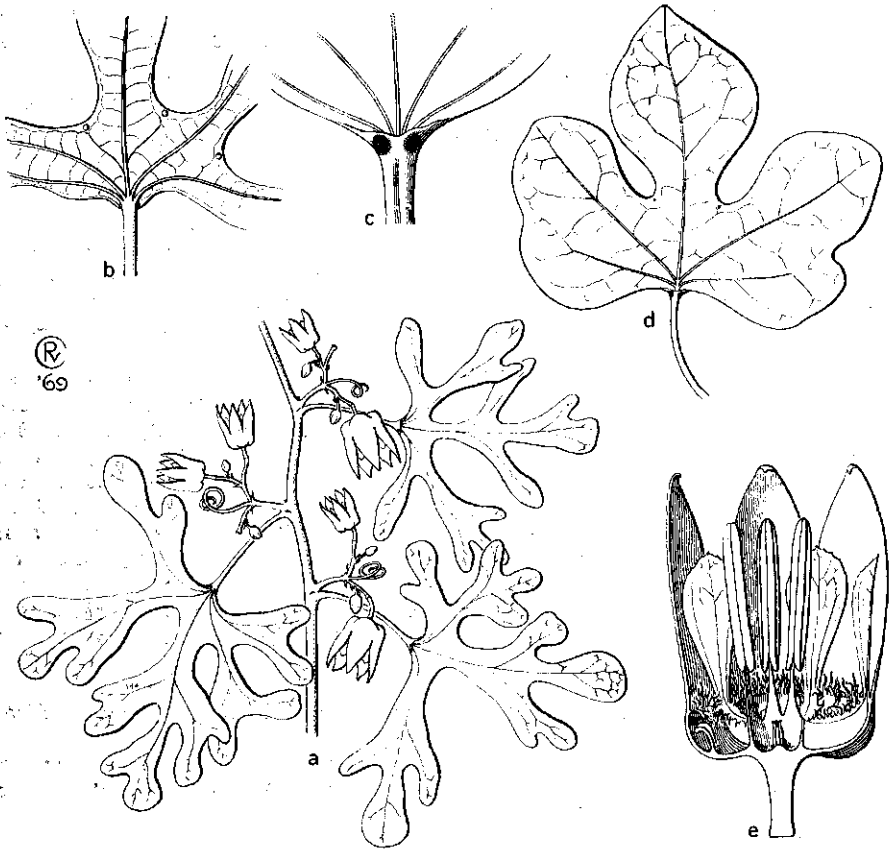


FIG. 25. *Adenia natalensis*. — a. habit, branch with ♂ inflorescences, $\times \frac{1}{2}$; b. basal part of blade, seen from beneath, $\times 1$; c. ditto, seen from above, $\times 2\frac{1}{2}$ (all from Gerrard 1820, type); d. leaf, seen from above, $\times \frac{1}{2}$ (Gerrard 1200); e. ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (Gerrard 1820, type).

peltata instructae. *Inflorescentiae* 0–1 cirrhiferae, pedunculo 1–4½ cm longo instructae; cirrhi 2–5 cm longi. *Flores* ♂ stipite 4–4½ mm longo incl. 20–22 mm longi, 10–13 mm lati. Hypanthium latum, 2–3 mm longum. Calycis tubus 1½–3 mm longus, lobis 10–12 mm longis. Petala obovato-oblonga, 7½–9 mm longa, 3½–4 mm lata, coronae altitudine insertae. Antherae subobtusae, c. 9 mm longae. Septa 1½–2 mm alta. Corona membrana laciniata vel e filamentis (½–)1 mm longis constituta. Disci glandulae c. 2 mm longae. *Flores* ♀ ac fructus ignoti.

Subherbaceous climber, c. 4 m. Fertile branches greyish, 2–4 mm; internodes 2–6 cm. *Leaves* herbaceous to subcoriaceous, brown-green above, grey-green, not punctate beneath, deeply 3–5-palmately lobed or -partite, orbicular

to 5-angular in outline, base subcordate, apex rounded, subtruncate or subacute, 5-9 by 6-10 cm, 5-subplinerved; lobes or parts ovate to (ob)lanceolate, entire or 2-4(-6)-lobed, apex rounded to subacute, 2-6 cm, pinninerved, reticulation distinct, margin entire; petiole $1\frac{1}{2}$ -6 cm. *Glands* at blade-base 2, separate or \pm contiguous, $1-1\frac{1}{2}$ mm \varnothing , on the 1-2 mm wide peltate blade-base; blade glands 2-6, $\frac{1}{2}$ -1 mm \varnothing , submarginal or \pm scattered. Stipules \pm triangular, c. $\frac{1}{2}$ (-1) mm, withering. *Inflorescences* peduncled for $1-4\frac{1}{2}$ cm, (1-) 2-6-flowered in δ ; tendril 0 or 1, 2-5 cm. Sterile tendrils 8-12 cm. Bracts and bracteoles narrowly triangular to lanceolate, acute, (1-) $1\frac{1}{2}$ mm. δ fl. \pm campanulate, incl. the $4-4\frac{1}{2}$ mm long stipe 20-22 by 10-13 mm, calyx lobes in anthesis suberect. Pedicel 5-10 mm. Hypanthium saucer-shaped, \pm 5-saccate, 2-3 mm, calyx tube ($1\frac{1}{2}$ -)2-3 mm, calyx lobes elongate-triangular, (sub)acute, 10-12 mm, subentire. Petals obovate-oblong, or \pm spatulate-unguiculate, apex rounded, $7\frac{1}{2}$ -9 by $3\frac{1}{2}$ -4, 3-5-nerved, finely dentate-sinuate in the upper half, inserted at the same level as the corona. Filaments 4-5 mm, connate for $1\frac{1}{2}$ -2 mm, inserted at the base of the hypanthium. Anthers c. 9 by $1\frac{1}{4}$ mm, subobtuse. Septa $1\frac{1}{2}$ -2 mm high. Corona consisting of hairs simple or branched, sometimes as a lacinate membrane, ($\frac{1}{2}$ -)1 mm. Disk glands $1\frac{3}{4}$ -2 mm. Vestigial ovary $1\frac{1}{4}$ mm, gynophore c. $\frac{1}{2}$ mm. φ fl. & fruit not known.

REP. OF SOUTH AFRICA. Natal, Zulu-Land: *Gerrard 1200*, st. (BM, K, W), 1820, δ fl. (BM; K, type).

ECOLOGY. Not known.

NOTES. 1. Known only from two collections made in the previous century; apparently an endemic and rare species, which is not unlikely extinct at present. 2. The species resembles most *A. stenodactyla*, which differs by the compound leaves and the longer calyx tube, and *A. panduriformis* which differs by the basal leaf glands situated on two auricles.

48. *Adenia stenodactyla* Harms, Notizbl. Berl.-Dahl. 8 (1923) 297. — *Adenia angustisecta* Engl. & Harms, Pfl. welt Afr. 3, 2 (1921) 605, non Burttt Davy, *nom. illeg.* — Type: *Busse 826 b.* — Fig. 26.

Adenia stenodactyla Harms var. *kondensis* Harms, Notizbl. Berl.-Dahl. 8 (1923) 298; *ibid.* 13 (1938) 426. — Type: *Stolz 2355.*

Herbaceous climber up to $2\frac{1}{2}$ m, growing from a tuberous rootstock. Fertile branches often grey-glaucous, 2-5 mm; internodes 2-10 cm. *Leaves* herbaceous, green above, greyish-green, sometimes purplish spotted beneath, very deeply 5-parted or 5-foliolate, suborbicular in outline, (2-)4-10(-25) by 4-20(-25) cm, 5-plinerved, nerves sometimes reddish; leaflets oblong to linear, base longly acute, apex subobtuse to acute, up to $1\frac{1}{2}$ mm acuminate, entire or deeply 3-8 (-16)-lobed, 2-16 by 0.2-2(-8) cm, pinninerved, reticulation fine, rather distinct, margin entire, petiolules up to $1\frac{1}{2}$ cm; petiole $\frac{1}{2}$ -5 cm. *Glands* at blade-base 2(-4), $1-1\frac{1}{2}$ mm \varnothing , on 2 separate or contiguous wart-like appendages at the

apex of the petiole; blade glands (0-)2-4(-16), c. 1 mm \varnothing , submarginal or partly scattered. Stipules linear, c. 1 mm. *Inflorescences* peduncled for 1-8 cm, up to 10-flowered in σ , 1-3-flowered in φ ; tendril (0-)1, 2-6 cm. Sterile tendrils up to 12 cm. Bracts and bracteoles lanceolate, acute, 1-3 mm. σ fl. broadly tubiform-urceolate, incl. the 4-8 mm long stipe 25-40 by 8-13 mm, calyx lobes in anthesis suberect. Pedicel 3-12 mm. Hypanthium \pm 5-saccate, 4-7 mm, calyx tube 12-20 mm, calyx lobes ovate-triangular, subobtuse, 4-8 mm, up to $\frac{1}{3}$ mm lacerate-denticulate. Petals oblong-spathulate, obtuse, shortly unguiculate, 6-10, by $2\frac{1}{2}$ -4 mm, 5-nerved, up to $\frac{1}{2}$ mm lacerate-dentate in the upper half, inserted at the same level as or up to 2 mm above the corona. Filaments 4-7 $\frac{1}{2}$ mm, connate for 1-3 mm, inserted at the base of the hypanthium. Anthers 6-8(-10) by 1(-1 $\frac{1}{2}$) mm, obtuse. Septa 1-3 mm high. Corona hairs fine, sometimes branched, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm. Disk glands 3-3 $\frac{1}{2}$ mm. Vestigial ovary c. 1 mm, gynophore 0-1 mm. φ fl. tubular-campanulate, incl. the 2-3(-4) mm long stipe 15-18 by 5-8 mm. Pedicel 2-8 mm. Hypanthium broadly cup-shaped, 2-2 $\frac{1}{2}$ mm, calyx tube 6-8 mm, calyx lobes ovate-triangular, subacute, entire, 5-7 mm. Petals oblong-spathulate, obtuse, c. 6 by 2 $\frac{1}{2}$ mm, 5-nerved, c. $\frac{1}{4}$ mm denticulate-lacerate in the upper half, inserted at the same level as the corona. Staminodes c. 4 mm, connate for c. 1 mm. Septa c. 1 mm high. Corona hairs sparse, simple or branched, 1-2 mm. Disk glands $\frac{3}{4}$ -1 mm. Pistil 9-10 mm. Gynophore c. 2 mm. Ovary ellipsoid, c. 4 by (2 $\frac{1}{2}$ -)3 mm, \pm 3-ribbed. Styles connate, 2-2 $\frac{1}{2}$ mm. Stigmas sessile, woolly-papillate, each c. 2 mm \varnothing . *Hermaphroditic flowers* resembling σ fl., but with a well developed pistil. *Fruit* 1-2 per inflorescence, ellipsoid, excl. the 8-15 mm long gynophore (2 $\frac{1}{2}$ -)3-6 by 2-3 $\frac{1}{2}$ cm. Pericarp coriaceous, c. $\frac{1}{2}$ mm, smooth. Seeds 40-60 per capsule, obovate, 5-6 $\frac{1}{2}$ by 5-6 mm, 6-8 pits \varnothing ; funicles 2-4 mm; embryo 4-4 $\frac{1}{2}$ mm; cotyledons suborbicular c. 3 $\frac{1}{2}$ by 4-4 $\frac{1}{2}$ mm.

TANZANIA. Western Prov. (T4), Manyoni Distr., Kazikazi, 4200 ft.: *Burt 3824 (I & II)*, φ fl., fr. (K); Ufipa Distr., near L. Sundi, 1500-1900 m: *Richards 10295*, σ fl. (EA, K), *13602*, σ fl. (K) — Southern Highlands, Kyimbila Distr., 1600-1800 m: *Stolz 2355*, σ fl., φ fl., fr. (B \dagger , type *A. stenodactyla* var. *kondensis*; BM, BR, K, P, Z); Mbeya Distr., Mbeya Mts., 7000 ft.: *Milton 44*, σ fl. (EA, K); Chimala R., 2100 m: *Richards 18540*, fr. (K); Mbeya, 5000 ft.: *Robertson 277*, σ fl. (EA); 5800-6200 ft.: *St. Clair-Thompson 766*, fr. (K); Iringa Distr., Msima Stock Farm: *Emson 322*, φ fl. (EA, K); Mufindi, 6000-6500 ft.: *Missionum a Consolata, Torino 200*, fr. (FI), *214*, fr. (FI), *516*, st. (FI), *Paget Wilkes 332*, fr. (EA) — Southern Prov. (T8), Songea Distr., Matogoro Mts.: *Busse 826b*. (B \dagger , n.v., type).

ZAMBIA. Northern Prov., Abercorn Distr., Kawimbe to Abercorn, 1740 m: *Richards 11851*, σ fl. (K, SRGH), *19269*, σ fl. (EA, K); Sandpits Abercorn, 1500 m: *Richards 18425 A*, σ fl. (K); Sunzu Hill: *White 3708*, σ fl. (FHO), *3713*, φ fl. (FHO).

ECOLOGY: Rocky hillsides, grassland, scrub, edges of woodland; dry soil, sand, red soil; 1300-2100 m. Flowers and fruit Nov.-Febr.

NOTES. 1. The leaves are very variable, sometimes resembling those of *A. digitata*.

2. *Burt 3824* bears bisexual flowers and mature fruits.

3. On the field-labels the leaves are once noted as dark reddish veined; fresh

flowers are greenish to salmon, or pinkish or brownish, often speckled or striped with red or brown; the petals are greenish to cream; the fruits are red, when dry finely paler blotched.

49. *Adenia dolichosiphon* Harms, Notizbl. Berl.-Dahl. 13 (1936) 425. — Type: *Schlieben 6001*. — Fig. 26.

Herbaceous climber to c. 5 m, growing from a turnip-shaped tuber. Fertile branches greenish, 2–3 mm; internodes 2–15 cm. *Leaves* herbaceous, greenish, greenish-yellow nerved, not punctate, entire, (broadly) ovate to triangular, rarely lanceolate, base cordate to truncate or hastate, apex obtuse to acute, up to 1 mm mucronate, 2–10 by 3–8 cm, 3–5(–7)-subplinerved and with 1–2 (–4) pairs of nerves from the midrib, reticulation rather indistinct, margin entire; petiole $\frac{1}{2}$ – $5\frac{1}{2}$ cm. *Glands* at blade-base 2, contiguous, $1\frac{1}{2}$ –3 mm \varnothing , yellowish, on the subspathulate or \pm bilobed 2–5 mm wide peltate blade-base; no other glands. *Stipules* narrowly triangular, 1–2 mm. *Inflorescences* sessile or peduncled up to 5 cm, 1–15-flowered in σ , 1–3-flowered in ρ ; tendril 1, 3–12 cm. Sterile tendrils up to 15 cm. Bracts and bracteoles narrowly-triangular to oblong, acute, 1– $2\frac{1}{2}$ mm. σ fl. tubiform, incl. the 4–9 mm long stipe 40–75 by 5–9 mm, the calyx lobes in anthesis opening to c. 10 mm. Pedicel 10–30 mm. Hypanthium tapering, cup-shaped, $1\frac{1}{2}$ –3 mm, calyx tube 30–55 mm, calyx lobes ovate-oblong, subobtuse, 5– $7\frac{1}{2}$ mm, up to $\frac{1}{2}$ mm crenulate or fimbriate. Petals linear, acute, 30–45 by $\frac{1}{2}$ (– $\frac{3}{4}$) mm, 1–3-nerved, densely feather-like fimbriate c. 2 mm, inserted at the same level as or up to 2 mm above the corona. Filaments 7–10 mm, connate for $\frac{1}{2}$ –1 mm, inserted at the base of the hypanthium or on an androgynophore up to 2 mm. Anthers 7– $8\frac{1}{2}$ by 1 mm, obtuse, c. $\frac{3}{4}$ mm apiculate. Septa $1\frac{1}{2}$ – $2\frac{1}{2}$ mm high. Corona hairs fine, ramified, 1– $1\frac{1}{2}$ mm. Disk glands $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Vestigial ovary c. $\frac{1}{2}$ mm. ρ fl. not known. *Fruit* 1–2 per inflorescence, subglobose, excl. the 1–2 mm long gynophore 4–5 by 4 cm. Pericarp thickly coriaceous, 10–15 mm. Seeds 15–20 per capsule, ovate, c. 7 by 5 mm, 6–8 pits along the length; funicles 2–3 mm; embryo not known.

TANZANIA. Tanganyika, Southern Prov., Tendaguru, 600 ft.: *Migeod 723*, fr., st. (BM); Nambilanje, 200 m (W. of Lindi): *Schlieben 6001*, σ fl. (B, type; BR, K, LISC).

MOZAMBIQUE. Cabo Delgado, Macondes (12 km from Nantulo), c. 350 m: *Torre & Paiva 9786*, σ fl. (LISC) — Zambézia, Gurnè (26 km from Mutuáli), 650 m: *Torre & Paiva 10498*, fr. (LISC) — Manica e Sofala, Vila Machado: *Mendonça 3827*, σ fl. (LISC).

ECOLOGY. Shrub vegetation along watercourses, *Brachystegia* woodland; 0–800 m. Flowers and fruits Dec.–Febr.

- NOTES. 1. Species with conspicuous 4– $7\frac{1}{2}$ cm long flowers.
2. The leaves resemble those of *A. hastata*, but remain greenish when dry; dry leaves of *A. hastata* are usually blackish.
 3. According to HARMS the stems are minutely puberulous to subglabrous, but in fact the stems are, also in the type *Schlieben 6001*, always glabrous.
 4. The flowers are greenish to creamy-yellow, the lobes more whitish; the fruits are apparently \pm fleshy.

50. *Adenia metriosiphon* de Wilde, Blumea 17 (1969) 179; Fl. Upl. Kenya (in preparation). — Type: Bally B 11956 — Fig. 26.

Subligneous climber to 6 m, growing from a tuberous rootstock. Fertile branches greenish, $1\frac{1}{2}$ –4 mm; internodes 2–10 cm. *Leaves* herbaceous, greenish above, grey-green often reddish-brown nerved beneath, not punctate, entire, ovate to suborbicular, base cordate to subtruncatae, apex obtuse to subacute, mostly c. 1 mm mucronate, 2–9(–17) by $1\frac{1}{2}$ –6(–11) cm, 5(–7)-plinerved and 2–3 pairs of nerves from the midrib, reticulation rather distinct, margin entire; petiole 1–6(–9) cm. *Glands* at blade-base 2, separate, or \pm contiguous, 1–2 mm \varnothing , on two auricles $1\frac{1}{2}$ –2 mm \varnothing which are slightly to distinctly connate over the apex of the petiole; no other glands. *Stipules* triangular to lanceolate, acute, $\frac{1}{2}$ – $2\frac{1}{2}$ mm. *Inflorescences* sessile or peduncled for up to 5 cm, up to 5-flowered in σ , 1–2-flowered in φ ; tendril (0–)1, ($\frac{1}{2}$ –)3–8 cm. Sterile tendrils up to 15 cm. *Bracts* and *bracteoles* oblong-lanceolate, acute, 2– $3\frac{1}{2}$ mm. σ *fl.* tubular-urceolate, incl. the 4– $4\frac{1}{2}$ mm long stipe 20–35(–38) by 5– $11\frac{1}{2}$ mm, calyx lobes in anthesis recurved to 15–18 mm wide. *Pedicel* 5–20 mm. *Hypanthium* cup-shaped, tapering, $\frac{1}{2}$ –1 by 3 mm, calyx tube 10–25 mm, calyx lobes ovate to triangular, subacute, 4–8 mm, up to $\frac{1}{2}$ mm crenulate-laciniate. *Petals* linear, subacute, 10–18 by $\frac{1}{2}$ – $\frac{3}{4}$ mm, 3-nerved, densely feather-like fimbriate 1–2 mm, inserted 1–5 mm above the corona. *Filaments* $2\frac{1}{2}$ –3 mm, free, on an androgynophore 1– $1\frac{1}{2}$ mm. *Anthers* $5\frac{1}{2}$ –7 by 1(– $1\frac{1}{2}$) mm, obtuse, c. $\frac{1}{2}$ mm apiculate. *Septa* 0. *Corona* hairs \pm branched, $\frac{1}{2}$ –1 mm. *Disk glands* 1– $1\frac{1}{2}$ mm. *Vestigial ovary* $\frac{1}{2}$ – $\frac{3}{4}$ mm, *gynophore* $\frac{1}{2}$ – $1\frac{1}{2}$ mm. *Hermaphroditic fl.* tubiform, incl. the c. $1\frac{1}{2}$ mm long stipe 16 by 6 mm. *Hypanthium* $1\frac{1}{2}$ mm, calyx tube 9–10 mm, calyx lobes $3\frac{1}{2}$ mm. *Petals* linear, c. 6 by $\frac{1}{2}$ mm, 1-nerved, $\frac{1}{2}$ –1 mm fimbriate, inserted at the same level as the corona. *Filaments* c. 4 mm, up to $\frac{1}{2}$ mm connate, inserted at the base of the hypanthium. *Anthers* c. 6 by 0.7 mm, subacute, c. 0.2 mm apiculate, apparently sterile. *Septa* c. $\frac{1}{2}$ mm high. *Corona* hairs \pm erect, $\frac{1}{2}$ –1 mm. *Disk glands* c. $\frac{1}{2}$ mm. *Pistil* 7 mm. *Gynophore* c. 1 mm. *Ovary* subglobose, c. 4 by $3\frac{1}{2}$ mm. *Styles* c. 1 mm, free. *Stigmas* ramified, woolly-papillate, each c. $1\frac{1}{2}$ mm \varnothing . φ *fl.* shortly tubiform, incl. the $\frac{1}{2}$ – $1\frac{1}{2}$ mm long stipe 15–20 by 10 mm. *Pedicel* 2–5 mm. *Hypanthium* 1– $1\frac{1}{2}$ by 4 mm, calyx tube 10–14 mm, calyx lobes triangular, subacute, 3–4 mm, up to $\frac{1}{2}$ mm crenulate-fimbriate. *Petals* linear, acute, (7–)8–10 by 0.3 mm, 1-nerved, sparsely c. 1 mm fimbriate or not, inserted c. 2 mm above the corona. *Staminodes* c. 2 mm, connate up to $\frac{1}{2}$ mm. *Septa* 0. *Corona* hairs suberect, $\frac{1}{2}$ –1 mm. *Disk glands* $\frac{1}{2}$ –1 mm. *Pistil* 8–10 mm. *Gynophore* 1– $1\frac{1}{2}$ mm. *Ovary* subglobose, 4– $5\frac{1}{2}$ by 4– $5\frac{1}{2}$ mm. *Styles* connate for 1 mm, style arms 1– $1\frac{1}{2}$ mm. *Stigmas* much-branched, (woolly-) papillate, each $2\frac{1}{2}$ – $3\frac{1}{2}$ mm \varnothing . *Fruit* 1 per inflorescence, subglobose, excl. the 2–5 mm long gynophore 4–5 by $3\frac{1}{2}$ – $4\frac{1}{2}$ cm. *Pericarp* thinly coriaceous outside, spongy inside, 4–5 mm. *Seeds* c. 40 per capsule, ovate-elliptic, c. $6\frac{1}{2}$ by 5 by 2– $2\frac{1}{2}$ mm, c. 8 pits along the length; *funicles* 2–3 mm; *embryo* c. 5 mm; *cotyledons* suborbicular, \pm truncate, c. $4\frac{1}{2}$ by 5 mm.

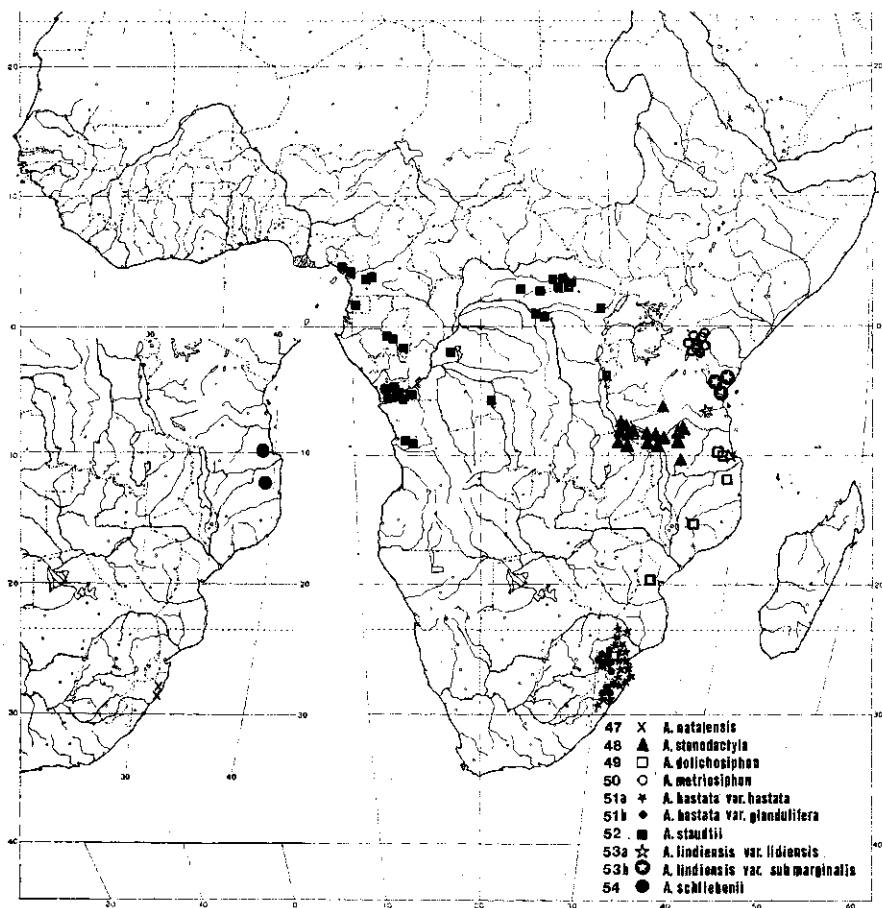


FIG. 26. Localities of species 47–54.

KENYA. Langata, 5850 ft.: *Archer s.n.*, ♂ fl. (EA), 11939, ♂ fl. (EA, K); s.loc.: *Musk 42*, ♀ fl. (EA, K); Hedowa, 7000 ft.: *Napier 6707*, ♀ fl. (BR, K) — Machakos Distr., K4: Athi R., 20 miles beyond Thika, 4800 ft.: *Bally 8454*, ♂ fl. (EA, K); Karura Forest (Nairobi), 6000 ft.: *Bally 9213*, st. (EA), 11956, ♂ fl. (EA, K, type); Nairobi: *Napier 3244*, ♂ fl. (EA, K); Kiambu, 5700 ft.: *Napier 3558*, ♀ fl. (EA); Garabani Hill, 4500 ft.: *van Someren 64*, fr. (K); Garabani valley, 4500 ft.: *van Someren 231*, ♂ fl. (K) — Southern Prov., K6, Ngong Forest, 6000 ft.: (*van Someren in Bally 752*, fr. (EA, K).

ECOLOGY. Forest edges, scrub; 1500–2300 m. Flowers throughout the year, fruits in Jan. and March.

NOTES. 1. *Musk 42* has hermaphroditic flowers ± intermediate between ♂ and ♀ flowers.

2. Not common; apparently endemic around Nairobi. Leaves recorded as

glaucous; once as variegated. Fresh flowers are noted as greenish-white to pale yellow, with yellowish lobes. In dry specimens the calyx tube and -lobes are often inside reddish-brown spotted.

3. Related to *A. dolichosiphon*.

51. *Adenia hastata* (Harv.) Schinz, Bot. Jahrb. 15, Beibl. 33,1 (1892) 3; Burt Davy, Ann. Transv. Mus. 3 (1912) 121; Engl., Pfl. welt Afr. 3, 2 (1921) 603; Harms, Notizbl. Berl.-Dahl. 8 (1923) 295; in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 491; Burt Davy, Man. Flow. Pl. and Ferns Transv. & Swazil. 1 (1926) 221; Liebenberg, Bothalia 3 (1939) 536, 519, 532, fig. 4-5; A. & R. Fernandes, Garcia de Orta 6, 2 (1958) 256; Watt & Breyer-Brandwijk, Med. Pois. Pl. ed. 2 (1962) 828. — *Modecca hastata* Harv., Thes. Cap. 2 (1863) 43, tab. 167. — Type: *Gerrard 1199*.

Adenia schlechteri Harms, Bot. Jahrb. 33, 1 (1902) 150. — Type: *Schlechter 11747*.

Herbaceous climber to c. 4 m, growing from a tuberous rootstock. Stems mostly annual, greyish or glaucous; fertile branches 2-4 mm; internodes 2-10 cm. *Leaves* herbaceous to coriaceous, grey-brown to blackish, often punctate, entire, broadly ovate to \pm hastate, base cordate to truncate, apex obtuse to acute, up to 2 mm mucronate, mucro sometimes inserted just below the apex, $1\frac{1}{2}$ -10(-14) by $1\frac{1}{2}$ -10(-13) cm, 3-7-plinerved and 1-2 pairs of nerves from the midrib, reticulation indistinct, margin entire; petiole $\frac{1}{2}$ -5(-10) cm. *Glands* at blade-base 1-2, contiguous, 1-3(-5) mm \varnothing , on the \pm semi-orbicular or bilobed 0-4 mm wide peltate blade-base; blade glands 0-2(-4), up to 5 mm \varnothing , (sub)marginal, at or near the apex. *Stipules* narrowly triangular, acute, $1\frac{1}{2}$ -2 mm. *Inflorescences* peduncled for $\frac{1}{2}$ -4(-11) cm, up to 12-flowered in σ , 1-3-flowered in ρ ; tendril (0-)1, 1-5 cm. Sterile tendrils up to 12 cm. Bracts and bracteoles narrowly triangular to lanceolate, 1-3 mm. σ fl. tubular-infundibuliform, incl. the 2-6 mm long stipe (13-)15-30 by (3-)4-5 mm, calyx lobes in anthesis opening to c. 8 mm. Pedicel 2-10 mm. Hypanthium cup-shaped, tapering, 2-3 mm, calyx tube (5-)7-15 mm, calyx lobes ovate to elliptic, obtuse, 4-7 mm, densely $\frac{1}{2}$ -1 mm fimbriate. Petals linear-lanceolate, 5-7(-9) by $\frac{1}{3}$ -1 mm, 1-3-nerved, entire to densely 1 mm fimbriate, inserted (1-)2-8 mm above the corona. Filaments 3-7 mm, connate for up to $2\frac{1}{2}$ mm, inserted at the base of the hypanthium or on an androgynophore up to 2 mm. Anthers 4-7 by 1 mm, obtuse, up to $\frac{1}{3}$ mm apiculate. Septa 1-2 $\frac{1}{2}$ mm high. Corona hairs sometimes branched, $\frac{3}{4}$ -2 mm. Disk glands 1-1 $\frac{1}{2}$ mm. Vestigial ovary c. 1 mm, gynophore up to 1 mm. ρ fl. campanulate-infundibuliform, incl. the $\frac{1}{2}$ -2 $\frac{1}{2}$ mm long stipe (8-)10-18 by 5-7(-8) mm. Pedicel 1-2 mm. Hypanthium tapering, 1-2 mm, calyx tube 3-6 mm, calyx lobes ovate, 4-7 mm, up to $\frac{1}{2}$ mm crenulate-laciniate. Petals linear, acute, 3-5(-6) by 0.1- $\frac{1}{3}$ (- $\frac{1}{2}$) mm, 1-nerved, entire to \pm fimbriate, inserted $1\frac{1}{2}$ -3 mm above the corona. Staminodes 2-2 $\frac{1}{2}$ mm, \pm free. Septa up to 0.2 mm high. Corona hairs fine, 1-1 $\frac{1}{2}$ mm. Disk glands $\frac{1}{3}$ - $\frac{3}{4}$ mm. Pistil 7-9 mm. Gynophore 1-1 $\frac{1}{2}$ mm. Ovary ellipsoid to subglobular, (2-)2 $\frac{1}{2}$ -4 $\frac{1}{2}$ by

(1½–)2–4 mm. Styles connate for ⅓–1½ mm, style arms 1½–2½ mm. Stigmas palmately branched, papillate, each 2–2½ mm ∅. *Fruit* 1–2 per inflorescence, subglobular, excl. the 1–3 mm long gynophore 2–3½(–6) cm ∅. Pericarp coriaceous, sometimes ± spongy inside. Seeds 5–25 per capsule, ellipsoid, 7(–8) by 5½–6½ by 3 mm, 7–9 pits along the length; funicles 2–3 mm; embryo c. 5½ mm; cotyledons suborbicular, apex ± truncate, 4½ by 5 mm.

DISTRIBUTION: NE. Rep. of South Africa (Transvaal, Natal), Swaziland, S. Mozambique. — Fig. 26.

ECOLOGY. Open savanna, stony slopes, rocky hill sides, stream banks, forest along watercourses; 0–1200 m. Flowers Aug.–Jan., fruits Nov.–Jan.

USES. The fruit is said to be edible.

NOTES. 1. Juvenile plants have distinctly peltate blades, without glands at the base.

2. As an exception flowers with 6 petals, or with 4 sepals and petals have been found.

3. Fresh flowers are greenish to creamy.

KEY TO THE VARIETIES

1. Leaves without glands at apex. Glands at blade-base on a ± semi-orbicular appendage. Petals in ♂ fl. entire to remotely serrate-fimbriate, or fimbriate only at the base. **a. var. *hastata***
1. Leaves with glands at apex. Glands at blade-base on two separate auricles or on a bilobed appendage. Petals in ♂ fl. (mostly densely) fimbriate. . . . **b. var. *glandulifera***

a. var. *hastata* — Fig. 26.

Leaves without glands at apex. Gland(s) at blade-base single, or two, contiguous, on a single, semi-orbicular, not lobed, appendage. ♂ fl. 13–25 mm. Petals entire or remotely, irregularly serrate-fimbriate, or fimbriate only at the base. Anthers in anthesis reaching to or nearly to the throat of the calyx tube.

MOZAMBIQUE. Sul do Save (Gaza), Mabalane, 600 ft.: *Leach & Bayliss 11776*, ♂ fl. (BR, COI, K, LISC; SRGH, *n.v.*) — Lourenço Marques: *Mendonça 1545*, fr. (LISC); Magude (near Motaze): *Mendonça 2783*, ♀ fl., fr. (BR, LISC).

REP. OF SOUTH AFRICA. Transvaal, Kruger Nat. Park, 1000–2000 m: *van der Schijff 1305*, ♂ fl. (PRE), 3023, st. (K, PRE), 3850, st. (PRE); Nelspruit to Skukuza Camp: *Codd 5732*, ♀ fl. (K, PRE); N. bank Sabi R.: *Letty 43*, ♀ fl. (PRE); Olifants R.: *van der Schijff 2991*, st. (PRE); Barberton Div., Barberton: *Wall 9*, fr. (S); between Komati Poort and Letaba Road, 1000–2000 ft.: *Rogers 12606*, fr. (Z); Komati Poort, 100–650 ft.: *Rogers T. 13273*, ♂ fl. (PRE, SRGH), 20887, fr. (Z), 22487, fr. (K), *Schlechter 11747*, ♂ fl. (B †, type *Adenia schlechteri*; BM, BR, HBG, K, P, Z) — Natal & Zululand, Ubombo (Mkuze Distr.), 1000 ft.: *Codd 10281*, st. (K, PRE); Greytown: *Dyer 4389*, st. (PRE); s. loc.: *Gerrard 1199*, ♀ fl. (BM, K; T. C. Dublin, *n.v.*, type *Modecca hastata*; W); Mahlabathini: *Gerstner 4234*, ♂ fl. (BR); Ingwavuma

Distr., Pongola Poort: *Strey 4643*, fr. (K, M, PRE); Mooa R. (?), 2000–3000 ft.: *Sutherland s.n.* ♀ fl. (K-Hb. Hook.); Ngotshe Distr., S. of Pongola Poort, c. 1750 ft.: *Ward 3914*, ♂ fl. (K, PRE); Ndumu Game Res., 225 ft.: *Ward 4520*, ♂ fl. (PRE); 130 ft.: *Ward 4528*, ♀ fl. (PRE).

ECOLOGY. 0–700 m.

NOTES. 1. *Strey 4643* and probably also *Codd 10281*, both from N. Natal, represent possibly a separate form with large fruits up to 6 cm \varnothing . The specimens have relatively large leaves, and are collected in forest along watercourses.

b. var. *glandulifera* de Wilde, var. nov. — Fig. 26.

Scandens, c. 3 m alta. *Folia* apice 2(–4) glandulifera; *glandulae* 2 basales, auriculis 2 separatis vel appendice mediana biloba insertae. *Flores* ♂ stipite incl. 15–30 mm longi. Petala plerumque dense fimbriata.

Leaves with 2(–4), paired, sometimes bulging glands at or just below the apex. *Glands* at blade-base 2, on two separate auricles, or contiguous on the bilobed \pm peltate blade-base. ♂ fl. 15–30 mm. Petals moderately to densely fimbriate. Anthers in anthesis remaining well below the throat of the calyx tube.

REP. OF SOUTH AFRICA. Cultivated at Witsteen: *Nouhuys 6813*, ♂ fl. (PRE) — Transvaal, Nelspruit Distr., 2000–3000 ft.: *Bayliss BS/1718*, ♀ fl. (Z), *Breyer T. 17950*, ♂ fl. (Z), *T. 17956*, ♂ fl. (PRE), *Burt Davy 1489*, fr. (PRE), *Hutt 7870*, fr. (PRE), *Lam & Meeuse 5049*, ♂ fl. (L, PRE), *Leach 11540*, ♂ fl., ♀ fl. (K, M, PRE, WAG), *Wall 10*, ♂ fl. (S); Barberton Distr., 2300–3000 ft.: *Galpin 563*, ♂ fl. (PRE, Z), *Smith 7006*, ♂ fl. (PRE), *7069*, ♀ fl. (PRE), *Thorncroft 2034*, ♂ fl. (PRE, type), *3923*, ♀ fl. (PRE), *Wager T. 23675*, ♂ fl. (PRE), *Williams 7643*, ♀ fl. (PRE), *Williamson 202*, ♂ fl., ♀ fl. (PRE) — Natal & Zululand, Nongoma, 1600 ft.: *Acocks 13019*, ♂ fl. (PRE), *Gerstner 2345*, ♂ fl. (PRE); Ngotshe Distr., Pongola, 800 ft.: *Eduards 3188*, ♂ fl. (K, M, PRE); Umkuzi: *Gerstner 2895*, ♂ fl. (PRE).

SWAZILAND. Manzini Distr., Bulunga Poort: *Compton 31759*, ♂ fl. (K, PRE).

ECOLOGY. 500–1200 m.

NOTES. 1. The var. *glandulifera* has a more western distribution than the var. *hastata*.

2. The specimens *Gerstner 2895*, *Eduards 3188* and *Compton 3159* from Natal and Swaziland are more or less intermediate between the two varieties, but in all three the glands at the apex of the leaves are present.

52. *Adenia staudtii* Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; Bot. Jahrb. 26 (1899) 238; Engl., in Engl. Pfl. welt Afr. 3,2 (1921) 604. — Type: *Zenker-Staudt 17*. — Fig. 26–27.

Adenia aspidophylla Harms, Bot. Jahrb. 26 (1899) 235; Engl., Pfl. welt Afr. 3,2 (1921) 604; Harms, Notizbl. Berl.-Dahl. 8 (1923) 296; in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 491; Hutch. & Dalz., Fl. W. Tr. Afr. ed. 1 (1927) 173; Exell, J. Bot. 67, Suppl. Polypet. (1929) 193; Gossw. & Mendonça, Cart. Fitogeogr. Angol. (1939) 91; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1,1

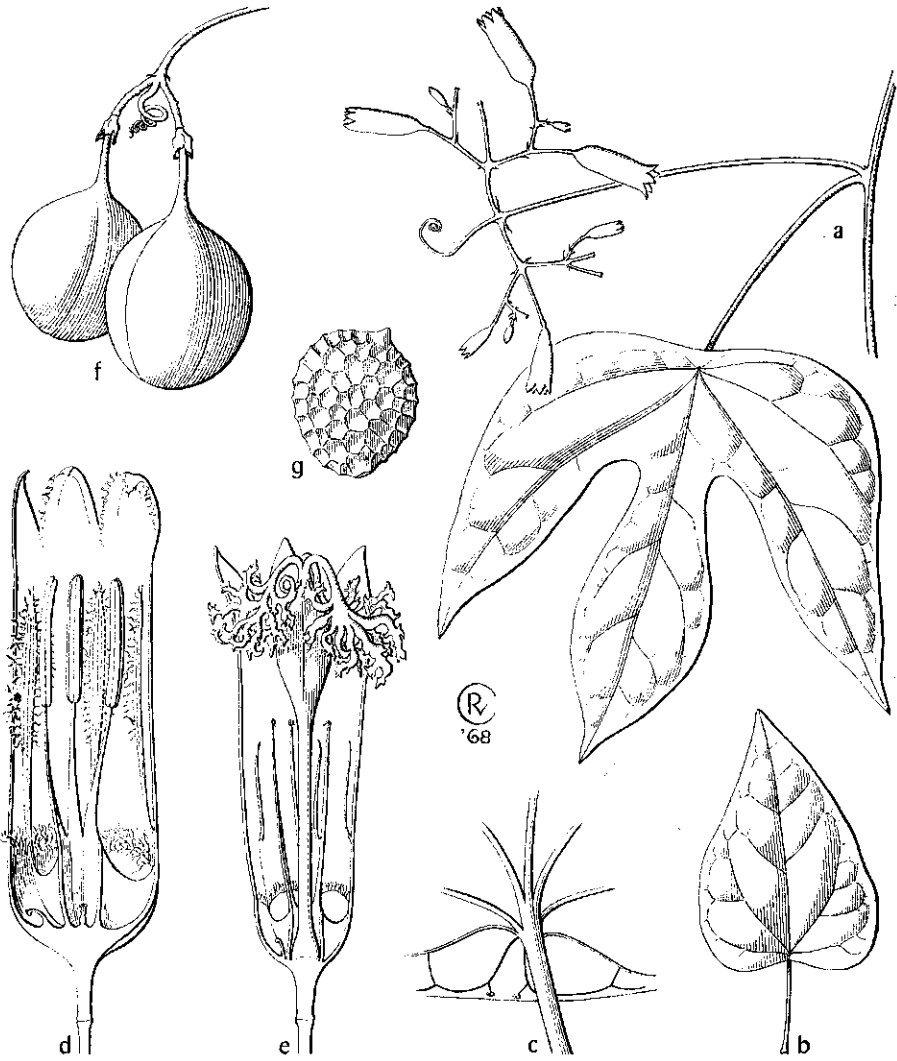


FIG. 27. *Adenia staudtii*. — a. habit, $\times \frac{1}{2}$ (Troupin 10124); b. leaf, $\times \frac{1}{2}$ (Lebrun 4149); c. blade-base with glands, seen from beneath, $\times 2\frac{1}{2}$ (Troupin 10124); d. ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (Toussaint 345); e. ♀ flower, longitudinal section, $\times 2\frac{1}{2}$ (Lebrun 4149); f. infructescence, $\times \frac{1}{2}$ (Gillet 1909); g. seed, $\times 2\frac{1}{2}$ (Gérard 5764).

(1954) 202; A. & R. Fernandes, *Garcia de Orta* 6, 4 (1958) 660, tab. 4; *Consp. Fl. Angol.* 4 (1970) 223. — Type: *Staudt 884*.

Rather herbaceous climber to c. 8 m. Fertile branches greenish, 1–4 mm; internodes 4–15 cm. *Leaves* herbaceous, green to brown above, much paler, not punctate beneath, entire to deeply 3–5-lobed, (broadly) ovate, base cordate

to rounded or subtruncate, apex acute, up to 1 cm acuminate, up to 2 mm mucronate, (4-)7-18 by (3½-)5-18(-20) cm, 5-7-plinerved and 1-3 pairs of nerves from the midrib, reticulation indistinct; lobes ovate to elliptic-oblong, at base ± constricted, 1-13 cm, margin entire; petiole 2-11 cm. *Glands* at blade-base 1-2, c. 1 mm ∅, on- or just below the margin of the 4-15 mm wide peltate blade-base; blade glands 0-6, submarginal. Stipules triangular to lanceolate, ½-2 mm. *Inflorescences* peduncled for 5-20 cm, up to 30-flowered in ♂, 1-3 (-5)-flowered in ♀; tendril 1, 2-5 cm. Sterile tendrils up to 20 cm. Bracts and bracteoles lanceolate to linear, 2-6 mm. ♂ *fl.* broadly tubular, incl. the 1½-3½ mm long stipe 18-32 by 4-8(-9) mm, calyx lobes in anthesis suberect. Pedicel 5-20 mm. Hypanthium cup-shaped, 3-5½ mm, calyx tube (10-)13-18 mm, calyx lobes ovate to triangular, obtuse to acute, 3-6 mm, up to ½ mm serrulate. Petals linear, acute, 10-18 by ½-1 mm, (1-)3-nerved, up to 1 mm fimbriate, inserted at the same level as or up to 5 mm above the corona. Filaments 10-20 mm, connate for 4-6 mm, inserted at the base of the hypanthium. Anthers 5-7½(-10) by 1 mm, obtuse. Septa 1½-4 mm high. Corona hairs fine, 1-1½ mm. Disk glands c. 1½ mm. Vestigial ovary incl. gynophore ½-1 mm. ♀ *fl.* broadly tubiform, resembling ♂ *fl.*, incl. the 1-3 mm long stipe (16-)20-30 by 6-10 mm. Pedicel 5-10 mm. Hypanthium 2-4 mm, calyx tube 10-18 mm, calyx lobes 4-7 mm. Petals linear to filiform, 4½-8 by ¼-½ mm, entire or with a few fine hairs, inserted at the same level as or up to 4 mm above the corona. Staminodes 10-15 mm, connate for 2-4 mm, inserted in the base of the hypanthium. Septa 1-2½ mm high. Corona hairs fine, ½-1 mm. Disk glands c. 1 mm. Pistil 15-24 mm. Gynophore (5-)8-14 mm, ovary ellipsoid(-oblong) 4-7 by 2½-3½ mm. Styles connate for 1-3 mm, style arms 2-3 mm, often recurved. Stigmas conspicuously branched, ± papillate, each 4-8 mm ∅. *Fruit* 1-2(-3) per inflorescence, subglobose to ellipsoid, excl. the 15-30 mm long gynophore 4-6½ by 3-4½ cm. Pericarp coriaceous, inside spongy, 2-5 mm, smooth. Seeds c. 20-45 per capsule, ovate, 8-9 by 6½-7 by 3 mm, 6-8 pits ∅; funicles c. 4 mm; embryo c. 5 mm; cotyledons suborbicular, c. 4 by 4 mm.

CAMEROUN. Yaoundé, Bitye: *Bates 1405*, ♂ *fl.* (BM); Yaoundé-Station, 800 m: *Zenker & Staudt 17*, st. (B†, type *A. staudtii*; BM, K) — Victoria, Station Johann-Albrechtshöhe: *Staudt s.n.*, st. (G), 884, st. (B †, type *A. aspidophylla*; BM); Buea: *Winkler 181*, drawing of leaf from specimen in B (BM), 203, ♂ *fl.* (Z).

RIO MUNI: *Tessmann 833*, ♂ *fl.* (K).

GABON. Haut-Ogooué, Latoursville: *LeTestu 7296*, ♂ *fl.* (BM, P), 7850, ♂ *fl.* (BM, P); Franceville: *Thollon s.n.*, ♂ *fl.* (P).

REP. OF THE CONGO. *Claessens s.n. (p.p.)*, ♂ *fl.* (BR); Kukwa: *Gillet s.n.*, fr. (BR) — Mayombe, Luki (INEAC): *Devred 3148*, ♂ *fl.* (BR), *Donis 1893*, fr. (BR), 2087, ♀ *fl.* (BR), *Toussaint 345*, ♂ *fl.* (BR), 631, ♂ *fl.* (BR), 2136, ♂ *fl.* (BR), 2191, st.? (BR), *Wagemans 1414*, fr. (BR), 2423, fr. (BR); La Kulu: *van de Brande 555*, ♂ *fl.* (BR), 3509 (509), ♂ *fl.* (BR) — Bas Congo, Gombe-Matadi: *Callens 2600*, fr. (BR); Mambamba: *Devred 931*, ♂ *fl.* (BR) — Kasai, Bongemba: *Jans 1098*, ♂ *fl.* (BR); Mukumbi s/Masai: *Gillardin 345*, ♂ *fl.* (BR) — For. Central, Isangi, Yabahondo: *Germain 8719*, ♂ *fl.* (BR); Yangambi: *Germain 4907*, ♂ *fl.* (BR) — Uele, Bambesa: *Gérard 3192*, ♀ *fl.* (BR), 3337, ♂ *fl.* (BR), 5449, ♂ *fl.* (BR), 5705, ♂ *fl.* (BR), 5764, fr. (BR); Buta: *Lebrun 2574*, ♂ *fl.* (BR); Mitule: *Lebrun 2769*, fr. (BR) — Lac Albert, Kibali-

Ituri, Iruma: *Lebrun 4149*, ♀ fl. (BR) — Kivu, Kalehe, Kavumu à Walikale: *Troupin 10124* ♂ fl. (BR).

BURUNDI. Terr. Burundi, Vallée de la Siguvyaye, 1650 m: *Lewalle 3988*, ♂ fl. (BR, L).

ANGOLA. Luanda, Vale do Bengo, 140 m: *Teixeira c.s. 10295* (LISC, n.v.) — Cuanza Norte, Cazengo: *Gossweiler 5282*, ♀ fl., fr. (BM, COI).

ECOLOGY. Forest, forest edges, gallery forest; 0–1650 m. Flowers and fruit throughout the year.

NOTE. 1. Fresh flowers are pale green to yellow, pendent, petals pale greenish.

53. *Adenia lindiensis* Harms, Notizbl. Berl.-Dahl. 13 (1936) 425. — Type: *Schlieben 6066*.

Subherbaceous climber up to 5 m. Fertile branches pale greenish, $1\frac{1}{2}$ –3 mm; internodes 3–15(–20) cm. *Leaves* thinly herbaceous, greenish above, some paler beneath, not punctate, glabrous, entire to deeply (2–)3(–5)-lobed, oblong-lanceolate to suborbicular in outline, base rounded to cordate or hastate, apex acute, up to $1\frac{1}{2}$ cm acuminate, 4–17 by $2\frac{1}{2}$ –16 cm, 3–5-plinerved to pinninerved with up to 4–6 pairs of nerves from the midrib, reticulation fine, rather indistinct; lobes triangular to oblong, 1–12 by 1–7 cm, margin entire or irregularly sinuate; petiole $1\frac{1}{2}$ –9 cm. *Glands* at blade-base 2, $\frac{1}{2}$ –1 mm \varnothing , either on two auricles 1–2 mm \varnothing lateral at the apex of the petiole (blade-base non-peltate) or on the 2–6 mm wide peltate blade-base; blade glands $\frac{1}{2}$ –1 mm \varnothing , 2–20, submarginal or \pm scattered; marginal glands minute, 0–4. *Stipules* narrowly triangular, $\frac{3}{4}$ – $1\frac{1}{2}$ mm, withering. *Inflorescences* peduncled for ($\frac{1}{2}$ –)1–5 cm, 1–5(–10)-flowered in ♀ and ♂, \pm monochasial; tendril (0–)1, 2–6 cm. Sterile tendrils up to 10 cm. Bracts and bracteoles (narrowly) triangular to oblong, acute, 1–2 mm. ♂ fl. not known. *Hermaphroditic fl.* infundibuliform, incl. the c. 10 mm long tapering stipe c. 30 by 5–8 mm, calyx lobes in anthesis suberect. Pedicel 5–10 mm. Hypanthium (incl. calyx tube) 12–13 mm long, c. 8 mm wide at the throat, calyx lobes ovate-oblong, obtuse, c. 8 mm, entire. Petals linear, 1– $1\frac{1}{2}$ mm, 1-nerved, entire, inserted 7–8 mm above the base of the hypanthium. Filaments 7–8 mm, connate for c. $\frac{1}{4}$ mm, inserted at the base of the hypanthium. Anthers $1\frac{1}{2}$ –2 by 1 mm, obtuse, c. 0.1 mm apiculate. Septa c. $\frac{1}{4}$ mm high. Corona 0. Disk glands c. 2 mm. Pistil c. 15 mm. Gynophore c. 5 mm. Ovary ellipsoid-oblong, c. 7 by 3 mm. Styles connate for c. 1 mm, style arms c. $1\frac{1}{2}$ mm. Stigmas subreniform, woolly(-laciniate)-papillate, each c. $2\frac{1}{2}$ mm \varnothing . ♀ fl. \pm infundibuliform, incl. the $1\frac{1}{2}$ – $2\frac{1}{2}$ mm long stipe 10–15 by 2–5 mm, calyx lobes in anthesis suberect. Pedicel 1–3 mm. Hypanthium cup-shaped, $\frac{1}{2}$ – $1\frac{1}{2}$ mm, calyx tube 4–5 mm, calyx lobes triangular to oblong, subacute, 3–6 mm, entire. Petals linear, acute to subobtuse, $1\frac{1}{2}$ –3 by $\frac{1}{4}$ – $\frac{1}{2}$ mm, 1-nerved, \pm serrulate near the apex, inserted $\frac{1}{2}$ –3 mm above the base of the hypanthium. Staminodes $1\frac{3}{4}$ –3 mm, free, inserted at the base of the hypanthium or on an androgynophore c. 1 mm. Septa up to 1 mm high. Corona 0 or consisting of a fringe of

fine hairs c. 0.1 mm. Disk glands 0. Pistil 7–8 mm. Gynophore c. 2 mm. Ovary subglobose to ellipsoid, 3–4 by $2\frac{1}{2}$ –3(– $3\frac{1}{2}$) mm. Styles connate for c. $\frac{1}{2}$ mm, style arms c. $\frac{3}{4}$ mm. Stigmas not known. *Fruit* 1 per inflorescence, ellipsoid to subglobose, excl. the 8–10 mm long gynophore 3–5 by $2\frac{1}{2}$ –5 cm. Pericarp coriaceous, spongy inside. Seeds c. 40 per capsule, subglobular, c. 5 by 5 by 3 mm, c. 5 pits across; funicles c. 5 mm; embryo not known.

DISTRIBUTION. E. Kenya and E. Tanzania. — Fig. 26.

ECOLOGY. Forest; 0–500 m. Flowers in Feb., March and July, fruits in March and July.

NOTES. 1. ♂ Flowers not known; two varieties are recognized mainly on vegetative characters.

2. The hermaphroditic flowers of *Schlieben 6066* (type) are relatively large, with small anthers which contain apparently good pollen.

3. The ovary resembles that of *A. aspidophylla*; the var. *lindiensis* resembles more or less *A. schliebenii*, which species differs, however, in the leaves which are slightly hairy, the dentate leaf margin, and in the flowers.

KEY TO THE VARIETIES

1. Leaves entire or (2–)3–5-lobed, broadly ovate to suborbicular, 3–5-plinerved. Glands at blade-base on two separate auricles at the apex of the petiole; blade glands few to many, submarginal or scattered. . . . a. var. **lindiensis**
1. Leaves entire, elliptic to oblong, ± pinninerved, rarely 2(–3)-lobed at base. Glands on the peltate blade-base, not on separate auricles; blade glands submarginal, 4–10 at either side of the blade. b. var. **submarginalis**

a. var. **lindiensis** — Fig. 26.

Leaves entire or (2–)3–5-lobed, broadly ovate to suborbicular in outline, base truncate to cordate, or ± hastate, (5–)7–17 by ($3\frac{1}{2}$ –)4 $\frac{1}{2}$ –17 cm, 3–5-plinerved; petiole $1\frac{1}{2}$ –9 cm. *Glands* at blade-base 2, on two separate auricles at the apex of the petiole; blade-base not peltate; blade glands 2–20, submarginal or scattered. *Hermaphroditic fl.* see under the species. *Fruit* c. 3 by $2\frac{1}{2}$ cm.

TANZANIA. Tanganyika, Eastern Prov., Morogoro Distr., Lusunguru Forest Res., 4 miles NE. of Turiani, 500 m: *Drummond & Hemsley 1930*, ♀ fl., fr. (K) — Southern Prov., Rondo (Muera) Plateau, 65 km W. of Lindi, 300 m: *Schlieben 6066*, ♀ fl. (B, type *A. lindiensis*; LISC).

ECOLOGY. Edges of evergreen forest, shrub vegetation; 300–500 m.

NOTE. 1. *Drummond & Hemsley 1930* has leaves which seem more or less intermediate with the var. *submarginalis*, but it has the glands at the blade-base on two separate auricles, which is characteristic for var. *lindiensis*.

b. var. submarginalis de Wilde, *var. nov.* — Fig. 26.

Scandens gracilis, c. 4 m longa. *Folia* integra, elliptica vel oblonga, vel lanceolata, basi rotundata vel subhastata, raro \pm lobata, apice acute acuminata, 7–17 cm longa, $2\frac{1}{2}$ –6(–10) cm lata, pinninervia. *Glandulae* 2 folii basi 2–6 mm peltata instructae; glandulae ceterae submarginales 4–10 utroque latere obviae. *Flores* δ ignoti. *Flores* η stipite $1\frac{1}{2}$ – $2\frac{1}{2}$ mm longo incl. 10–15 mm longi, 2–5 mm lati. Hypanthium $\frac{1}{2}$ – $1\frac{1}{2}$ mm longum. Calycis tubus 4–5 mm longus, lobis 3–6 mm longis. Petala $1\frac{1}{2}$ –3 mm longa, $\frac{1}{4}$ – $\frac{1}{2}$ mm lata, $\frac{1}{2}$ –3 mm supra hypanthii basin inserta. Septa 0–1 mm alta. Corona nulla vel e pilis c. 0.1 mm longis formata. Disci glandulae nullae. Pistillum 7–8 mm longum. *Fructus* subglobosus, gynophorio c. 8 mm longo excl. c. 5 cm. diam.; pericarpium intus spongiosum.

Leaves entire, or sometimes with \pm undate margin, rarely \pm lobed at base, elliptic to oblong-lanceolate, base rounded to truncate or subhastate, 7–17 by $2\frac{1}{2}$ –6(–10) cm, \pm 3-plinerved and 3–6 pairs of nerves from the midrib; petiole 1–4 cm. *Glands* at blade-base 2, separate or contiguous, on or near the margin of the 2–6 mm wide peltate blade-base; blade glands submarginal, 4–10 at either side of the blade. η fl. see under the species. *Fruit* subglobose, c. 5 cm \varnothing ; pericarp spongy inside.

KENYA. Coastal Prov. (K7), Shimba Hills, Makadara, 1000 ft.: *van Someren* 87, \pm fl. (EA).

TANZANIA. Tanganyika, Tanga Prov., 5 miles SE. of Ngomeni, 75 m: *Drummond & Hemsley* 3562, fr. (K); Sangasawe – Kwamkoro: *Zimmermann* 6577, η fl. (BM; EA, type; K); E. Usambara: *Peter* 54625, fl. scars (B), 54626, fr. (B), 54627, st. (B).

ECOLOGY. Shrub-layer of damp evergreen forest; 0–300 m.

NOTE. 1. The two varieties are separated mainly on vegetative characters, e.g. the position of the glands at the blade-base: either on two auricles or on the peltate blade-base. It is noteworthy that juvenile plants of certain species with two separate base-glands in adult stage sometimes produce distinct peltate leaves, e.g. *A. volkensii*, or the Asian *A. cordifolia*.

54. *Adenia schliebenii* Harms, Notizbl. Berl.-Dahl. 13 (1936) 426; A. & R. Fernandes, Garcia de Orta 6, 2 (1958) 257, fig. 13. — Type: *Schlieben* 5975. — Fig. 26.

Herbaceous climber up to 5 m, growing from a tuberous rootstock. Fertile branches greenish, glabrous, 2–5 mm; internodes 5–15 cm. *Leaves* thinly herbaceous, brownish-green above, much paler beneath, densely reddish punctate, finely pubescent especially on the nerves, entire to deeply 3–5-lobed, suborbicular, base cordate to subtruncate, apex acute, up to $\frac{3}{4}$ cm acuminate, up to 2 mm mucronate, 5–12 by 4–13 cm, 5-plinerved and up to 4 pairs of nerves from

the midrib, reticulation rather indistinct; lobes ellipsoid to oblong, mostly \pm constricted at the base, 1–8 cm, margin remotely up to c. 3 mm dentate; petiole 2–6 $\frac{1}{2}$ cm. *Glands* at blade-base 2, c. 1 mm \varnothing , on two auricles 1–1 $\frac{1}{2}$ mm \varnothing lateral at the apex of the petiole; no other glands. Stipules triangular, acute-acuminate, c. 1 mm. *Inflorescences* peduncled for $\frac{1}{2}$ –6 cm, 3–15-flowered in δ ; tendril 1, 1 $\frac{1}{2}$ –5 cm. Sterile tendrils up to 15 cm. Bracts and bracteoles lanceolate, dentate-laciniate, 3–6 mm. δ fl. tubular-infundibuliform, incl. the 3–6 mm long stipe 25–35 by (6–) 8–10 mm, calyx lobes in anthesis erect. Pedicel 4–10 mm, glabrous. Hypanthium (incl. calyx tube) (15–)18–24 mm, calyx lobes ovate-triangular, subacute, 4–5 $\frac{1}{2}$ mm, c. 0.1 mm serrulate. Petals lanceolate, subacute, 3–5 by $\frac{3}{4}$ –1(–1 $\frac{1}{2}$) mm, 3-nerved, densely 1–1 $\frac{1}{2}$ mm fimbriate, inserted 11–15 mm above the base of the hypanthium. Filaments 10–21 mm, connate for 1–2 mm, inserted at the base of the hypanthium. Anthers (3–)4–7 by $\frac{1}{2}$ –1 mm, obtuse, up to 0.1 mm apiculate. Septa 0. Corona 0. Disk glands c. 1 $\frac{1}{2}$ mm. Vestigial ovary $\frac{1}{2}$ –1 mm, gynophore $\frac{1}{4}$ –1 mm. φ fl. & fruit not known.

TANZANIA. Tanganyika, Southern Prov., Rondo (Muera) Plateau, c. 80 km W. of Lindi, c. 500 m: *Schlieben 5975*, δ fl. (B, type; BM, BR, HBG, LISC, Z).

MOZAMBIQUE. Cabo Delgado, Msalu R.: *Allen 150*, δ fl. (K).

Ecology. Bush-forest; c. 500 m. Flowers in Feb. and March.

NOTES. 1. One of the few pubescent species; also characterized by the finely reddish-brown spotted leaves (tannin?). The leaves resemble much those of *A. stricta* and *A. volkensii* (also pubescent), and of *A. lindiensis* (glabrous; leaf margin not dentate).

The corona is absent, as also in a part of the material of *A. lindiensis*.

2. The flowers are yellowish, reddish-brown punctate.

55. *Adenia stricta* (Mast.) Engl., Pfl. welt Afr. 3,2 (1921) 605; A. & R. Fernandes, Garcia de Orta 6, 2 (1958) 258, fig. 14–15. — *Modecca stricta* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 515. — Syntype: *Kirk s.n.*, *Meller s.n.* — Fig. 28.

Herbaceous climber $\frac{1}{2}$ –2 $\frac{1}{2}$ m, except the flowers \pm hispidulous-pubescent, stem sometimes \pm thickened to the base, growing from a tuberous rootstock. Fertile branches grey-green, 3–7 mm; internodes 2–8 cm. *Leaves* herbaceous, brownish-green above, paler beneath, not punctate, \pm pubescent especially on the nerves, entire to deeply 3–7-lobed, ovate-oblong to suborbicular, base cordate to subtruncate, apex acute, up to 1 $\frac{1}{2}$ mm mucronate, 3–15 by (2–)3–15 cm, 3–5(–7)-plinerved and (1–)2–5 pairs of nerves from the midrib, reticulation rather indistinct; lobes ovate to spatulate-oblong, (1–)2–10 by 1–5(–6) cm, margin up to 2 cm deep dentate; petiole 2–15 cm. *Glands* at blade-base 2, c. 1 mm \varnothing , on two auricles which are c. 1 mm connate over the apex of the petiole; blade glands 0–6, submarginal; marginal glands minute, on the teeth. Stipules triangular, acute, glandular dotted, 1–2 mm. *Inflorescences* peduncled for $\frac{1}{2}$ –5

cm, 5–10-flowered in ♂, 1–2-flowered in ♀; tendril (0–)1, 2–6 cm. Sterile tendrils up to 10 cm. Bracts and bracteoles lanceolate, mostly dentate, ± glandular dotted, 2–7 mm. ♂ *fl.* tubiform to ± urceolate, incl. the 3–6 mm long stipe 25–37 by (7–)9–13 mm, calyx lobes in anthesis suberect. Pedicel 5–20 mm, hispidulous-pubescent. Hypanthium cup-shaped 3–5 mm, calyx tube 12–20 mm, calyx lobes (narrowly) triangular to oblong, obtuse to subacute, c. 8 mm, up to 2 mm fimbriate. Petals lanceolate to linear, subacute, 7–17 by 1½ mm, 3-nerved, densely 2–3 mm fimbriate, inserted in the calyx tube 4–5 mm above the corona. Filaments 3½–7 mm, free, inserted at the base of the hypanthium or on an androgynophore up to 1½ mm. Anthers c. 12 by 1–1½ mm, obtuse, up to 0.1 mm apiculate. Septa 0–½ mm high. Corona hairs fine, 1½–2 mm. Disk glands 1½–2 mm. Vestigial ovary ½–1 mm, gynophore ½–1½ mm. ♀ *fl.* campanulate, incl. the 1½–2 mm long stipe 15–18 by 10(–15) mm. Pedicel 2–10 mm, puberulous. Hypanthium cup-shaped c. 2 mm, calyx tube 4–6 mm, calyx lobes oblong, obtuse, 9–10 mm, 2–3 mm woolly-fimbriate. Petals lanceolate, acute, c. 7 by 1–1½ mm, 3-nerved, sparsely c. 2 mm fimbriate, inserted 1–2 mm above the corona. Staminodes c. 3 mm, free. Septa 0. Corona hairs fine, 1–1½ mm. Disk glands 1–1½ mm. Pistil 7–10 mm. Gynophore ½–1 mm. Ovary subglobose, 3½–5 by 3½–4½ mm, smooth. Styles 2–2½ mm, free. Stigmas subreniform, woolly-papillate, each c. 3 mm ∅. *Fruit* 1 per inflorescence, ovoid-ellipsoid, excl. the 1–2 mm long gynophore c. 4½(–6?) by 3½(–4½?) cm. Pericarp coriaceous. Seeds c. 40 per capsule, obovate, c. 7½ by 5½–6 by 3 mm, 4–6 pits along the length; funicles 2–3 mm; embryo 5½–6 mm; cotyledons suborbicular, c. 5 by 5 mm.

SOUTH RHODESIA. Northern Prov., Urungwe Distr., 11 miles ESE. of Chirundu Bridge, 460 m: *Drummond 5349*, ♂ fl. (BR, K, LISC, SRGH).

MOZAMBIQUE. Tete Prov., Vicinity of Tete: *Kirk s.n.* (July 1860), fr. (K), *s.n.* (Feb. 1860), fr. (K, lectotype *Adenia stricta*); Zambesi Mittellauf (Tete): *Menyhart 688*, ♂ fl., fr. (WU, n.v.; Z); km 6 on Changara Rd., 130 m: *Torre & Correia 13812*, ♂ fl. (LISC); Chicoo: *Torre & Correia 13891*, ♀ fl. (LISC).

MALAWI. Murchison Falls: *Meller s.n.* (K, syntype *A. stricta*, n.v.).

ECOLOGY. Open woodland; sandy and stony soil; 0–500 m. Flowers and fruits Dec.–Febr.

USES. The fruits are once reported as edible.

NOTES. 1. Related to *A. volkensii*, *A. ellenbeckii* and *A. schliebenii*. *A. volkensii* is erect, without tendrils, *A. ellenbeckii* has much narrower flowers, *A. schliebenii* is less pubescent, the leaves are less deeply dentate, the petals of the male flowers are smaller, and the filaments much longer than the anthers; in *A. stricta* the anthers are much longer than the filaments.

The styles are free to the base; in the three related species mentioned above the styles are connate for at least the half.

2. Fresh flowers are creamy, sometimes reddish-brown punctate; according to *Kirk s.n.* the pericarp of the fresh fruit is ± fleshy.

56. *Adenia ellenbeckii* Harms in Engl., Pfl. welt Afr. 3, 2 (1921) 606, fig. 270; Notizbl. Berl.-Dahl. 8 (1923) 298; in Engl., Pfl. welt Afr. 1, 1 (1910) 163, 165, fig. 135 (*nom. nud.*); Coll. Bot. Stefanini e Paoli (1916) 79; in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 492, fig. 225; Chiov., Fl. Somal. 1 (1929) 177. — Syn-type: *Ellenbeck 2133, 2291* (B†). — **Fig. 28.**

Adenia toxicaria Harms, Notizbl. Berl.-Dahl. 13 (1936) 426. — Type: *Kohl-Larsen 10*.

Adenia vitifolia Hutch. & Bruce, Kew Bull. (1941) 98. — Type: *Gillett 4202*.

Shrub or herb up to 1½ m, the climbing or suberect shoots 20–100(–150) cm growing from an erect, ± woody-succulent stem up to 30(–60) by 1½(–2) cm arising from a tuberous rootstock. Fertile branches grey-green, 2–5(–10) mm; internodes ½–6 cm. Plant pubescent, sometimes glabrous. *Leaves* herbaceous to coriaceous, brown to green above, much paler beneath, not punctate, mostly pubescent especially on the nerves, entire to mostly deeply palmately 3–5(–7)-lobed or pinnatifid, elliptic or ovate to suborbicular, base acute to cordate, apex obtuse to acute, mostly c. 1 mm mucronate, 2–17 by 1½–11 cm, 3–5-subplinerved and with 1–3 pairs of nerves from the midrib, or ± pinninerved, reticulation distinct, margin subentire to variously dentate or dissected, the teeth ending in a blackish mucro, ½–1 mm; lobes ovate to obovate or oblong, 1–8 cm; petiole (½–)1–7 cm. *Glands* at blade-base 2, ½–1½ mm ∅, sessile or sometimes on two semi-orbicular auricles on the very blade-base at each side of the top of the petiole; blade glands 0–6, submarginal. *Stipules* triangular, dark brown glandular-dotted, 1–2½ mm. *Inflorescences* sessile, 1–10-flowered in ♂, 1–3-flowered in ♀; tendril 0–1, 2–10 cm. Sterile tendrils up to 10 cm. *Bracts* and *bracteoles* linear-lanceolate, sometimes ± serrate, minutely glandular-dotted, 2–8 mm. *Flowers* glabrous. ♂ *fl.* tubiform, incl. the 3–4 mm long stipe 20–50 by 3–6½ mm, calyx lobes in anthesis suberect. *Pedicel* 1–10 mm, glabrous or pubescent. *Hypanthium* incl. calyx tube 14–45 mm, not saccate, calyx lobes ovate-oblong, obtuse, 3–6 mm, 1–2 mm densely woolly-fimbriate. *Petals* lanceolate-linear, acute, 5–8(–11) by ½–½ (–¾) mm, 1(–3)-nerved, 1½–3 mm woolly fimbriate, inserted in the calyx tube 3–7 mm below the throat. *Filaments* 6–12 mm, free, or connate for up to 3 mm, inserted at the base of the hypanthium, or on an androgynophore up to 2 mm. *Anthers* 5–8 by 1 mm, obtuse, 0.2–½ mm apiculate. *Septa* 0. *Corona* 0 or consisting of a few hairs. *Disk glands* c. 2½ mm, sometimes papillate, rarely absent. *Vestigial ovary* ¾–1½ mm, gynophore up to 2 mm. ♀ *fl.* tubiform-urceolate, incl. the 1–3 mm long stipe 12–30(–35) by 4½–8(–9) mm. *Pedicel* 5–15 mm, glabrous or puberulous. *Hypanthium* tapering, incl. calyx tube 8–25 mm, calyx lobes ovate-oblong, (sub-)obtuse, 3–6 mm, partially 1–2½ mm woolly fimbriate. *Petals* linear, acute, 4–9 by 0.2–¼ mm, 1-nerved, 1–2½ mm fimbriate or not, inserted in the calyx tube 1–5 mm below the throat. *Staminodes* 2–7½ mm, entire or rarely dissected, free or up to 2 mm connate. *Septa* 0. *Corona* 0. *Disk glands* ½–1½ mm, free or rarely ± connate into a ring. *Pistil* 7–18 mm. *Gynophore* 1–2½ mm. *Ovary* subglobose to ellipsoid, 3–7½ by 2¼–6½ mm. *Styles* connate

for 0–4 mm, style arms $\frac{1}{2}$ –4 mm. Stigmas much divided, hairy-papillate, each 2–5 mm \varnothing . Fruit 1 per inflorescence, subglobose, excl. the 1–2 mm long gynophore 2–4 $\frac{1}{2}$ (–5) by 2–4(–4 $\frac{1}{2}$) cm. Pericarp coriaceous, \pm spongy or fleshy inside, 2–5 mm thick, smooth. Seeds 10–30 per capsule, ovate, 6 $\frac{1}{2}$ –8 by 5–6 by 3 mm, \pm roughly pitted, 5–8 pits along the length; funicles 2–4 mm; embryo 4 $\frac{1}{2}$ –6 mm; cotyledons suborbicular 3 $\frac{1}{2}$ –5 by 3 $\frac{1}{2}$ –5 mm.

ETHIOPIA. Sidamo, Gondaraba: *Corradi* 2287, st. (FI), 8239, φ fl. (FI); El Banno (Tertale): *Corradi* 8240, fr. (FI), 8241, fr. (FI); Lago Margherita: *Vatova* 1834, φ fl. (FI) — Harar, Oga-den, Scillave, 1300 ft.: *Simmons* 139, φ fl. (EA, K); Jijiga: *J. J. de Wilde* 6410, σ fl. (WAG), 6411, φ fl., fr. (WAG).

SOMALIA. Northern (formerly British), Ghor (between Bureo and Hargeisa), 3500 ft. *Bally* 7308, fr. (EA); Ga-an Libah (between Ghor and Forest Station): *Bally* 11716, σ fl. (EA, K); Haud: *Drake-Brockman* 781, φ fl. (K); Boundary Pillar 93 (45° 9' E – 8° 37' N), 3300 ft.: *Gillett* 4202, σ fl., fr. (B \dagger , FI; K, type *Adenia vitifolia*; P, UPS); Dannon (?): *James & Thrupp s.n.*, φ fl. (K) — Central (formerly Italian), Baidoa: *Corradi* 8238; Djuba (?) Prov.: *Ellenbeck* 2291, fr. (B \dagger , type *Adenia ellenbeckii*; K, photo); Boran: *Ellenbeck* 2133 (B \dagger , n.v., syn-type); Lugh (Gezira): *Paoli* 1003, σ fl. (FI); Uegit: *Paoli* 1085, fr. (FI); Uebi Scebeli R.: *Paoli* 1347, fr. (FI); Dolobscio (Obbia): *Puccioni & Stefani* 462 (514), φ fl., fr. (FI); s. loc.: *Riva* 464, fr. (FI), 516, fr. (FI), 1225, fr. (FI), 1673, fr. (FI).

UGANDA. Northern, Karamoja, Kanamugit: *Eggeling* 2999, σ fl. (K); N. of Kacheliba, 3000 ft.: *Padwa* 77, φ fl., fr. (EA, K); *Thomas* 3104, σ fl. (K).

KENYA. s. loc.: *Adamson H.* 134/56–7, \pm st. (EA); Elera, 500 ft.: *Bally* 2201, st. (K) — K1 (Northern), Mt. Kulal, 3800–5900 ft.: *Bally* 5488, σ fl., fr. (EA, K); Huri Hills: *Bally* 12516, σ fl., φ fl. (K); 11 miles from Marsibil, Moyale Rd.: *Bally* 12660, p.p., σ fl. (K); Isiolo: *Adamson* 90, σ fl. (EA), *Gillett* 12509, σ fl. (B, BR, EA, FI, K), 15149, φ fl. (K); Dandu, 750 m: *Gillett* 12722, φ fl. (K), 12787, φ fl. (B, K); 2500 ft.: *Gillett* 12788, st. (K); Furroli Mt., 3200–4600 ft.: *Gillett* 13875, σ fl. (K, W), 13926, φ fl. (B, BR, EA, FI, K, S, W); between Habaswein and Muddo Gashi, 1000 ft.: *Hemming* 126, σ fl. (EA) — K2 (N. Western), Turkana: *Champion s.n.*, fr. (K), *Symes* 186, σ fl. (EA, K), 187, φ fl., fr. (EA, K), *Thomas* 268, σ fl. (K) — K4 (Central), Ngomeni (Kitui Distr.): *Edwards* 32, σ fl. (EA), 32-bis, σ fl. (EA) — K6 (Southern), Machakos Distr., Mtito Andei, 2460 ft.: *Greenway & Duvigneaud* 12622, σ fl., φ fl. (EA, K).

TANZANIA. Tanganyika, Lake Prov. (T1), Mwanza, 3800 ft.: *Tanner* 1292, fr. (K) — ? Northern (T2), Issansu: *Kohl-Larsen* 10, fl. (B \dagger , type *Adenia toxicaria*, n.v.).

ECOLOGY. Rocky places; lava rock, granite rock, black soil, black cotton soil, red sandy soil, red sandy loam; 200–1500 m; rainfall c. 250–500 mm per year. Flowers and fruits Febr.–Nov.

USES. Several times reported as poisonous; the juice of the fruit in meat is used to poison hyenas.

NOTES. 1. Related to *A. volkensii* and *A. stricta*, but differing by the presence of tendrils, the inflorescences which are always sessile, the narrow flowers which lack the corona.

2. *Bally* 5488 is monoecious: it contains fruit-remnants near the base- and male flowers in the upper part of the shoot.

3. Fresh flowers are reported as greenish to creamy or dirty yellow, finely purplish-red spotted; the lobes as yellowish or creamy, sometimes pinkish flushed. The fruits are fleshy, red or yellowish-green when ripe. The pericarp in *de Wilde* 6411, in spirit, is 3–6 mm thick.

4. Juvenile leaf-forms have sometimes an up to 1 mm wide peltate blade-base.

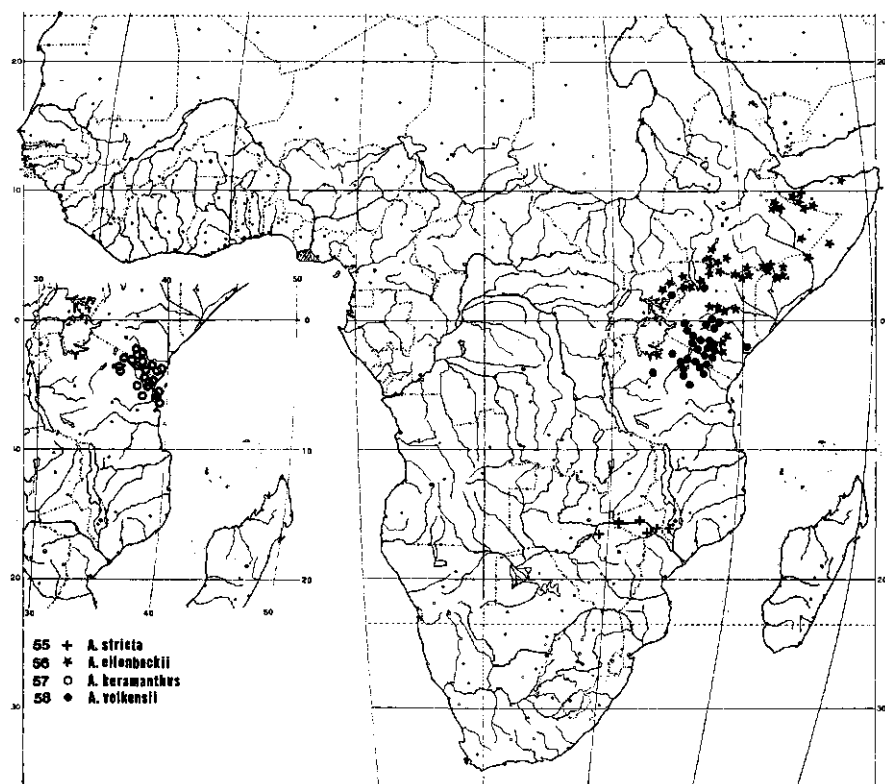


FIG. 28. Localities of species 55–58.

5. *J. de Wilde* 6410 and 6411 from SE. Ethiopia represent a coarse form with relatively coarse fleshy leaves and large flowers with a corona consisting of but a few hairs.

57. *Adenia keramanthus* Harms in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84; *ibid.* ed. 2, 21 (1925) 492; in Engl., Pfl. welt Ost Afr. 2, C (1895) 281; Bot. Jahrb. 24 (1897) 177; Engl., Pfl. welt Afr. 3, 2 (1921) 605, 595, fig. 269. — *Keramanthus kirkii* Hook. f., Bot. Mag. (1876) t. 6271. — Type: *Kirk s.n.* — Fig. 28.

Herb or shrub with erect sparingly branched \pm succulent shoots up to 1 m tall, up to 5(–10) cm wide at the base, arising from a tuberous rootstock. Fertile branches herbaceous, grey-green, up to 40 cm long, 4–8(–10) mm thick; internodes 1–6 cm. No tendrils. Plant densely grey to rusty-brown hairy. *Leaves* herbaceous to subcoriaceous, densely pubescent, brownish-green above, some paler beneath, sometimes punctate on the margin, not lobed, ovate to orbicular,

base cordate to truncate, apex subacute to rounded, $1\frac{1}{2}$ –15 by 1–14 cm, 5-plinerved and 1–4 pairs of nerves from the midrib, reticulation distinct or not, margin subentire to up to 5 mm deep dentate; petiole 1–12 cm. *Glands* at blade-base 2, 1–2 mm \varnothing , on the up to 10 mm wide peltate blade-base; blade glands 0; marginal glands minute, as blackish mucros on the teeth $\frac{1}{2}$ –1 mm. Stipules linear, acute, sometimes \pm lacerate, 3–10 mm, pubescent. *Inflorescences* sessile, up to 10-flowered in σ , 1–2-flowered in ρ ; tendrils 0. Bracts and bracteoles resembling the stipules, 2–8 mm. σ fl. tubular-urceolate, incl. the 1–3 $\frac{1}{2}$ mm long stipe 17–26 by 8–10 mm, calyx lobes in anthesis suberect or but slightly recurved. Pedicel 5–40 mm, pubescent. Hypanthium broadly cup-shaped, $1\frac{1}{2}$ –2 mm, calyx tube 8–17 mm, calyx lobes ovate(-oblong), obtuse, 3–5 mm, densely 2–3 mm woolly fimbriate. Petals lanceolate to linear, subacute, 5–7 by $\frac{1}{2}$ – $\frac{3}{4}$ mm, 1-nerved, $1\frac{1}{2}$ –3 mm fimbriate, inserted 2–9 mm above the corona. Filaments 3–5 mm, up to $1\frac{1}{2}$ mm connate, inserted at the base of the hypanthium. Anthers 6–7 by 1 mm, obtuse, up to $\frac{1}{2}$ mm apiculate. Septa 0. Corona hairs rather sparse, 1–2 mm, rarely absent. Disk glands 1–2 mm. Vestigial ovary incl. gynophore $\frac{1}{2}$ – $1\frac{1}{2}$ mm. ρ fl. tubular-urceolate, resembling σ fl., incl. the c. $1\frac{1}{2}$ mm long stipe 18–22 by 8–12 mm. Pedicel 10–15(–25) mm, pubescent. Hypanthium 1– $1\frac{1}{2}$ mm, calyx tube 12–14 mm, calyx lobes ovate, obtuse, 4–5 mm, c. 1 mm fimbriate-lacerate. Petals linear, c. 3 by 0.2 mm, 1-nerved, c. $\frac{1}{2}$ mm fimbriate, inserted 6–7 mm above the corona. Staminodes c. $3\frac{1}{2}$ mm, free. Septa 0. Corona consisting of a few hairs c. 1 mm. Disk glands c. 1 mm. Pistil 10–14 mm. Gynophore 1– $1\frac{1}{2}$ mm. Ovary subglobose to ellipsoid, faintly 3-ribbed, 5–6 by 4–4 $\frac{1}{2}$ mm. Styles connate for c. 3 mm, style-arms 1– $1\frac{1}{2}$ mm. Stigmas reniform, lacinate-papillate, each 4–5 mm \varnothing . *Fruit* 1 per inflorescence, subglobose, excl. the 1–2 mm long gynophore $3\frac{1}{2}$ –5 by 3–4 $\frac{1}{2}$ cm. Pericarp coriaceous, sometimes spongy inside, 2–5 mm thick. Seeds 20–40 per capsule, broadly ovate to elliptic, 7(–9) by 5–6(–7) by 3 mm, 4–8 pits along the length; funicles 3–4 mm; embryo 5–7 mm; cotyledons suborbicular, $4\frac{1}{2}$ – $5\frac{1}{2}$ by $4\frac{1}{2}$ – $5\frac{1}{2}$ mm.

KENYA. K4., Machakos Distr., Kibwezi and vicinity, c. 1000 m: *Faden & Evans 67/806*, σ fl. (EA), *Teofilo B. 8660*, σ fl. (EA, K), *Verdcourt 1850*, fr. (EA) — Coastal Prov. (K7), between Mvata and Bura (Voi-Moshi Rd.): *Ossent 98*, fr. (EA); Voi, 2000 ft.: *Beecher H. 162*, fr. (EA), *Gardner 3008*, σ fl. (EA, K); Tsavo Park, 3300 ft., Murka Hill: *Akury 8*, σ fl. (EA), *Gilbert C. 42*, σ fl. (EA); Rabai, 1000 ft.: *van Someren 296*, fr. (EA); Kwale Distr., 330 m: *Drummond & Hemsley 4233*, fr. (BR, EA, K).

TANZANIA. Kideleho, 2000 ft.: *Archbold 542*, σ fl. (K) — Tanganyika, Northern Prov., Mt. Kilimanjaro: *Gilbert D. 77*, fr. (EA); Makuyuni Distr., 400–1000 m: *Koritschoner 1119*, fr. (EA, K), *1262*, σ fl. (EA, K); Momella: *Trappe H. 7/49*, fr. (EA) — Tanga Prov., Mombo: *Braun 1977*, σ fl. (EA); Handeni Distr., 2000 ft.: *Burt 4887*, σ fl. (K); W. Usambaras, Lasa Mt., 2000 ft.: *Greenway 4055*, ρ fl. (EA, K); Pare Mts., 1900 ft.: *Greenway 6473*, σ fl. (EA, K); Kwale-Amboni, 2000 ft.: *Greenway 6612*, σ fl. (EA, K); Lushoto Rd., above Mombo, 1500 ft.: *Verdcourt & Greenway 330*, σ fl. (EA, K) — Zanzibar I.: *Boivin s.n.*, fr. (P), *Hildebrandt 1198*, σ fl. (BM), *Jablonski (5)*, fr. (P), *Kirk s.n.*, ρ fl. (K, cultivated, type *Keramanthus kirkii*), *Sacleux 118*, σ fl., fr. (P), *Stuhlmann 806*, σ fl. (HBG).

ECOLOGY. Open woodland, rocky bushland, thornbush, apparently nowhere

common; reddish-brown sandy loam; in a variety of associations, a.o. together with tree-*Euphorbias*, *Acacia*, *Commiphora*, *Sansevieria*, etc.; 0-1000 m. Flowers and fruits apparently throughout the year.

USES. Leaves and roots are once reported as a snake bite treatment; stem once reported as a remedy for syphilis.

NOTES. 1. The flowers are mostly produced before the leaves are fully developed.

2. Fresh flowers are pale greenish to yellowish, often purplish spotted, the calyx lobes whitish; ripe fruits are crimson or purplish.

58. *Adenia volkensii* Harms, Pfl. welt Ost Afr. 2, C (1895) 281; Engl., Pfl. welt Afr. 3, 2 (1921) 606; Harms in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 492; Battiscombe, Cat. Trees and Shrubs Kenya Col. Spec. no. H 20; Verdcourt & Trump, East Afr. Poison. Pl., Dicot. (1970) 37, fig. 3. — Type: *Volkens 2174* — Fig. 28-29.

Subligneous shrub or herb 0.3-1½ m, the erect, annual shoots 20-60 cm, without tendrils, arising from a tuberous rootstock or from a ± succulent stem up to 100 by 5 cm. Fertile twigs greyish-green, 3-8(-10) mm; internodes ½-5 cm. Plant ± pubescent, rarely glabrous. *Leaves* herbaceous to coriaceous, brownish-green above, grey-green, sometimes punctate, sometimes reddish veined beneath, pubescent especially on the veins, rarely glabrous, subentire to deeply 3-7-lobed or -dissected, base cordate to truncate, apex acute, up to 1 mm mucronate, 3-16 by 3-14 cm, 3-5(-7)-(sub)plinerved and 2-5 pairs of nerves from the midrib, reticulation distinct or not; lobes oblong to lanceolate, acute, 2-12 by (¼)-½-6 cm, ± pinninerved, margin finely dentate to up to 2 cm deep dissected; petiole 1½-10 cm. *Glands* at blade-base 2, ½-1½ mm ∅, on two suborbicular auricles at the very blade-base at each side of the top of the petiole; blade glands 2-6, submarginal; marginal glands as dark mucros on the teeth-apexes. Stipules triangular, acute, finely glandular dotted, ½-1½ mm. *Inflorescences* peduncled for up to ½ cm, 1-6-flowered in ♂, 1-2(-3)-flowered in ♀; no tendrils. Bracts and bracteoles lanceolate, acute, mostly dentate and glandular dotted, 2½-10 mm. Flowers glabrous. ♂ *fl.* broadly urceolate, incl. the 2-8 mm long stipe 20-35(-45) by 10-18(-20) mm, calyx lobes in anthesis suberect or but slightly outward curved. Pedicel 5-25 mm, mostly ± pubescent. Hypanthium broadly cup-shaped, ± 5-saccate, 3-6 mm, calyx tube 12-20 mm long, 7-12 mm wide at throat, calyx lobes ovate-triangular, obtuse, (3-)4-7(-9) mm, densely woolly 2-4 mm fimbriate. Petals lanceolate-linear, acute, 10-14 by 1½-2 mm, 3(-5)-nerved, 3-5 mm long, densely woolly fimbriate, inserted at the same level as or up to 5 mm above the corona. Filaments 3-5½ mm, free, inserted at the base of the hypanthium. Anthers 8-12 by 1-1½ mm, obtuse, up to 0.1 mm apiculate. Septa 0-½ mm high. Corona hairs 1½-3 mm, also on the septa. Disk glands 1½-3 mm. Vestigial ovary (incl. gynophore) ½-1½ mm. ♀ *fl.* broadly tubiform, incl. the ¼-1½ mm

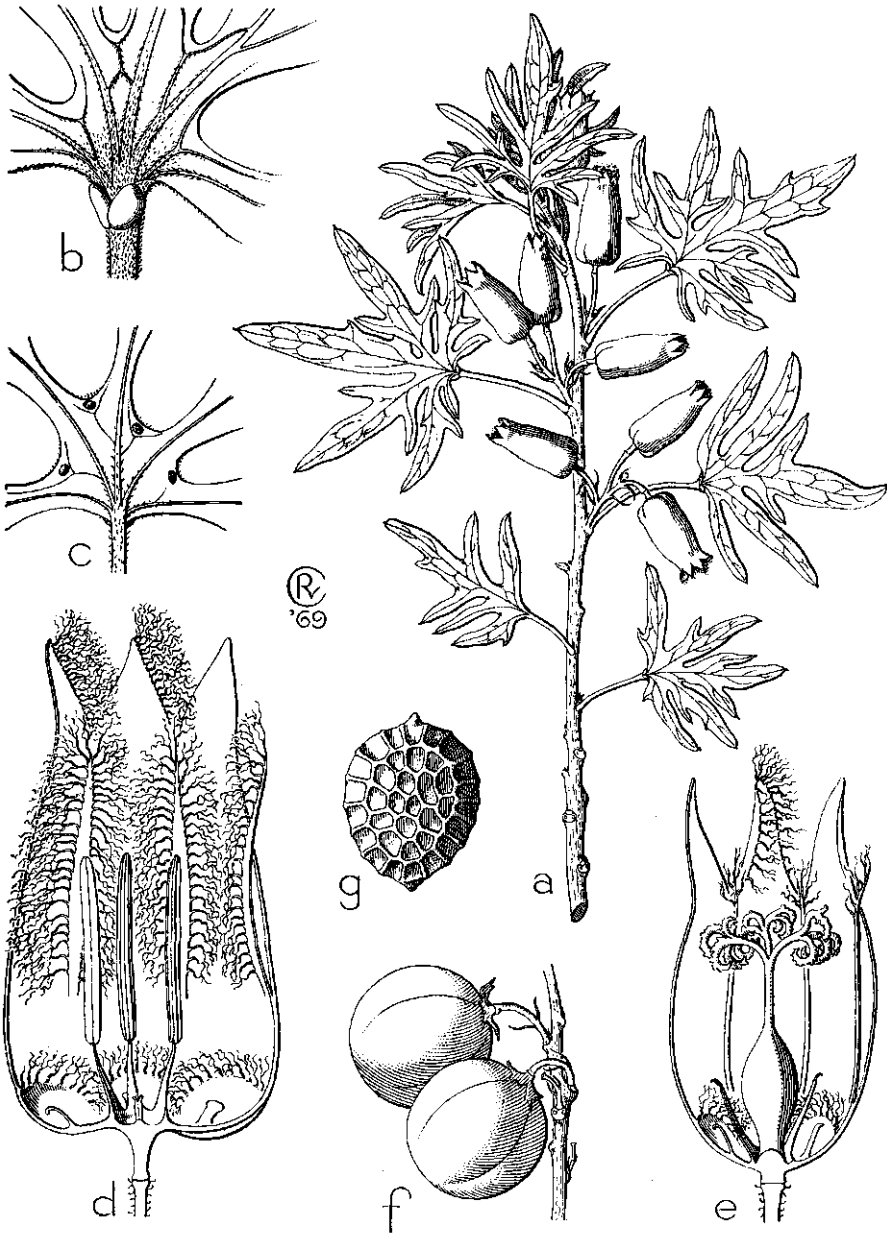


FIG. 29. *Adenia volkensis*. — a. habit of branch with ♂ inflorescences, $\times \frac{1}{2}$ (Napier 2315); b–c. blade-base with glands seen from above and beneath, $\times 2$ (from van Someren 7190 and Wigg 13735 resp.); d. ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (van Someren 7190); e. ♀ flower, longitudinal section, $\times 2\frac{1}{2}$ (Haarer 1211); f. infructescences, $\times \frac{1}{2}$ (van Someren 7190); g. seed, $\times 2\frac{1}{2}$ (Napier 2315).

long stipe 16–22(–25) by 8–11 mm. Pedicel 5–10 mm, mostly puberulous. Hypanthium cup-shaped $1\frac{1}{2}$ –2 mm, calyx tube 7–10 mm, calyx lobes oblong, obtuse-subacute, 5–8 mm, $1\frac{1}{2}$ – $2\frac{1}{2}$ mm fimbriate. Petals linear, acute, 8–12 by $\frac{1}{3}$ – $\frac{1}{2}$ mm, 1-nerved, sparsely $1\frac{1}{2}$ –3 mm fimbriate in the upper half, inserted 1– $2\frac{1}{2}$ mm above the corona. Staminodes $2\frac{1}{2}$ –5 mm, up to $1\frac{1}{2}$ mm connate. Septa 0. Corona hairs fine, woolly, $1\frac{1}{2}$ –2 mm. Disk glands 1–2 mm. Pistil 10–14(–16) mm. Gynophore 1– $2\frac{1}{2}$ mm. Ovary ellipsoid, 4– $5\frac{1}{2}$ (–8) by 3–4(–6) mm. Styles connate for 2–4 mm, style-arms c. 1 mm. Stigmas much branched, subreniform, \pm woolly-papillate, each c. 4 mm \varnothing . *Fruit* 1 per inflorescence, subglobose to ellipsoid, excl. the 1–3 mm long gynophore $3\frac{1}{2}$ – $5\frac{1}{2}$ by 3– $4\frac{1}{2}$ cm. Pericarp coriaceous, inside \pm spongy, 2–8 mm thick. Seeds 15–30 per capsule, ovate, 8–9 by 7– $7\frac{1}{2}$ by 3–4 mm, 6–8 pits along the length; funicles 2–4 mm; embryo 6–7 mm; cotyledons suborbicular 5–6 by 5 mm.

UGANDA. Northern (UI), Karamoja, Burota: *Wilkinson H 52/61*, \varnothing fl., an introduced (planted) specimen (EA).

KENYA. s. loc.: *Bally 16*, st. (K, cult. in Bot. Gard. Kew), *Greenway s.n.*, fr. (EA, culta); Eastern side of Lu: *Isaac H. 316/62 (EAH. 12605)*, δ fl. (EA); Leroki: *Leakey 3457*, δ fl. (EA, K) — K1 (Northern), Isiolo, 3000–4500 ft.: *Adamson 23*, δ fl. (EA), *520*, δ fl. (EA), *Bally 3509*, δ fl. (EA, K); Mt. Kulal, 5000 ft.: *Bally 5489*, δ fl. (EA) — K3 (Rift), Bahati, 5800 ft.: *Gilbert Rogers 12*, δ fl. (BR, EA, K); Nairobi Nat. Park: *Greenway 936*, δ fl. (K); Kedong Valley: *Napier s.n.*, δ fl., \varnothing fl. (K, n.v.) Kedong, 6000 ft.: *Stevens H. 20 (420)*, fr. (K) — K4, Ruaraka, 6000 ft.: *Bally 6897*, fr. (EA); Nairobi, 5600 ft.: *Battiscombe 1158*, st. (EA, K), *Bird s.n.*, fr. (EA), *Verdcourt 1603*, δ fl., fr. (EA, K); Machakos Distr., 3000–5000 ft.: *Battiscombe 464/1920*, fr. (K), *Drummond & Hemsley 4426*, δ fl. (K), *Ivens 2286*, st. (EA), *Napper 1324*, δ fl. (EA); Kitui: *Edwards 84*, δ fl. (EA); Meru Distr., Gatunga: *Parsons EAH. 13895*, δ fl. (EA); Athi Plains (Lone Tree): *van Someren 7190*, δ fl., fr. (EA) — K6 (Southern), Chyulu Range, 4200 ft.: *Bally 1052*, fr. (EA); Lenyore, 3900 ft.: *Bally 3851*, \varnothing fl. (EA); Ngong Escarpment, 5000 ft.: *Bally 7362*, δ fl. (EA, K); Chyulu-South, 4200 ft.: *Bally 7999* (K); Simba, 3400 ft.: *Bally 8738*, δ fl. (EA); Kajiado Distr., 1450 m: *Faden c.s. 67/909*, fr. (EA); Kijiado-Magadi, 4000 ft.: *Glover & Cooper 3481*, fr. (EA); Ngong Distr., 6000 ft.: *Napier 2315*, δ fl., fr. (EA, K) — K7 (Coastal), near Lamu (cult. in Nairobi): *Bally 6217*, δ fl. (K).

TANZANIA. Tanganyika, Lake Prov. (T1), Mudiati (Kisukum): *Raymond s.n.*, fr. (EA) — Northern Prov., Ngorongoro Crater, 5600 ft.: *Bally 2429*, st. (K); Moshi, 920 m: *Drummond & Hemsley 1323*, \varnothing fl. (K); Kilimanjaro, Kibohöhe, 1050–1150 m: *Endlich 315*, δ fl., fr. (M); Mbulu Distr., Lake Manyara Nat. Park, 3350 ft.: *Greenway & Kirrika 11136*, \varnothing fl., fr. (EA, K); Moshi Distr., 4300 ft.: *Greenway & Fitzgerald 12202*, δ fl., fr. (BR, EA, K), do, 3000 ft.: *Haarer 1211* (EA, K); Tarangire Mbush, 3600 ft.: *Mwinyjuma 457*, δ fl. (EA, K); Kilimanjaro: *Smith 12/92*, δ fl. (K); do, Kahe: *Volkens 2174*, δ fl. (B \dagger , type *Adenia volkensii*; BM); Edge of Mbuja (Kongwa Ranch), 3300 ft.: *Wigg 37*, fr. (EA) — Western Prov. (T4), Nzega (N. of Tabora): *Carnochan 134*, \varnothing fl., fr. (BM) — Central Prov. (T5), Kaywa Res. Sta.: *Pitwigg EAH. 13735*, \varnothing fl., fr. (EA).

Fanshawe 5067, a female specimen in K, is according to the label erroneously located as Solwezi, N. Rhodesia.

ECOLOGY. Scrub, rocky places; red soil, lava-dust; 1000–2000 m, once from Lamu, near the coast. Flowers and fruits mainly Sept.-April.

USES. Repeatedly reported as deadly poisonous, especially the roots. The roots are used to poison the bait for hyenas. Once reported that the fruits were eaten by the Wagogo. According to *Bird s.n.* the panicle with fruits was used

in one of the Mau-Mau oath ceremonies.

NOTES. 1. Stem grey-green to purplish-brown, sometimes greenish streaked; older stems with whitish pith. Leaves mostly tomentose, especially on the lower surface and the veins, rarely glabrous. Sometimes reported as \pm glossy above or \pm fleshy. Fresh flowers are \pm fleshy, green to (dirty) yellow, purplish mottled or pinkish flushed; the fresh fruits are fleshy, green turning red, sometimes obscurely whitish speckled.

2. *Verdcourt 1603* bears male flowers and semi-mature fruits.

3. Juvenile leaf forms are up to 7 mm wide peltate.

4. Closely related to *A. stricta* and *A. ellenbeckii*: see also under these species.

59. *Adenia lanceolata* Engl., Bot. Jahrb. 14 (1891) 378; Harms, Bot. Jahrb. 15 (1893) 572; in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84; Engl., Pfl. welt Afr. 3, 2 (1921) 603; Andrews, Flow. Pl. Angl.-Eg. Sudan, 1 (1950) 163. — Syn-
type: *Schweinfurth 1570, 1834, 1837*.

Adenia lanceolata var. *grandifolia* Engl., Bot. Jahrb. 14 (1891) 378. —
Type: *Schweinfurth 109*.

Suberect herb or climber $\frac{3}{4}$ –6 m, growing from a tuberous rootstock up to 30 cm \varnothing . Fertile branches greyish-green, $1\frac{1}{2}$ –5 mm; internodes $1\frac{1}{2}$ –10 cm. *Leaves* herbaceous to coriaceous, greenish to brownish above, grey to glaucous beneath, densely punctate or not, entire, ovate or obovate to lanceolate, base acute to rounded, apex acute-acuminate to broadly obtuse, sometimes \pm truncate, mostly $\frac{1}{2}$ –1 mm mucronate, the mucro apical or subapical, 1–15 by 0.5–5 cm, 3–5-plinerved and 2–5 pairs of nerves from the midrib, or \pm pinninerved, reticulation mostly distinct, margin entire; petiole 0.2–3 cm. *Glands* at blade-base 1 single, or 2 contiguous or free, $\frac{1}{2}$ –2 mm \varnothing , either on a wart-like or subspathulate median appendage, or on two \pm connate- or entirely separate auricles; blade glands 0 or 1–3 pairs, \pm approximate to the axils of the nerves. *Stipules* narrowly triangular to linear, 1–1 $\frac{1}{2}$ mm. *Inflorescences* peduncled for up to 2(–3) cm, 2–20 (–50)-flowered in δ 1–3(–5)-flowered in φ ; tendril 0–1, 3–7(–10) cm. Sterile tendrils 2–10 cm. Bracts and bracteoles narrowly triangular to lanceolate, sometimes \pm serrulate, 1–2 mm. δ *fl.* tubular-infundibuliform, incl. the (2–)4–10 mm long stipe (13–)15–27 by 3–5 mm, the calyx lobes in anthesis opening to c. 10 mm. Pedicel 2–20 mm. Hypanthium cup-shaped $1\frac{1}{2}$ –3 $\frac{1}{2}$ mm, calyx tube (4–)5–10 mm, calyx lobes oblong to lanceolate, obtuse to subacute, 5–8(–10) mm, up to 0.3 mm serrulate-fimbriate. Petals lanceolate, acute, $5\frac{1}{2}$ –9 by (1–)1 $\frac{1}{2}$ –2 mm, 3-nerved, up to 0.3 serrulate, inserted at the same level as or up to 2 mm above the corona. Filaments 2–4 $\frac{1}{2}$ mm, connate for $\frac{1}{2}$ –2 $\frac{1}{2}$ mm, inserted at the base of the hypanthium or on an androgynophore up to 3 mm. Anthers $3\frac{1}{2}$ –5 by ($\frac{1}{2}$ –) $\frac{3}{4}$ –1 mm, subobtuse, up to 0.2 mm apiculate. Septa 1–2 $\frac{1}{2}$ mm high. Corona hairs fine, $\frac{1}{3}$ –1 mm. Disk glands $\frac{3}{4}$ –1 $\frac{1}{2}$ mm. Vestigial ovary $\frac{1}{2}$ – $\frac{3}{4}$ mm, gynophore up to $\frac{3}{4}$ mm. φ *fl.* tubular-campanulate, incl. the 1–7 mm long stipe 10–22 by (3–)3 $\frac{1}{2}$ –6 mm, calyx lobes in anthesis opening to

c. 10 mm. Pedicel 2–10 mm. Hypanthium shortly cup-shaped 1–2½(–3) mm, calyx tube 2½–7½ mm, calyx lobes oblong, obtuse to acute, 3–6(–8) mm, up to 0.3 mm serrulate-laciniate. Petals lanceolate(-linear), acute, 3–7½ by ½–1½ mm, 1–3-nerved, entire or up to 0.2 mm denticulate in the upper half, inserted at the same level as the corona. Staminodes 2½–4 mm, connate for up to 1½ mm, inserted at the base of the hypanthium; once found with abortive anthers. Septa 0–1½ mm high. Corona hairs ½–1 mm. Disk glands ½–1 mm. Pistil 6–11 mm. Gynophore 1½–3 mm. Ovary ovate-ellipsoid, 3½–6 by 2½–4 mm. Styles connate for ½–1½ mm, style-arms ½–1 mm. Stigmas subglobose, (lacinate-) papillate, each 1–2½ mm \varnothing . *Fruit* 1–2 per inflorescence, ovate-ellipsoid (to oblong), excl. the 2–10 mm long gynophore 2–4 by 1½–2½ cm. Pericarp thinly to thickly coriaceous. Seeds 10–30 per capsule, ovate to orbicular, 5–7 by 4½–6 by 2½–3 mm, nearly smooth to muricate, 4–8 pits along the length; funicles 2–3 mm; embryo 4–5½ mm; cotyledons suborbicular, apex \pm truncate, 3½–5½ by 3½–5½ mm.

DISTRIBUTION. S. Sudan to Malawi. — Fig. 30.

ECOLOGY. Savanna, rocky places; (600-)800–2000 m. Flowers mainly Aug.-Febr., fruits (Aug.-)Oct.-Febr.

USES. Several times recorded as poisonous; the fruit once as edible. Various medicinal properties are ascribed to the plant.

NOTES. 1. Once a specimen with hermaphroditic flowers was found; also incidentally flowers with 6 calyx lobes and petals, or with 4 styles.

2. Fresh flowers are recorded as greenish, creamy, dull yellow, or salmon-pink, sometimes brown-reddish spotted. Fruits greenish turning yellow or orange.

3. A variable species, in habit as well as in size of flowers and fruits and seeds, as in the shape of the leaves. Two largely allopatric subspecies are recognized.

KEY TO THE SUBSPECIES

1. Glands at blade-base 2, on two separate auricles. **a. ssp. lanceolata**
1. Gland(s) at blade-base 1–2, on a single median wart-like or subspathulate appendage, or on two \pm connate auricles. **b. ssp. scheffleri**

a. ssp. lanceolata — Fig. 30.

Leaves elliptic-oblong to lanceolate 2–15 by ½–3½ cm. *Glands* at blade-base 2, on two separate auricles ½–2 mm \varnothing at the apex of the petiole. *Inflorescences* up to 10(–15)-flowered in σ , 1–3-flowered in φ . σ *fl.* incl. the 4–10 mm long stipe (13–)15–27 mm. φ *fl.* variable in size, incl. the 2–7 mm long stipe 10–22 mm. *Fruit* excl. the 2–6 mm long gynophore 2–4 cm.

SUDAN. Bahr el Ghazal, Yirol Distr., Joki Abbot: *Andrews 425*, ♂ fl. (K) — Equatoria, Djurland, Grosse Sibera Ghattes: *Schweinfurth 109*, ♂ fl. (B †, type *A. lanceolata* var. *grandifolia*; K), 1570, 1834, 1837 (B †, n.v., syntype *A. lanceolata*).

UGANDA. Eastern Prov., Teso, Serere, 3600 ft.: *Chandler 552*, ♀ fl. (K); Kyere, 3600 ft.: *Chandler 1077*, ♀ fl. (K).

KENYA. Karamoja (K2), Kalapata, 6000 ft.: *Wilson 842*, ♀ fl., fr. (EA, K).

TANZANIA. Tanganyika, Lake Prov., Ukerewe I.: *Conrads 5654*, ♀ fl., fr. (BR, EA, K); 40 miles S. of Nungwe, Emin Pasha Gulf, 4400 ft.: *Morgan 64*, fr. (BM); Mwanza Distr.: *Tanner 1284*, ♂ fl. (BR, K) — Western Prov., Uvinsa, 3700 ft.: *Bullock 3238*, fl. (K); 25 miles W. of Tabora: *Carnochan 89*, ♀ fl. (BM); Mpanda Distr., Kungwe-Mahali Penins., 3000 ft.: *Harley 9484*, ♂ fl. (BR, K); Mpanda-Ikola Rd., 1050 m: *Richards 11677 (I & II)*, ♀ fl., fr. (K); 10 miles from Ikola, 900 m: *Richards 11746*, ♀ fl. (K); Rungwe (Iyonga Rd.), 1080 m: *Richards 13394*, ♂ fl. (K).

NOTE. 1. Very variable in habit — possibly partly due to burning — and in the size of flowers and fruit. The specimens *Bullock 3238*, *Harley 9484*, *Richards 11677*, *11746* and *13394*, from east of Lake Tanganyika, are slender with remarkably small female flowers and fruits.

b. ssp. *scheffleri* (Engl. & Harms) de Wilde, *Blumea* 17 (1969) 180. — *Adenia scheffleri* Engl. & Harms, *Pfl. welt Afr.* 3, 2 (1921) 603; Harms, *Notizbl. Berl.-Dahl.* 8 (1923) 294. — Type: *Scheffler 213* — Fig. 30.

Leaves ovate or obovate to lanceolate, 1–6(–8½) by ½–2½(–5) cm. *Glands* at blade-base 1–2, either single or contiguous, on a median wart-like or subspathulate appendage, or two ± connate auricles, 1½–3 mm ∅, at the apex of the petiole, making the blade slightly peltate. *Inflorescences* up to 50-flowered in ♂, 1–3(–5)-flowered in ♀. ♂ fl. incl. the 3–7½ mm long stipe 17–26 mm. ♀ fl. variable in size, incl. the 1–6 mm long stipe 10–22 mm. *Fruit* excl. the 2–10 mm long gynophore (2–)2½–4 cm.

KENYA. Machakos Distr. (K4), Mutha Plain: *Boy Joana (7472)*, ♀ fl. (EA, K), *B7507*, ♀ fl. (K); Kibwezi, 3000 ft.: *Battescombe 887*, ♂ fl. (EA, K), *Boy Theophilo B. 7594*, ♂ fl. (EA, K); Kibwezi to Makindu, 1000 m: *Scheffler 213*, ♂ fl. (B †, type; HBG); Mtito Andei, 2550–2800 ft.: *Greenway 9544*, ♂ fl. (EA, FI); *Greenway EAH. 12220*, fr. (EA), *Polhill & Paulo 468*, ♀ fl., fr. (K); mile 147 Mombasa – Nsi: *Verdcourt 2388*, ♀ fl., fr. (EA) — Coastal (K7), Tsavo., Nat. Park E., Yatta Plateau: *Bally 13502*, fr. (K); N. of Galana: *Hucks 512*, fr. (EA); Mbololo Plain: *Boy Joana (9083)*, ♀ fl., fr. (EA).

TANZANIA. Tanganyika: *Govt. Chemist, Dar es Salaam A/60*, st. (EA) — Lake Prov., Shinyanga: *Koritschoner 1723*, ♂ fl. (EA), *1793*, ♀ fl. (EA, K), *1816*, ♂ fl. (EA) — North. Prov., Mbulu Distr., 914 m: *Richards 23457*, ♀ fl., fr. (K) — Tanga Prov., Pare Hills, below Mwembe, 3200 ft.: *Bally 4251*, fr. (EA); Handeni, Ngobore, 3500 ft.: *Burt 4924*, ♂ fl., ♀ fl. (K) — Central Prov., Manyoni Distr., 4000 ft.: *Burt 5397*, ♂ fl. (BM, BR, EA, K); Saranda: *Peter 33607*, st. (B) — Eastern Prov., Mpwapwa, 3500 ft.: *Burt 4002*, ♀ fl., fr. (K), *Hornby 551*, p.p., fr. (EA, K), *640*, ♀ fl., fr. (EA, K); Morogoro Distr., Uluguru Mt., c. 750 m: *Bruce 294*, ♀ fl. (K), *Schlieben 3129*, ♂ fl. (BM, BR, K, M, P, Z); Morogoro Plains, 1600 ft.: *Wallace 512*, fr. (K).

ZAMBIA. Northern Prov., Isoka: *Fanshawe 7213 (1 & 2)*, fr. (FHO, K) — Eastern Prov., Lundazi R. Tigone Dam, 1200 m: *Robson 663*, ♂ fl. (BM), *677*, ♀ fl., fr. (BM).

MALAWI. 77 km N. of Lilongwe, south of Mtiti R., 1140 m: *Gillett 17515*, ♂ fl. (EA).

NOTE. 1. Most Kenya- and Tanzania specimens have small female flowers, measuring 10–13(–15) mm.

Specimens from Mpwapa (Tanzania), e.g. *Hornby 551* and *640* have large leaves with subtruncate apex, female flowers 17–22 mm long, and fruits c. 4 cm long on 7–10 mm long gynophores.

The specimens from Zambia and Malawi (*Fanshawe F.7213*, *Gillett 17515*, *Robson 663* and *677*) represent a form often with a subapical, not apical, mucro on the leaves, many-flowered male inflorescences, and large female flowers, incl. the 4–6 mm long stipe 17–20 mm.

60. *Adenia digitata* (Harv.) Engl., Bot. Jahrb. 14 (1891) 375; Burt Davy, Ann. Transv. Mus. 3 (1912) 121; Engl., Pfl. welt Afr. 3, 2 (1921) 605; Burt Davy, Man. Flow. Pl. and Ferns Transv. & Swazil. 1 (1926) 221; Steyn, Tox. Pl. South Africa (1934) 310, fig. 43A, 44, 45, 47A; Henkel, Woody Pl. Natal Zulul. (1934) 118; Liebenberg, Bothalia 3, 4 (1939) 541, 527, 530–532, fig. 1–3, 14–17, pl. 6–36; A. & R. Fernandes, Garcia de Orta 6, 2 (1958) 259; Dyer c.s., Wild Flow. Transv. (1962) 225; Watt & Breyer-Brandwijk, Med. Pois. Pl. ed. 2 (1962) 826, fig. 218. — *Modecca digitata* Harv., Thes. Cap. 1 (1859) 8, tab. 12; Fl. Cap. 2 (1862) 500. — Type: *Owen s.n.* — Fig. 30; 31a-h.

Clemanthus senensis Klotzsch in Peters, Reise Moss. Bot. (1862) 143. — *Modecca senensis* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 513; Schinz, Bull. Trav. Soc. Bot. Genève (1891) 67; Hook. f. in Curt., Bot. Mag. 3, 57 (1901) tab. 7763. — *Adenia senensis* Engl., Bot. Jahrb. 14 (1891) 375; Harms, Bot. Jahrb. 15 (1893) 573; in E. & P., Nat. Pfl. fam. 3, 6a (1894) 84; *ibid.* ed. 2, 21 (1925) 491; Bak. f., Contr. Fl. Gazal., in J. Linn. Soc. Bot. 40 (1910) 73; Engl., Pfl. welt Afr. 3, 2 (1921) 605; Burt Davy, Man. Flow. Pl. and Ferns Transv. & Swazil. 1 (1926) 221; Norlindh, Bot. Not. (1934) 106; Garcia, Est. Ens. Doc. Junta Inv. Ultr. 12 (1954) 163; A. & R. Fernandes, Garcia de Orta 6, 2 (1958) 258. — Syntype: *Peters s.n.*

Adenia stenophylla Harms, Bot. Jahrb. 26 (1899) 238; Engl., Pfl. welt Afr. 3, 2 (1921) 605; Burt Davy, Man. Flow. Pl. and Ferns Transv. & Swazil. 1 (1926) 222. — Type: *Wilms 941*.

Adenia multiflora Potts, Ann. Transv. Mus. 5 (1917) 235; Harms, Notizb. Berl.-Dahl. 8 (1923) 298; Burt Davy, Man. Fl. Pl. and Ferns Transv. & Swazil. 1 (1926) 221 — Type: *Potts (Fehrson), Transv. Mus. 13786*.

Adenia angustisecta Burt Davy, Kew Bull. (1921) 280; Man. Fl. Pl. and Ferns Transv. & Swazil. 1 (1926) 222. — Type: *Mundy 4700*.

Adenia buchananii Harms in Engl., Pfl. welt Afr. 3, 2 (1921) 605. — Lectotype: *Buchanan 244*.

Subherbaceous climber 0.2–3 m, growing from a variable tuber up to 60 cm \varnothing . Stems mostly annual; fertile branches greenish or greyish, 1½–5 mm; internodes 1½–12 cm. *Leaves* herbaceous to coriaceous, green to brownish above, greyish to glaucous beneath, densely punctate or not, deeply (3–)5

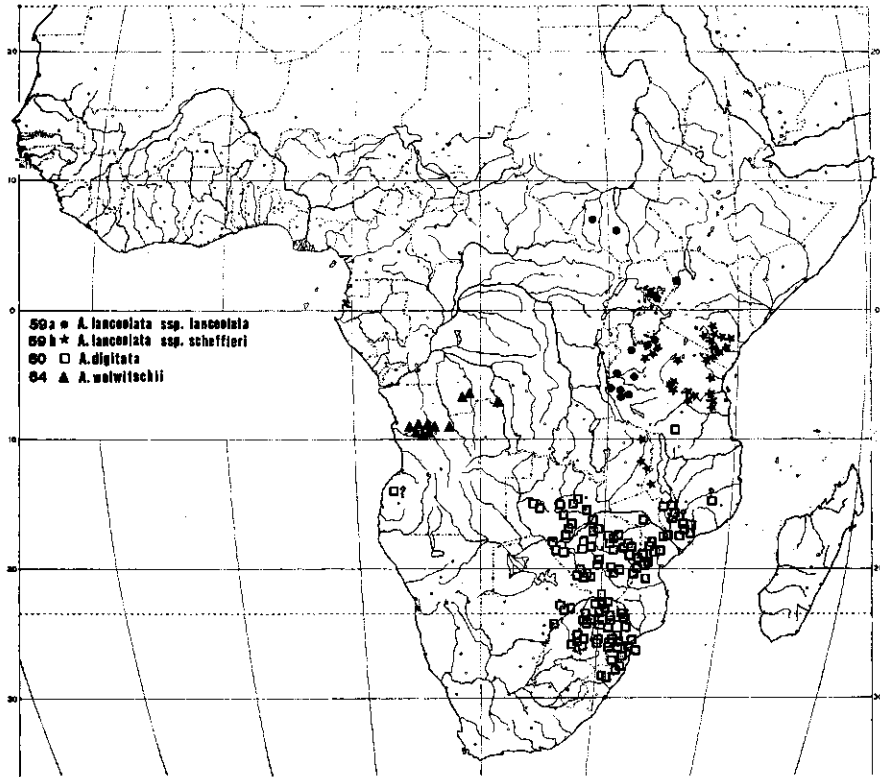


FIG. 30. Localities of species 59-60, 64.

-parted or -foliate, suborbicular in outline, base cordate, 4-18 by 3-17 cm, 5-plinerved; leaflets variable, entire to deeply (2-)3-5(-10)-lobed, ovate or obovate to linear, longly acute, apex rounded to acute, sometimes 1 mm mucronate, $1\frac{1}{2}$ -15 by $\frac{3}{4}$ -4 (-7) cm, nerves 2-12 pairs, reticulation rather indistinct, margin entire, petiolule up to 2 cm; petiole 1-9 cm. Glands at blade-base 2, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm \varnothing , on two separate \pm upward directed auricles 1-2 mm \varnothing , at the transition of petiole to blade; blade glands 2-4, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm \varnothing in the basal part between the insertions of the leaflets and each leaflet with 0-8 glands, scattered or submarginal. Stipules narrowly triangular to lanceolate, acute, 1-3 mm, withering. *Inflorescences* peduncled for up to 7 cm, (1-)5-20(-60)-flowered in σ , 1-10-flowered in ρ ; tendril 1, 2-10 cm. Sterile tendrils up to 15 cm. Bracts and bracteoles lanceolate, acute, rarely serrulate, $1\frac{1}{2}$ -3 mm. σ fl. \pm tubular-infundibuliform, incl. the 3-12(-15) mm long stipe (14-)20-38 by 3-10 mm, the calyx lobes in anthesis spreading to 6-15 mm. Pedicel 1-15 mm. Hypanthium cup-shaped, (1-)2-3 $\frac{1}{2}$ mm, calyx tube (5-)8-12 mm, calyx lobes ovate or oblong to lanceolate, obtuse, (4-)7-11 mm, up to $\frac{1}{2}$ mm dentate-fimbriate. Petals lanceolate, acute, 6-12 by (1-)1 $\frac{1}{2}$ -2 $\frac{1}{2}$ mm, (1-)3-nerved, up to 0.2 mm

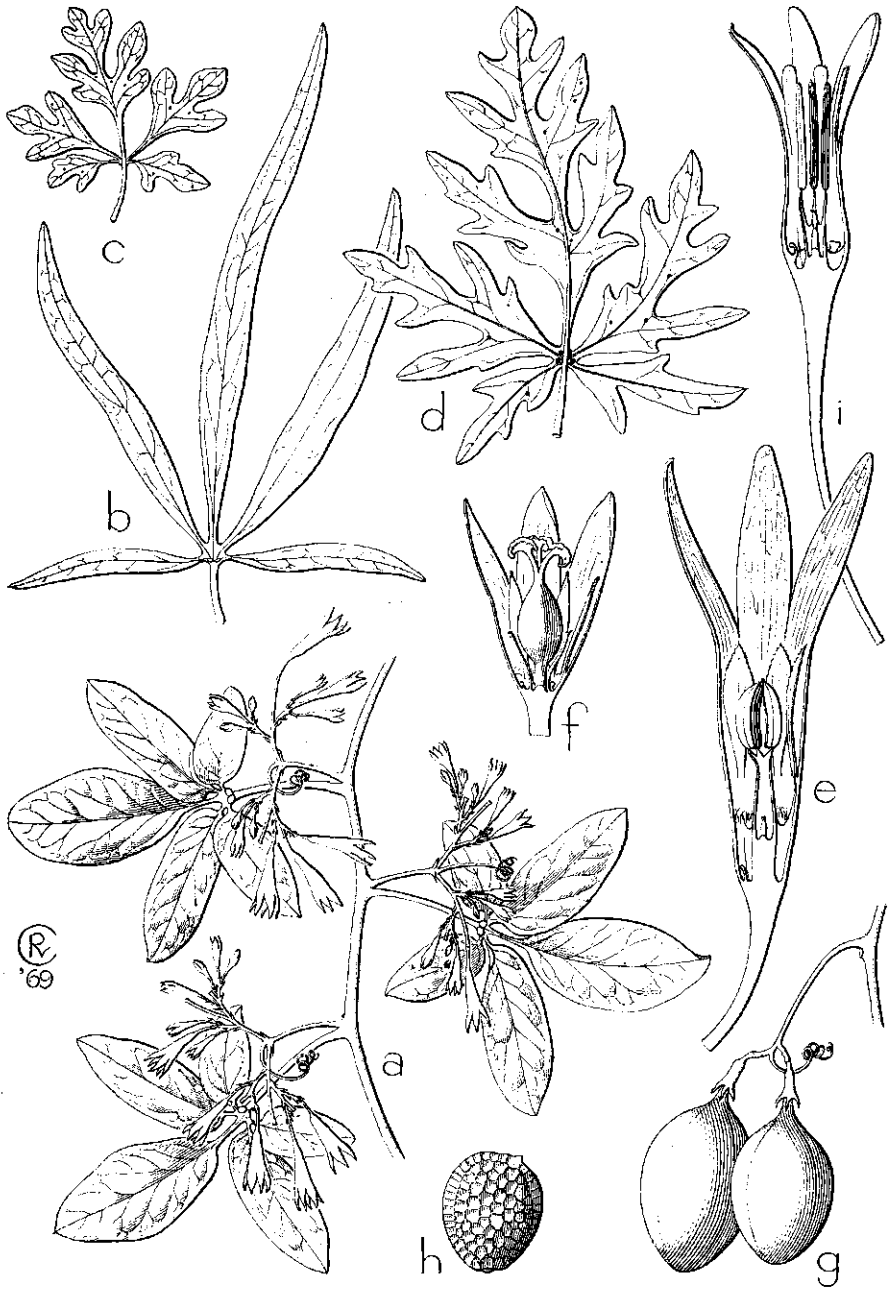


FIG. 31. a-h. *Adenia digitata*. a. habit of branch with ♂ inflorescences, $\times \frac{1}{2}$ (Fries, Norlindh & Weimarck 3415); b. leaf, $\times \frac{1}{2}$ (Young 33291); c. ditto, $\times \frac{1}{2}$ (Galpin 677); d. ditto, $\times \frac{1}{2}$ (Munro s.n.); e. ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (Chase 7887); f. ♀ flower, longitudinal section, $\times 2\frac{1}{2}$ (Liebenberg 3366); g. infructescence, $\times \frac{1}{2}$ (Marques 3443); h. seed, $\times 2\frac{1}{2}$ (Munro s.n.). — i. *Adenia kirkii*, ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (Mgaza 556).

dentate or fimbriate, inserted at the same level as or up to 5 mm above the corona. Filaments $3\frac{1}{2}$ –(9–12) mm, connate for $(1\frac{1}{2}$ –) $2\frac{1}{2}$ –7 mm (that is for at least halfway), inserted on an androgynophore 1– $3\frac{1}{2}$ mm. Anthers 3–6 by $1(-1\frac{1}{2})$ mm, \pm inward curved, clinging together by the c. 0.2 mm long papillate apiculae. Septa $\frac{1}{2}$ –3 mm high. Corona hairs $(\frac{1}{3}$ –) $\frac{1}{2}$ –2 mm, rarely absent. Disk glands $(\frac{1}{3}$ –) $\frac{1}{2}$ – $1\frac{1}{2}$ mm. Vestigial ovary $\frac{1}{2}$ –1 mm, gynophore up to $1\frac{1}{2}$ mm. *Hermaphroditic fl.* 20–25 mm; see also the notes. *♀ fl.* tubular-infundibuliform, incl. the 2–7 mm long stipe 15–26 by 5–6 mm. Pedicel 1–5 mm. Hypanthium 2–4 mm, calyx tube 4–8 mm, calyx lobes ovate to oblong, obtuse, 5–7 mm, entire. Petals lanceolate to linear, acute, 2–7 by $\frac{1}{3}$ –1 mm, 1(–3)-nerved, entire or serrulate near the apex, inserted at the same level as or up to 4 mm above the corona. Staminodes 3–5 mm, up to 1 mm connate, inserted at the base of the hypanthium. Septa up to $\frac{1}{2}$ mm high. Corona hairs $\frac{1}{3}$ –1 mm. Disk glands c. 1 mm. Pistil 8–12 mm. Gynophore 2–4 mm. Ovary ovoid to oblong, (4–)5–6 by (2–)3–4 mm. Styles connate for 1– $1\frac{1}{2}$ mm; style-arms 1– $1\frac{1}{2}$ mm. Stigmas subreniform, woolly-papillate, each 2–3 mm \varnothing . *Fruit* 1–3 per inflorescence, ovoid to ellipsoid(-oblong), excl. the (2–)5–12 mm long gynophore $(2\frac{1}{2}$ –)3– $5\frac{1}{2}$ (– $7\frac{1}{2}$) by $(1\frac{1}{2}$ –)2– $3\frac{1}{2}$ (–4) cm. Pericarp coriaceous, sometimes spongy inside, up to 4 mm thick, smooth. Seeds (10–)20–60 per capsule, (ob)ovate to elliptic, 6–8 by $4\frac{1}{2}$ – $6\frac{1}{2}$ by 3 mm, 6–8 pits along the length; funicles 1–3 mm; embryo $4\frac{1}{2}$ – $6\frac{1}{2}$ mm; cotyledons suborbicular, apex obliquely truncate, 4–6 by 4– $5\frac{1}{2}$ mm.

TANZANIA. Tanganyika, Iringa Distr., T7, Mufindi Rd., 1800 m: *Richards 15707*, fr. (K).
 ANGOLA. Moçamedes, Caitô to Camucuiu (Serra do Lungo): *Mendes 391*, δ fl., fr. (LISU).
 ZAMBIA. — Barotse. — Southern Prov. — Central Prov., Lusaka: *Fanshawe 4107*, δ fl. (FHO, K).

SOUTH RHODESIA. Northern Prov. — Western Prov. — Central Prov. — Eastern Prov. — Southern Prov., Victoria Distr.: *Monro 1465*, φ fl. (BM), *1471*, δ fl. (BM, Z); Beitbridge, 1500 ft.: *Davies 2828*, δ fl. (LISC, SRGH).

MALAWI. Southern Prov.: *Buchanan 49*, δ fl. (BM), *244*, δ fl. (B†, lectotype *Adenia buchananii*; K); Zomba: *Cameron 57*, φ fl. (K), *Jackson 2129*, fr. (K, SRGH); Chikala, 2000 ft.: *Manning (J.M.P.) 17*, δ fl. (K); Ruo, Mlanje: *Shinn s.n.*, δ fl. (BM).

MOZAMBIQUE. Amalongas: *Johnson 31*, δ fl. (K); Cundine: *Le Testu 623*, δ fl., φ fl. (BM, P), *912*, δ fl. (P) — Moçambique Prov., Ribáuê: *Torre & Paiva 10180*, δ fl., φ fl., fr. (LISC) — Zambézia Prov., Mocuba (Quelimane Distr.), 200–400 ft.: *Faulkner 266*, δ fl., φ fl., fr. (BR, EA, K, P, PRE, S); km 26 from Nicuadala, 40 m: *Torre & Correia 14320*, δ fl. (LISC); Maganja da Costa: *Torre & Correia 14540*, δ fl. (LISC) — Tete Prov., Tete to Lupate: *Kirk s.n.* (K) — Manica e. Sofala Prov., Chitengo (Gorongosa): *Balsinhas 1051*, δ fl. (COI); Moramballa (?): *Kirk s.n.*, fr. (K); Sena (Senna): *Kirk s.n. (1)*, δ fl. (K; BR, photographs); Rio de Sena: *Peter s.n.* (B†, type *Clemanthus senensis, n.v.*, photographs see Liebenberg l.c.). — Gaza Prov., Amatonga Forest (Sul do Save): *Rogers 4524*, δ fl. (BM, SRGH); Madanda Forest, 400 ft.: *Swynnerton s.n.*, δ fl., fr. (BM, K); Kurumadzi R. (Jihu), 2000 ft.: *Swynnerton 27*, δ fl., φ fl., fr. (BM, K, Z); Lower Muswirizwi, 1000 ft.: *Swynnerton 2091 (a)*, fr. (BM, K) — Lourenço Marques Prov., Delagoa Bay; Namaacha: *Mendonça 1702*, fr. (LISC); Sábiê: *Mendonça 3101*, fr. (LISC); Maputo: *Mendonça 3443*, fr. (BR, LISC), *Torre 2058*, δ fl. (LISC, SRGH); Inhaca I.: *Mogg s.n.*, fr. (EA, K, PRE), *5370*, φ fl., fr. (K, SRGH).

BOTSWANA. SE. Prov., Mts. Koudou (Kalahari): *Duparquet 289*, st. (P); Maseking (Kalahari): *Duparquet 492*, st. (P); s.loc.: *Gething s.n.*, fr. (K); Mochudi: *Rogers 6231*, δ fl. (K, Z); Mahalapye: *Yalala 345*, fr. (SRGH), *353*, fr. (SRGH, WAG).

REP. OF SOUTH AFRICA. — Transvaal; Lydenburg: *Mundy 4700* (BOL, *n.v.*, type *Adenia an-meded. Landbouwhogeschool Wageningen 71-18 (1971)*

gustisecta, photograph see Liebenberg, pl. 16.); Lydenburg: *Wilms 941* (B †, type *A. stenophylla*, photograph see Liebenberg, pl. 15); Pretoria, Baviaanspoort: *Fehrson, Transv. Mus. 13786* (PRE, type *Adenia multiflora*) — Natal, Vrijheid, 4000 ft.: *Gerstner 2330*, ♂ fl. (K, L, P, PRE); Ngwavuma Distr.: *Strey 4781*, ♂ fl. (K) — Zululand: Macallisberg: *Burke s.n.*, ♂ fl. (K, Z); Nongoma: *Gerstner 4707*, ♀ fl., fr. (K); s. loc.: *Owen s.n.*, ♂ fl. (T. C. Dublin, n.v., type *Modecca digitata*; K, photo); Togoland: *Vahrmeijer & Tölken 276*, st. (K); Ngwavuma, 200 ft.: *Ward 3173*, ♂ fl. (PRE).

SWAZILAND: *Wells 2033*, fr. (K).

ECOLOGY. Various savanna associations, bushland ('veld'), dry rocky or grassy places, termite mounds, forest fringes; stony-, sandy- or clayish soils; 0–1850 m. Never gregarious. Flowers and fruits Oct.-March.

USES. Known as deadly poisonous. In the tuber two kinds of poison have been found: a quickly acting cyanogenetic glucoside and a more slowly acting toxalbumine called modeccine. Sometimes recorded as with medicinal properties.

NOTES. 1. According to LIEBENBERG, pl. 11, *Wood 6878* in herb. *Schlechter* (B†), annotated in HARMS' handwriting, is the type of *A. buchananii*. In the original description HARMS cites no type specimen, but mentions Nyassaland. WOOD, however, never collected in Nyassaland. *Buchanan 244* (K) is chosen as lectotype.

As LIEBENBERG (1939) points out with the aid of a series of photographs, *A. senensis* and *A. digitata* have to be considered as one single variable species. LIEBENBERG (l.c. p. 527, 530, 531) mentions the possible existence of a large-fruited taxon in the Pretoria-Rustenburg-area in South Africa.

A. multiflora is a small-flowered specimen taken from a tuber kept in a windowsill in the Transvaal Museum. (See also LIEBENBERG l.c., p. 531).

2. Distinguished from its most related species, i.e. *A. kirkii*, *A. welwitschii*, *A. trisecta* and *A. mossambicensis*, and the non-climbing *A. wilmsii*, by the short, ± curved anthers which are clinging together by the papillate apiculae, and by the filaments which are connate into a tube for more than halfway.

3. Two collections from Mozambique, *Le Testu 623* and *Torre & Paiva 10180*, contain beside male flowers also some hermaphroditic flowers. *Le Testu 623* deviates in both types of flowers by the filaments which are ± free or connate for less than the half; in *Torre & Paiva 10180* the filaments are for the larger part connate. In both collections the anthers are small, 2(–3) mm, and free at their apexes; the corona is absent or ill-developed. Also in the drawing of the type-specimen of *A. digitata* (*Owen s.n.* in Herb. Trinity Coll., Dublin), in Thes. Cap., the filaments are shown as largely free. The only known specimen from Angola, *Mendes 391*, is a deviating specimen with aberrant anthers.

4. Fresh flowers are reported as pale green, cream, (pale) yellow, orange, brownish or reddish, sometimes as streaked with red; they are recorded as fragrant, with a sweet but unpleasant smell, or as odourless. Often the flowers are produced before the leaves. Ripe fruits are brilliant yellow to red; the pulpy aril is orange.

The leaves are sometimes reported as fleshy; once as glaucous.

5. Sometimes mature flowers of very variable sizes are found in one specimen.

61. *Adenia kirkii* (Mast.) Engl., Bot. Jahrb. 14 (1891) 375; Harms in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84; Engl., Pfl. welt Afr. 3, 2 (1921) 605; Watt & Breyer-Brandwijk, Med. Pois. Pl. ed. 2 (1962) 828. — *Modecca kirkii* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 515. — Type: *Kirk s.n.* — Fig. 31 i, 32.

Herbaceous climber to 3 m. Fertile branches greyish- or purplish green, $1\frac{1}{2}$ –3 mm; internodes 2–10 cm. *Leaves* herbaceous to coriaceous, brown to green above, grey-glaucous beneath, punctate or not, 3–5-foliolate, suborbicular in outline, base \pm cordate, 3–14 by $2\frac{1}{2}$ –13 cm, 3–5-plinerved; leaflets entire or (especially the middle ones) pinnately up to 5-lobed, ovate to oblong, base acute, apex obtuse to acute, 1–10 by $\frac{1}{2}$ –5(–7) cm, nerves 2–5 pairs, reticulation indistinct, margin entire, petiolule (0–)0.2– $2\frac{1}{2}$ cm; petiole 1–5 cm. *Glands* at blade-base 2, 1–2 mm \varnothing , on two \pm upward curved auricles 1–3 mm \varnothing at the transition to the petiole; blade glands 2–4, $\frac{1}{2}$ –1 mm \varnothing , in the basal part of the blade between the insertions of the leaflets; the middle leaflets with up to 10 small glands, scattered or submarginal, rarely with two auricle-like glands at the apex of the petiolule. *Stipules* linear, c. 1 mm, withering. *Inflorescences* peduncled for 1–6 cm, up to 15-flowered in σ , 1–4-flowered in ρ ; tendril 1, 2–6 cm. Sterile tendrils up to 12 cm. Bracts and bracteoles narrowly triangular to linear, 1– $1\frac{1}{2}$ mm. σ fl. tubular-infundibuliform, incl. the 15–25 mm long stipe 25–40 by 2–4 mm, calyx lobes in anthesis opening to c. 10 mm. Pedicel 5–10 mm. Hypanthium (incl. calyx tube) (5–)7–9 mm, calyx lobes oblong-lanceolate, obtuse, 5– $6\frac{1}{2}$ mm, subentire. Petals (ob)lanceolate, obtuse, (4–)5–6 by 1– $1\frac{1}{2}$ mm, 3-nerved, c. 0.1 mm serrulate near the apex, inserted (4–)5–6 mm above the base of the hypanthium. Filaments 4–5 mm, connate for c. $1\frac{1}{2}$ mm, inserted on an androgynophore up to $\frac{1}{2}$ mm. Anthers $4\frac{1}{2}$ –6 by $\frac{1}{2}$ – $\frac{3}{4}$ mm, obtuse, up to 0.1 mm apiculate. Septa ($\frac{1}{2}$ –)1 mm high. Corona 0. Disk glands $\frac{1}{2}$ –1 mm. Vestigial ovary $\frac{1}{2}$ –1 mm, gynophore 1– $1\frac{1}{2}$ mm. ρ fl. tubular-infundibuliform, incl. the 8–12(–15) mm long stipe 16–24(–30) by 3–4 mm. Pedicel 1–7 mm. Hypanthium (incl. calyx tube) 2– $6\frac{1}{2}$ mm, calyx lobes ovate to oblong, subobtuse, 4–5 mm, (sub)entire. Petals lanceolate to linear, subobtuse, $2\frac{1}{2}$ – $4\frac{1}{2}$ by $\frac{3}{4}$ – $1\frac{1}{4}$ mm, (1–)3-nerved, subentire, inserted 1– $3\frac{1}{2}$ mm above the base of the hypanthium. Staminodes 2–4 mm, connate for $\frac{1}{2}$ –1 mm, sometimes with \pm abortive anthers 1–2 mm, inserted at the base of the hypanthium. Septa up to 1 mm high. Corona 0. Disk glands $\frac{1}{3}$ – $\frac{3}{4}$ mm. Pistil 7–8 mm. Gynophore 2–3 mm. Ovary ovoid-ellipsoid, 3– $3\frac{1}{2}$ by 2– $2\frac{1}{2}$ mm. Styles connate for $\frac{2}{3}$ – $\frac{3}{4}$ mm, style-arms $\frac{2}{3}$ – $\frac{3}{4}$ mm. Stigmas subglobular, finely papillate-laciniate, $1\frac{1}{2}$ –2 mm \varnothing . *Fruit* 1(–2) per inflorescence, ovoid to ellipsoid, excl. the c. 5 mm long gynophore (2–)3– $3\frac{1}{2}$ by 2– $2\frac{1}{2}$ cm. Pericarp coriaceous, c. $\frac{1}{3}$ mm. Seeds c. 40 per capsule, obovate to subrotund, c. 5– $5\frac{1}{2}$ by $4\frac{1}{2}$ –5 by 3 mm, 6–8 pits \varnothing ; funicles c. 3 mm; embryo not known.

KENYA. Coastal Prov. (K 7), s.loc.: *Rawlins 292*, st. (EA); Utwani Forest Res.: *Rawlins 359*, σ fl. (EA); Malindi, Lower Sabaki (Galana R.): *Rawlins 891*, σ fl. (EA, K).

TANZANIA. Tanganyika, Northern Prov., Mbulu Distr., Lake Manyara Nat. Park: *Greenway & Kaweri EAH. 13096*, st. (EA, K) — Tanga Prov.: *Kässner 136*, σ fl. (BM); SE. of

Ngomeni, 75 m; *Drummond & Hemsley 3601*, st. (EA, K); Pangani Distr., Msubugwe Forest: *Mgaza 556*, ♂ fl. (EA); E. Usambara: *Peter 54624*, st. (B) — Eastern Prov., Dida Forest: *Jeffrey K. 569*, st. (EA); Sokotu-Ganga: *Jeffrey K. 694*, ♂ fl. (EA); opposite Zanzibar I.: *Kirk s.n.*, ♀ fl. (K); Dar es Salaam: *Kirk s.n.*, ♂ fl. (K, type *Modecca kirkii*); Morogoro Distr., 1600 ft.: *Wallace 304*, ± fl. (K) — Southern Prov., Tendaguru Hill, 400 ft.: *Migeod 374*, ♂ fl. (BM), *1185*, ♀ fl., fr. (EM); 80 km W. of Lirdi, 700 m: *Schlieben 6175*, ♂ fl. (BM, BR, P, S, Z) — Zanzibar I.: *Faulkner 2919*, ♀ fl. (K).

ECOLOGY. Shrublayer of evergreen forest, grassland; mostly near the coast, sandy soil; 0–700 m. Flowers in Oct., Febr., March, April and May; fruit in Dec.

NOTES. 1. Characterized by the long, slender, flower stipe; distinguished from *A. digitata* by the straight anthers, not clinging at their apices.

2. In the female flowers sometimes ± abortive anthers are developed; tending to hermaphroditism.
3. Leaves of juvenile specimens are sometimes variegated and have a distinct, up to 3 mm wide peltate blade-base.
4. Stem once reported as dark brown; leaves as fleshy. Fresh flowers are whitish, pale yellow, cream, or reddish; once reported as fragrant.

62. *Adenia mossambicensis* de Wilde, *sp. nov.* — Fig. 32.

Scandens, c. 2 m alta, tuberifera. *Folia* 3–5-partita, ambitu ovato-oblonga, 3–6 cm longa, 2–4(–5) cm lata; petioli $\frac{1}{2}$ – $2\frac{1}{2}$ cm longi. Foliola integra vel usque ad 8-lobata, basi acuta, apice obtusa usque acuta, $2\frac{1}{2}$ –5 cm longa; petioluli $\frac{1}{2}$ (–1) cm longi. *Glandulae* 2 basales, transitione laminae cum petiolo instructae. *Inflorescentiae* 1-cirrhiferae, pedunculo $1\frac{1}{2}$ –4 cm longo instructae. *Flores* ♂ stipite 9–11 mm longo incl. (20–)25–30 mm longi, 3–4 mm lati. Hypanthium 3–5 mm longum. Calycis tubus 4–7 mm longus, lobis 5–8 mm longis. Petala 5–7 mm longa, 1 mm lata. Antherae erectae, c. 4 mm longae, apice liberae. Filamenta $4\frac{1}{2}$ –6 mm longa, parte inferiori in tubum $2\frac{1}{2}$ –3 mm longum coalita. Septa $2\frac{1}{2}$ –5 mm alta. Corona e pilis $\frac{1}{2}$ –1 mm longis constituta. Disci glandulae $1\frac{1}{2}$ –2 mm longae. *Flores* ♀ ac fructus ignoti.

Herbaceous climber up to 2 m, growing from a tuberous rootstock. Fertile branches greyish-green, 1– $2\frac{1}{2}$ mm; internodes 1–10 cm. *Leaves* herbaceous, green above, glaucous-green, not punctate beneath, 3–5-foliate, ovate-oblong in outline, base cordate, apex subacute, 3–6 by 2–4(–5) cm, 3(–5)-plinerved; leaflets entire or the middle leaflet pinnately up to 8-lobed, ovate to oblong, base acute, apex obtuse to acute, the middle leaflet largest, $2\frac{1}{2}$ –5 by 1– $1\frac{1}{2}$ (– $2\frac{1}{2}$) cm, nerves 2–6 pairs, reticulation indistinct, margin entire, petiolule $\frac{1}{2}$ (–1) cm, basal leaflets much smaller, 1–2 cm, subsessile; petiole $\frac{1}{2}$ – $2\frac{1}{2}$ cm. *Glands* at blade-base 2, wart-like, flat, $\frac{1}{2}$ –1 mm \varnothing , at the transition to the petiole; blade glands c. $\frac{1}{2}$ mm \varnothing , up to 6 on the middle leaflet, submarginal, no glands between the insertions of the leaflets. Stipules lanceolate, c. 1 mm, withering. *Inflorescen-*

ces peduncled for $1\frac{1}{2}$ –4 cm, up to 12-flowered in ♂; tendril 1, 1–5 cm. Sterile tendrils up to 10 cm. Bracts and bracteoles lanceolate, acute, 1– $1\frac{1}{2}$ mm. ♂ fl. ± tubiform, incl. the 9–11 mm long stipe (20–)25–30 by 3–4(–5) mm, calyx lobes in anthesis opening to c. 10 mm. Pedicel 5–15 mm. Hypanthium cup-shaped, 3–5 mm, calyx tube 4–7 mm, calyx lobes oblong, obtuse, 5–8 mm, (sub)entire. Petals lanceolate, ± obtuse, 5–7 by 1 mm, 3-nerved, irregularly c. 0.1 mm dentate near the apex, inserted at the same level as or up to 1 mm above the corona. Filaments $4\frac{1}{2}$ –6 mm, connate for $2\frac{1}{2}$ –3 mm, inserted at the base of the hypanthium or on an androgynophore up to 2 mm. Anthers c. 4 by $\frac{3}{4}$ mm, obtuse, up to 0.2 mm apiculate. Septa $2\frac{1}{2}$ –5 mm high. Corona hairs fine, branched, $\frac{1}{2}$ –1 mm. Disk glands ($\frac{1}{2}$ –) $1\frac{1}{2}$ –2 mm. Vestigial ovary c. $\frac{1}{2}$ mm, gynophore c. $\frac{1}{2}$ mm. ♀ fl. and fruit not known.

MOZAMBIQUE. Moçambique Prov., Eráti (2 km from Alua, via Mejuco), 450 m: Torre & Paiva 9544, ♂ fl. (LISC, type).

ECOLOGY. Granite rock; c. 450 m. Flowers in Dec.

NOTES. 1. Apparently closely allied to *A. welwitschii* from N. Angola but differing e.g. by the different position of the stamens, the smaller anthers and the obtuse petals.

2. The flowers are cream-coloured.

63. *Adenia trisecta* (Mast.) Engl., Bot. Jahrb. 14 (1891) 375; Hiern, Cat. Afr. Pl. Welw. (1898) 384; Engl., Pfl. welt Afr. 3, 2 (1921) 605; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 660; Consp. Fl. Angol. 4 (1970) 223. — *Modecca trisecta* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 514. — Type: *Welwitsch 863*. — Fig. 32.

Subherbaceous climber c. 3 m, growing from a tuberous rootstock. Stems annual, greyish; fertile branches 2–3 mm; internodes 2–7 cm. Leaves herbaceous, green-brown above, much paler, minutely reddish-brown punctate beneath, 3(–5)-foliate, ± suborbicular in outline, base ± cordate, 4–8 by 5–10 cm, 3–5-plinerved; leaflets entire, ovate to oblong, base acute, apex acute to subobtuse, up to 1 mm mucronate, 2–6 cm, nerves 2–4 pairs, reticulation indistinct, margin entire, petiolule 0–1 cm; petiole 1–4 cm. Glands at blade-base 2, c. 1 mm \varnothing , on two auricles 1– $1\frac{1}{2}$ mm \varnothing at the transition to the petiole; blade glands 2(–4), $\frac{1}{2}$ –1 mm \varnothing , in the basal part between the insertions of the leaflets; no other glands. Stipules narrowly triangular, acute, 1– $1\frac{1}{2}$ mm, withering. Inflorescences peduncled for 2– $7\frac{1}{2}$ cm, up to 12-flowered in ♂, 1–3-flowered in ♀; tendril (0–)1, 3–6 cm. Sterile tendrils c. 8 cm. Bracts and bracteoles lanceolate, 1–2 mm. ♂ fl. ± tubular-campanulate, incl. the 2–7 mm long stipe 18–26 by 3–7 mm, calyx lobes in anthesis opening to c. 10 mm. Pedicel 5–10 mm. Hypanthium cup-shaped $2\frac{1}{2}$ –4 mm, calyx tube 5–8 mm, calyx lobes ovate-oblong, subacute, 5–9 mm, up to 0.1 mm dentate. Petals lanceolate-linear, subacute, 5– $6\frac{1}{2}$ by 1–2 mm, 3-nerved, remotely up to 0.3 mm dentate-sinuate

in the upper half, inserted at the same level as, or up to 2 mm above the corona. Filaments 2–2½ mm, connate for c. 1 mm, inserted on an androgynophore 1–2 mm. Anthers 5–5½ by ¾–1 mm, obtuse, c. 0.2 mm apiculate. Septa 1½–3 mm. Corona hairs sparse, ½–¾ mm. Disk glands c. 1 mm. Vestigial ovary ½–1 mm, gynophore c. 1 mm. ♀ fl. campanulate, incl. the 1½–2½ mm long stipe 10–15 by 6–8 mm. Pedicel 2–5 mm. Hypanthium 1½–2 mm, calyx tube 3½–5½ mm, calyx lobes oblong, acute, 4–6 mm, entire. Petals lanceolate-linear, subacute, 2–2½ by ½ mm, 1-nerved, entire, inserted at the same level as, or up to ½ mm above the corona. Staminodes 3 mm, connate for c. 1 mm. Septa c. 1 mm high. Corona hairs sparse ¼–⅓ mm. Disk glands ½ mm. Pistil 8–10 mm. Gynophore 1½–2 mm. Ovary ellipsoid 4–5 by 3–4 mm. Styles connate for ½ mm, style-arms 2 mm. Stigmas woolly-papillate, each c. 2½ mm ∅. *Fruit* 1–2 per inflorescence, subglobose to ellipsoid, excl. the 2–3 mm long gynophore c. 3 by 2¼ cm. Pericarp thinly coriaceous. Seeds c. 30 per capsule, obovate, 5–5½ by 4 by 2½ mm, ± rugose, c. 7 pits along the length; funicles c. 2 mm; embryo c. 4 mm; cotyledons suborbicular c. 3½ by 3¼ mm.

TANZANIA. Tanganyika, Western Prov. (T4), Kigoma Distr., Mahali Mts., Lumbye R. mouth, 2600 ft.: *Newbould & Jefford 1155*, ♂ fl. (K).

ANGOLA. Malange, Pungo Andongo Distr., left side of Lutete R.: *Welwitsch 863*, fr. (BM; LISU, lectotype), *863 fol. 2*, ♂ fl., ♀ fl. (LISU, syntype).

ECOLOGY. Fringing forest, thickets; sandy soil; 800–1200 m. In Angola flowers and fruits in Oct., in W. Tanzania flowers July–Aug.

NOTES. 1. Except the type-collection only known from a specimen from W. Tanzania which is slightly deviating by the somewhat broader male flowers and the small, not fully developed, leaves sustaining the inflorescences.

2. Related to *A. welwitschii* but differing by the smaller flowers, the presence of an androgynophore in the male flowers and by the smaller and shortly stiped fruits.

64. *Adenia welwitschii* (Mast.) Engl., Bot. Jahrb. 14 (1891) 375; Harms, Bot. Jahrb. 15 (1893) 573; in E. & P., Nat. Pfl. fam. 3, 6a (1893) 84; Hiern, Cat. Afr. Pl. Welw. (1898) 383; Engl., Pfl. welt Afr. 3, 2 (1921) 605; Exell, J. Bot. 67, Suppl. Polypet. (1929) 192; Gossw. & Mendonça, Cart. Fitogeogr. Angol. (1939) 66, 83; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 660; Consp. Fl. Angol. 4 (1970) 223. — *Modecca welwitschii* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 513. — Type: *Welwitsch 864*. — Fig. 30.

Subherbaceous climber to c. 3 m, growing from a tuberous rootstock. Fertile branches greenish 1½–3½ mm; internodes 3–12 cm. *Leaves* herbaceous, brownish-green above, much paler, glaucous, ± brownish-reddish or yellowish nerved, not punctate beneath, (3–)5-foliate, suborbicular in outline, base cordate, apex (sub)acute, up to 1 cm acuminate, up to 1 mm mucronate, 4–16 by 4–16(–19) cm, (3–)5-plinerved; leaflets entire or the middle leaflet(s) deeply 3-

lobed, ovate to oblong, base acute, apex (sub)acute-acuminate, (1-)2-12 cm, nerves (2-)4-9 pairs, reticulation rather indistinct, margin entire, petiole 0-1.8 cm; petiole $1\frac{1}{2}$ -7 cm. *Glands* at blade-base 2, $\frac{1}{2}$ -1 mm \varnothing , on two \pm upward directed auricles 1-2 mm \varnothing , at the transition to the petiole; blade glands (2-)4, c. $\frac{1}{2}$ mm \varnothing , in the basal part between the insertions of the leaflets; the leaflets with 0-4 glands, scattered or submarginal. Stipules narrowly triangular to lanceolate, c. 1 mm, withering. *Inflorescences* peduncled for 2-9 cm, up to 10-flowered in δ , 1-3-flowered in φ ; tendril 1, 2-6 cm. Sterile tendrils up to 15 cm. Bracts and bracteoles lanceolate, sometimes serrulate, 1-2 $\frac{1}{2}$ mm. δ fl. tubular-campanulate, incl. the (3-)5-11 mm long stipe 20-38 by 5-8 mm, the calyx lobes opening in anthesis to c. 15 mm. Pedicel 5-12 mm. Hypanthium long cup-shaped 4-8 mm, calyx tube 5-8 mm, calyx lobes oblong-lanceolate, subacute, (5-)6-10 mm, subentire. Petals lanceolate, acute, $6\frac{1}{2}$ -10 by 2-2 $\frac{1}{2}$ mm, 3-nerved, c. 0.1 mm denticulate in the upper half, inserted at the same level as or up to 1 mm above the corona. Filaments 5-10 mm, connate for 2-6 mm, inserted 1-4 mm above the base in the hypanthium. Anthers 7-8 by $\frac{3}{4}$ -1 mm, obtuse, up to 0.1 mm apiculate. Septa 1-5 mm high. Corona hairs simple or branched, $\frac{1}{4}$ -1 mm. Disk glands $1\frac{1}{2}$ -2 mm. Vestigial ovary $\frac{1}{2}$ - $\frac{3}{4}$ mm, gynophore 1-3 mm. φ fl. tubular-campanulate, incl. the 4-8 mm long stipe 20(-24) by 5-6 mm, calyx lobes opening in anthesis to c. 10 mm. Pedicel 2-5 mm. Hypanthium 3-4 mm, calyx tube 6-7 mm, calyx lobes oblong, obtuse, 5-7 mm, subentire. Petals linear, acute, c. 3 mm, 1-nerved, entire, inserted c. 1 mm above the corona. Staminodes c. 4 mm, connate for 1-1 $\frac{1}{2}$ mm, inserted c. 1 mm above the base of the hypanthium. Septa 0-1 mm high. Corona hairs c. $\frac{1}{4}$ mm. Disk glands c. 1 mm. Pistil 12-14 mm. Gynophore 6-7 mm. Ovary ellipsoid, c. 5 by 3 mm. Styles connate for 1-1 $\frac{1}{2}$ mm, style-arms c. 2 mm. Stigmas subreniform, papillate, each c. 2 $\frac{1}{2}$ mm \varnothing . *Fruit* 1-2 per inflorescence, ellipsoid(-oblong), excl. the 15-27 mm long gynophore ($5\frac{1}{2}$ -)6-6 $\frac{1}{2}$ by 3-3 $\frac{1}{2}$ cm. Pericarp thinly coriaceous, \pm spongy inside, up to 5 mm. Seeds c. 45-60 per capsule, ovate, beaked for up to 1 mm, 6-6 $\frac{1}{2}$ by 4 $\frac{1}{2}$ -5 by 3 mm, 6-8 pits along the length; funicles c. 3 mm; embryo 4 $\frac{1}{2}$ -5 mm; cotyledons suborbicular, 4-4 $\frac{1}{2}$ by 4-4 $\frac{1}{2}$ mm.

REP. OF THE CONGO. Kasai, Kasanji: *Renier* 38, fr. (BR), 132, fr. (BR).

ANGOLA. s. loc.: *Gossweiler s.n.* (LISJC, n.v.) — Cuanza Norte, Vila Salazar, Cazengo: *Gossweiler* 4501, δ fl., fr. (BM, COI, K), 4528, φ fl., fr. (BM, K), 4769, δ fl. (BM), 5095, φ fl., fr. (BM, COI, LISJC, LISU; LUA, n.v.), 5209, δ fl., fr. (BM, COI, LISU); Salazar, Centro de Estudos, 800 m: *Silva s.n.* (LISC; LUA, n.v.); Pungo Andongo, 800-1200 m: *Welwitsch* 864, δ fl., fr. (BM, lectotype *Modecca welwitschii*; COI, K, LISU, P, Z), 864 fol. 2, δ fl. (LISU, syntype), 864 fol. 3, fr. (LISU, syntype), 864 fol. 4, fr. (LISU, syntype) — Lunda, Dundo, 750 m: *Gossweiler* 13922, δ fl. (BM, K; LUA, n.v.) — Malanje, Alto de Quela, 1200 m: *Nolde* 853, δ fl. (B†, BM, COI).

ECOLOGY. Forest edges, gallery forest; 500-1200 m. Flowers and fruits June-Jan.

NOTES. 1. Related to *A. trisecta* from the same area, and *A. digitata* and *A. mossambicensis*: see under these species.

2. Dry fruits are yellowish-red.

65. *Adenia wilmsii* Harms, Bot. Jahrb. 26 (1899) 238; Engl., Pfl. welt Afr. 3, 2 (1921) 603; Harms in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 491; Burt Davy, Man. Flow. Pl. and Ferns Transv. & Swazil. (1926) 222; Liebenberg, Bothalia 3, 4 (1939) 538, 526, 532, fig. 13; Dyer c.s., Wild Flow. Transv. (1962) 225. — Type: *Wilms 961*. — Fig. 32.

Erect herb 10–30(–50) cm, growing from a tuberous rootstock up to 20 cm \varnothing . Stems annual, pale greenish, 2–4 mm; internodes $1\frac{1}{2}$ –5 cm. *Leaves* herbaceous, \pm glaucous-green, not punctate, (5–)7-foliolate, broadly ovate to suborbicular in outline, base \pm cordate, 2–8(–12) by 2–6(–10) cm, 5–7-plinerved; leaflets entire to pinnately 3–7-lobed, ovate-oblong, base acute, apex acute up to 1 mm mucronate, 1–6(–10) by $\frac{1}{2}$ – $1\frac{1}{2}$ (–2), cm, the middle leaflet largest, nerves 3–8 pairs, reticulation mostly indistinct, margin entire, sessile; petiole 2–8(–10) cm. *Glands* at blade-base 2, 1– $1\frac{1}{2}$ mm \varnothing , on two auricles 1–2 mm \varnothing at the transition to the petiole; blade glands (0)–4–6, c. $\frac{1}{2}$ mm \varnothing , at the very base between the insertions of the leaflets and sometimes a few submarginal on the leaflets. *Stipules* lanceolate, 1–3 mm. *Inflorescences* peduncled for $\frac{1}{2}$ –5 cm, 1–3-flowered in σ , 1(–3)-flowered in ρ ; no tendrils. *Bracts and bracteoles* lanceolate, acute, 1–3 mm. σ *fl.* tubular-infundibuliform, incl. the 4–6 mm long stipe 20–25 by 2–5 mm, calyx lobes in anthesis spreading to c. 15 mm. *Pedicel* 5–10 mm. *Hypanthium* 2–3 mm, calyx tube 7–8 mm, calyx lobes elliptic to oblong, obtuse, 6– $7\frac{1}{2}$ mm, entire. *Petals* oblanceolate, obtuse to subacute, 7–10 by $1\frac{1}{2}$ –2 mm, 3–5-nerved, subentire, inserted at the same level as to up to 3 mm above the corona. *Filaments* 4– $5\frac{1}{2}$ mm, connate for $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, inserted on an androgynophore 1– $1\frac{1}{2}$ mm. *Anthers* $3\frac{1}{2}$ –4 $\frac{1}{2}$ by $\frac{3}{4}$ –1 mm, obtuse, up to 0.1 mm apiculate. *Septa* 2–3 mm high. *Corona hairs* $\frac{1}{2}$ –1 mm. *Disk glands* c. $\frac{1}{2}$ mm. *Vestigial ovary* c. 1 mm, *gynophore* $\frac{1}{2}$ –1 mm. ρ *fl.* tubiform-campanulate, incl. the 2–3 mm long stipe c. 12 by 3–4 mm, calyx lobes in anthesis opening to c. 6 mm. *Pedicel* 2–4 mm. *Hypanthium* c. 1 mm, calyx tube 5–6 mm, calyx lobes elliptic-oblong, obtuse, c. 4 mm, entire. *Petals* oblanceolate, subobtuse, c. 6 by 1 mm, 3-nerved, \pm 0.1 mm fimbriate near the apex, inserted at the same level as the corona. *Staminodes* c. $2\frac{1}{2}$ mm, free. *Septa* c. 1 mm high. *Corona hairs* c. $\frac{1}{2}$ mm. *Disk glands* c. $\frac{1}{2}$ mm. *Androgynophore* c. $\frac{1}{2}$ mm. *Pistil* c. 8 mm. *Gynophore* c. $1\frac{1}{2}$ mm. *Ovary* ovoid-ellipsoid, 4– $4\frac{1}{2}$ by 3 mm. *Styles* connate for $\frac{3}{4}$ mm, style-arms c. 1 mm. *Stigmas* subglobular, papillate, each c. $1\frac{1}{2}$ mm \varnothing . *Fruit* 1 per inflorescence, ellipsoid, excl. the c. 5 mm long gynophore, c. 4 by $2\frac{1}{2}$ cm. *Pericarp* thinly coriaceous. *Mature seeds* not known.

REP. OF SOUTH AFRICA. Transvaal, Lydenburg Distr.: *Liebenberg 3488*, ρ fl. (PRE), *Strey & Schlieben 3116*, σ fl., ρ fl., fr. (K, PRE), *Wilms 961*, σ fl. (B†, type; BM, K, L, P, Z), *van Wijk 7*, st. (PRE).

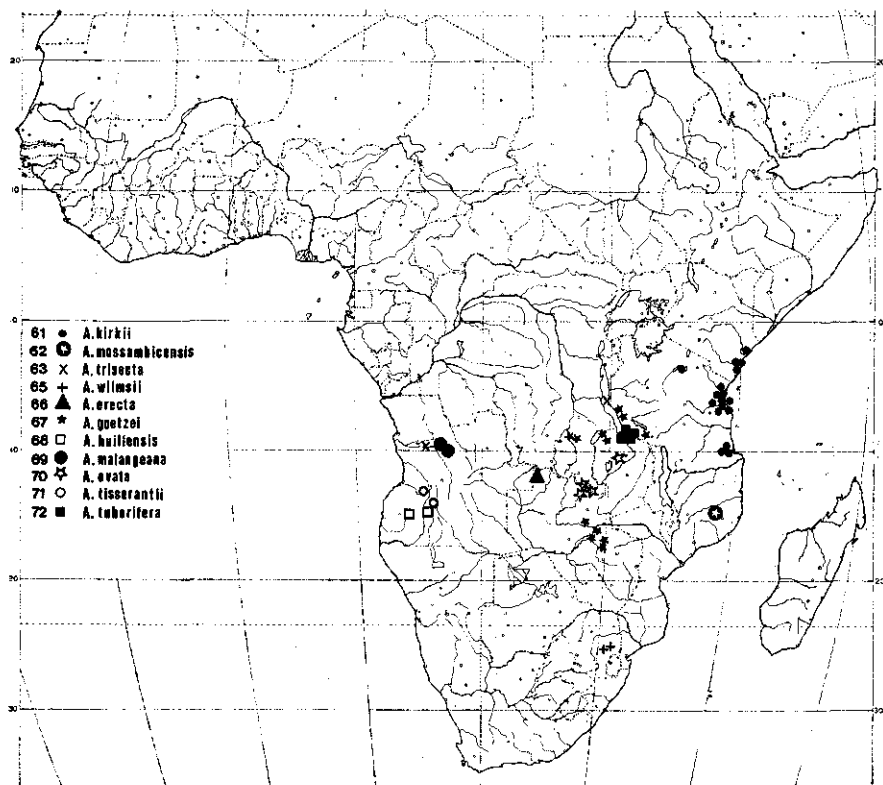


FIG. 32. Localities of species 61-63, 65-72.

ECOLOGY. Rocky places, dolomite outcrops; red loam soil; c. 1500 m. Flowers and fruits Sept.-Dec.

NOTES. 1. Apparently related to *A. digitata* but quite distinct by the low, erect habit and the absence of tendrils.

2. One of the male flowers of *Strey & Schlieben 3116* is 6-merous.

66. *Adenia erecta* de Wilde, *sp. nov.* — Fig. 32.

Herba erecta c. 40 cm alta, tuberifera. *Folia* linearia, integra, 12-20 cm longa, $\frac{1}{4}$ -0.4 cm lata; petioli 0-1 mm longi. *Glandulae* 2 basales, auriculis parvis transitione ad petiolum instructae. *Inflorescentiae* sessiles, ecirrhosae. *Flores* ♂ stipite 10-15 mm longo incl. 40-52 mm longi, 3-5 mm lati. Hypanthium calycis tubo incl. 20-23 mm longum. Calycis lobi 10-15 mm longi. Petala c. 4 mm longa, $\frac{2}{3}$ mm lata, c. 4 mm infra calycis lobos inserta. Antherae obtusae, c. $\frac{1}{2}$ mm apiculatae, c. 4 mm longae. Filamenta 7-9 mm longa, parte inferiore in tubum $1\frac{1}{2}$ -2 mm longum coalita, androgynophorio $1\frac{1}{2}$ -2 mm longo inserta.

Septa $2\frac{1}{2}$ –3 mm alta. Corona e pilis $\frac{1}{2}$ –1 mm longis 5–10 mm supra basin hypanthii dispersis composita. Disci glandulae 2–3 mm longae. Flores ♀ ac fructus ignoti.

Erect not ramified herb to 40 cm, growing from an elongate rootstock. Stems annual, 4–5 mm; internodes 1– $3\frac{1}{2}$ cm. Leaves ± coriaceous, ± glaucous-green, not punctate beneath, entire, linear, base acute, apex longly acute, 12–20 by 0.2–0.4 cm, pinninerved, reticulation indistinct, margin entire; petiole 0–0.1 cm. Glands at blade-base 2, 1– $1\frac{1}{2}$ mm \varnothing , partially situated on two inconspicuous auricles at the very base; blade glands $\frac{1}{2}$ –1 mm \varnothing , 10–20 in a row at either blade-half. Stipules triangular-lanceolate, acute, $1\frac{1}{2}$ –2 mm. Inflorescences sessile, 1–3-flowered in ♂; no tendrils. Bracts and bracteoles narrowly triangular to linear, $1\frac{1}{2}$ –2 mm. ♂ fl. narrowly tubular-infundibuliform, incl. the 10–15 mm long stipe 40–52 by 3–5 mm, calyx lobes in anthesis spreading to c. 20 mm. Pedicel 1–3 mm. Hypanthium incl. calyx tube 20–23 mm, calyx lobes lanceolate, obtuse, 10–15 mm, up to $\frac{1}{2}$ mm dentate. Petals lanceolate, obtuse, c. 4 by $\frac{2}{3}$ mm, 1-nerved, c. $\frac{1}{2}$ mm laciniate-fimbriate near the apex, inserted c. 4 mm below the throat of the calyx tube. Filaments 7–9 mm, connate for $1\frac{1}{2}$ –2 mm, inserted on an androgynophore $1\frac{1}{2}$ –2 mm. Anthers 4 by 1 mm, obtuse, c. $\frac{1}{2}$ mm apiculate. Septa $2\frac{1}{2}$ –3 mm high. Corona hairs $\frac{1}{2}$ –1 mm, scattered between 5–10 mm above the base of the hypanthium. Disk glands 2–3 mm. Vestigial ovary incl. gynophore 1– $1\frac{1}{2}$ mm. ♀ fl. and fruit not known.

ZAMBIA. Western, Mwinilunga Distr., Mujileshi R.: Richards 16959, ♂ fl. (K, type).

ECOLOGY. Grassland at edge of river; 1290 m. Flowers in Nov.

NOTES. 1. Related to *A. malangeana*.

2. Fresh flowers are reported as with pale ochre calyx tube and pale yellow petals.

67. *Adenia goetzei* Harms, Bot. Jahrb. 30 (1902) 360, tab. 14; Engl., Pfl. welt Afr. 3, 2 (1921) 603; Harms in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 491. — Type: Goetze 1418. — Fig. 32.

Erect, not- or sparingly branched herb up to 35 cm, growing from a tuber up to 10(–20) cm \varnothing . Stems annual, $2\frac{1}{2}$ –5 mm; internodes $\frac{1}{2}$ –3(–7) cm. Leaves subcoriaceous, somewhat glaucous, finely purplish-brown spotted beneath, (oblong-)lanceolate to lanceolate-linear, base acute to long-attenuate and inconspicuously auricled, apex acute, c. $\frac{1}{2}$ mm mucronate, 7–22 by ($\frac{3}{4}$ –)1– $6\frac{1}{2}$ cm, pinninerved, nerves 4–6 pairs, ascending, reticulation rather distinct, margin entire; petiole (0–)1–2(–4) mm. Glands at blade-base 2, 1–2 mm \varnothing , partly situated on two ± inwardly curved auricles of c. 2 mm \varnothing at the very base of the blade. Blade glands 0–20, $\frac{1}{4}$ – $\frac{1}{2}$ mm \varnothing , scattered. Stipules narrowly triangular, entire or 2–5-dentate or -partite, 1– $2\frac{1}{2}$ mm. Inflorescences sessile or up to 8 mm peduncled, 1–5-flowered, the lower often axillary to 5–10 mm long

tricuspidate cataphylls; tendrils 0. Bracts and bracteoles narrowly triangular, sometimes serrulate, 1–2½ mm. Flowers polygamous. ♂ *fl.* tubular-infundibuliform, incl. the 3–7 mm long stipe 12–24 by 3–6(–8) mm, lobes spreading in anthesis to c. 12 mm. Pedicel 3–5 mm. Hypanthium 1½–3 mm, calyx tube 5–8 (–9) mm, calyx lobes oblong, obtuse, 3–7(–8) mm, 0.2 mm long crispate-fimbriate or denticulate or entire. Petals inserted at the same level or up to 3 mm above the corona, lanceolate-linear, acute, 6–10 by ¾–2 mm, 1–3-nerved, up to ½ mm long fimbriate in the upper ⅔ to only near the apex. Filaments 4–7 mm, ½–2 mm connate, inserted at the base of the hypanthium or on an androgynophore up to 3 mm. Anthers 3–5 by ¾–1 mm, obtuse with a ± blunt or acute, mostly ± papillate, 0.2–½ mm long apiculum. Septa 1–3 mm high. Corona consisting of a dense row of ¾–2 mm long hairs. Disk glands ½–¾ mm. Vestigial ovary, incl. gynophore 1–1½ mm. *Hermaphroditic fl.* tubular-infundibuliform, slightly larger than the ♂ *fl.*, incl. the 2½–8 mm long stipe 13–26 by 3–8 mm. Pedicels 2–4 mm. Hypanthium (½–)1–2½ mm, calyx tube 4–8(–10) mm, calyx lobes oblong, obtuse, 4–8(–9) mm. Petals inserted at the same level as the corona, lanceolate-linear, acute, 5–12 by ½–1¾ mm, 3-nerved, fimbriate. Filaments inserted at the base of the hypanthium or on an up to 1 mm long androgynophore, 3–7 mm, free or up to 1½ mm connate. Anthers sometimes partly abortive towards the apex, 2½–4(–4½) by ½–1 mm, incl. the ½–1 mm long, blunt, mostly papillate apiculum. Septa (0–)1–2 mm high. Corona consisting of a dense row of 1–1½ mm long hairs. Disk glands ¼–¾ mm. Pistil 7–10(–12) mm. Gynophore 2(–4) mm. Ovary ellipsoid-oblong, 3½–5(–6) by 2½–4(–4½) mm. Styles ± free or up to 1 mm connate, free style arms ¾–1½ mm. Stigmas subglobular, papillate, each 1–1½ mm ∅. ♀ *fl.* resembling the ♂ and hermaphroditic flowers, incl. the 2½–5½ mm long stipe 16–22 mm. Petals 5–7 by ½–1 mm. Staminodes c. 2 mm, ± free. Septa 0–1 mm. *Fruit* 1 per inflorescence, pendent at maturity, ellipsoid to obovate, faintly 3(–6)-ribbed, excluding the curved 10–20 mm long gynophore 3–4(–4½) by 2–2½ cm. Pericarp coriaceous. Seeds 30–40 per capsule, ovoid to subglobular, 4–4½ by 3½ by 2–2½ mm, 8–10 pits across the diameter; funicles 2–3 mm; embryo c. 3 mm long; cotyledons suborbicular, c. 2½ by 3 mm.

REP. OF THE CONGO. Haut Katanga, Parc Nat. de l'Upembe, Lufera R., 920 m: *Witte s.n.*, fl., fr. (BR); Kiwakishi: *Witte 4483*, ♂ fl. (BR).

TANZANIA. Tanganyika, Western, Kigoma Distr., Ulemba-Ikola track, 1050 m: *Richards 11723*, ♀ fl., fr. (K), *11726*, ♂ fl. (K) — Southern Highlands, Unyika, Toola, 1300 m: *Goetze 1418*, ♀ fl., fr. (B†, *n.v.*, type).

ZAMBIA. Northern Prov., Lake Mweru reg., NE. of Chiengi, Mweru Wantipa: *Bullock 1266A*, fr. (K), *1290*, ♂ fl. (K) — Centr. Prov., Lusaka: *Fanshawe 10487*, ♀ fl. (K).

SOUTH RHODESIA. Northern Prov., Sinoia: *Rand 322*, ♂ fl., ♀ fl. (BM); Urungwe, 3000 ft.: *Wild 4202*, ♀ fl. (K), *4238*, ♂ fl., ♀ fl. (K); Lomagundi Distr., 4000 ft.: *Wild & Drummond 6673*, ♀ fl., fr. (K, M).

ECOLOGY. Savannas, stony places, shrub vegetation, *Brachystegia*-woodland; 900–1400 m. Sometimes typical pyrophytes emerging after the first heavy rains. Flowers and fruits in Oct., Nov. and Dec.

- NOTES. 1. On the field labels the flowers are noted as pale greenish or greenish-yellow, on the outer side often finely reddish striped.
2. One of the few species which are usually polygamous: specimens with either male- and hermaphroditic-, as well as specimens with male- and female flowers, apparently preferably on different shoots, have been found. The flowers are variable in size and shape: relatively broad and narrow male flowers may be found together.
 3. Specimens from S.Rhodesia deviate in having relatively broad, toothed or dissected stipules.
 4. In the original description and figure the apiculae of the anthers are not shown as papillate; the styles are figured as relatively long-connate; this is also found in *Witte s.n.* from SE. Congo.
 5. The specimen *Fanshawe 10487* (in K) from Lusaka, with female flowers, is in habit more or less intermediate with *A.ovata* by its relatively broad leaves (up to 10 by 4½ cm) more or less in a rozette at the apex of the c. 10 cm long erect stem. The structure of the flowers and the presence of well developed basal blade glands, however, point to *A.goetzei*. More material is needed to establish the relationship between these two species.

68. *Adenia huillensis* (Welw.) A. & R. Fernandes, *Bol. Soc. Brot.* 2, 32 (1958) 83; Garcia de Orta 6, 4 (1958) 658; *Consp. Fl. Angol.* 4 (1970) 220. — *Machadoa huillensis* Welw., *Trans. Linn. Soc. Lond.* 27 (1871) 29, t. 10; Mast. in Oliv., *Fl. Tr. Afr.* 2 (1871) 520; Harms in E. & P., *Nat. Pfl. fam.* 3, 6a (1894) 80; *ibid.*, *Nachtr.* 1 (1897) 254; *ibid.* ed. 2, 21 (1925) 486; *Bot. Jahrb.* 24 (1897) 177; Hiern, *Cat. Afr. Pl. Welw.* 1, 2 (1898) 385; Engl., *Pfl. welt Afr.* 3, 2 (1921) 596; Parr, *Bull. Afr. Succ. Pl. Soc.* 2 (1968) 253; Hutch., *Evol. and Phyl. Flow. Pl.* (1969) 219, fig. 187. — Type: *Welwitsch 865*. — Fig. 32.

Erect not- or sparingly ramified herb to 30 cm, growing from a napiform tuber c. 10 cm long. Stems annual, glaucous, 2–4 mm; internodes ½–2 cm. *Leaves* thinly coriaceous, glaucous, finely punctate beneath, entire, lanceolate-linear, base and apex longly acute, 8–18 by ½–0.8 cm, nerves 5–9 pairs, reticulation indistinct; petiole (0–)0.1–0.2 cm. *Glands* at blade-base 0; blade glands 0. *Stipules* narrowly triangular-linear, acute, 1½–2 mm. *Inflorescences* peduncled for up to 1 cm, 1–5-flowered in ♂ and ♀, 1–2-flowered in ♀; tendrils 0. Lower inflorescences in the axils of cataphylls up to 10 mm. Bracts and bracteoles narrowly triangular to linear, acute, 2–4 mm. ♂ *fl.* resembling ♀ *fl.* *Hermaphroditic fl.* tubular-infundibuliform, incl. the 2–4 mm long stipe 14–16 by 2½–4 mm, calyx lobes in anthesis opening to c. 10 mm. Pedicel 5–10 mm. Hypanthium 1½–2 mm, calyx tube 4–5 mm, calyx lobes elliptic-oblong, obtuse, 5–6 mm, up to 0.2 mm crispate-fimbriate. Petals lanceolate-linear, acute to obtuse, (5–)6–8 by ½–1 mm, 3-nerved, up to 0.3 mm denticulate towards the apex, inserted at the same level as the corona. Filaments 3–4 mm, connate for ½–1 mm, inserted at the base of the hypanthium or on an androgynophore up to

1 mm; alternating with the filaments there are appendages, 1-1½ mm, linear or bifid, acute, originating from the septa (see notes). Anthers 3-4 by ¾ mm, subacute, c. ½ mm apiculate. Septa c. 1½ mm high. Corona filaments ½-¾ mm. Disk glands 1-1½ mm. Pistil c. 8 mm. Gynophore c. 2 mm. Ovary ellipsoid-oblong, c. 5 by 3 mm. Styles ½-1 mm, largely free. Stigmas subglobular, papillate, each c. 1½ mm \varnothing . ♀ fl. incl. the c. 2-3 mm long stipe c. 10 by 2 mm. *Fruit* 1 per inflorescence, pendent, ellipsoid to obovoid, excl. the 6-15 mm long, curved gynophore (2½-3)-3½ by 1½-2 cm. Pericarp coriaceous, faintly 3(-6)-ribbed. Seeds c. 30 per capsule, ovoid, c. 5 by 4 by 2½ mm, c. 10 pits along the length; funicles 1½-2 mm; embryo not known.

ANGOLA. Huila, Lopollo, 5000 ft.: *Welwitsch* 865, ♂ fl., ♀ fl., fr. (BM, type; K, LISU) — Bié — Huila, Ganguelas, Vila Artur de Paiva, 1450 m: *Mendes* 1903, ♀ fl., fr. (LISC).

ECOLOGY. Dry stony hills with low scrub; 1450-1650 m. Flowers and fruits in Dec. and Jan.

NOTES. 1. The acute, linear or bifid appendages ('denticulis singulis' of *WELWITSCH* (1871) ('subulate processes' of *HUTCHINSON*, 1967) mentioned in the description, originating from the septa close of the filaments, are homologous with a part of the corona hairs or filaments, which not rarely also in other species extend on the septa; see also under *A. ovata*.

2. Only male- and hermaphroditic flowers are known. The male flowers resemble according to A. & R. FERNANDES the hermaphroditic flowers. *Mendes* 1903 is a fruiting specimen with remnants of ♀ flowers at the fruit bases.

3. The species seems most related to *A. tisserantii* from which it differs by a number of small characters.

69. *Adenia malangeana* Harms, Notizbl. Berl.-Dahl. 8 (1923) 294; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 658; Consp. Fl. Angol. 4 (1970) 219. — Type: *Mechow* 296. — Fig. 32.

Erect herb to 40 cm, growing from a tuberous rootstock. Stems annual, grey-glaucous, 1½-3 mm; internodes 1-5 cm. *Leaves* herbaceous to thinly coriaceous, ± glaucous, finely spotted beneath, entire, (oblong-)lanceolate to oblanceolate, base longly acute, apex acute to obtuse, (4-)5-9 by 0.8-1½ cm, nerves 5-8 pairs, reticulation rather distinct, margin entire; petiole (0-)0.1-0.2 cm. *Glands* at blade-base 2, c. 1 mm \varnothing , partially on two inconspicuous auricles at the very base; blade glands 10-20, scattered or partly submarginal. Stipules narrowly triangular to linear, 1½-2 mm. *Inflorescences* peduncled for 0.2-1½ cm, monochasial, 1-5-flowered in ♂; no tendrils. Bracts and bracteoles narrowly triangular, acute, sometimes denticulate, 1½-3 mm. ♂ fl. narrowly tubular-infundibuliform, incl. the (5-)7-15½ mm long stipe 30-48 by 2-5 mm, calyx lobes in anthesis spreading to c. 20 mm. Pedicel 2-10 mm. Hypanthium incl. calyx tube 12-15 mm, calyx lobes lanceolate, subobtuse, (8-)10-18 mm, subentire. Petals lanceolate-linear, obtuse, 5-7 by ¾ mm, 1(-3)-nerved, 0.2 mm

fimbriate, inserted $1\frac{1}{2}$ –3 mm below the throat of the calyx tube. Filaments 6–8 mm, connate for $1-1\frac{1}{2}$ mm, inserted at the base of the hypanthium or on an androgynophore $\frac{1}{2}$ –1 mm. Anthers (4–) $4\frac{1}{2}$ – $5\frac{1}{2}$ by $\frac{1}{2}$ mm, obtuse. Septa 1–2 mm high. Corona 0. Disk glands $1\frac{1}{2}$ –2 mm. Vestigial ovary incl. gynophore c. $1\frac{1}{2}$ mm. ♀ fl. and fruit not known.

ANGOLA. Malanje: *Mechow* 296, ♂ fl. (B †, type, n.v.); Nova Gaia Rd.: *Young* 976, ♂ fl. (BM) — Huila, Lubango, Hoque, c. 1700 m: *Teixeira & Andrade* 4407 (LUA, n.v.).

ECOLOGY. Savanna; c. 1000 m. Flowers in Oct.

70. *Adenia ovata* de Wilde, *sp. nov.* — Fig. 32–33.

Herba c. 10 cm alta, radice tuberiformi. *Folia* late ovata vel suborbiculata, integra, 7–14 cm longa, 5–12 cm lata; petioli 1–4 mm longi. *Glandulae* minutae 0–2 folii basi transitiona ad petiolum instructae. *Inflorescentiae* sessiles, ecirrhosae. *Flores* ♂ stipite (4–)5–7 mm longo incl. (14–)18–22 mm longi, 4–7 (–8) mm lati. Hypanthium $1\frac{1}{2}$ –2 mm longum. Calycis tubus 6–8 mm longus, lobis 3–5 (–7) mm longis. Petala 7–9 mm longa, $1-1\frac{1}{2}$ mm lata, coronae altitudine insertae. Antherae (1–) $1\frac{1}{2}$ –3 mm longae; apiculae papillosae $\frac{1}{2}$ – $1\frac{1}{4}$ mm longae. Septa $1\frac{1}{2}$ –2 mm alta. Corona e pilis 1–2 mm longis constituta. Disci glandulae $\frac{1}{3}$ –1 mm longae. Pistillum 7–10 mm longum. *Flores* ♀ floribus hermaphroditis similes. *Fructus* obovati usque oblongi, subacuti, gynophorio 5–10 mm longo excl. $1\frac{1}{2}$ – $2\frac{1}{2}$ cm longi, c. 1 cm lati.

Suberect herb 5–10 cm, growing from a roundish tuber. Stems annual or partly perennial, short, 1–3 cm long, 2–3 mm thick; internodes 0.2–1 cm. *Leaves* ± prostrate, subcoriaceous, brownish- or reddish-green or grey-green above, distinctly paler, grey-green, densely purplish-red mottled beneath, entire, broadly ovate to suborbicular, base broadly rounded, shortly cuneate, apex broadly rounded, sometimes minutely acuminate, 7–14 by 5–12 cm, (3–)5 (–7)-plinerved and 3–4 (–7) pairs of nerves from the midrib, reticulation distinct, margin entire; petiole 0.1–0.4 cm. *Glands* at blade-base 0 or 2, $\frac{1}{2}$ –1 mm \varnothing , on the blade-margin near the insertion of the petiole; no other glands. Stipules narrowly triangular, acute, entire or remotely dentate or dissected, 2–4 mm. *Inflorescences* peduncled up to 0.4 cm, 1–7-flowered in ♂, ♀ and ♀; no tendrils. Bracts and bracteoles narrowly triangular to linear, acute, denticulate, $1\frac{1}{2}$ – $3\frac{1}{2}$ mm. Flowers polygamous. ♂ fl. buds up to 10 mm. Anthers as in ♀ fl., 3– $3\frac{1}{2}$ mm, incl. the blunt, papillate apiculum c. 1 mm. Vestigial ovary 1– $1\frac{1}{2}$ mm. *Hermaphroditic fl.* tubular-infundibuliform, incl. the (4–)5–7 mm long (c. 2 mm thick) stipe (14–)18–22 by 4–7 (–8) mm, calyx lobes in anthesis suberect. Pedicel 2–5 mm. Hypanthium $1\frac{1}{2}$ –2 mm, calyx tube 6–8 mm, calyx lobes ovate-oblong, obtuse, 3–5 (–7) mm, up to 0.2 mm crispate-fimbriate. Petals lanceolate(-linear), subobtuse to subacute, 7–9 by $1-1\frac{1}{2}$ mm, (1–)3-nerved, densely 0.1–0.2 mm fimbriate-papillate in the upper half, inserted at the same

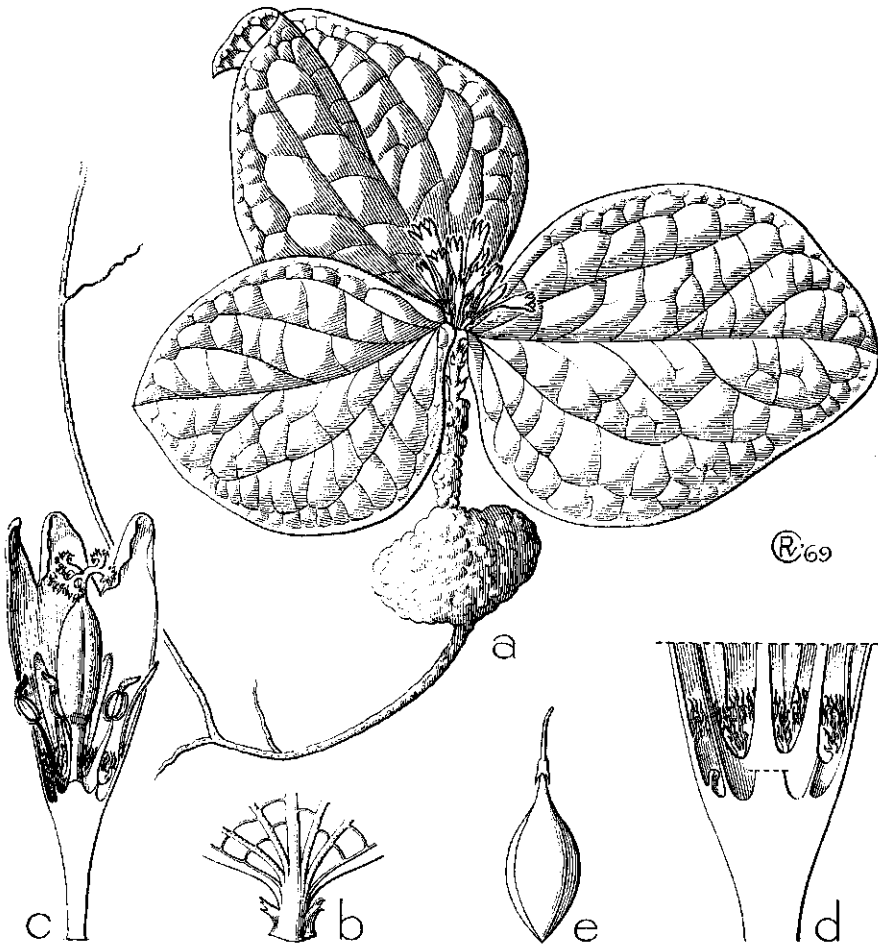


FIG. 33. *Adenia ovata*. — a. habit, $\times \frac{1}{2}$ (Fanshawe 2516, type); b. leaf base with stipules, $\times 1$ (Richards 19374); c. hermaphroditic flower, longitudinal section, $\times 2\frac{1}{2}$ (Wild 4854); d. ditto, detail of hypanthium, $\times 5$ (Cruse 30); e. fruit, $\times 1$ (Mutimushi 2857).

level as the corona. Filaments 4–5 mm, connate for (1–)1½(–2) mm, inserted at the base of the hypanthium. Anthers (1½–)2–4 by ¾–1¼ mm, incl. the obtuse, papillate apiculum ½–1¼ mm. Septa 1½–2 mm high. Corona hairs 1–2 mm, extending on the septa. Disk glands ½–1 mm. Pistil 7–10 mm. Gynophore 1½–3 mm. Ovary ellipsoid-oblong, 4–5 by 2–3 mm, often finely warty. Styles connate for c. 1 mm, style arms 1–1½ mm. Stigmas subglobular, woolly-papillate, each c. 1½ mm \varnothing . ♀ fl. tubular-infundibuliform, incl. the 4–5(–6) mm long stipe (12–)17–19 by 4–6(–8) mm. Pedicel 2–5 mm. Hypanthium c. 1½ mm, calyx tube 5–6 mm, calyx lobes oblong, obtuse, 3½–5 mm, subentire. Petals obovate to oblanceolate, (sub)obtuse, (4–)5–6 by 1–1½(–2) mm, (1–)3-nerved,

0.1–0.2 mm finely fimbriate in the upper half, inserted at the same level as the corona. Staminodes c. 4 mm; filaments c. 3 mm, connate for $\frac{1}{2}$ – $\frac{3}{4}$ mm, vestigial anthers c. 1 mm. Septa $\frac{1}{2}$ –1 mm. Corona hairs 1–1 $\frac{1}{2}$ mm. Disk glands c. $\frac{1}{2}$ mm. Pistil 7–8 mm. Gynophore 1–1 $\frac{1}{2}$ mm. Ovary ellipsoid-oblong c. 4 by 2 mm. Styles connate for c. 1 mm, style arms 1–1 $\frac{1}{2}$ mm. Stigmas subglobose, woolly-papillate, each 1–1 $\frac{1}{2}$ mm \varnothing . Fruit 1–3 per inflorescence, obovoid-oblong, apex subacute, excl. the 5–10 mm long gynophore 1 $\frac{1}{2}$ –2 $\frac{1}{2}$ by c. 1 cm. Pericarp coriaceous, smooth. Seeds not known.

ZAMBIA. Northern Prov., Kasama Distr., Chosi Flats, 1200 m: *Richards 19374*, ♀ fl. (K) — West. Prov., Mufulira: *Cruse 30*, ♀ fl. (K), *Fanshawe 2516*, ♂ fl. ♀ fl., (BR; K, type); Kitwe: *Mutimushi 2828*, fl. (K; NDO, n.v.), *2857*, fr. (K; NDO, n.v.); Ndola Distr., 10 miles Luanshya Rd.: *Wild 4854*, ♀ fl. (K).

ECOLOGY. *Brachystegia*-woodland; lateritic outcrops, sandy laterite, dry loam-sand soil; c. 1200 m. Flowers in Nov. and Dec., fruits in Dec.

NOTES. 1. The species has the blunt, papillate, apiculae of the anthers in common with *A. tisserantii* and *A. goetzei*; it resembles in habit *Tryphostemma caerulescens* A. & R. Fernandes.

2. As in many other species the corona extends on the septa. In the present species the filaments on the septa are often grown together into flabellate, lacinate appendages, alternating with the filaments. Similar, apparently homologous appendages are found in *A. huillensis*.

3. One of the hermaphroditic flowers of *Fanshawe 2516* deviates by that 4 of the disk glands are grown into an uninterrupted ring, the septa are partly absent, and two filaments are nearly entirely connate.

4. Fresh leaves are reported as brown-green, reddish-green or olive-green, fleshy, with prominent veins. Fresh flowers are greenish, yellow-green or cream; sometimes precocious flowering.

71. *Adenia tisserantii* A. & R. Fernandes, Bol. Soc. Brot. 2, 32 (1958) 83; Garcia de Orta 6, 4 (1958) 659; Consp. Fl. Angol. 4 (1970) 219. — Type: *Tisserant A. 212*. — Fig. 32.

Erect herb to 10(–15) cm, growing from a tuberous rootstock c. 10 cm long. Stems annual, 1–5 cm long, 2–3 mm thick; internodes 0.2–1 cm. Leaves subcoriaceous, brown-green above, much paler, \pm glaucous, minutely brownish-black punctate beneath, entire, lanceolate to lanceolate-linear, base acute, apex acute to subobtuse, 6–15(–20) by 1–3 $\frac{1}{2}$ (–4) cm, nerves 5–10 pairs, reticulation rather distinct, margin entire; petiole (0–)0.1–0.2 cm. Glands at blade-base and blade glands 0. Stipules narrowly triangular, acute, 1 $\frac{1}{2}$ –2 mm. Inflorescences sessile, 1–3(–5)-flowered in ♂ and ♀; tendrils 0. Bracts and bracteoles narrowly triangular, acute, sometimes remotely dentate, 1 $\frac{1}{2}$ –3 mm. ♂ fl. tubular-infundibuliform, incl. the c. 3 $\frac{1}{2}$ mm long stipe 14–16 by 3–4 mm, calyx lobes in anthesis opening to c. 8 mm. Pedicel 1–2 mm. Hypanthium c. 1 mm, calyx

tube 4–5 mm, calyx lobes elliptic-oblong, obtuse, 5–6 mm, up to 0.2 mm cripate-fimbriate. Petals lanceolate-linear, subacute, $6\frac{1}{2}$ –9 by $1-1\frac{1}{2}$ mm, 3-nerved, $0.3-\frac{1}{2}$ mm fimbriate in the upper half, inserted at the same level as the corona. Filaments c. $4\frac{1}{2}$ mm, connate for c. 1 mm, inserted at the base of the hypanthium. Anthers 2–3 by $\frac{3}{4}$ mm, incl. the blunt papillate apiculum c. $\frac{1}{2}$ mm. Septa c. 1 mm high. Corona hairs c. 1 mm. Disk glands c. $\frac{3}{4}$ mm. Vestigial ovary incl. gynophore c. $1\frac{1}{2}$ mm. *Hermaphroditic fl.* tubular-infundibuliform, incl. the ($1\frac{1}{2}$ –)2–4 mm long stipe 11–16 by 3–5 mm. Pedicel 1–3 mm. Hypanthium 1–2 mm, calyx tube $2\frac{1}{2}$ –5 mm, calyx lobes oblong, obtuse, $4\frac{1}{2}$ –6 mm, 0.2–0.3 mm lacinate-fimbriate. Petals lanceolate-linear, subobtuse, 5–8 by $1-1\frac{1}{2}$ mm, 3-nerved, $0.1-\frac{1}{2}$ mm fimbriate in the upper half, inserted at the same level as, or up to 1 mm above the corona. Filaments 4–5 mm, connate for $\frac{1}{2}$ –1 mm, inserted at the base of the hypanthium. Anthers (sometimes unequal in size and probably partly sterile) ovate to ovate-oblong, $1\frac{1}{2}$ – $2\frac{1}{2}$ by ($\frac{1}{2}$ –) $\frac{3}{4}$ –1 mm, incl. the blunt papillate apiculum $0.3-\frac{1}{2}$ mm. Septa 0– $1\frac{1}{2}$ mm high. Corona hairs $\frac{1}{2}$ – $1\frac{1}{2}$ mm. Disk glands $\frac{1}{2}$ – $\frac{3}{4}$ mm. Pistil $5\frac{1}{2}$ –11 mm. Gynophore $1\frac{1}{2}$ – $3\frac{1}{2}$ mm. Ovary ovoid-ellipsoid, $3-5\frac{1}{2}$ by 2–4 mm. Styles connate for $\frac{1}{2}$ –1 mm, style arms $\frac{1}{2}$ –1 mm. Stigmas semi-globular, papillate, each $1-1\frac{1}{2}$ mm \varnothing . ♀ *fl.* not known. *Fruit* 1 per inflorescence, \pm pendent, ellipsoid, excl. the 10–12 mm long gynophore $2\frac{1}{2}$ –3 by $1\frac{1}{2}$ –2 cm. Pericarp coriaceous. Seeds c. 30 per capsule, ovoid, c. $3\frac{1}{2}$ by 3 by $1\frac{1}{2}$ mm, 4–6 pits \varnothing ; funicles c. 2 mm; embryo c. $2\frac{3}{4}$ mm; cotyledons \pm ovate, $2\frac{1}{4}$ by 2 mm.

ANGOLA. Huambo (Benguela), near the Mission: *Tisserant* A.212, ♂ fl., ♀ fl., fr. (COI, type) — Cubango, Fort Princesa Amélia: *Gossweiler* 4158, fr. (BM).

ECOLOGY. Savanna; c. 1500 m. Flowers and fruits Oct. and Dec.

NOTES. 1. The species is probably polygamous, but hitherto only male- and hermaphroditic flowers have been found.

2. Resembles *A. huillensis* and *A. goetzei*.

3. Fresh leaves are reported as reddish-brown veined beneath, the male flowers as creamy, the hermaphroditic flowers as red at maturity.

72. *Adenia tuberifera* R. E. Fries, *Wiss. Ergebn. Rhod. Kongo Exp.* 1911–1912, 1 (1914) 158, t. 12, fig. 3–8; *Engl., Pfl. welt Afr.* 3, 2 (1921) 603. — Type: *Fries* 1353. — Fig. 32.

Erect slender herb to c. 60 cm growing from a napiform tuber up to 12 cm \varnothing . Stems annual, branched or not, ($1\frac{1}{2}$ –)2–3 mm thick; internodes $\frac{1}{2}$ – $1\frac{1}{2}$ cm. *Leaves* herbaceous, grey-glaucous, punctate beneath, entire, lanceolate-linear, base acute to narrowly rounded, apex acute to subobtuse, up to $1\frac{1}{2}$ mm mucronate, (2–)4–7(–9) by $\frac{1}{2}$ –1 cm, nerves 5–13 pairs, reticulation rather indistinct, margin entire; petiole 0.1–0.3 cm. Glands at blade-base 2, $\frac{1}{2}$ –1 mm \varnothing , \pm wart-like, on the margin at the transition to the petiole; no other glands. *Stipules* linear, c. 1 mm. *Inflorescences* peduncled for 0.3–1 cm, 1-flowered in ♂

and ♀; tendril 0. Bracts and bracteoles narrowly triangular, acute, c. 1 mm. Flowers distinctly pendent. ♂ fl. 4 or 5-merous, tubular-infundibuliform, including the tapering, curved, 5–7 mm long stipe 16–23 by 2–4½ mm, calyx lobes in anthesis opening to c. 8 mm. Pedicel 10–20 mm. Hypanthium 1–1½ mm, calyx tube 7–10 mm, calyx lobes oblong to lanceolate, obtuse or subacute, (3–)4–6 mm, up to 0.1 mm denticulate. Petals lanceolate-linear, acute, 7–10 by ¾–1 mm, 1-nerved, remotely 0.2–½ mm fimbriate in the upper half, inserted at the same level as, or up to 2 mm above the corona. Filaments 3–3½ mm, connate for 1–1½ mm, inserted at the base of the hypanthium. Anthers 2½–4 by ¾–1 mm, obtuse, up to 0.2 mm apiculate. Septa c. 1 mm high. Corona hairs ½–1 mm. Disk glands truncate, c. ½ mm. Vestigial ovary c. ½ mm, gynophore c. ½ mm. ♀ fl. ± tubiform, incl. the 2½–4 mm long stipe 11–14 by 2–4 mm. Pedicel 5–10 mm. Hypanthium c. 1 mm, calyx tube 4–5 mm, calyx lobes oblong, obtuse to subacute, 3–4 mm, entire. Petals lanceolate-linear, acute, 4–5½ by ½–¾ mm, 1-nerved, entire or up to ¼ mm laciniate towards the apex, inserted at the same level as the corona. Staminodes 1½–2 mm, free or up to ¾ mm connate. Septa up to ¾ mm high. Corona hairs fine, ½–¾ mm. Disk glands ½–½ mm. Pistil c. 7 mm. Gynophore 1–2 mm. Ovary ellipsoid-oblong, fusiform, 3–5 by 1½–2½ mm, finely 6-ribbed. Styles c. 1 mm, entirely free or connate. Stigmas subglobular, woolly-papillate, each 1–1½ mm ∅. Fruit 1 per inflorescence, fusiform, ± 3-angular, excl. the c. 5 mm long gynophore 4–4½ by 2½ cm. Pericarp thickly coriaceous. Seeds c. 30 per capsule, obliquely ovate, c. 5 by 3½–4 by 2½ mm, 5–7 pits along the length; funicles 2–3 mm; embryo c. 4 mm; cotyledons orbicular, c. 3 by 3 mm.

ZAMBIA. Northern Prov., Abercorn Distr., Mpulunga Rd., 4800 ft.: *Richards 2103*, ♀ fl. (K); Kalambo Falls, 900–1500 m: *Fries 1353*, fl., fr. (K; UPS, type; Z), *Richards 13565*, ♂ fl. (K), 19294, fr. (K); Abercorn: *Bredo 5*, ♂ fl., ♀ fl., fr. (BR); Lunzua Hydro-electric Sta., 1500 m: *Richards 15357*, ♂ fl. (K); Kambole Escarpment, 1500 m: *Richards 19259*, ♀ fl., fr. (K).

ECOLOGY. Stony places in dry forest, open woodland; c. 1000–1500 m. Flowers and fruits in the end of Nov.

NOTES. 1. Part of the male flowers in *Bredo 5* is entirely 4-merous.

2. In *Fries 1353* (type) there is one single, connate, style. In the other female specimen at my disposal (*Bredo 5*) there are 3 entirely free styles.

3. Fresh flowers are greenish-yellowish or cream, when dry finely reddish-brown streaked and veined.

4. SECT. ERYTHROCARPUS (ROEM.)
DE WILDE, COMB. NOV.

Erythrocarpus Roem., 1846. — *Modecca* subg. *Erythrocarpus* (Roem.) Miq., Fl. Ind. Bat. 1, 1 (1856) 703. — Type species: *Modecca populifolia* Bl. = *A. heterophylla* (Bl.) Koord.

Modecca subg. '*Modeccae verae*' (incl. sect. *Microblepharis* & sect. *Blepharantes* pro maj. parte, typo excl.) Miq., Fl. Ind. Bat. 1, 1 (1856) 702. — *Adenia* sect. *Microblepharis* [non (W. & A.) Engl.] Engl., Bot. Jahrb. 14 (1891) 376; Hall. f., Med. Rijksherb. 42 (1922) 8 (pro maj. parte, typo excl.).

73. *Adenia cardiophylla* (Mast.) Engl., Bot. Jahrb. 14 (1891) 376; Harms in E. & P., Nat. Pfl. fam. ed. 1, 3, 6a (1893) 84; ed. 2, 21 (1925) 473, 490, 492; Bot. Jahrb. 15 (1893) 573; King, J. As. Soc. Beng. 71, 2, 1 (1902) 53, p.p. (excl. spec. Andam., Nicob. and Coco I.); Gagnep., Bull. Soc. Bot. Fr. 65 (1918) 76, 77, pro min. parte; Fl. Gén. I.-C. 2, 8 (1921) 1024, pro min. parte; Hall. f., Med. Rijksherb. 42 (1922) 9; Craib, Fl. Siam. En. 1 (1931) 745; Chakravarty, Bull. Bot. Soc. Beng. 3, 1 (1951) 66, p.p. (excl. spec. Andam., Nicob., and Coco I.); Wang, Act. Phytotax. Sin. 6 (1957) 236. — *Modecca cardiophylla* Mast. in Hook. f., Fl. Br. Ind. 2 (1879) 602; Smith, Not. Bot. Gard. Edinb. 17 (1930) 321; Kanjilal & Das, Fl. Assam 2 (1938) 324; Hundley & Chitkoko, List of Trees Burma etc., Rangoon, ed. 3 (1961) 112. — Type: Hook. f. & Thomson s.n. — Fig. 34.

Adenia heterophylla (non. Bl.) Vidal, Not. Syst. 15 (1959) 45.

Climber up to 25 m, stem at base up to 8 cm \varnothing . Fertile branches greenish to brownish, 2–6 mm; internodes 5–15 cm. Leaves herbaceous, green above, pale green or \pm glaucous-green, not punctate beneath, entire or rarely 3-lobed, ovate in outline, base cordate to subtruncate, apex subobtusely to acute, up to 1 cm acuminate, (5–)7–25 by (4–)5–19 cm, 3–5-plinerved and 1–2(–3) pairs of nerves from the midrib, reticulation distinct, prominent, pale yellowish-green, distinctly trabeculate, margin entire; lobes triangular to elliptic, up to 7 cm; petiole (2–)3–10 cm. Glands at blade-base 2, 2–3 mm \varnothing , on two semi-orbicular auricles 2½–4 mm \varnothing at the apex of the petiole; blade glands c. 1 mm \varnothing , submarginal, 0–1 at either side of the blade; marginal glands c. ½ mm \varnothing , blackish, 0–20 at either side. Stipules triangular or rounded, ½–1 mm. Inflorescences peduncled for (½–)4–18 cm, up to 20-flowered in σ , 1–3-flowered in ρ ; tendrils (0–)1(–3), 1–5(–8) cm. Sterile tendrils up to 20 cm. Bracts and bracteoles (narrowly) triangular, acute, c. 1 mm. σ fl. tubiform-campanulate, incl. the 6–12 mm long stipe 16–25 by (4½–)5–8 mm, calyx lobes in anthesis \pm recurved. Pedicel 5–10 mm. Hypanthium incl. calyx tube fleshy-leathery, ½–¾ mm thick, widening to above, 6½–10 mm, calyx lobes elongate triangular,

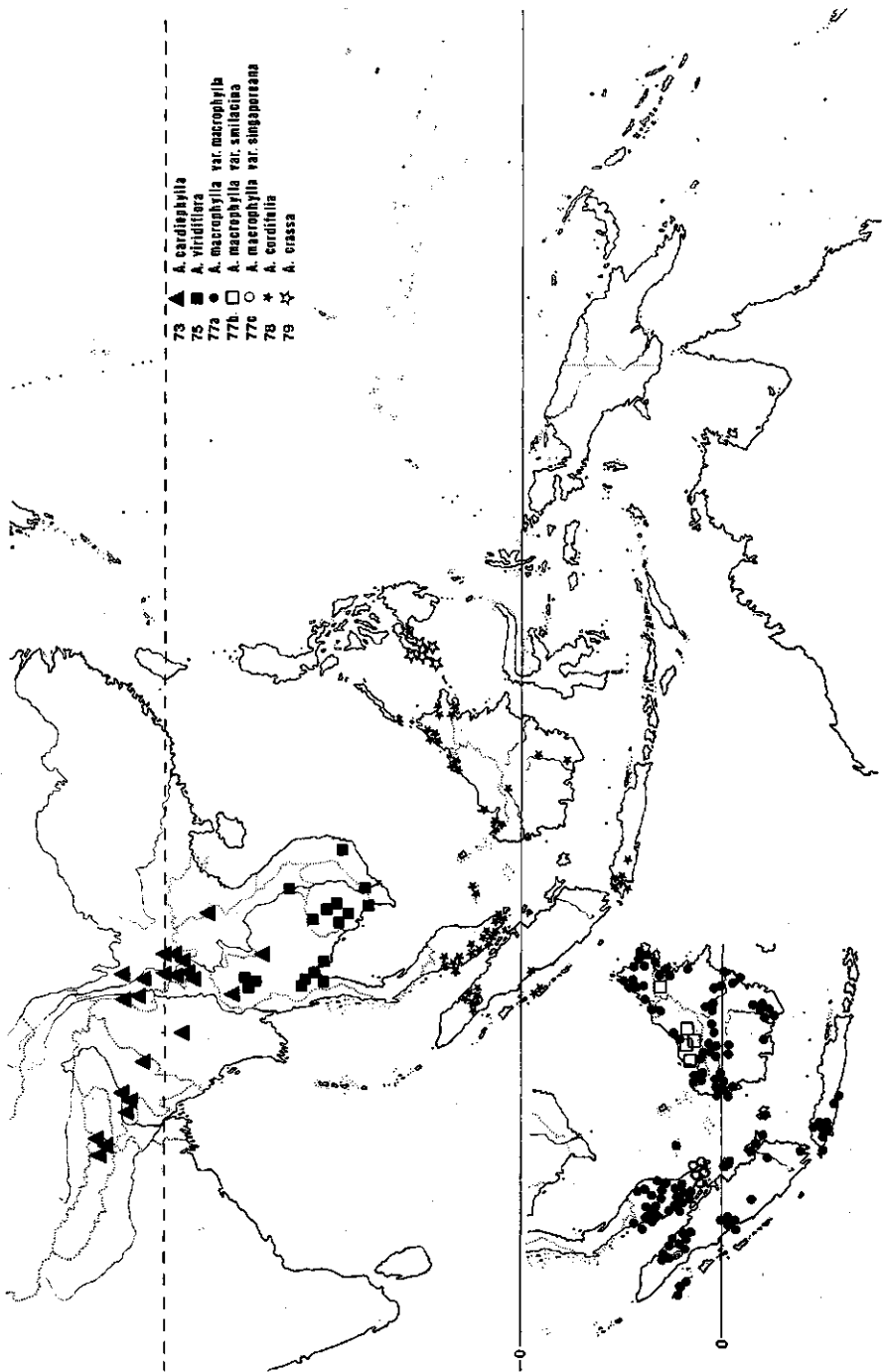


FIG. 34. Localities of species 73, 75, 77-79.

subobtuse to acute, 4–5(–6) mm, entire. Petals narrowly triangular to oblong, obtuse, 5–7 by $2\frac{1}{2}$ – $3\frac{1}{2}$ mm, 3–5-nerved, entire to finely serrate, inserted c. 2 mm below the throat of the calyx tube. Filaments $3\frac{1}{2}$ – $5\frac{1}{2}$ mm, connate for $2\frac{1}{2}$ –4 mm, inserted at the base of the hypanthium. Anthers $4\frac{1}{2}$ – $5\frac{1}{2}$ by ($\frac{3}{4}$ –)1– $1\frac{1}{2}$ mm, subacute, up to $\frac{1}{2}$ mm apiculate. Septa 1– $1\frac{1}{2}$ mm high. Corona 0. Disk glands c. 2 mm. Vestigial ovary $1\frac{1}{2}$ –2 mm, gynophore $\frac{1}{2}$ –1 mm. ♀ fl. tubiform-campanulate, incl. the 1–3 mm long stipe 11–15 by ($4\frac{1}{2}$ –)5–8 mm. Pedicel 2–10 mm. Hypanthium incl. calyx tube fleshy-leathery, widening to above, 6– $9\frac{1}{2}$ mm, calyx lobes elongate triangular, subobtuse, 3–6 mm, entire. Petals ovate-oblong, obtuse, $4\frac{1}{2}$ –7 by 2–3 mm, 3–5-nerved, irregularly denticulate, inserted 1–2 mm below the throat of the calyx tube. Staminodes 2–3 mm, connate for 1– $1\frac{1}{2}$ mm, inserted at the base of the hypanthium. Septa 1– $1\frac{1}{2}$ mm high. Corona 0. Disk glands c. $1\frac{1}{2}$ mm. Pistil 7–11 mm. Gynophore 2–4 mm. Ovary ellipsoid, 4– $4\frac{1}{2}$ by $2\frac{1}{2}$ –4 mm. Styles connate for $\frac{1}{2}$ –1 mm, style arms $\frac{1}{2}$ –1 mm. Stigmas \pm reniform, lobed-laciniate, each $2\frac{1}{2}$ –3 mm \varnothing . Fruit 1–2 per inflorescence, obovate to pear-shaped, apex subacute to rounded, excl. the tapering 40–75 mm long gynophore 5–11(–12) by $2\frac{1}{2}$ –7 cm. Pericarp woody outside, \pm spongy inside, 5–20 mm thick. Seeds 10–40 per capsule, suborbicular to broadly reniform, 6– $8\frac{1}{2}$ by 8–10 by $2\frac{1}{2}$ – $3\frac{1}{2}$ mm, \pm muricate, 6–8 pits \varnothing ; funicles 10–20 mm; embryo 8–9 mm; cotyledons ovate, broadly emarginate at one side, 7–9 by 5– $6\frac{1}{2}$ mm.

INDIA. Sikkim: *King s.n.*, st. (CAL) — West Bengal, Darjeeling: *Brandis s.n.*, fl. (NY), *Clarke H. 993 A*, fr. (K), *17200 A*, ♀ fl. (K), *26567 A, B*, ♂ fl. (BM, K); c. 3000 ft: *Gamble 6917*, ♂ fl. (K), *9748*, ♀ fl., fr. (K) — Assam, Khasia Hills, 2000–4000 ft: *Clarke 45500 A*, ♂ fl. (FD), *Hook. & Thomson 1708*, ♂ fl. (K), *s.n.*, ♂ fl. (A, BM, C, E, FI; K, type; L, LD, M, NY, P, S, W), *Hb. Masters s.n.*, ♂ fl. (K), *Hb. Planchon s.n.*, fl. (MPU); Jatookia: *Rep. Ec. Products 11311*, fl. (CAL) — Manipur: *Clarke 41935 A, B*, fr. (CAL, K).

BURMA. Maymyo, c. 3500 ft.: *Lace 4832*, ♂ fl. (CAL, E).

CHINA. Yunnan, Lat. 25°N, 5000–6000 ft: *Forrest 8639*, fr. (E); Tali Range, 10,000 ft. *Forrest 11655*, ♂ fl. (A, E, K); Salween Valley, 4000 ft: *Forrest 18225*, ♂ fl., fr. (E, K); Szemao, 4000–5000 ft.: *Henry 12036*, ♂ fl. (K, Z), *12036 A*, ♂ fl. (E, K, NY), *12036 B*, ♂ fl. (A, E, K, US), *12036 C*, ♂ fl. (K); Shang-pa Hsien, 1500 m: *Tsai 54602*, fr. (A); Fo-Hai, 1000–1600 m: *Wang 73945*, fl. (A), *74346*, ♂ fl. (A), *74668*, ♂ fl. (A); Nan-Chiao, 1450 m: *Wang 75206*, fr. (A); Che-li-Hsien, 900–1800 m: *Wang 76329*, fl. (A), *77442*, fr. (A), *79629*, ♀ fl., fr. (A); Lan-Tsang, 1300 m: *Wang 76753*, fl. (A); Fo-Hai, 1400 m: *Wang 77123*, fl., fr. (A); Shunning, Hila, 1700 m: *Yü 16441*, ♂ fl. (A).

LAOS: *Poilane s.n.*, fr. (E, K); Sam Neua: *Poilane 2115*, fr. (P).

THAILAND. Pāyap, Chiang Mai Distr., 1040 m: *Garrett 1250*, ♂ fl. (K, L) — Udawn, Kao Keo Kang, 900–1300 m: *Kerr 5770*, ♂ fl. (BM, K); ?: *Kerr s.n.* (31–5–1925), fl. (BM).

ECOLOGY. Mixed forest, scrub; (800–)1000–2000 m. Flowers Apr.–Sept., fruits June–Nov.

NOTES. 1. Allied to *A. heterophylla* from which it is distinguished by the thick pericarp, the larger flowers, and the raised-trabeculate venation of the leaves; it has also a largely different distributional area and altitude of occurrence.

2. According to GAGNEPAIN (1918, 1921) sometimes with hermaphroditic flowers.

3. Fresh flowers are reported as pale greenish or pale yellow, once as reddish-yellow; when dry purple- or reddish veined and striped. Ripe fruits are red.

74. *Adenia heterophylla* (Bl.) Kds., Exk. Fl. Java 2 (1912) 637; Hall. f., Med. Rijksherb. 42 (1922) 8; Back. & Bakh., Fl. Java 1 (1963) 289; Cusset, Adansonia 2, 7 (1967) 373, 382. — *Modecca heterophylla* Bl., Bijdr. 15 (1826) 940; DC., Prodr. 3 (1828) 336; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Hassk., Cat. Hort. Bog. (1844) 187; Miq., Fl. Ind. Bat. 1, 1 (1856) 702; F.-Villar, Nov. App. (1880) 95; Usteri, Vierteljahrsschr. Naturf. Ges. Zürich 50 (1905) 440. — *Microblepharis heterophylla* Roem., Syn. Mon., 2 Pepon. (1846) 133, 200. — Type: *Blume s.n.*

Modecca acuminata Bl., Bijdr. 15 (1826) 940; DC., Prodr. 3 (1828) 336; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Hassk., Cat. Hort. Bog. (1844) 187; Miq., Fl. Ind. Bat. 1, 1 (1856) 702. — *Microblepharis acuminata* Roem., Syn. Mon., 2 Pepon. (1846) 133, 200. — *Adenia acuminata* King, J. As. Soc. Beng. 71 (1903), 55, *quoad basionym.*; Kds., Exk. Fl. Java 2 (1912) 637; Hall. f., Med. Rijksherb. 42 (1922) 11; Back. & Bakh., Fl. Java 1 (1963) 289; Cusset, Adansonia 2, 7 (1967) 372, 383. — Type: *Blume s.n.*

Passiflora parviflora Blanco, Fl. Filip. ed. 1 (1837) 647, *non* Swartz 1788. — *Modecca parviflora* Blanco, Fl. Filip. ed. 2 (1845) 453, *non* G. Don 1834; ed. 3, 3 (1879) 52; Merr., Philip. J. Sc. Bot. 10 (1915) 331. — *Adenia parviflora* Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 145, t. 2, fig. 1; t. 5, fig. 3–12; t. 7, fig. 5–6, *quoad basionym.*, *specim. p.p.*, *nom. illeg.*; Adansonia 2, 7 (1967) 373, 383. — Type: *Blanco* †.

Passiflora zucca Blanco, Fl. Filip. ed. 1 (1837) 648 — *Adenia zucca* Merr., Spec. Blanc. (1918) 276; Merr., En. Philip. 3 (1923) 117; Harms in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 472, 492. — Type: *Blanco* †, Illustr. Specim.: *Merrill, Sp. Blanc. 892.*

Passiflora coccinea Blanco, Fl. Filip. ed. 1 (1837) 650, *non* Aubl. 1774, *neq* Banks & Soland. ex Benth. 1867. — *Modecca coccinea* Blanco, Fl. Filip. ed. 2 (1845) 453; ed. 3 (1879) 53; Merr., Philip. J. Sc. 1 (1906) Suppl. 100. — *Adenia coccinea* Merr., Philip. J. Sc. 3 (1909) 421; Fl. Manila (1912) 337; Philip. J. Sc. Bot. 10 (1915) 331. — Type: *Blanco* †.

Modecca lobata (*non* Jacq.) Hassk., Cat. Hort. Bog. (1844) 187; Miq., Fl. Ind. Bat. 1, 1 (1856) 703.

Modecca kardiocarpa Hassk., Cat. Hort. Bog. (1844) 187; Walp., Rep. Bot. Syst. 5 (1846) 774; Roem., Syn. Mon., 2 Pepon. (1846) 203; Miq., Fl. Ind. Bat. 1, 1 (1856) 703. — *Adenia kardiocarpa* Kds., Exk. Fl. Java 2 (1912) 637. — Type: ?

Modecca oblonga Hassk., Cat. Hort. Bog. (1844) 187; Walp., Rep. Bot. Syst. 5 (1846) 774; Roem., Syn. Mon., 2 Pepon. (1846) 203; Miq., Fl. Ind. Bat. 1, 1 (1856) 703. — *Adenia oblonga* Kds., Exk. Fl. Java 2 (1912) 637. — Type: ?

Modecca trilobata (*non* Roxb.) Blanco, Fl. Filip. ed. 2 (1845) 452; ed. 3 (1879) 52; F.-Villar, Nov. App. (1880) 95; Merr., Philip. J. Sc. 1 (1906) Suppl. 100 (*as M. triloba*); Philip. J. Sc., Bot. 10 (1915) 331.

- Modecca cardiophylla* (non Mast.) F.-Villar, Nov. App. (1880) 95.
- Modecca populifolia* (non Bl.) K. Sch. & Holtr., Fl. Kais. Wilh. Land (1889) 83.
- Adenia populifolia* (non Bl.) K. Sch. & Laut., Fl. Schützgeb. (1900) 456; Pulle, Nov. Guin. 8 (1912) 673 (as *Adenia* aff. *populifolia*); White, J. Arn. Arb. 10 (1929) 244.
- Modecca formosana* Hayata, Ic. Pl. Form. 4 (1914) 8, fig. 1-2; Ito, Ill. Formos. Pl. (Taiwan Shokubutu Dzusetu) t. 11; Sasaki, Cat. Gov. Herb. Formos. Dept. Forest (1930) 362. — *Adenia formosana* Hayata, Ic. Pl. Form. 4 (1914) 8, fig. 1-2; Harms in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 492; Cusset, Adansonia 2, 7 (1967) 373, 384. — Type: *Tashiro s.n.*
- A. longifolia* Merr., Philip. J. Sc., Bot. 10 (1915) 330; En. Philip. 3 (1923) 117. — Type: *Reillo B.S. 15495.*
- A. palmatifolia* Merr., Philip. J. Sc., Bot. 10 (1915) 330; En. Philip. 3 (1923) 117. — Type: *Elmer 6262.*
- A. chevalieri* Gagnep., Bull. Mus. Hist. Nat. Paris 25, 1919 (1920) 126; Bull. Soc. Bot. Fr. 65 (1918) 76, 77 (flow. morph.); Fl. Gén. I.-C. 2, 8 (1921) 1030, fig. 114, 1-5; Harms in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 490; Craib, Fl. Siam. En. 1 (1931) 746; Merr. & Chun, Sunyatsenia 1 (1934) 73; Chun, Sunyatsenia 1 (1934) 276; Masamune, Fl. Kaitan. (Hainan) (1943) 216; Wang, Act. Phytotax. Sin. 6 (1957) 237; Chun, Chang & Chen, Fl. Hainan 1 (1964) 467, fig. 258; Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 140, t. 2, fig. 2; t. 5, fig. 20-23; t. 7, fig. 2-3; Adansonia 2, 7 (1967) 372, 383. — Syntype: *Balansa 3994, 3995 (lecto)*; *Bon 5026, 5100; Chevalier s.n.*
- A. cordifolia* (non Bl.) Gagnep., Fl. Gén. I.-C. 2, 8 (1921) 1025; Bull. Soc. Bot. Fr. 65 (1918) 76, 77 (flower morph.).
- A. maclurei* Merr., Philip. J. Sc., Bot. 21 (1922) 349; Lingn. Sc. J. 5 (1927) 133. — Type: *McClure 8242.*
- A. diversifolia* Hall. f., Med. Rijksherb. 42 (1922) 10. — Type: *Forsten s.n.*
- A. sumbawana* Hall. f., Med. Rijksherb. 42 (1922) 10. — Type: *Colfs 262.*
- A. pandurata* Hall. f., Med. Rijksherb. 42 (1922) 12; Holthuis & Lam, Blumea 5 (1942) 215. — *Momordica* spec. Pulle, Nov. Guin. 8, 2 (1910) 405. — Type: *Branderhorst 161.*
- A. pinnatisecta* (non Craib) Pham-Hoang-Hô, Fl. Vietn. (1960) 148, fig. D.
- A. nicobarica* (non Kurz) Gagnep., Fl. Gén. I.-C. 2, 8 (1921) 1028; Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 148, t. 2, fig. 3.

Subligneous climber up to 30 m. Fertile branches $1\frac{1}{2}$ -6 mm, pale greenish when dry; internodes 2-20 cm. *Leaves* membranous to thickly coriaceous, greenish or brownish above, mostly much paler, not punctate beneath, entire to 5-partite, orbicular to ovate to lanceolate, base acute to cordate, apex rounded to acute, up to 2(-3) cm acuminate, ($3\frac{1}{2}$ -)5-25 by ($1\frac{1}{2}$ -)2 $\frac{1}{2}$ -19 cm, 3-5(-7)-pli- to pinninerved by 4-10 pairs of nerves from the midrib, reticulation distinct or not, margin entire or up to $\frac{1}{2}$ cm deep dentate; lobes triangular to lanceolate,

acute to acuminate, up to 15 cm; petiole 1–10 cm. *Glands* at blade-base 2, 1–4 mm \varnothing , in two concave auricles lateral at the apex of the petiole, auricles 2–6 mm \varnothing , \pm adnate with the blade, mutually free or \pm connate over the apex of the petiole; blade glands 0, or 1–2 pairs, $\frac{1}{2}$ –2 mm \varnothing , submarginal; marginal glands 0–25 at either side of the blade, dot-like, $\frac{1}{2}$ – $\frac{3}{4}$ mm \varnothing , in dentate leaves at the apexes of the teeth. Stipules triangular, rounded or reniform, sometimes lacerate, c. $\frac{1}{2}$ mm. *Inflorescences* axillary to normal leaves, rarely to \pm reduced leaves in short-shoots, peduncled for ($\frac{1}{2}$ –)2–20 cm, up to 40-flowered in σ , (1–)2–4(–8)-flowered in ρ , sometimes monoecious with σ and ρ flowers mixed; tendrils 1(–3), 1–5 cm. Sterile tendrils simple, rarely 3-fid, up to 25 cm. Bracts and bracteoles narrowly triangular, acute, $\frac{1}{2}$ –1 $\frac{1}{2}$ mm. σ fl. tubular to urceolate, incl. the 3–15 mm long stipe (10–)15–25(–30) by $1\frac{1}{2}$ –5(–7 $\frac{1}{2}$) mm. Pedicel $\frac{1}{2}$ –1 $\frac{1}{2}$ mm. Calyx tube (incl. hypanthium) 5–12(–14) mm, with fleshy wall $\frac{1}{2}$ –1 $\frac{1}{2}$ mm thick; lobes (4–)5, narrowly triangular, acute to bluntish, entire, 1–3 mm, reflexed. Petals inserted 1–2 $\frac{1}{2}$ mm below the throat of the calyx-tube, reflexed, narrowly triangular to lanceolate, acutish, 2–4 by ($\frac{1}{2}$ –) $\frac{3}{4}$ –2(–2 $\frac{1}{2}$) mm, 1–3-nerved, subentire, decurrent. Filaments 1–4 mm, ($\frac{1}{4}$ –) $\frac{1}{2}$ –2 $\frac{1}{2}$ (–3) mm connate, inserted at the base of the hypanthium or on an androgynophore up to 4 mm. Anthers 3–4 $\frac{1}{2}$ (–5) by $\frac{3}{4}$ (–1) mm, acutish or up to $\frac{1}{2}$ mm apiculate. Septa 1–3 mm high. Corona 0. Disk glands 1–3 mm. Vestigial ovary 1–1 $\frac{1}{2}$ mm, sessile or on gynophore up to 1 mm. ρ fl. tubular, incl. the 1–6(–10) mm long stipe (6–)7–18(–22) by 3–5(–6) mm. Pedicels 1–10 mm. Calyx tube (incl. hypanthium) (4–)6–13 mm, lobes (narrowly) triangular, subacute, entire, 1–2 $\frac{1}{2}$ mm. Petals inserted $\frac{1}{2}$ –2 $\frac{1}{2}$ mm below the throat of the calyx tube, oblong to lanceolate, bluntish to acute, 2–4 by $\frac{1}{2}$ –1 mm, 1–3-nerved, subentire. Stamines 1–3 mm, free or $\frac{1}{2}$ –1 $\frac{1}{2}$ mm connate. Septa $\frac{1}{2}$ –2 mm high. Corona 0. Disk glands $\frac{1}{2}$ –2 $\frac{1}{2}$ mm. Androgynophore 0–2 $\frac{1}{2}$ mm. Pistil 5–10 mm. Gynophore (1–)1 $\frac{1}{2}$ –3 $\frac{1}{2}$ mm. Ovary subglobular to oblong, 3–5 by 2–3 mm, 3(–5)-carpellate. Styles 3(–5), free or up to $\frac{1}{2}$ mm connate, style-arms $\frac{1}{2}$ –1 mm. Stigmas subglobular, papillate, each c. 1 $\frac{1}{2}$ mm \varnothing . *Fruit* 1–3(–4) per inflorescence, ellipsoid to oblong-lanceolate, base obtuse to acute, apex broadly rounded to acute, sometimes \pm 3-ribbed, excl. the (4–)10–30(–40) mm long gynophore, 2–13 by $1\frac{3}{4}$ –4 $\frac{1}{2}$ cm. Pericarp coriaceous, 1–3 mm, in fresh specimens sometimes \pm fleshy, yellowish to bright red. *Seeds* 10–60 per capsule, orbicular to obliquely triangular, (4–)5–10 by $4\frac{1}{2}$ –10 by $2\frac{1}{2}$ –3 $\frac{1}{2}$ mm; testa rather smooth to muricate, finely to coarsely pitted with 6–11 pits across the diameter of the seed; funicles 5–15 mm; embryo 4–8 $\frac{1}{2}$ mm; cotyledons orbicular to ovate, emarginate-truncate at one side or shallowly 3-lobed, 4–7 $\frac{1}{2}$ by 4–7 mm.

DISTRIBUTION. Widely distributed from the Andaman Is., the Indo-Chinese Peninsula and S. China through Malesia to N. Australia, eastwards to the Solomon Is.; not in Malaya, Sumatra and Borneo. — Fig. 35.

ECOLOGY. In a variety of habitats in forest and scrub. The species does not

occur in the everwet regions of the Malay Peninsula, Sumatra and Borneo, but is commonly distributed in W. Java and New Guinea. Flowers and fruits are found during the whole year, but apparently most frequently in the rainy season. The species is, as mostly in *Adenia*, usually dioecious, but not rarely monoecious specimens with male and female flowers mixed in one inflorescence occur. The tubular, narrow-throated flowers suggest pollination by insects.

USES. The fruits and the plant as a whole are reported as poisonous, and used as a poison for hunting, but the juicy aril is sometimes mentioned as sweet and edible, whereas POILANE reports for Indo-China that the leaves are eaten by the Moïs. In the Philippines a decoction of the root is a remedy for stomach trouble.

NOTE. 1. *Modecca heterophylla* Blume and the synonym *Modecca acuminata* Blume, the oldest two names available, are both of 1826. I have chosen the epithet *heterophylla* because of the current misinterpretation of specimens from the Malay Peninsula which belong to a different species, *Adenia macrophylla* (Blume) Koorders, under the name *Adenia acuminata* (non Blume) King.

A variable species, in which more or less arbitrarily four subspecies, one of which divided into two varieties, are recognized. The subspecific taxa are largely allopatric.

KEY TO THE SUBSPECIES AND VARIETIES

1. Stipe of ♀ flowers (1-)2-6 mm, in fruit (1-)3-13 mm. Gynophore in fruit 8-30 mm. Fruits (4-)6-13 cm, mostly with acute apex. Stipe of ♂ flowers 5-15 mm, as long as to longer than the remainder of the flower. Leaves orbicular to lanceolate-linear in outline with cordate to acute base, palmately to pinninerved, venation distinct or not. ssp. **heterophylla**
2. Leaves subherbaceous to coriaceous, orbicular to lanceolate(-linear), entire to deeply 5-lobed, base cordate to acute, nerves palmate to pinnate, margin entire or dentate. Gland-bearing auricles well marked off from the blade, glands limited to the auricles. **a. var. heterophylla**
2. Leaves strongly coriaceous, ovate-oblong to oblong, entire, base rounded to subacute, nerves pinnate, margin entire. Gland-bearing auricles broadly adnate with the blade, the glands extended on the blade. **b. var. celebica**
1. Stipe of ♀ flowers c. 1 mm, in fruit 1-2 mm. Gynophore in fruit 3-13 mm. Fruits 2-7 cm. Stipe of ♂ flowers 3-8 mm, as long as to shorter than the remainder of the flower. Leaves orbicular to ovate in outline, with cordate to truncate base, mostly palmately nerved, venation distinct beneath.
3. Leaves mostly membranous, margin entire. Marginal glands mostly absent. Gland-bearing auricles ± peltately connate, sometimes free. Stipe of ♂ flowers about as long as the remainder of the flower. Filaments connate about halfway. Fruits 4-7 cm, with obtuse apex. **c. ssp. australis**
3. Leaves ± coriaceous, margin entire or dentate. Marginal glands present.

Gland-bearing auricles free. Stipe of ♂ flowers shorter than the remainder of the flower. Filaments more than halfway connate.

4. Leaves (sub)orbicular, up to 1 cm acuminate, distinctly reticulate at both sides. Fruits 2–3½(–4) cm, apex obtuse. d. ssp. *arcta*
4. Leaves suborbicular to ovate, 1–2 cm acuminate, reticulate only beneath. Fruits 4½–7 cm, apex acute. e. ssp. *andamanica*

a. ssp. *heterophylla* var. *heterophylla*. — Fig. 35.

Leaves ± coriaceous, rarely herbaceous, entire to deeply 3–5-lobed or -partite, suborbicular to lanceolate(-linear), base cordate to acute, apex acute or rarely obtuse, up to 2(–3) cm acuminate, 3½–25 by 1½–19 cm, 3–7-plinerved and 1–5(–7) pairs of nerves from the midrib, or pinninerved, reticulation distinct or not, margin entire or sometimes dentate; petiole 1–10 cm. Gland-bearing auricles peltately connate over the apex of the petiole or not, only slightly adnate with the blade; the glands 1–2(–3) mm ∅, limited to the auricles. Marginal glands 3–15 at either side of the blade, rarely absent. ♂ *fl.* including the 7–15 mm long stipe 15–30 by 2–5(–7½) mm; calyx tube 6–12(–14) mm, calyx lobes 1–3 mm. ♀ *fl.* including the (1½)–2–6 mm long stipe (10)–12–18 by 2–6 mm; calyx tube 6–13 mm, calyx lobes 1–2½ mm. *Fruit* ellipsoid to oblong, fusiform, rarely with obtuse apex, excl. the 8–30(–40) mm long gynophore, (4)–6–13 by 2½–4½ cm; flower stipe below the withered perianth (1½)–3–13 mm. *Seeds* (5)–6–10 mm ∅.

THAILAND. Ayuthia, Hin Lap, c. 100 m: *Kerr 9130*, fr. (BM, K); Chantaburi, Chantabun, c. 200 m: *Kerr 10041*, fr. (K).

LAOS. *Massie s.n.*, fr., narrow-leaved form (P); Luang Prabang, exp. Me-Kong: *Thorel s.n.*, fr., narrow-leaved form (P); Thakhek Prov., Phon Thane: *Spire 319*, fr., narrow-leaved form (P).

CAMBODIA. Samrong-tong Prov., Mt. Srâl: *Pierre 949*, st. (P); Koh-Kong Prov., Mt. de l'Eléphant: *Poilane 367*, fr. (P); Ph. Kraupau (?), 800 m: *Poilane 17705*, fr. (P).

VIETNAM. Tonkin, West Tonkin, Biêu Hiêu: *Bon 5026*, fr. (P); Bao Lac Prov.: *Hoàng Hồ 5040*, st. (P); col de Brañan, 1000–1100 m: *Poilane 24516*, st. (P); North-east, Long-Tchéou: *Simond s.n.*, fr. (P); Kwangtung-Tonkin border, Ha-Coi: *Tsang 27046*, fr. (A, C, E, K, P), 27126, ♂ fl., fr. (A, C, K, P), 29451, ♂ fl. (A, E, K), 30045, ♂ fl. (A, BO, C, E, K, P, SING); Prov. Son Tay, Tu-Phap: *Balansa 3994*, fr. (P), 3995, ♀ fl. (P, lectotype *A. chevalieri*) — Annam, Prov. Nghé-an (Vinh), res. for. Cò-ba: *Chevalier 32380*, fr. (P); Prov. Quang-Tri, 300–600 m: *Poilane 9025*, fr. (P), 10740, fr. (P), 10861, st. (P); Da Lat Prov., Haut Donaï, 800–1500 m: *Poilane 22503*, fl. (P), 30358, fr. (P).

CHINA. Kwangsi Prov., Shang-Sze Distr.: *Tsang 22206*, fl. (A, BM, P, S) — Kwangtung Prov., Sunyi, c. 900 m: *Tsiang Ying 2646*, ♂ fl., fr. (P), 2658, ♂ fl., fr. (NY); Kuangchou (Canton), Notia: *McClure 8242*, fr. (A, type *Adenia maclurei*; US) — Hainan, 500–1700 ft.: *Chun & Tso 43414*, fr. (NY), 44348, fl. (A, NY, US), *How 70797*, ♀ fl., fr. (GH, NY), 71950, fl. (GH), 72770, fl. (A, S), *Lau 27490*, fl., fr. (A), *Liang 62013*, fr. (A, NY), 64640, ♂ fl. (NY), 66552, fl. (NY), *Wang 32794*, fr. (NY), 33046, fl., fr. (NY), 35046, fl., fr. (A, NY).

TAIWAN. Hōzan: *Tashiro s.n.* (Type *Adenia formosana*, n.v.), *Tsiang Hb. Taiwan n. 17559* (Photograph in US, topotype *Adenia formosana*).

SUMATRA. *Korthals 682 b.*, st. (L).

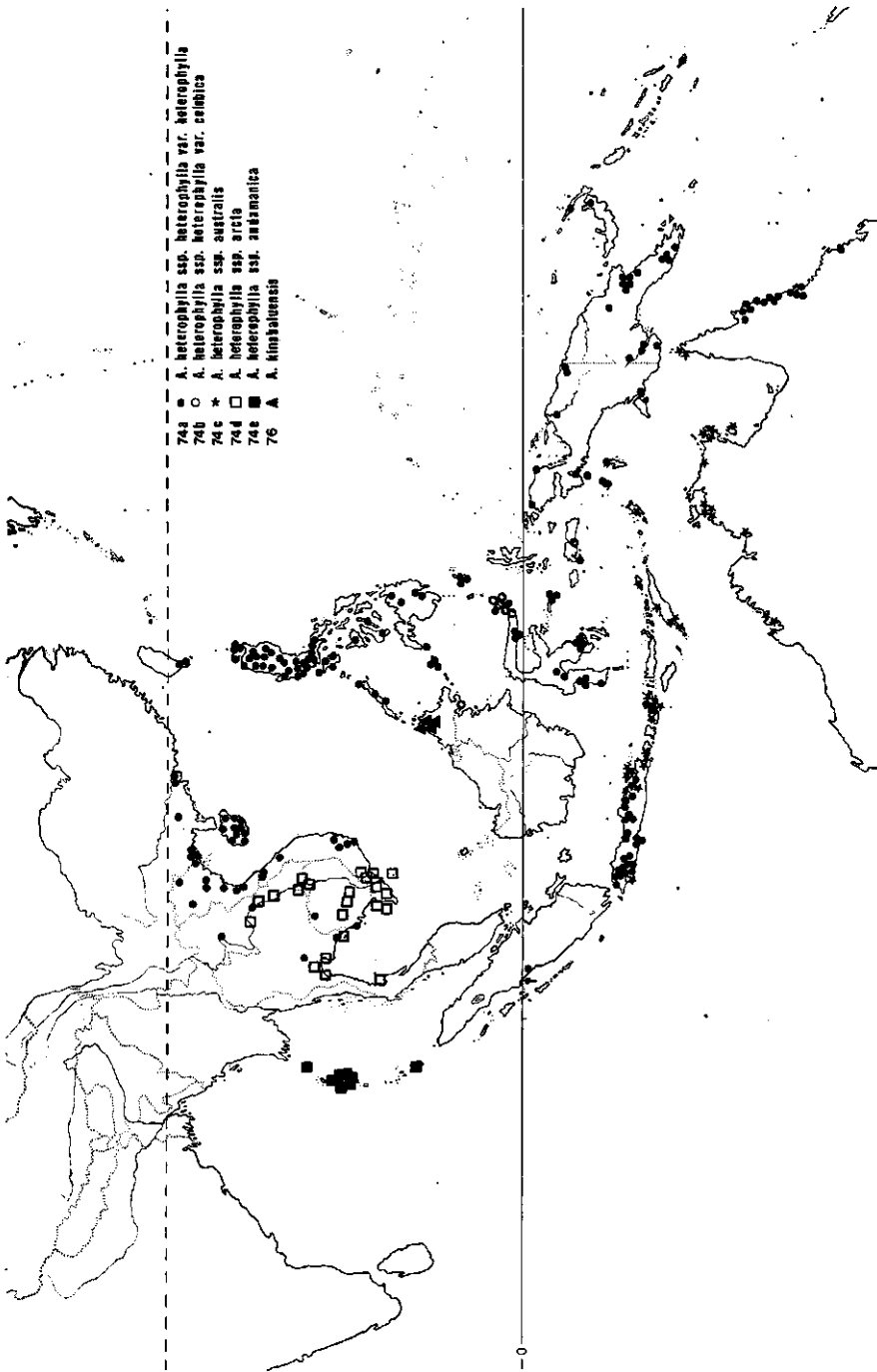


FIG. 35. Localities of species 74, 76.

JAVA. *Anon. s.n.* (*Hasskarl?*), fl. (C; Z, type ? *Modecca cardiocarpa*) — West Java, Bantam, 500–1000 m; Bogor, Bogor: *Kuhl & van Hasselt (?) s.n.*, fr. (L), *Scheepmaker s.n.*, st. (BO); Salak: *Blume 598*, st. (L, 4 sheets, type *Modecca acuminata*), *Blume s.n.*, fr. (BO); L, 3 sheets, type *Modecca heterophylla*; P); Djasinga: *Backer 10073*, fr. (BO); Tjiampea: *Bakhuizen v.d. Brink 1364*, ♂ fl. (K, L); Tjipakoe: *Hallier s.n.*, st. (BO); Priangan, Bantardawa (Bandjar): *Backer 34710*, ♂ fl. (BO); Noesagede (in Lake Pendjaloe), 720 m: *Koorders 47787* ♂, fr. (BO), *47816* ♂, ♂ fl. (BO), *47817* ♂, st. (BO) — Central Java, Pekalongan, 100–150 m: *Beumée 1949*, fr. (BO), *5190*, st. (BO); Banjoemas, Nusa Kambangan; Semarang, Tempura: *Docters van Leeuwen-Reijnvaan s.n.*, fr. (BO); Djapara Ngarengan (Tajoe Distr.), 50 m — East Java Kediri, G. Pandan, 400 m: *Thorenaar 144*, fr. (L); Malang, Pasaroean, Tangkil: *Koorders 23576* ♂, st. (BO).

LESSER SUNDA Is. Sumbawa: *Colfs 227*, fr. (L, spirit), *262*, fr. (L, type *Adenia sumbawana*).

PHILIPPINES. Palawan, Silanga: *Merrill B.S. 9598*, fr. (US); Lipuun I.: *Mendoza & Cordero PNH. 91387*, st. (PNH); Arborian, c. 100 m: *Sulit PNH. 12380*, ♂ fl. (A, L) — Mindoro — Babuyan Is. — Luzon; Benguet Subprov.; Sablan: *Elmer 6163*, fl. (US), *6262*, st. (US, type *Adenia palmatifolia*), *Fénix BS. 12577* (PNH, *n.v.*); Bataan Prov.: *Merrill, Sp. Blancoanae 892*, fl., fr., illustrative specimen *Passiflora zucca* (A, BO, BM, K, L, NY, P, US W) — Cebu: *Ramos BS. 11068*, fl. (L) — Negros I., Damaguete: *Elmer 10091*, ♀ fl. (BO, BM, E, FI, HBG, K, L, NY, US, W, Z) — Panay I., Capiz Prov.: *Ramos & Edaña PNH. 31007*, fl. (BRI, NY, SING) — Sulu I., Jolo (& Siassi): *Kondo & Edaña PNH. 38947*, ♀ fl., fr. (A, PNH, US), Siassi: *Kondo & Edaña PNH. 38964* (A, L, PNH), *Merrill 5309*, st. (NY, US) — Basilan: *Reillo B.S. 15495*, fl. (K; US, type *Adenia longifolia*) — Mindanao.

CELEBES. N. Penins., Gorontalo: *Beccari 4396*, ♂ fl. (FI), *Forsten s.n.*, fl. (L, type *Adenia diversifolia*), *Riedel s.n.*, ♂ fl. (K); Menado, Tomohon: *Alston 16428*, ♂ fl. (BM); Tondano: *Forsten s.n.*, ♂ fl. (L) — Central Celebes, Pakamisang: *Rachmat (exp. van Vuuren) 313*, fr. (BO, L); Palopo: *Curran 3464*, fr. (A) — Southwest Penins. — Southeast Peninsula, Kendari, Lepolepo: *Beccari 4397*, fl. (FI); Moeara Sampara, 0 m: *Kjellberg 1312*, fr. (BO, S).

MOLUCCAS. Talaud I.; Soela I., Soela Mangole: *Bloembergen 4680*, ♂ fl., fr. (BO, K, L, SING); Soelabesi: *Teysmann s.n.*, fr. (BO); Ambon: *Rant 586*, fr. (BO); Kai I.: *Beccari 4395*, ♂ fl. (FI), *Jensen 399*, ♂ fl., ♀ fl. (BO, C).

NEW GUINEA. Vogelkop, Andai & Sorong: *Beccari 4393*, ♂ fl. (FI, 2 sheets); Kaimana, 20 m: *Lundquist 186*, fl. (BO); Adi. I.: *Moll 9938*, fr. (L) — N. West New Guinea, Mamberamo, 60 m: *Docters van Leeuwen 9674*, fl., fr. (BO, K, L); Lake Sentani, 80 m: *van der Sijde BW. 4108*, fr. (BO, FI, K, L, NY, SING, US); Hollandia (Kotabaru): *van der Sijde BW. 4072*, fr. (K, L) — S. West New Guinea, Gelib: *Branderhorst 161*, fr. (BO; L, type *Adenia pandurata*; U) — Papua; Northeast New Guinea, Eastern Highlands, Okapa Patrol, 6500 ft.: *White NGF. 9586*, fr. ? (L); Morobe Distr., Lae, 0–500 ft.; Wau Subdistr., 2800 ft., 7.10 S – 146.40 E: *Millar & Vandenberg NGF. 35197*, fr. (L) — New Britain, Gazelle Penins.: *Womersley NGF. 7933*, fr. (A, BRI) — Aru Is., Vokan: *Beccari 4394*, ♀ fl. (FI).

AUSTRALIA. Queensland: *Bauer 46*, fr. (MEL), *v. Mueller 30*, ♂ fl., fr. (MEL); Endeavour R.: *Perdiak (?) in Hb. Mueller s.n.*, fr. (MEL), *501*, fr. (MEL); North Kennedy Distr., Palm I.: *Bancroft s.n.*, fr. (BRI); Cook Distr. (Cairns); Rockingham Bay: *Dallachy s.n.*, st. (MEL); *v. Mueller s.n.*, fl. (MEL); Herbert R.: *v. Mueller s.n.*, fr. (MEL); Mackay R.: *v. Mueller s.n.*, fr. (MEL).

SOLOMON Is. San Cristobal: *Comins 156*, ♂ fl. (K).

ECOLOGY. Forest and scrub, often in secondary vegetation, growing on a variety of soil types: sand, clay, silt (*Rhizophora*-forest), stony soil, rocks; 0–1000 m, in New Guinea to 2000 m. In Java found in the everwet regions of W. Java, as well as in the seasonal teak forests and scrub of C. and E. Java. One collection from Sumatra.

NOTES. 1. On field labels the leaves are often reported as very glossy; the flowers as greenish, creamy or (pale) yellow; ripe fruits as yellow to bright

red, often ± 3 (-6)-angular; seeds blackish, covered by a whitish aril.

2. The present variety is a variable entity in with a number of intergrading local forms or paramorphs – the extremes often with a marked leaf shape and -consistency – have been described as different species. They are shortly discussed below:

The type specimens of *A. heterophylla*, *A. cardiocarpa*, and *A. oblonga* represent a form from Java with rather thin, (sub)herbaceous, 3–5-lobed leaves, often strongly resembling certain forms from the Philippines. The various syntypes of *A. acuminata*, also from Java, resemble much the types of *A. heterophylla*, but they have entire, not lobed, leaves. The only specimen probably from S. Sumatra (*Korthals*) belongs here. In Java forms with remarkably narrow, distinctly penninerved leaves, with small, indistinct auricles have been found at an altitude of c. 1000 meters.

A. zucca, *A. parviflora* and *A. coccinea* are representatives of the very variable-leaved populations from the Philippines (See also MERRILL, Sp. Blanc., 1918, p.276). The fruits of Philippine specimens have acute to obtuse apices.

The types of *A. formosana* (from Formosa) and *A. palmatifolia* (from Luzon), are specimens with deeply, acute-lobed leaves, respectively 3- and 5-lobed. They are linked up with the variable-leaved populations from the Philippines. *A. longifolia* from Basilan I. (Philippines) is based on a specimen with thin, entire, oblong, penninerved leaves with finely dentate margins. MERRILL describes the ♂ flowers as 4-merous, but I found a flower bud in the type specimen which is – as normal – 5-merous.

The type specimens of *A. diversifolia* from the environs of Gorontalo (Celebes) represent a form with rather small, coriaceous, entire or 3-lobed leaves. These leaf-types merge in the variation of the leaves found in the Philippines and the Moluccas.

The type of *A. pandurata* (New Guinea) is an entire-leaved specimen linked up with certain Philippine specimens and with the population in Queensland. The basal auricles in the leaves of specimens from Queensland are often distinctly peltately connate.

The type of *A. sumbawana* (from Sumbawa) is a broad-leaved, subpalmately nerved from linked up with specimens from Celebes and the Moluccas.

A. chevalieri and *A. machurei* represent a form found in SE. Thailand, Tonkin, S. China (Kwangsi Province) and Hainan. The leaves are entire or 3-lobed, ovate to elliptic-oblong with slightly cordate to rounded or acute base, subpalmately to pinninerved and with the gland-bearing auricles free or slightly peltately connate. The specimen *Kerr 9130* (NE. of Bangkok) deviates from the normal Indochinese form and resembles more certain specimens from the Philippines or Java. It has 3-lobed, distinctly reticulate leaves.

3. As an exception the flowers are 4-merous, mostly only having 4 calyx-lobes.

According to HAYATA (1914) the type-specimen of *A. formosana* has flowers with 4–5-carpellate ovaries. I did not examine the holotype, but the same deviating number of carpels and styles is occasionally found in specimens from the

Philippines; 4 or 5 carpels are also found in the allied Malesian species *A. macrophylla* and in some African species.

4. In specimens from the Philippines several times galled, club-shaped flowers were found.

b. ssp. heterophylla var. celebica (Kds.) de Wilde *stat. nov.* — *Modecca celebica* Kds., Minah. 19 (1898) 638, 478. — *Adenia celebica* Kds. in Koord.-Schum., Syst. Verz. 3 (1914) 90. — Type: *Koorders 16607* β — Fig. 35.

Leaves mostly strongly coriaceous, entire, ovate-oblong to oblong, the base rounded to subacute, 5–16 by 3–7(–9) cm, pinninerved, margin entire; petiole ($\frac{1}{2}$ –)1–5 cm. *Gland*-bearing auricles not peltately connate, broadly adnate with the blade; the glands 2–4 mm \varnothing , partly extending on the blade. σ *fl.* incl. the 5–11 mm long stipe 12–22 by $1\frac{1}{2}$ –3 mm; calyx tube 5–11 mm, calyx lobes 1–2 mm. ρ *fl.* incl. the ($1\frac{1}{2}$ –)2–5 mm long stipe 10–13 by 2– $3\frac{1}{2}$ mm; calyx tube 5–8 mm, calyx lobes 1–2 mm. Fruit fusiform, excl. the 10–20 mm long gynophore 5–8 by 2–3 cm; flower stipe below the withered perianth ($1\frac{1}{2}$ –)2–6 mm. *Seeds* 5–6 mm \varnothing .

BORNEO. North Borneo (Sabah), Tawau, Elphinstone's Bay: *Anon. (J. Brooke?) 43*, fr. (E).

CELEBES. Minahasa: *De Vriese & Teysmann s.n.*, fr. (L); Likupang: *Forsten s.n.* (2 sheets), fl., fr. (L); Menado: *Koorders 16607* β , fr. (BO, type *Modecca celebica*), *18108* β , σ fl., ρ fl. (BO), *19587* β , σ fl. (BO), *19588* β , σ fl. (BO).

MOLUCCAS. Ceram: *de Vriese s.n.*, fr. (L).

ECOLOGY. Up to c. 200 m. Flowers in Feb., March and Sept., fruits in March and Sept. Found on tuff in Celebes.

c. ssp. australis (R. Br. ex DC.) de Wilde, *stat. nov.* — *Modecca australis* R. Br. ex DC., Prodr. 3 (1828) 337; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Endl., Iconogr. Gen. Pl. (1838) t. 114, 115; Roem., Syn. Mon., 2 Pepon. (1846) 203; Schnitzlein, Iconogr. 3 (1851) t. 197; Benth., Fl. Austr. 3 (1866) 312; F.v.M., Landsb. Expl. Austr. c (1866) 116; Fragm. Phytogr. Austr. 9 (1875) 69; *ibid.*, first census (1882) 76; *ibid.*, sec. census (1889) 128; Bailey, Syn. Queensl. Fl. (1883) 200; Cat. Pl. Queensl. (1890) 20; Queensl. Fl. 2 (1900) 689; Compr. Cat. Queensl. (1913) 220, fig. 192; Domin, Bibl. Bot. 3, 2 (1928) 987 ('*Modica australis*'). — *Adenia australis* Engl., Bot. Jahrb. 14 (1891) 376; Harms, Bot. Jahrb. 15 (1893) 572, 573; in E. & P. Nat. Pfl. fam. ed. 1, 3, 6a (1893) 85; ed. 2, 21 (1925) 492; Ewart & Davies, Fl. North. Terr. Austr. (1917) 196; Specht, Rec. Am.-Austr. Exp. Arnhem Land 3 (1958) 262. — Type: *R. Brown s.n.* — Fig. 35.

Modecca populifolia Zipp. ex Blume, Rumphia 1 (1837) 168, t. 50; Spanoghe, Linnaea 15 (1841) 207; Walp., Rep. Bot. Syst. 2 (1843) 222; Miq., Fl. Ind. Bat. 1, 1 (1856) 703; Mast. in Hook. f., Fl. Brit. Ind. 2 (1879) 603 (as imperfectly

known species); Britten in Forbes, Wanderings etc., App. 6 (1885) 506; Bailey, Queensl. Agr. J. 1, 3 (1897) 228; Queensl. Fl. 2 (1900) 690; Compreh. Cat. Queensl. (1913) 220, fig. 193. — *Erythrocarpus populifolius* Roem., Syn. Mon., 2 Pepon. (1846) 204. — *Adenia populifolia* Engl., Bot. Jahrb. 14 (1891) 376; Harms, Bot. Jahrb. 15 (1893) 573, 553 (anatomy); in E. & P., Nat. Pfl. fam. ed. 1, 3, 6a (1893) 85; ed. 2, 21 (1925) 492; Hall, f., Med. Rijksherb. 42 (1922) 9; Ridl., Disp. (1930) fig. frontisp. — Type: *Zippelius s.n.*

Leaves herbaceous, rarely subcoriaceous, entire or sometimes to halfway 3–5-lobed, orbicular to ovate, rarely ovate-oblong, base cordate to truncate, apex acute, up to 1 cm acuminate, rarely obtuse, 5–18 by 3–15 cm, 3–7-plinerved and mostly with 1–2(–4) pairs of nerves from the midrib, reticulation fine, distinct, margin entire; petiole 1–5½ cm. *Gland-bearing auricles* mostly peltately connate; glands restricted to the auricles. Marginal glands (few to) absent. ♂ *fl.* incl. the 5–8 mm long stipe 11–18 by 2–3½ mm; calyx tube 5–8 mm, calyx lobes 1–2 mm. ♀ *fl.* incl. the 1–1½(–2) mm long stipe 6–8 by 2–3 mm; calyx tube 4–6 mm, calyx lobes c. 1 mm. *Fruit* ellipsoid to obovate-oblong, apex obtuse, excl. the 3–13 mm long gynophore 4–7 by 2–3 cm; flower stipe below the withered perianth 1–2 mm. *Seeds* 4–7 mm ∅.

JAVA. West Java, Djampang Koelon Distr., Tji Tespong: *Backer 17581*, ♂ *fl.* (BO) — East Java, Res. Surabaya, Kalang Anjar, 15 m: *Backer 26648*, ♂ *fl.* (BO, L); Grisee, 50 m: *Bremekamp s.n.*, fl. (BO), 150 m: *Dorgelo 2191*, st. (L); *Voyage Labillardiere (Hb. Webb) s.n.*, fr. (P), *s.n.*, ♀ *fl.*, fr. (FI), *Leschenault 339*, st. (P), *de Voogd 904*, ♂ *fl.* (L); Res. Besoeeki, Wato Dodol, 3 m: *Clason 96*, fl. (BO), *Zollinger 3998 (& 517Z, 1820Z)*, ♂ *fl.* (L, W, Z) — Kangean Is., 1–50 m: *Backer 26768*, ♂ *fl.* (BO), *27121*, st. (BO), *27236*, ♂ *fl.* (BO), *27643*, fl. (BO), *27725*, ♂ *fl.* (BO), *28226*, ♂ *fl.* (BO), *28945*, fr. (BO), *29119*, fl. (BO), *29292*, fr. (BO), *29807*, ♂ *fl.* (BO) — Madura I., 1–150 m: *Backer 20065*, st. (BO), *20282*, fl. (BO), *20643*, fr. (BO), *20760*, fl. (BO), *28705*, ♂ *fl.* (BO).

LESSER SUNDA Is. Bali: *Zollinger 1696Z*, st. (W) — Sumbawa: *Colfs 189*, fl. (L); 75–250 m: *Elbert 3546*, ♂ *fl.* (A, L), *3969*, ♂ *fl.* (L); 100 m: *Soejarto 50*, st. (BO) — W. Timor: *Anon. s.n.*, fr. (P), *Teysmann 8953*, st. (BO), *10789*, fr. (BO), *Zippelius s.n.*, fl., fr. (L, type *Modecca populifolia*) — Wetar, c. 50 m: *Elbert 4691*, ♂ *fl.* (L) — Tanimbar Is.: *Buwalda 4033*, ♂ *fl.* (BO, K, L).

NEW GUINEA. Thursday I.: *Bailey s.n.*, fr. (BRI), *Jaheri s.n.*, fr. (BO).

AUSTRALIA. W. Australia, King Sound: *Chapman s.n.*, fr. (MEL); Cygnet Bay: *Cunningham 319*, st. (K) — Northern Terr., NW. Coast: *Anon. s.n.*, fr. (K), *Hughan (?) s.n.*, fr. (MEL); Gulf of Carpentaria: *Bauer s.n.*, ♂ *fl.*, fr. (drawing in W), *Brown s.n.*, fr. (BM?, E; K, type *Modecca australis*); N. Coast: *Schomburgk s.n.*, st. (W); Port Darwin: *Schulz 577*, ♂ *fl.* (K, Z), *698*, fr. (K, Z), *Holze 338*, ♂ *fl.* (MEL); Arnhems Land: v. *Mueller s.n.*, st. (MEL), *Specht 876*, ♂ *fl.* (K, MEL, US); Melville Bay: v. *Mueller s.n.*, st. (MEL); Liverpool River: *Geel (Gull?) s.n.*, st. (MEL).

ECOLOGY. Scrub vegetation in seasonal climate, monsoon forests; 0–150 m, mostly found on sandy or limy soils near the coast. Flowers and fruits in Java mainly Febr.–May, in the Lesser Sunda Is. and Australia March–Dec.

d. *ssp. arcta* (Craib) de Wilde, *stat. nov.* — *A. cardiophylla* var. *arcta* Craib, Fl. Siam. En. 1 (1931) 746. — Type: *Kerr 6920*. — Fig. 35.

A. pierrei Gagnep., Bull. Mus. Hist. Nat. Paris 25, 1919 (1920) 128, p.p.; Fl. Gén. I.-C. 2, 8 (1921) 1026, fig. 133, 1-4; Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 143, t. 5, fig. 1-2, p.p., lectotypo incl.

Leaves membranous to coriaceous, entire or sometimes up to halfway 3-lobed, \pm orbicular, base cordate, apex rounded to subacute, up to 1 cm acuminate, 5-16 by $4\frac{1}{2}$ -14 cm, 5-7-plinerved and 0-2 pairs of nerves from the midrib, reticulation distinct on both surfaces, margin entire or finely dentate; petiole $1\frac{1}{2}$ -8 cm. *Gland*-bearing auricles free; glands restricted to the auricles. Marginal glands 10-25 at either side of the blade. σ fl. incl. the $3\frac{1}{2}$ -4 mm long stipe 10-14 by $3\frac{1}{2}$ -4 mm; calyx tube 6-8 mm, calyx lobes 1-2 mm. Filaments inserted at the base of the hypanthium, $2\frac{1}{2}$ - $3\frac{1}{2}$ (-4) mm, 2-3 mm connate. Anthers 3- $3\frac{1}{2}$ (-4) mm. Inflorescences with 1-3 tendrils. ρ fl. incl. the 1- $1\frac{1}{2}$ mm long stipe 7-8(-9) by 4-5 mm; calyx tube 4-5 mm, calyx lobes 1- $1\frac{1}{2}$ mm. *Fruit* ellipsoid, apex obtuse, excluding the 5-15 mm long gynophore 2- $3\frac{1}{2}$ (-4) by $1\frac{1}{2}$ - $2\frac{1}{2}$ cm; flower stipe below the withered perianth 1- $1\frac{1}{2}$ mm. Seeds 7-8 mm \varnothing , rather finely pitted.

THAILAND. Udawn, Chaiyaburi: *Kerr 21320*, ρ fl., fr. (BM, K) — Ayuthia, Bangkok: *Kerr 10706*, σ fl. (BM, K), *Marcan 2087*, σ fl. (BM), *2124*, σ fl. (BM, K) — Chantaburi, Kaw Chang: *Kerr 6920*, σ fl. (BM; K, type *A. cardiophylla* var. *arcta*) — Surât, Kanchanadit: *Kerr 13071*, σ fl. (BM, K).

LAOS. *Massie s.n.*, st. (P); Savannakhet: *Poilane 28087*, fr. (P); Phon Thane: *Spire 135*, fr. (P); exp. Me-Kong: *Thorel s.n.*, σ fl., fr. (P); *s.n.*, \pm σ fl. (K, P).

CAMBODIA. Var Kombo: *Beaud 49*, σ fl. (P); Kampong Chnang Prov.: *Harmand 168*, \pm σ fl. (P), *330*, fr. (P); Forêt de Prek-Praloung: *Müller 137*, fr. (P); Pursat Prov.: *Poilane 17815*, fr. (P).

SOUTH VIETNAM. Chochin China, Baria (Phuoc Le): *Pierre 947*, σ fl. (GH, syntype *A. pierrei*), *Thorel s.n.*, fr. (GH, P), *s.n.*, fr. (BM, L, P), *s.n.*, st. (BO), *189*, fr. (NY, P), *816*, σ fl. (P); Phu Quoc I.: *Contest-Lacour 254*, σ fl. (LD), *Pierre 947* (p.p.), fr. (P); Poulo Condore I.: *Harmand s.n.*, fr. (K, P), *Pierre 947*, fr. (P).

ECOLOGY. Scrub, secondary vegetation; 0-300 m. Flowers from April to August, fruits in May, June and Oct.

NOTES. 1. In the female flowers of *Kerr 21320* the free parts of the staminodes are dilated and petaloid.

2. For a discussion on the typification of *A. pierrei* see the notes under *A. viridiflora*.

e. ssp. *andamanica* de Wilde, ssp. nov. — Type: *Lace 2826* — Fig. 35. *Modecca heterophylla* Kurz, Rep. And. (1870) 39.

Modecca cordifolia (non Bl.) Kurz, J. As. Soc. Beng. 44-45, 2 (1876) 132; J. As. Soc. Beng. 2 (1877) 95; Mast. in Hook. f., Fl. Brit. Ind. 2 (1879) 602.

Adenia cardiophylla (non Mast.) King, J. As. Soc. Beng. 71 (1902) 53; Chakravarty, Bull. Bot. Soc. Beng. 3, 1 (1951) 66, *quoad spec. And., Nic. & Coco I.*

Scandens, usque ad 30 m alta. *Folia* integra vel 3-lobata, suborbiculata vel

ovata, basi cordata, apice acuta, per 1–2 cm acuminata, 8–23 cm longa, 5–18 cm lata, subtus distincte reticulata. Auriculae glanduliferae apice petioli 2 liberae. *Inflorescentiae* 1-cirrhiferae. *Flores* ♂ stipite 3–5 mm longo incl. 11–16 mm longi, 2–4½ mm lati. Hypanthium calycis tubo incl. 6–10 mm longum. Calycis lobi 1½–2½ mm longi. Antherae 4–4½ mm longae. Filamenta 1½–3 mm longa, parte inferiore in tubum 1–2½ mm longum coalita. Corona nulla. *Flores* ♀ ignoti, fructificationem versus tantum cogniti et 1–2 mm stipitati. *Fructus* ovalis vel oblongus, apice acutus, gynophorio 4–12(–15) mm longo excl. 4½–7 cm longus. Pericarpium coriaceum. Semina 6–8 mm diam.

Leaves membranous to subcoriaceous, entire or sometimes (deeply) 3-lobed, suborbicular to ovate in outline, base cordate, apex acute, 1–2 cm acuminate, 8–23 by 5–18 cm, 3–7-plinerved and 1–2 pairs of lesser nerves from the midrib, reticulation distinct only beneath, margin entire; petiole 2–10 cm. *Gland-bearing auricles* free; glands restricted to the auricles. Marginal glands inconspicuous, 1–10 at either side of the blade, or absent. ♂ *fl.* incl. the 3–5 mm long stipe 11–16 by 2–4½ mm; calyx tube 6–10 mm, calyx lobes 1½–2½ mm. Filaments inserted on a 1–2 mm long androgynophore, 1½–3 mm, 1–2½ mm connate. Anthers 4–4½ mm. Inflorescences with 1 tendril. ♀ *fl.* unknown. *Fruit* fusiform, excl. the 4–12(–15) mm long gynophore 4½–7 by 1¾–3½ cm; flower stipe below the withered perianth 1–2 mm. *Seeds* 6–8 mm ø, rather coarsely pitted.

ANDAMAN AND NICOBAR IS. Great Coco I.: *Prain s.n.*, st. (CAL) — Andaman Is.: *Prain's Coll. s.n.*, ♂ fl. (US, W), *s.n.*, ♂ fl. (HBG, M), 69, ♂ fl. (MPU), 102, fl., fr. (L), *King's Coll. 89*, ♂ fl. (HBG, M) — South Andaman: *King s.n.*, fr. (K, P), *s.n.*, ♂ fl. (FI, P), *s.n.*, ♂ fl. (BM), *s.n.*, fr. (Z), *King's Coll. (Prain) s.n.*, fl. (CAL), *King's Coll. s.n.*, ♂ fl. (K, P), *s.n.*, ♂ fl. (CAL, UPS) *s.n.*, fr. (BO, CAL, K, U), *s.n.*, fr. (L), *s.n.*, ♂ fl. (K, US), *s.n.*, ♂ fl. (CAL, Z), *s.n.*, fr. (P), *s.n.*, ♂ fl. (GH), 255, ♂ fl. (CAL, W), *Kurz s.n.*, ♂ fl., fr. (K, P), *Lace 2826*, ♂ fl. (E; K, type) — Nicobar Is.: *Jelinek 229*, ♂ fl. (W).

ECOLOGY. Hill jungle, along creeks; 0–100 m. Flowers Febr.–Oct., fruits found in Aug., Sept., Oct., and Dec.,

75. *Adenia viridiflora* Craib, Kew Bull. (1914) 124; Fl. Siam. En. 1 (1931) 749; Cusset, *Adansonia* 2, 7 (1967) 373, 382; Fl. Camb., Laos, Vietn. 5 (1967) 142, t. 5, fig. 17–18. — Type: *Kerr 2340*. — Fig. 34.

A.harmandii Gagnep., Bull. Mus. Hist. Nat. Paris 25, 1919 (1920) 126; Bull. Soc. Bot. Fr. 65 (1918) 76, 77 (flow. biol.); Fl. Gén. I.-C. 2, 8 (1921) 1026, fig. 133, 5–7; Harms in E. & P. Nat. Pfl. fam. ed. 2, 21 (1925) 490. — Type: *Harmand 440*.

A.pierrei Gagnep., Bull. Mus. Hist. Nat. Paris 25, 1919 (1920) 128, *quoad spec. fr.*; Bull. Soc. Bot. Fr. 65 (1918) 76–77, *p.p.*; Fl. Gén. I.-C. 2, 8 (1921) 1026 (*p.p.*); Craib, Fl. Siam. En. 1 (1931) 748; Cusset, *Adansonia* 2, 7 (1967) 373, 383, (*p.p.*); Fl. Camb., Laos, Vietn. 5 (1967) 143, t. 2, fig. 6 (*p.p.*, *lectotypo excl.*). — Syntype: *Pierre 947*, Samrong-Tong, Cambodia (P); *947*, Baria, Cochinchina (P).

A. cardiophylla (non Mast.) Gagnep., Bull. Soc. Bot. Fr. 65 (1918) 76-77, *pro maj. parte*; Fl. Gén. I.-C. 2, 8 (1921) 1024, *pro maj. parte*.

A. parviflora (non Blanco) Cusset, Fl. Camb., Laos, Vietn. 5 (1967) 145, *p.p.*

Subligneous climber up to 20 m. Fertile branches pale greenish-brown, 2-6 mm; internodes 2-10 cm. *Leaves* thinly coriaceous, dull greenish-brown, not punctate, entire or rarely (2-)3-lobed, suborbicular to ovate, base cordate, apex subobtusate to subacute, sometimes shortly acuminate, 3-15(-20) by 2-12(-18) cm, 3-5(-7)-plinerved and 1-2(-3) pairs of nerves from the midrib, reticulation rather distinct, margin entire or up to $\frac{3}{4}$ mm deep sinuate-dentate especially towards the base; lobes oblong, up to 9 cm; petiole $1\frac{1}{2}$ -8 cm. *Glands* at blade base 2, 1-2 mm \varnothing , in two \pm hollowed auricles 2-4 mm \varnothing shortly adnate with the blade and \pm peltately connate over the apex of the petiole; blade glands 0-2, 1-2 mm \varnothing , submarginal; marginal glands blackish, c. $\frac{1}{3}$ mm \varnothing , 5-15 at either side. Stipules triangular, finely dentate-lacerate, $\frac{1}{2}$ - $\frac{3}{4}$ mm. *Inflorescences* peduncled for 1-14 cm, sometimes in the axils of reduced leaves in short-shoots (1-)2-10 cm, 5-15-flowered in σ , 1-3-flowered in ρ ; tendrils 0-3, 1-4 cm. Sterile tendrils simple or 3-fid, 10-18 cm. Bracts and bracteoles narrowly triangular, acute, $\frac{1}{2}$ - $1\frac{1}{2}$ mm. Flowers fleshy; sometimes monoecious with σ - and ρ flowers mixed in one inflorescence. σ fl. tubiform-urceolate, incl. the 3-8 mm long stipe (10-)13-19 by $2\frac{1}{2}$ -5(-7) mm, calyx lobes in anthesis reflexed. Pedicel 3-12 mm. Hypanthium incl. calyx tube fleshy, $\frac{1}{2}$ - $\frac{3}{4}$ mm thick, (6-)7-10 mm, calyx lobes (elongate) triangular, subacute, 2-3 $\frac{1}{2}$ mm, entire. Petals narrowly triangular to lanceolate, subacute, 4-5 by $1\frac{1}{2}$ mm, 1-3-nerved, subentire, decurrent, inserted 2(-3) mm below the throat of the calyx tube. Filaments c. $3\frac{1}{2}$ mm, free or connate for 1-1 $\frac{1}{2}$ mm, inserted at the base of the hypanthium or on an androgynophore up to 1 $\frac{1}{2}$ mm. Anthers (2 $\frac{1}{2}$ -)3-4 by $\frac{3}{4}$ mm, \pm tapering towards the apex, subobtusate or up to 0.2 mm acuminate-apiculate. Septa 1-2 mm high. Corona 0. Disk glands $1\frac{1}{2}$ -2 $\frac{1}{2}$ mm. Vestigial ovary 1-1 $\frac{1}{2}$ mm, gynophore c. $\frac{1}{2}$ mm. ρ fl. tubular, incl. the 2-4 mm long stipe 10-14 by 3-5 mm. Pedicel 3-10(-20) mm. Hypanthium incl. the calyx tube tubiform, 6-9 mm, calyx lobes elongate-triangular, subacute, $1\frac{1}{2}$ -2 $\frac{1}{2}$ (-3) mm, entire. Petals oblong-lanceolate, subacute, 3-4 by $1\frac{1}{2}$ mm, 1-3-nerved, subentire, inserted c. 2 mm below the throat of the calyx tube. Staminodes 2-3 mm, \pm free. Septa 0. Corona 0. Disk glands c. 2 mm. Pistil 8-10 mm. Gynophore 3-4 mm. Ovary subglobose to ellipsoid, thick-walled, c. 4 by $3\frac{1}{2}$ mm. Styles c. $\frac{1}{2}$ (-1) mm, partially connate. Stigmas subglobular, papillate, each c. $1\frac{1}{2}$ mm \varnothing . *Fruit* 1-2 per inflorescence, subglobose to ellipsoid or \pm pyriform, not ribbed, apex rounded, excl. the 10-40 mm long gynophore 4-7 $\frac{1}{2}$ by $3\frac{1}{2}$ -5 cm. Pericarp coriaceous, sometimes \pm spongy inside, 5-8 mm. Seeds 40-60 per capsule, obliquely ellipsoid, c. (7-)8 by 6-7 by 3 mm, 7-9 pits along the length; funicles c. 10 mm; embryo 7-7 $\frac{1}{2}$ mm; cotyledons ovate, \pm emarginate-truncate at one side, cordate, 6-6 $\frac{1}{2}$ by 5-5 $\frac{1}{2}$ mm.

THAILAND. *Kerr s.n.*, st. (BM) — Pāyap, Chiangmai, 300 m: *Winit 66*, σ fl. (BM, E, K); Me Ya (Chawng Tawng): *Kerr 5359*, fr. (BM, K) — Maharat, Mē Chang, 330 m: *Kerr 2340*,

♂ fl. (BM, E; K, type *A. viridiflora*); Palat (Lampang), 330 m: *Kerr 2340A*, ♂ fl. (BM, E, K) — Prachinburi, Sriracha: *Collins 1528*, ♂ fl., fr. (K, US) — Ayuthia, Koh si Chang, 20 m: *Marcan 2329*, fr. (K) — Rachaburi, Kanburi: *Kerr 10573*, ♂ fl. (BM, K); *Teysmann 5937*, fr. (BO); Ban Cha-am: *Marcan 1683*, fr. (BM, K).

LAOS. Battambang Prov., South Laos, Bassin du Sè — Moun: *Harmand 440*, ♂ fl. (K; P, type *A. harmandii*).

CAMBODIA. Samrong-Tong Prov.: *Pierre 947*, p.p., fr. (NY, syntype *A. pierrei*); Pang Chahk: *Pierre 950*, fr. (A) — Pursat Prov.: *Poilane 15259*, fr. (P), *17815*, fr. (P); Tongle Sap (Lake): *Godefroy — Lebeuf 168*, ♂ fl. (K, P) — Kompong Chnang Prov.: *Müller 457*, fr. (P).

SOUTH VIETNAM. S. loc.: *Hayata 70*, fr. (P) — Nha Trang Prov., Hoa Tran: *Poilane 50*, fr. (P) — Cochinchina: *Thorel s.n.*, ♂ fl. (P), *189*, fr. (P) — Chau Doc Prov., Mt. Cau: *Harmand 507* (A), ♂ fl. (P) — Nam-pixta I. (Phu Quoc?): *Pierre 947*, p.p., st. (P) — Phan Rang Prov., Ca Na (Muông Man): *Evrard 2329*, fr. (P) — Baria (Phuoc Le), SE. of Saigon: *Pierre 947*, p.p., fr. (BM, BO, K; P, syntype *A. pierrei*).

ECOLOGY. Deciduous forest, scrub, bamboo jungle, rocky places; 0–400 m. Flowers and fruits Jan.–May.

NOTES. 1. *Adenia pierrei* Gagnepain is based on two syntypes. In accordance with CRAIB, who mentions for the type 'Cambodia', the lectotype chosen by CUSSET is *Pierre 947* from Samrong-Tong in Cambodia, in P, a male specimen. It appeared that in various herbaria *Pierre 947* is heterogenous, either being a male specimen or a fruiting specimen, and variously labelled either 'Samrong-Tong, Cambodia', or 'Baria, Austro-Cochinchina', or 'Sinus Siamica, Nam Pixta, Phu Quoc', or 'Poulo Condor'. The large-fruited specimens, labelled 'Baria' in the Paris herbarium, belong to the present species; the male specimens in the Paris herbarium, from Samrong-Tong, to which also belongs the lectotype of *A. pierrei* and the small fruited specimens from Phu Quoc and Poulo Condor belong to *A. heterophylla* ssp. *arcta*.

As both taxa occur in approximately the same area it is not possible to decide in what localities the various specimens are in reality collected.

2. Fresh fruits are reported as red.

76. *Adenia kinabaluensis* de Wilde, sp. nov. — Fig. 35.

Scandens usque ad 20 m alta. Folia integra, ovata vel ovata-elliptica, in sicco brunnea, basi cordata vel late rotundata, apice acuta, 1–1½ cm acuminata, 6–14 cm longa, 3½–11 cm lata, 3(–5)-plinervia, nervis superioribus 1(–2)-paribus apicem versus arcuato-ascendentibus. Glandulae 2 basales auriculis apice petioli instructae, ulro conspicue ad laminae basin extensae. Inflorescentiae 1 vel 3-cirrhiferae, pedunculo 2–12 cm longo instructae. Flores ♂ stipite 1–1½ mm longo incl. 7–9 mm longi, 4(–5) mm lati. Hypanthium calycis tubo incl. 4–5 mm longum. Calycis lobi recurvi, 2–2½ mm longi. Petala c. 3 mm longa, 1–1½ mm lata, c. 1 mm infra calycis lobos inserta. Antherae acutae, 0.1–0.3 mm apiculatae, 3–4 mm longae. Septa nulla. Corona nulla. Disci glandulae c. 1 mm longae. Flores ♀ ignoti. Fructus globosi, gynophorio 10–30 mm longo excl. 3½–4 cm longi, 3½–4 cm lati. Pericarpium lignosum, (2–)3 mm crassum. Semina 8–9(–10) mm diam.

Climber to 20 m. Fertile branches grey- to yellowish-brown, 2–5 mm; internodes 2–10 cm. *Leaves* thinly coriaceous, grey brown to dark brown above, brown, not punctate beneath, entire, ovate to ovate-elliptic, base cordate to broadly rounded, apex acute, 1–1½ cm acuminate, 6–14 by 3½–11 cm, 3(–5)-plinerved and 1(–2) pairs of strong nerves from near the base of the midrib arching towards the apex, reticulation mostly distinct, margin entire; petiole (1½–)2–6 cm. Glands at blade-base 2, elliptic to reniform, 2–4 mm long, mainly on the two semi-orbicular, ± hollowed auricles 3–4 mm \varnothing at the apex of the petiole, but glands extending on the blade to or beyond the insertion of the basal nerves; blade glands 0; marginal glands c. ¼ mm \varnothing , 0–5 at either side. Stipules subtriangular, apex rounded, c. ½ mm. *Inflorescences* peduncled for 2–12 cm, up to 30-flowered in ♂, 2–5-flowered in ♀; tendrils 1(–3), ½–3 cm. Sterile tendrils up to 15 cm. Bracts and bracteoles (narrowly) triangular, acute, ½–1 mm. ♂ *fl.* urceolate, incl. the 1–1½ mm long stipe 7–9 by 4(–5) mm, calyx lobes in anthesis reflexed. Pedicel 1–10 mm. Hypanthium incl. calyx tube urceolate, fleshy, ⅓–½ mm thick, 4–5 mm long, calyx lobes elongate triangular, subobtuse, c. 3 by 1–1½ mm, 1(–3)-nerved, c. 0.1 mm serrulate, inserted c. 1 mm below the throat of the calyx tube. Filaments 1–1¼ mm, free, inserted at the base of the hypanthium. Anthers 3–4 by 1–1¼ mm, acute, 0.1–0.3 mm apiculate. Septa 0. Corona 0. Disk glands ¾–1 mm. Vestigial ovary 1–1½ mm, gynophore c. 1 mm. ♀ *fl.* not known. *Fruit* 1–2 per inflorescence, globose, excl. the 20–30 mm long gynophore 3½–4 by 3½–4 cm. Pericarp woody, (2–)3 mm. Seeds c. 15 per capsule, suborbicular, 8–9(–10) by 8–9 by 2–2½ mm, 9–11 pits \varnothing ; funicles c. 10 mm; embryo 7–8 mm; cotyledons ovate, deeply emarginate at one side, c. 7½ by 7 mm.

BORNEO. Sabah (North Borneo), West Coast Distr., Mt. Kinabalu Region, Upper Kinunut Valley, 4500 ft.: *Carr SFN. 27204*, ♂ fl. (SING); Tenompok, 5000 ft.: *Clemens 02826* (? 2883), fr. (BM), 28104, fr. (A, BM, BO, HBG, K, L, NY), 29421, fl. (BM), 30074, ♀ fl., fr. (BO, HBG, K; L, type; NY); 4000 ft.: *Clemens 5127*(7), st. (BM); Kota Belud Distr. (c. ½ mile E. of Tenompok on path to Ranau), 5000 ft.: *Wood & Wyatt-Smith San. A. 4496*, fl. (BRI, L, SING); 12 miles W. of Ranau, 5500 ft.: *Wood & Kapis San. 17015*, fr. (BRI, L, SING).

ECOLOGY. Montane forest; 1500–1800 m.

NOTE. 1. The leaves resemble *A. macrophylla* var. *smilacina* and certain broad-leaved forms of var. *macrophylla*, but differ by the usually cordate base, the basal glands which extend on the blade, and the brown colour and different texture when dry; the male flowers are smaller. The fruits resemble thick-valved forms of *A. macrophylla* var. *macrophylla*. See also the key to the species.

77. *Adenia macrophylla* (Bl.) Kds., Exk. Fl. Java 2 (1912) 637; Hall. f., Med. Rijksherb. 42 (1922) 12; Backer & Bakh., Fl. Java 1 (1963) 289; Cusset, Adansonia 2, 7 (1967) 373, 384. — *Modecca macrophylla* Bl., Bijdr. 15 (1826) 939; DC., Prod. 3 (1828) 337; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Hassk., Cat. Hort. Bog. (1844) 187; Miq., Fl. Ind. Bat. 1, 1 (1856) 702. —

Microblepharis macrophylla Roem., Syn. Mon., 2 Pepon. (1846) 202. — Syntype: *Blume s.n.*, 1359.

Modecca dubia Roxb., Hort. Beng. (1814) 49, *nom. nud.*; Fl. Ind. 3 (1832) 135. — Type: ? (drawings probably at Brussels).

M. quintuplinervia Miq., Fl. Ind. Bat. 1, 1 (1858) 1093; Suppl. 1 (1860) 132, 333. — *Adenia quintuplinervia* Hall. f., Med. Rijksherb. 42 (1922) 16. — Type: *Teysmann 116*.

M. palmata (*non* Lamk.) Kurz, Nat. Tijd. N.I. 27 (1864) 168.

Modecca sp. Ridl., Trans. Linn. Soc. Bot. 2, 39 (1893) 304.

Adenia acuminata (*non* Bl.) King, J. As. Soc. Beng. 71 (1903) 55; Ridl., Fl. Mal. Pen. 1 (1922) 841; Rendle, J. Bot. (1924/1925) Suppl. p. 43; Burk. & Henderson, Gard. Bull. S.S. 3 (1925) 378; Bartlett, Pap. Mich. Ac. Sc. 6 (1926) 31; Henderson, Gard. Bull. S.S. 4 (1928) 264; Burk., Dict. 1 (1935) 48; Ridl., Kew Bull. (1938) 112; Masamune, Enum. Phan. Born. (1942) 506; Henderson, Mal. Nat. J. 4 (1949) 153, fig. 147; Cusset, *Adansonia* 2, 7 (1967) 372, 383.

A. clementis Merr., Philip. J. Sc. Bot. 13 (1918) 95; En. Born. (1921) 413; *Plantae Elmer. Born.*, in Univ. Cal. Publ. Bot. 15 (1929) 210; Ridl., Kew Bull. (1938) 112; Heine in Fedde, Rep. 54 (1951) 242; Pfl. Clem. Kinabalu (1953) 68, diss. — Type: *Clemens 10166*.

A. longipedunculata Merr., Philip. J. Sc. Bot. 13 (1918) 96; En. Born. (1921) 413. — Type: *Agama 437*.

A. grandifolia Ridl., J. Fed. Mal. St. Mus. 10 (1920) 136; Fl. Mal. Pen. 1 (1922) 842. — Syntype: *Evans s.n.*, *Beccari 743*.

A. borneënsis Hall. f., Med. Rijksherb. 42 (1922) 13; Harms in E. & P. Nat. Pfl. fam. ed. 2, 21 (1925) 492; Ridl., Kew Bull. (1938) 112. — Syntype: many specimens.

A. borneënsis var. *microcarpa* Hall. f., Med. Rijksherb. 42 (1922) 16. — Syntype: *De Vriese & Teysmann s.n.*, *De Vriese 43*.

A. palmata (*non* Lamk.) Steen., Bull. Jard. Bot. Btzg. 3, 12 (1932) 165.

Liana to c. 25 m, at base up to c. 15 cm \varnothing . Fertile branches grey-green to yellowish- or reddish-brown, 2–5(–6) mm; internodes 1–16 cm. *Leaves* subcoriaceous to coriaceous, green to brown above, paler green to whitish, not punctate beneath, entire or shallowly up to $\frac{1}{2}$ cm deep lobed in the upper half, suborbicular to oblong-lanceolate or (ob)ovate, base acute-acuminate to rounded or subcordate, apex (sub)obtuse to acute, up to 1(– $1\frac{1}{2}$) cm acuminate, (4–) 5–21 by ($1\frac{1}{2}$ –) $2\frac{1}{2}$ –12 cm, 3–5-subplinerved to pinninerved with 3–5(–10) pairs of nerves from the midrib, nerves \pm arching towards the apex, reticulation sometimes \pm trabeculate, distinct or not, margin entire; petiole $\frac{1}{2}$ – $7\frac{1}{2}$ cm. *Glands* at blade-base 2, elliptic to \pm reniform, 1–4 mm \varnothing ; on or largely on two \pm hollowed, semiorbicular auricles $1\frac{1}{2}$ –5 mm \varnothing at the apex of the petiole; blade glands 0–4(–6), $\frac{1}{2}$ –1 mm \varnothing , submarginal, in the upper half of the blade; marginal glands c. $\frac{1}{2}$ mm \varnothing , 0–25 at either side. *Stipules* triangular, subobtuse to rounded, c. $\frac{1}{2}$ mm. *Inflorescences* either in the axils of normal leaves, peduncled for $\frac{1}{4}$ –14 cm, or sometimes in the axils of \pm reduced leaves in short-shoots

up to 10(-25) cm, peduncled for up to 1 cm, lax or condensed, up to 100 (-150)-flowered in ♂, 2-10-flowered in ♀; tendrils (0-)1-3, $\frac{1}{2}$ -3(-4) cm. Sterile tendrils simple or 3-fid, up to 20 cm. Bracts and bracteoles (narrowly) triangular, acute, $\frac{1}{2}$ -1 mm. Flower buds ovate, not ellipsoid. ♂ *fl.* narrowly tubular-urceolate, incl. the $1\frac{1}{2}$ -4(-8) mm long stipe 9-15 by 2-3 $\frac{1}{2}$ mm, calyx lobes in anthesis reflexed. Pedicel 2-10(-15) mm. Hypanthium incl. calyx tube fleshy, broadest towards the base, 5 $\frac{1}{2}$ -9 mm, calyx lobes elongate triangular to oblong, subobtuse, 2-2 $\frac{1}{2}$ (-3) mm. Petals oblong-lanceolate, obtuse to subacute, 2 $\frac{1}{2}$ -4 by 1-1 $\frac{1}{2}$ (-2 $\frac{1}{2}$) mm, 1(-3)-nerved, subtire, inserted at- or up to 2 mm below the throat of the calyx tube. Filaments 1-1 $\frac{1}{2}$ mm, connate for up to $\frac{1}{2}$ mm, inserted at the base of the hypanthium. Anthers 4-7 by $\frac{3}{4}$ -1 $\frac{1}{4}$ (-1 $\frac{1}{2}$) mm, \pm tapering to above, subacute, $\frac{1}{3}$ -1 mm apiculate. Septa 0- $\frac{1}{3}$ mm high. Corona 0. Disk glands $\frac{1}{2}$ -1 mm. Vestigial ovary 1-1 $\frac{1}{2}$ mm, gynophore $\frac{1}{2}$ -1 mm. ♀ *fl.* tubular-campanulate, incl. the $\frac{1}{4}$ -1 mm long stipe 5-7 by 2 $\frac{1}{2}$ -3 mm. Pedicel 2-5 mm. Hypanthium incl. calyx tube fleshy, 3-4 mm, calyx lobes elongate-triangular to oblong, obtuse, 2-4 mm. Petals oblong-lanceolate, subobtuse to subacute, 2-3 by $\frac{3}{4}$ mm, 1-nerved, subtire, inserted c. $\frac{1}{2}$ mm below the throat of the calyx tube. Staminodes c. 1 mm, \pm free, inserted at the base of the hypanthium. Septa 0. Corona 0. Disk glands c. 1 mm. Pistil 4-6 mm. Gynophore 1-2 mm. Ovary subglobose to ovoid, 1 $\frac{3}{4}$ -2 $\frac{1}{2}$ by 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ mm. Styles $\frac{1}{2}$ - $\frac{3}{4}$ mm, \pm free. Stigmas broadly reniform, irregularly lobed (not papillate), each c. 1 $\frac{1}{2}$ mm \varnothing . *Fruit* 1-2(-3?) per inflorescence, globose to broadly ovoid, base rounded, apex rounded to subacute, or fruit \pm fusiform, excl. the (7-)10-30 mm long gynophore 2-6(-6 $\frac{1}{2}$) by 1 $\frac{1}{2}$ -5 cm. Pericarp hard-coriaceous to woody, $\frac{1}{2}$ -3 mm. Seeds 15-40 per capsule, \pm orbicular, 5-10 by 5-10 by 2 $\frac{1}{2}$ -4 mm, mostly \pm muricate, 6-10 pits \varnothing ; funicles 8-13 mm; embryo 5-8 mm; cotyledons ovate to elliptic, sometimes emarginate at one side, 4 $\frac{1}{2}$ -7 $\frac{1}{2}$ by 4-6 mm.

DISTRIBUTION. Malay Peninsula, Borneo, Sumatra and Java.

ECOLOGY. Everwet forest. — Fig. 34.

USES. Fruits several times recorded as poisonous. According to various authors the roots and leaves are medicinal. According to HEYNE (1927) the bark is used for spinning threads for fishing tackle in Sumatra's West Coast. *Jacobs 5003* mentions: 'the wood smells a bit like HCN; vessels contain potable water'.

- NOTES.** 1. Sometimes 4-carpellate fruits are found.
 2. Often larva feeding on the pollen are found.
 3. Deformed, galled flowers were found several times.
 4. Flowers once reported as without odour; the urceolate flowers enclosing the anthers, however, suggest entomogamy.
 5. Fresh flowers are yellow or lemon, sometimes 'waxy', sometimes reddish spotted inside, or orange at the base. Pollen bright yellow to orange-yellow. Fruits red, when dry orange-brown to reddish-purplish; funicles pinkish; arils whitish.

KEY TO THE VARIETIES

1. Fruit globular to ovoid. Leaves mostly greenish beneath.
 2. Leaves suborbicular to lanceolate, palmately- to pinninerved. Fruit (2-)3-6(-6½) cm; gynophore (10-)15-30 mm. Valves (½-)1-3 mm thick. a. var. *macrophylla*
 2. Leaves suborbicular to ovate, 3-5-subplinerved. Fruit 2-3 cm; gynophore c. 10 mm. Valves ½-1 mm thick. b. var. *smilacina*
1. Fruit (ovate-)oblong, ± fusiform. Valves c. 1 mm thick. Leaves oblong to lanceolate, ± pinninerved, mostly whitish-green beneath.
 - c. var. *singaporeana*

a. var. *macrophylla* — Fig. 34.

Leaves thinly to thickly coriaceous, green to brown above, pale green to grey-green beneath, entire or bluntly up to ½ cm lobed in the upper half, suborbicular to lanceolate or ovate, base acute or acuminate to broadly rounded, apex rounded to acute, up to 1 cm acuminate, 4-21 by 1½-12 cm, 3(-5)-plinerved and 1-2 pairs from the midrib, or ± pinninerved with 3-5(-10) pairs of nerves; petiole ½-6(-7½) cm. *Glands* at blade-base confined to the auricles; submarginal glands (0-)1-2(-3) pairs; marginal glands 5-25 at either side. *Inflorescences* peduncled up to 14 cm. *Fruit* globular to ovoid, excl. the (10-) 15-30 mm long gynophore (2-)3-6(-6½) by (1½-)2-5 cm. Pericarp thickly coriaceous to woody, (½-)1-3 mm. Seeds 7-10 mm ∅.

SUMATRA. West Coast; Poeloe Pisang (Padang): *Teysmann 116*, fl. (L; U, type *Modecca quintuplinervia*) — East Coast, 0-500 m — Djambi, road to Rantau Padjang, 60 m: *Posthumus 575*, fl. (B, L), road to S. Manan, 180 m: *Posthumus 705*, fl. (BO, L.) — Palembang: *de Voogd 201*, fl. (BO) — Lampong Distr., Toeloeng Boejoet: *Engles-Julius 21*, fl. (BO) — Simaloeer Is.: *Achmad 458*, fr. (BO), 951, st. (BO, L), 1696, st. (BO, L) — Banka, Toboalei: *Teysmann s.n.*, fl. (BO); Pankal Pinang: *Teysmann s.n.*, fr. (BO); Lobok-besar, 20 m: *Kostermans & Anta 576*, fl. (A, BM, K, L, PNH, SING) — Billiton: *Riedel s.n. (Beccari 4403)*, fr. (FI) — Riouw Lingga Arch., Manggoc, 60 m: *Bünnemeijer 7162*, fr. (BO); Sungei Tanda: *Teysmann s.n.*, fr. (BO).

MALAY PENINS. Kedah, 22 miles Teniang Sëlëmbau Rd., low alt.: *Kadir SFN. 35801* (K, SING) — Perak, 0-200 m. — Dindings — Kelantan, Sungei Keteh: *Henderson 19660*, fl. (BO, SING) — Trengganu, Ulu Brang, 300 ft.: *Moysey & Kiah SFN. 33814*. ♂ fl. (A, K, SING), *SFN. 33850*, fr. (BO, BRI, SING) — Pahang, Jerantut: *Corner s.n.*, fr. (SING), *Burkill & Haniff 16072*, fr. (SING); Mentakab: *Henderson 10776*, fr. (SING); Kuala Tekan: *Evans s.n.*, fl. (K, syntype *Adenia grandifolia*; SING); Sakan R.: *Ridley s.n.*, fr. (SING); Kwala Luit: *Ridley s.n.*, fr. (SING); Pulau Baru: *Ridley s.n.*, fr. (SING) — Selangor — Negri Sembilan — Malacca — Penang, Bukit Penara, 900 ft.: *Curtis 864 (or 869?)*, fl. (SING).

JAVA. West Java, Bantam, Udjong Kulon, 200-300 m: *Nenga Wirawan 124*, fr. (K, L); G. Kentjana, 300 m: *Backer 1233*, fl. (K, L); Bodjong-manik: *Koorders 40841 β*, fl. (BO) — Bogor (Preanger), 250-1000 m; G. Salak: *Blume s.n.*, fl., fr. (L, 8 sheets, syntype *Modecca macrophylla*; P), G. Parang: *Blume 1359* (BO; L, syntype *Modecca macrophylla*) — Central Java, Nusa Kambangan: *Kostermans & van Woerden 50*, st. (K, L), 197, fl. (L).

BORNEO. Sarawak, Kuching and vicinity, 0-700 m; Betong: *Brooke 8236*, fl. (BM, L);

Lubok Antu: *Brooke* 10673, fr. (BM, L); Bintulu, 100 ft.: *Brunig* S. 12086, fl. (K, L); Tatau⁷ 100 ft.: *Purseglove* 5477, fl. (K, L, SING); Puak: *Ridley* s.n., fl. (SING); Matang: *Ridley* s.n., fr. (K) — Brunei, Berakas, 100 ft.: *Pukol Brun.* 5416, fr. (K, L); Bt. Peradayan, 100–300 m: *Mitsuru Hotta* 13613, fr. (L) — West Borneo, Permantang, 50 m: *Alston* 13283, ♂ fl. (BM); Sungei Bulang: *Amdjah* (*exp. Nieuwenhuis*) 116, fr. (BO, L); Kapuas: *Beccari* (*leg. Teysmann*) 8529, fl. (FI); Soeka Lanteng: *Hallier* B. 103, fr. (BO; L, syntype *A. borneënsis*), B. 105, fl. (BO; L, syntype *A. borneënsis*), 136, ♀ fl., fr. (BO; L, syntype *A. borneënsis*); Sanggouw: *Hallier* B. 765, fl. (BO; L, syntype *A. borneënsis*); Tihang: *Hallier* 891, fr. (P); between S. and G. Kenepai: *Hallier* B. 1892, st. (BO; L, syntype *A. borneënsis*); base of G. Klam: *Hallier* B. 2505, fr. (BO); Liang-gagang: *Hallier* B. 2733, st. (L, syntype *A. borneënsis*); ?, Jaheri (*exp. Nieuwenhuis*) s.n., fr. (BO), 1307, fl. (BO), 1728, fr. (BO), Mt. Biang: *Teysmann* 8527, fr. (BO, FI; L, syntype *A. borneënsis*), 8528, fr. (BO; L, syntype *A. borneënsis*), 8529, fl. (BO, FI; L, syntype *A. borneënsis*); Bengbagang: *Teysmann* 10835, fr. (FI); ?, *De Vriese & Teysmann* s.n. st. (L, syntype *A. borneënsis*), *de Vriese* s.n., ♀ fl., ♂ fl. (BO; L, syntype *A. borneënsis*), 43, fl. (BO; L, syntype *A. borneënsis*); Lebang Kera, 150 m: *Winkler* 343, fl. (L); Lebang Hara, 150 m: *Winkler* 384, ♀ fl., fr. (L) — South Borneo, Hayoep: *Winkler* 2184, fl. (L, syntype *A. borneënsis*); Selissai: *Winkler* 3161, fl. (BM, BO, K; L, syntype *A. borneënsis*; Z); Doeson: *Korthals* s.n., fr. (L, syntype *A. borneënsis*); Rantau Mantalat: *Korthals* s.n., fr. (L, syntype *A. borneënsis*); Tanjong-petong: *Korthals* s.n., fl. (L, syntype *A. borneënsis*); Martapoera: *Korthals* s.n., fl. (L, syntype *A. borneënsis*); ?, *Korthals* s.n. (several sheets), fl., st. (L, syntypes *A. borneënsis*); Bandjarmasin: *Motley* 1167, ♂ fl. (K) — East Borneo: *Rutten* 181, fl. (U, syntype *A. borneënsis*); Bukit Ulu Sebuku: *Amdjah* 473, fr. (BO, L, SING), 487, fl. (L), G. Pemblilangan: *Amdjah* 881, fl. (K, L), 901, fl. (BO, K, L); Sungei Tikung: *Amdjah* 891, fr. (L) (all *Amdjah* coll. syntypes *A. borneënsis*); Sungei Blu'uh: *Jaheri* (*exp. Nieuwenhuis*) 1059, fl. (BO; L, syntype *A. borneënsis*); Boengaloen R.: *Rutten* 777, fl. (U, syntype *A. borneënsis*); Belajan R., 0–100 m: *Forman* 493, fl. (K, L); Central Kutei: *Kostermans* 10652, fl. (BO); West Kutei (Koetai): *Enderit* 2215, fl. (BO, L, PNH, SING), 3437, fl. (A, BO, K, L), 4948, fl. (A, BO, K, L), 5036, fr. (BO, L); Berau, low alt.: *Kostermans* 21061, fr. (L); Balikpapan Bay: *Kostermans* 4370, fl. (K, L) — North Borneo (Sabah), Mt. Kinabalu, Kiau: *Clemens* 10166, fl. (BO, K, PNH; US, type *A. clementis*), 10223, fr. (PNH); Dallas, 3000 ft.: *Clemens* 26104, fr. (A, BM, BO, HBG, K, L, NY), 27633, fl., fr. (A, BM, BO, K, L, M, NY); Kabayo Resthouse, 1000 ft.: *Clemens* 27684, fr. (BM); Tenompok, 5000 ft.: *Clemens* 28794, ♀ fl., fr. (A, BM, BO, K, L, NY); Beaufort Distr.: *Pitty Binideh* SAN. 58416, ♂ fl. (L.); Sandakan; Sandakan and vicinity, 0–100 ft.: *Agama* 437, ♂ fl. (PNH, type *A. longipedunculata*); Tawau, Elphinstone Prov.: *Elmer* 20547, fr. (BM, BO, HBG, K, L, M, NY, P, S, SING, U, Z) — Anambas & Natuna Is., Siantan: *van Steenis* 684, st. (L).

ECOLOGY. Primary and secondary forest, peat swamp forest, swamp edges; sand, loam, 'red' soil, sandstone, sandy loam soil with lime, rich yellow soil, podsolized sands, peat; 0–1000(–1500) m. Flowers and fruits mostly Apr.–Dec.

NOTE. 1. Some small-fruited, pale-leaved specimens from Java resemble var. *singaporeana*; narrow-fruited forms are known from Mt. Kinabalu.

b. var. *smilacina* (Hall. f.) de Wilde, *stat. nov.* — *A. smilacina* Hall. f., *Med. Rijksherb.* 42 (1922) 17; *Ridl.*, *Kew Bull.* (1938) 112. — Type: *Amdjah* 379. — **Fig. 34.**

Leaves thinly coriaceous, brown-green above, some paler beneath, entire, suborbicular to ovate, base broadly rounded, mostly shortly acuminate, apex acute, $\frac{1}{2}$ –1 cm acuminate, 6–12 by 3–9 cm, 3–5-subplinerved, nerves arching

towards the apex; petiole 2–7 cm. *Glands* at blade-base \pm extending beyond the auricles; submarginal glands 0; marginal glands c. 5 at either side. *Inflorescences* peduncled for (1–)6–13 cm. *Fruit* globular to ovoid, excl. the c. 10 mm long gynophore c. 2–3 by $1\frac{1}{2}$ –2 cm. Pericarp coriaceous, $\frac{1}{2}$ –1 mm. Seeds 5–7 mm \varnothing .

BORNEO. Sarawak, Rejang: *Bartlett s.n.*, st. (SING); Upper Rejang R.: *Clemens 21683*, fl., fr. (K, NY), 21684, ♀ fl., fr. (BO, K, NY, Z); path to Bt. Kemantan, low alt.: *Ilias Paie S. 19505*, fr. (K, L) — Northeast Borneo, Gunung Labang, 200 m: *Amdjah 379*, fr. (BO, K; L, type *Adenia smilacina*).

ECOLOGY. Forest, forest edges, secondary forest; rich yellow clay soil; low altitudes. Fruits July–Oct.

- NOTES. 1. The leaves resemble those of *A. kinabaluensis*.
2. Fruits sea-green turning bright red.

c. var. *singaporeana* (Wall. ex G. Don) de Wilde, *stat. nov.* — *Passiflora singaporeana* Wall., Cat. (1829) n. 1232, *nom. nud.*; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 55; Steudel, Nom. ed. 2, 2 (1841) 276 ('*sengaporeana*'); Mast., Trans. Linn. Soc. Bot. 27 (1871) 631 ('*sengaporeana*'). — *Anthactinia singaporeana* Roem., Syn. Mon., 2 Pepon. (1846) 192. — *Modecca singaporeana* Mast. in Hook. f., Fl. Br. Ind. (1879) 601; Ridl., J. Str. Br. R. As. Soc. 33 (1900) 87. — *Adenia singaporeana* Engl., Bot. Jahrb. 14 (1892) 376; King, J. As. Soc. Beng. 71 (1903) 55; Ridl., Fl. Mal. Pen. 1 (1922) 841; Burk., Dict. 1 (1935) 48; Heyne, Nutt. Pl. 1, ed. 3 (1950) 1142; Keng, Ord. & Fam. Mal. Seed Pl. (1969) 76, fig. 41. — Type: *Wallich Cat. n. 1232* — Fig. 34.

Leaves thickly coriaceous, green to brown above, grey-green to whitish-green beneath, entire, (obovate-)oblong to lanceolate, base acute to rounded, apex acute, up to $\frac{1}{2}$ cm acuminate, 5–15 by $1\frac{3}{4}$ –7(–8) cm, faintly 3-plinerved and (1–)2–4 pairs of nerves from the midrib; petiole $\frac{1}{2}$ –2 $\frac{1}{2}$ cm. *Glands* at blade-base confined to the auricles; submarginal glands 0–1(–2) pairs; marginal glands 3–10 at either side. *Inflorescences* peduncled for up to 6 cm. *Fruit* (ovate-)oblong, \pm fusiform, excl. the (7–)10–25 mm long gynophore 2 $\frac{1}{2}$ –6 by $1\frac{1}{2}$ –2 $\frac{1}{2}$ cm. Pericarp thickly coriaceous or woody, c. 1 mm. Seeds 6–9 mm \varnothing .

MALAY PENINS. Johore, Kota Tinggi: *Ridley s.n.*, fr. (SING); Bukit Soya: *Ridley s.n.*, fl. (SING); Jaffaria: *King s.n.*, fr. (CAL); Mawai-Jemaluang Rd.: *Corner s.n.*, fl. (SING) — Singapore: *Anon. s.n.*, fr. (W), *Burkill 7649*, fl. (BO, SING), *Cantley's Coll.*, fr. (SING), *Goodenough 2412*, fr. (SING), *Hullett 392*, fr. (K), *Ridley s.n.* (specim. div.) fl., fr., st. (BM, MPU, SING), *Ridley 2412*, fr. (BM, SING), 3852, fl. (MEL), 3889, fr. (SING), 5710, ♂ fl. (BM, BO, SING), *Sinclair s.n.*, fr. (BO, E, LISU), *s.n.*, fl. (E), *Wallich 1232*, st. (K-W, type *Adenia singaporeana*).

ECOLOGY. Forest edges; low altitudes. Flowers Sept.–March, fruits Jan. and July–Oct.

78. *Adenia cordifolia* (Bl.) Engl., Bot. Jahrb. 14 (1891) 376; Harms in E. & P., Nat. Pfl. fam. ed. 1, 3, 6a (1893) 84; *ibid.* ed. 2, 21 (1925) 490; Koord., Exk. Fl. Java 2 (1912) 637; Hall. f., Med. Rijksherb. 42 (1922) 11; Merr., Pl. Elmeriana-nae Born., Univ. Calif. Publ. Bot. 15 (1929) 210; Ridl., Kew Bull. (1938) 112; Masamune, En. Phan. Born. (1942) 506; Heyne, Nutt. Pl. 1, ed. 3 (1950) 1142; Back. & Bakh., Fl. Java 1 (1963) 289; Cusset, Adansonia 2, 7 (1967) 372, 383. — *Modecca cordifolia* Bl., Bijdr. 15 (1826) 939; DC., Prodr. 3 (1828) 336; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Bl., Rumphia 1 (1837) 167, t. 49, fig. 1-7; Hassk., Cat. Hort. Bog. (1844) 187; Miq., Fl. Ind. Bat. 1 (1856) 702. — *Microblepharis cordifolia* Roem., Syn. Mon., 2 Pepon. (1846) 202. — Type: *Blume s.n.* — Fig. 34, 36.

Modecca obtusa Bl., Bijdr. 15 (1826) 939; DC., Prodr. 3 (1828) 336; G. Don, Gen. Syst. Gard. Bot. 3 (1834) 59; Bl., Rumphia 1 (1837) 166, t. 48, fig. 1-10; Hassk., Cat. Hort. Bog. (1844) 187; Miq., Fl. Ind. Bat. 1, 1 (1856) 702. — *Microblepharis obtusa* Roem., Syn. Mon., 2 Pepon. (1846) 200. — *Adenia obtusa* Engl., Bot. Jahrb. 14 (1891) 376; Harms in E. & P., Nat. Pfl. fam. ed. 1, 3, 6a (1893) 84, fig. 30 A-E; *ibid.* ed. 2, 21 (1925) 489, 492, fig. 223; Koord., Exk. Fl. Java 2 (1912) 637; Hall. f., Med. Rijksherb. 42 (1922) 11; Steen., Act. Bot. Neerl. 15 (1966) 41. — Type: *Blume s.n.*

A. populifolia var. *pentamera* King, Mat. Fl. Mal. Pen., J. As. Soc. Beng. 71, 2, 1 (1903) 54; Ridl., Fl. Mal. Pen. 1 (1922) 841. — Syntype: *Maingay 668, Scortechini 1609, King's Coll. nos. div.*

A. quadrifida Merr., Philip. J. Sc. Bot. 13 (1918) 94; Merr., En. Born. (1921) 413; Harms in E. & P., Nat. Pfl. fam. ed. 2, 21 (1925) 492; Masamune, En. Phan. Born. (1942) 506. — Type: *Clemens 11138*.

A. vespertilio Hall. f., Med. Rijksherb. 42 (1922) 8; Masamune, En. Phan. Born. (1942) 506. — Syntype: *Bartlett & La Rue 455, Jaheri 132*.

Adenia sp. Bartlett, Pap. Mich. Ac. Sc. 6 (1926) 31.

A. populifolia (non Bl.) Ridl., Kew Bull. (1926) 66; Kew Bull. (1938) 112; Henderson, Gard. Bull. S.S. 4 (1928) 264; Burk., Dict. 1 (1935) 48; Masamune, En. Phan. Born. (1942) 506.

Liana to 20(-50?) m. Fertile branches pale greenish, 2-4(-5) mm; internodes 1-7 cm. *Leaves* herbaceous to subcoriaceous, greenish above, pale green to glaucous-green, not punctate beneath, entire, often \pm bullate, broadly ovate to oblong, base deeply cordate to rounded, rarely subtruncate, apex obtuse to (longly) acute, up to 1 cm acuminate, $2\frac{1}{2}$ -10(-17) by $1\frac{1}{2}$ -6(-9) cm, 3-5-plinerved and 2-10 pairs of nerves from the midrib, reticulation rather distinct, margin entire; petiole $\frac{1}{2}$ -3(-4 $\frac{1}{2}$) cm. *Glands* at blade-base 2, 1-2 $\frac{1}{2}$ mm \varnothing , in two deeply hollowed hemispherical auricles $2\frac{1}{2}$ -4 $\frac{1}{2}$ mm \varnothing at the apex of the petiole; blade glands 0-6, $\frac{1}{4}$ -1 mm \varnothing , submarginal; marginal glands blackish, 0.1-0.3 mm \varnothing , 0-8 at either side. Stipules broadly triangular, obtuse to rounded, $\frac{1}{2}$ -1 mm. For leaves of juvenile specimens see the notes. *Inflorescences* peduncled for $\frac{1}{2}$ -4 $\frac{1}{2}$ (-5 $\frac{1}{2}$) cm, sometimes \pm in short-shoots, up to 60-flowered in σ , 3-5-flowered in ρ ; tendrils 0-3, $\frac{1}{2}$ -2 $\frac{1}{2}$ cm. Sterile tendrils 3-5(-7)-fid, up to 10 cm,

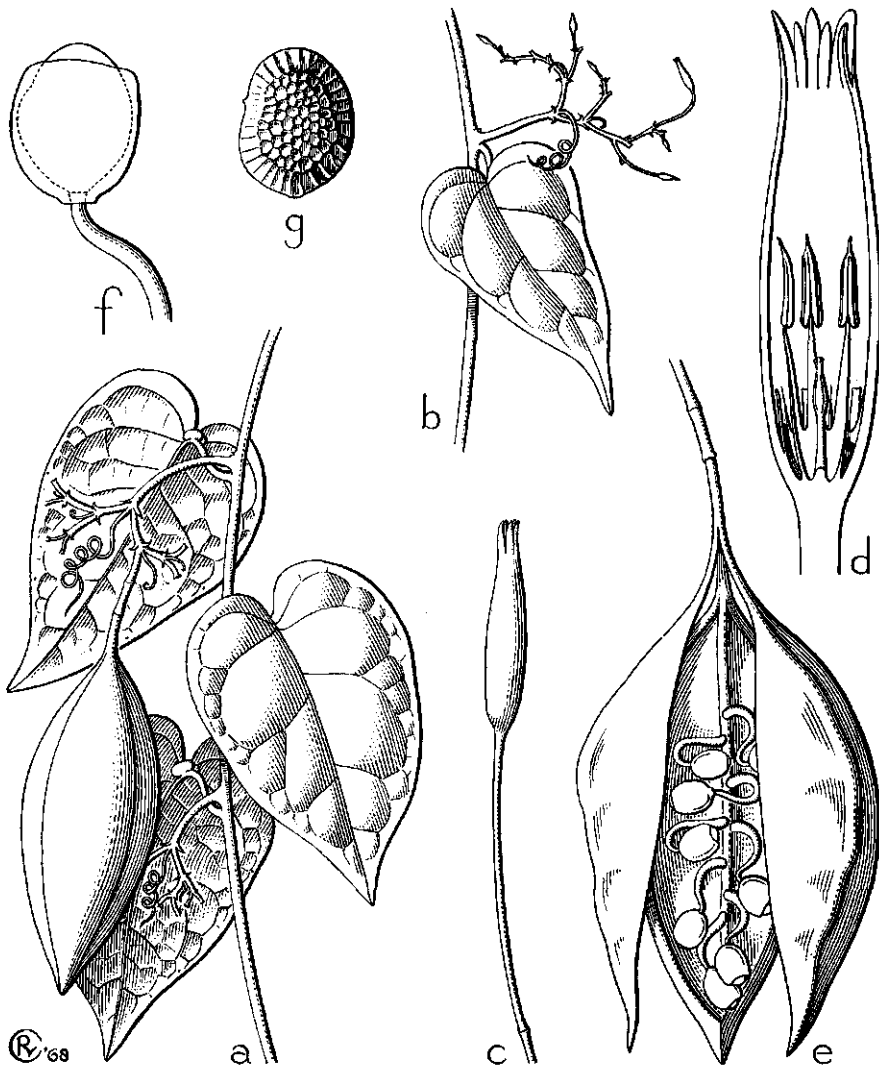


FIG. 36. *Adenia cordifolia*. — a. habit, $\times \frac{2}{3}$ (Alvins 2288); b. ♂ inflorescence, $\times \frac{2}{3}$ (Ridley 10197); c. ♂ flower, $\times 2$ (Ridley 10197); d. ♂ flower, longitudinal section, $\times 4$ (Ridley 10197); e. fruit, $\times \frac{2}{3}$ (Blume 2030, in spirit); f. seed with aril, $\times 2$ (Blume 2030, in spirit); g. seed, $\times 2$ (Beccari 2155).

sometimes ending in adhesive disks. Bracts and bracteoles oblong, acute, $\frac{1}{2}$ – $1\frac{1}{2}$ mm. ♂ fl. narrowly tubular-urceolate, incl. the 10–20 mm long stipe 18–35 by $1\frac{1}{2}$ –3(–4) mm, calyx lobes in anthesis (sub)erect. Pedicel 3–10 mm. Hypanthium incl. calyx tube fleshy-leathery, $\frac{1}{3}$ – $\frac{1}{2}$ mm thick, \pm narrowed to the throat, 8–12 (–14) mm, calyx lobes elliptic-oblong, obtuse to subacute, 1–2(– $2\frac{1}{2}$) mm, entire. Petals oblong-lanceolate, subacute to obtuse, 1–2 mm, 1-nerved, entire, inserted

at or up to 1 mm below the throat of the calyx tube. Filaments ($1\frac{1}{2}$ –)2–5 mm, connate for 1–2 mm, inserted at the base of the hypanthium. *Anthers* 3–4 by 0.6–1 mm, acute, up to $\frac{1}{2}$ mm apiculate. Septa 1–2 mm high. Corona 0. Disk glands 1–2 mm. Vestigial ovary $1\frac{1}{2}$ –2 mm, gynophore 1–2 mm. ♀ *fl.* tubular (-urceolate), incl. the 4–10 mm long stipe 12–18 by $2\frac{1}{2}$ –3 mm. Pedicel 2–6 mm. Hypanthium incl. calyx tube c. 7 mm, calyx lobes ovate-triangular, obtuse, c. $1\frac{1}{2}$ mm. Petals lanceolate, subobtusate, c. $1\frac{1}{2}$ mm, 1-nerved, entire, inserted at or up to 2 mm below the throat of the calyx tube. Staminodes 1– $1\frac{1}{2}$ mm, connate for $\frac{1}{2}$ – $\frac{3}{4}$ mm, inserted at the base of the hypanthium. Septa c. $\frac{1}{2}$ mm high. Corona 0. Disk glands $\frac{3}{4}$ –1 mm. Pistil 5–6 mm. Gynophore c. 1 mm. Ovary ellipsoid c. 4– $4\frac{1}{2}$ by $2\frac{1}{2}$ mm. Styles c. $\frac{1}{2}$ mm, free. Stigmas subglobose, \pm papillate, each c. $1\frac{1}{2}$ mm \varnothing . *Fruit* 1–2 per inflorescence, ellipsoid-oblong, fusiform, \pm 3-angular, apex acute, up to 1 cm acuminate, excl. the 5–10(–15) mm long gynophore ($4\frac{1}{2}$ –)5–8(–9) by $1\frac{1}{2}$ – $3\frac{1}{2}$ cm. Pericarp woody-coriaceous, 1– $1\frac{1}{2}$ mm. Seeds 10–30 per capsule, orbicular to subreniform, 7– $8\frac{1}{2}$ by 8–10 by 4– $4\frac{1}{2}$ mm, 7–10 pits \varnothing ; funicles 10–20 mm; embryo 7–9 mm; cotyledons ovate-elliptic, broadly emarginate at one side towards the apex, 7–9 by $5\frac{1}{2}$ – $6\frac{1}{2}$ mm.

SUMATRA. West Coast, Indrapoera: *Korthals s.n.*, fl. (C, L), *s.n.*, ♂ fl. (L, Z) — East Coast, Sibolangit; Asahan: *Bartlett & La Rue 455*, st. (A; L, lectotype *Adenia vespertilio*), *Rahmat si Boeea 6978*, ♂ fl. (A, MI, US) — Mentawai I., Siberut: *Boden-Kloss 14493*, ♂ fl. (K, SING), *Iboet 175*, ♂ fl. (L, SING).

MALAY PEN. Perak: *King's Coll. 7936*, fr. (BM, HBG, L, P), 8383, fr. (FI, K, M, S), *Scortechini, s.n.*, st. (K); Ipoh: *Curtis 3165*, ♂ fl. (SING); Kota Lama, Kuala Kangsar: *Haniff 15525*, juv. (SING); Larut, 200–600 ft.: *King's Coll. 4303*, fr. (CAL, E, U), 5948, fr. (K, W), 6053, fl. (FI; K, lectotype *Adenia populifolia* var. *pentamera*); Ulu Bubong, 400–600 ft.: *King's Coll. 10308*, fr. (BO); Pulau Rumbia: *Seimund s.n.*, fl. (SING) — Selangor — Negri Sembilan, Sungei Ujong: *Alvins 2288*, fr. (SING) — Malacca — Johore, G. Panti, 500–1000 ft.; *Holtum s.n.*, juv. (SING) — Singapore, Bajau Distr.: *Ridley s.n.*, fr. (SING).

JAVA. West Java, Bantam: *Kühl & van Hasselt s.n.*, juv. (L) — Bogor, Dépok, 90 m: *Bakhuizen van den Brink 5759*, fl. (K, L, P); G. Tjileueur, 350 m: *Bakhuizen van den Brink 5822*, juv. (L); Salak: *Blume s.n.* (3 sheets), ♂ fl., ♀ fl., fr. (BO; L, lectotype *Modecca obtusa*; P), *Blume s.n.* (2 sheets), ♂ fl. (BO; L, lectotype *Modecca cordifolia*), *Blume 208*, fr. in spirit (L); Bogor: *Boerlage s.n.*, juv. (L), *s.n.*, galled ♂ fl. (L); 240 m: *Palmer & Owen Bryant 73*, juv. (US); Tjiliwoeng: *Hallier 116a, 116b*, juv. (BO); Babakan: *Hallier 187*, juv. (A, BO, K, L); Tjibodas: *Anon. (Hallier?) s.n.*, st. (BO, 3 sheets).

BORNEO. Sarawak, Kuching Distr.; Binatang Distr.: *Sanusi bin Tahir 9271*, fl. (L); Beraya, 4th Div., 0 m: *Seal 36*, juv. (L); Beram Distr., 0–500 ft.: *Chew Wee-lek 1011*, juv. (L) — Brunei — West Borneo: *Jaheri (exp. Nieuwenhuis) 132*, st. (BO; L, syntype *Adenia vespertilio*) — Southeast Borneo, Tewe R.: *Korthals s.n.*, fr. (L); Bandjarmasin: *Korthals 1*, juv. (L) — North Borneo (Sabah), West Coast, Mt. Kinabalu Reg., 1000–1200 m; Mt. Kalawat: *Clemens 11138*, ♂ fl. (PNH, type *Adenia quadrifida*); Tawau: *Elmer 20504*, fr. (A, BM, BO, C, HBG, K, L, M, NY, P, SING, U, Z), 21350, ♂ fl. (A, BM, BO, C, HBG, K, L, M, NY, P, PNH, S, U, Z); Sandakan, 50 m: *Puasa 4187*, fl., fr. (K, SING), *San. 34659*, fr. (K, L) — Anambas & Natuna Is.: *van Steenis 1073*, st. (BO), 1362, fl. (BO).

PHILIPPINES. Paragua I. (Palawan), Point Separacion (Island Bay): *Merrill 806*, st. (US).

ECOLOGY. Everwet rain forest, thickets, clearings, peat-swamp forest; 0–1200 m. Flowers and fruits during the whole year, but most flower records Sept.–March, most fruits in Nov.

Because of the narrow-urceolate flowers, enclosing either stamens or pistil, pollination is probably effected by small insects.

USES. The roots and fruits are known as poisonous; leaves and stems have medicinal properties.

BLUME assumes that the juicy arils are eaten by birds. According to HEYNE the branches are resistant to humidity and therefore used as binding material under water.

- NOTES. 1. Records from the Philippines concern the related *A. crassa*.
2. Juvenile forms are often found creeping on open places, tree trunks and rocks, and are provided with typical 3-lobed or lunate leaves with more or less peltate blade-base; *A. vespertilio* is a juvenile form with lunate leaves.
3. Sometimes 4-merous ♂ flowers are found; once a ♀ flower with a 4-carpellate pistil; once 8 staminodes. *A. quadrifida* is based on a specimen in which part of the flowers have 4 calyx lobes.
4. *Modecca cordifolia* and *M. obtusa* are both of 1826. *M. obtusa* was listed for the first time in the synonymy of *A. cordifolia* by KOORDERS, 1912.
5. Often galling flowers or slightly deformed flowers with an insect larva within are found.
6. Fresh flowers are pale greenish, greenish-yellow or yellow, when dry often inside reddish-brown spotted; ripe fruits are bright glossy red.

79. *Adenia crassa* Merr., Philip. J. Sc., Bot. 10 (1915) 331; En. Philip. 3 (1923) 117. — Type: Reillo BS. 15419. — Fig. 34.

Adenia quadrifida (non Merr.) Merr., En. Philip. Flow. Pl. 3 (1923) 117.

Climber to c. 10 m. Fertile branches pale greyish-green, 1½–4 mm; internodes 1½–5(–7) cm. Leaves herbaceous, (brownish-)green above, pale greyish-green not punctate beneath, entire, sometimes ± bullate, ovate-elliptic to oblong, base cordate, apex longly acute or up to 3(–5) cm acuminate, 3–15 by 1½–9½ cm, 3–5-plinerved and 1–3 pairs of nerves from the midrib, nerves often reddish tinged, reticulation rather indistinct, margin entire or remotely up to 3 mm toothed in the lower half; petiole ¾–3½ cm. Glands at blade-base 2, 1–2½ mm ∅, in two deeply hollowed auricles 2½–6 mm ∅ lateral at the apex of the petiole; blade glands 0–2, c. ½ mm ∅, submarginal; marginal glands c. 0.2 mm ∅, 0–10. Stipules broadly triangular, rounded, irregularly laciniate, ½–1 mm. Leaves of juvenile specimens deeply 3-lobed with much reduced middle lobe, base ± peltate. Inflorescences peduncled for 1½–6 cm, up to 30-flowered in ♂, 2–5-flowered in ♀; tendrils 0 or 1 or 3, ½–2½ cm. Sterile tendrils up to 10 cm, in juvenile forms 3-fid, ending in small adhesive disks. Bracts and bracteoles narrowly triangular to oblong, acute, ½–1 mm. ♂ fl. narrowly tubular-urceolate, incl. the 9–10 mm long stipe 16–18 by 2½–3 mm, calyx lobes in anthesis subrect. Pedicel 3–10 mm. Hypanthium incl. calyx tube ± narrowed to the throat, herbaceous-fleshy, not leathery, 6–7 mm, calyx lobes elongate triangular, subacute, 1–1½ mm, entire. Petals elongate triangular, acute, 1–1½ mm, 1-

nerved, entire, inserted in the throat of the calyx tube. Filaments c. 3 mm, connate for $1\frac{1}{2}$ –2 mm, inserted at the base of the hypanthium. Anthers 3– $3\frac{1}{4}$ by $\frac{3}{4}$ mm, obtuse. Septa c. $1\frac{1}{2}$ (?) mm high. Corona 0. Disk glands 1– $1\frac{1}{2}$ mm. Vestigial ovary c. 1 mm, gynophore c. 1 mm. ♀ fl. \pm urceolate, incl. the $2\frac{1}{2}$ –3 mm long stipe 8–10 by 3 mm. Pedicel 1–7 mm. Hypanthium incl. calyx tube 4– $4\frac{1}{2}$ mm, calyx lobes triangular, subobtuse, c. 1 mm, entire. Petals oblong, subobtuse, c. $1\frac{1}{4}$ mm, 1-nerved, entire, inserted at the throat of the calyx tube. Staminodes c. 1 mm, connate for c. $\frac{1}{2}$ mm, inserted at the base of the hypanthium. Septa c. $\frac{1}{2}$ mm high. Corona 0. Disk glands c. $\frac{1}{2}$ mm. Pistil c. $5\frac{1}{2}$ mm. Gynophore c. 1 mm. Ovary subglobose, c. 3 by $2\frac{1}{2}$ mm. Styles connate for c. $\frac{1}{2}$ mm, style arms c. $\frac{1}{2}$ mm. Stigmas subglobular or \pm flat, papillate-laciniate, each c. 1 mm \varnothing . Fruit 1 per inflorescence, subglobose, excl. the 10–15 mm long gynophore 5–6 by $4\frac{1}{2}$ –5 cm. Pericarp woody-coriaceous, \pm spongy inside, $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Seeds 30–40 per capsule, suborbicular to rounded-triangular, c. $7\frac{1}{2}$ by $7\frac{1}{2}$ –8 by $2\frac{1}{2}$ –3 mm, 6–9 pits \varnothing ; funicles 15–20 mm; embryo c. 7 mm; cotyledons ovate, broadly emarginate at one side towards the apex, c. $6\frac{1}{2}$ by $5\frac{1}{2}$ mm.

PHILIPPINES. S.loc.: *Hallier 707*, juv. (HBG) — Sulu Is., Jolo, 430 m: *Edaño PNH. 39073*, juv. (PNH), *Williams 2920*, ♂ fl. (NY) — Basilan I.: *Reillo BS. 15419*, fr. (K; US, type) — Mindanao, Zamboanga Prov.: *Gordon PNH. 82005*, fr. (PNH), *Hallier 4707*, st. (L), *Merrill 8129*, ♀ fl. (BM, BO, K, L, P, US), *11645*, ♂ fl. (K, P, US), *Ramos & Edaño BS. 37054*, fl. (BO, K).

ECOLOGY. Forest and forest edges; 0–500 m. Flowers Sept.–Dec., fruits Aug. and Jan.

USES. According to *Gordon PNH. 82005* the fleshy arils are edible.

NOTES. 1. Related to *A.cordifolia*, but distinguished by the stronger 3–5-plinerved leaves and the subglobose, thick-valved fruits.

2. Fresh flowers pale (greenish-)yellow, when dry purple-red spotted. Fresh fruits are shining red.

5. SECT. PASCHANTHUS (BURCH.) HARMS

in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; *ibid.* ed. 2, 21 (1925) 490; De Dalla Torre & Harms, Gen. Siph. (1903) 331; Engl., Pfl. welt Afr. 3, 2 (1921) 600; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 669. — *Paschanthus* Burch., 1822. — Type species: *Paschanthus repandus* Burch. = *A. repanda* (Burch.) Engl.

Jäggia Schinz, 1888. — Type species: *Jäggia repanda* Schinz = *A. repanda* (Burch.) Engl.

80. *Adenia repanda* (Burch.) Engl., Bot. Jahrb. 14 (1891) 375; Harms, Bot. Jahrb. 15 (1893) 573; in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; *ibid.* ed. 2, 21 (1925) 490, fig. 224; in Warburg, Kunene-Samb. Exp. H. Baum (1903) 310; Fries, Wiss. Ergebn. Rhod.-Kongo Bot. (1914) 159, tab. 12, fig. 9; Engl., Pfl. welt Afr. 3, 2 (1921) 600, fig. 266; Liebenberg, Bothalia 3, 4 (1939) 534, 525, 532, fig. 12; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 658; Consp. Fl. Angol. 4 (1970) 219; Watt & Breyer-Brandwijk, Med. Pois. Pl. ed. 2 (1962) 828; Schreiber in Merxmüller, Prod. Fl. SW. Afr. 24 (1968) fam. 89. — *Paschanthus repandus* Burchell, Travels Int. Southern Afr. 1 (1822) 543; DC., Prod. 3 (1828) 336; G. Don, Gen. Syst. 3 (1834) 58; Schinz. Bot. Jahrb. 15, Beibl. 33, 1 (1892) 3; Harms in E. & P., Nat. Pfl. fam. 3, 6a (1893) 81; Marloth, Fl. South Afr. 2, 2 (1925) 197, fig. 130. — *Modecca paschanthus* Harv. in Harv. & Sond., Fl. Cap. 2 (1862) 500, *nom. illeg.* — *Modecca repanda* Druce, Rep. Bot. Exch. Cl. Brit. Is. (1917) 636. — Type: *Burchell 2486/2* — **Fig. 37–38.**

Jäggia repanda Schinz, Verh. Bot. Ver. Brand. 30 (1888) 254; Harms, Bot. Jahrb. 24 (1897) 169. — *Paschanthus jäggii* Schinz, Mém. Herb. Boiss. 20 (1900) 23. — Type: *Schinz s.n.*

Suberect herb or woody climber 0.2–2 m, growing from a tuberous rootstock. Stems annual or perennial, dry bark grey-purplish often transversely cracked; fertile branches $1\frac{1}{2}$ –4 mm; internodes 1–10 cm. *Leaves* herbaceous to coriaceous, grey-glaucous, sometimes punctate beneath, entire or irregularly repand to lobed, obovate to linear, base acute to subcordate, apex subacute to obtuse or retuse, sometimes curved at apex, 2–15 by 0.2–2(–6) cm, pinninerved, nerves 4–10 pairs, sometimes brown-red, interlooping, reticulation rather indistinct; lobes up to 5 at either side of the blade, up to 1 cm; petiole 0.1–1 cm. *Glands* at blade-base 2, 1– $1\frac{1}{2}$ mm \varnothing , one at each side of the base of the midrib; blade glands 0–10, $\frac{1}{2}$ –1 mm \varnothing , submarginal, mostly corresponding with the lobes, and one apical- or up to 2 mm subapical gland $\frac{1}{2}$ – $1\frac{1}{2}$ mm \varnothing , in which the midrib ends. Stipules narrowly triangular, acute, 1– $1\frac{1}{2}$ mm. *Inflorescences* sessile or peduncled up to 2 cm, 1–5-flowered in σ , 1–2(–3)-flowered in φ and φ ; tendrils (0–)1, up to 4 cm. Sterile tendrils simple, up to 5 cm. Bracts and

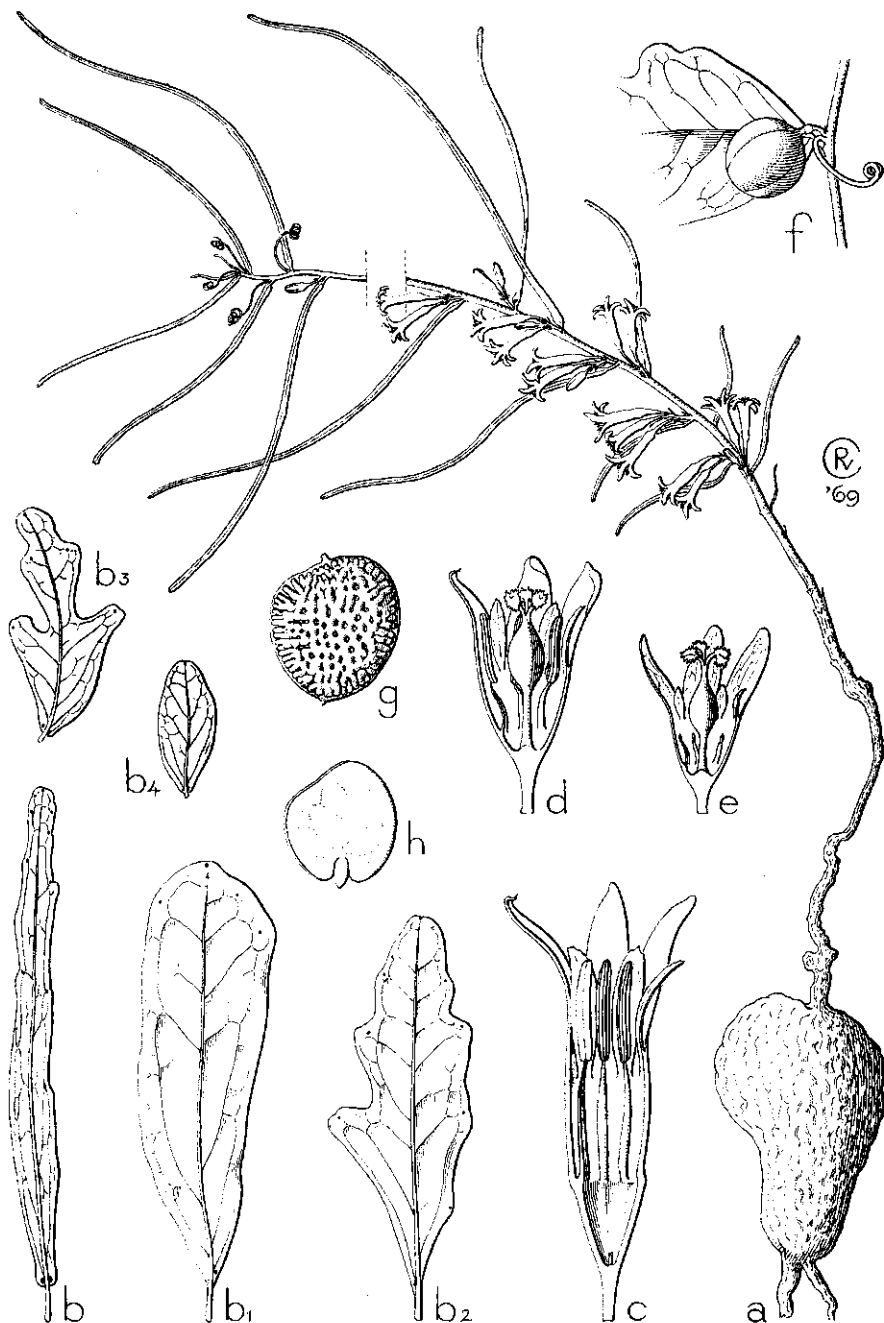


FIG. 37. *Adenia repanda*. — a. habit, $\times \frac{1}{2}$ (Bingham 914); b. leaf, $\times \frac{1}{2}$ (Seydel 3214); b 1–b 3. leaves, $\times \frac{1}{2}$ (Rehm s.n.); b 4. leaf, $\times \frac{1}{2}$ (Boss Transv. Mus. 35549); c. ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (Bingham 914); d. hermaphroditic flower, longitudinal section, $\times 2\frac{1}{2}$ (Dinter 6761); e. ♀ flower, longitudinal section, $\times 2\frac{1}{2}$ (Bryant J. 345); f. infructescence, $\times \frac{1}{2}$ (Story 6284); g. seed, $\times 2\frac{1}{2}$ (Anon.); h. embryo, $\times 2\frac{1}{2}$ (Anon.).

bracteoles narrowly triangular(-lanceolate), 1-2½(-10) mm. Flowers polygamous or dioecious. ♂ *fl.* tubular-infundibuliform, incl. the 2-3 mm long stipe 15-24 by 2-5 mm, calyx lobes spreading in anthesis to c. 10 mm. Pedicel 1-5 (-10) mm. Hypanthium (incl. calyx tube) tubiform 9-14 mm, calyx lobes oblong-lanceolate, obtuse, 4-7½ mm, entire. Petals lanceolate, obtuse to subacute, 5-8 by 1½-2 mm, (1-)3-nerved, entire or up to 0.2 mm dentate-fimbriate towards the apex, inserted near the throat of the calyx tube, 8-12 mm above the base of the hypanthium. Filaments 3½-6 mm, free, inserted at about the middle, 4-5 mm above the base of the hypanthium (incl. calyx tube). Anthers 4-6 by ¾-1 mm, obtuse. Septa 0. Corona 0. Disk glands 0. Vestigial ovary incl. gynophore ½-1 mm. *Hermaphroditic fl.* tubular-campanulate, incl. the 1-4 mm long stipe 10-15 by 3-5½ mm. Pedicel 1-3(-10) mm. Hypanthium (incl. calyx tube) 4-5 mm, calyx lobes oblong to lanceolate, obtuse, 4-6½ mm, entire. Petals lanceolate, obtuse or acute, 2-4½ by ½-1.2 mm, 1- or 3-nerved, up to 0.3 mm dentate towards the apex, inserted 3-5 mm above the base of the hypanthium. Filaments c. 3 mm, free, inserted ½-2 mm above the base of the hypanthium. Anthers 4-4½ by ¾ mm, obtuse. Septa 0. Corona 0. Disk glands 0. Pistil 7-9 mm. Gynophore 3-3½ mm. Ovary ovate to ellipsoid, 3-4 by 2½ mm. Styles connate for ½-¾ mm, style arms ½-¾ mm. Stigmas subglobular, papillate, each 1-1½ mm ∅. ♀ *fl.* tubular-campanulate, incl. the c. 1 mm long stipe 8-11 by 3-4 mm. Pedicel 1-2 mm. Hypanthium (incl. calyx tube) 3½-5 mm, calyx lobes oblong to lanceolate, obtuse, 3-5 mm, entire. Petals lanceolate, obtuse or acute, 1½-2 by ¾ mm, 1(-3)-nerved, entire, inserted 2½-3½ mm above the base of the hypanthium. Staminodes 2-3 mm, free, sometimes tipped with abortive anthers, inserted near the base of the hypanthium. Septa 0. Corona 0. Disk glands 0. Pistil 7-8 mm. Gynophore c. 2 mm. Ovary ellipsoid, 2½-3 by 2 mm. Styles connate for 1-1½ mm, style arms c. ½ mm. Stigmas subglobular, papillate, each c. 1 mm ∅. *Fruit* 1-2 per inflorescence, subglobular, excl. the 2-5 mm long gynophore 1½-2½(-3) by 1¼-2½ cm. Pericarp coriaceous, c. ¼ mm, smooth, sometimes ± spongy inside. Seeds (2-)5-12 per capsule, suborbicular to broadly ovate, 7-8 by 7 by 3 mm, 9-12 pits ∅; funicles c. 2 mm; embryo 6-7 mm; cotyledons suborbicular, apex obliquely truncate to emarginate, 5-6 by 5-6 mm.

ANGOLA. Bié, Longa R., Napalanca, 1150 m: *Baum* 602 (B †, n.v.) — Huila, Cuanhama, Mupa, no Caandeje: *Menezes* 1368, fr. (COI); between Pocolo and Poiwo: *Stopp* Bo. 165, ± fl. (K).

ZAMBIA. Barotse, Mongu Distr., Kanda Lake: *Drummond & Cookson* 6333, ♂ fl. (K, SRGH), *Robinson* 6713, st. (K).

SOUTH RHODESIA. Northern Prov., Gokwe: *Bingham* 418, fr. (SRGH), 914 (I & II), ♂ fl., ♀ fl., fr. (K, LISC, SRGH).

SOUTH WEST AFRICA. Amboland: *Schinz* 437, fr. (Z); Ondangua Distr.: *Winter & Giess* 6833, fr. (BR, K, M, PRE, SRGH); Grootfontein Distr.: *Rehm s.n.*, ♀ fl. (M), *Story* 6284, fr. (PRE), *Schönfelder* 1, st. (B); N. of Tsumeb: *Boss T. Mus.* 35549 (I & II), ♂ fl. (K, PRE); Otavi: *Dinter* 5376, fr. (B); Waterberg Distr.: *Bradfield* 75, fr. (K, PRE); Khomas High-land: *Gassner* 213, ♂ fl., fr. (M); Hereroland (vicinity of Windhoek): *Fleck* 410, ♂ fl. (Z), *Dinter* 1329, ♀ fl., fr. (Z), *Seydel* 2593, fr. (M); Windhoek (Gross-Namaland): *Dinter s.n.*,

♀ fl., fr. (Z); Lichtenstein: *Dinter 4331*, ♀ fl., fr. (B, HBG, S, Z); Guibes: *Schinz s.n.*, ♀ fl. (Z, type *Jäggia repanda*); Haris: *Fleck 477*, fr. (Z), *Pearson 9690*, fr. (K); Aris R., 1600 m: *Seydel 3214*, ♂ fl., ♀ fl., fr. (BR, M, WAG); Gurumana: *Pearson 9407*; Karibib: *Dinter 6761*, ♀ fl., fr. (B, HBG, K, M, Z); Wortel: *Pearson 3033*, ± fl. (BM, K); Rehoboth Distr.: *Merxmüller 947*, ♀ fl., fr. (M), *Pearson 9057*, fr. (K); Gobabis, 40 miles N. of Gobabis: *Basson 240*, fr. (M, PRE); Great Karasberg, Kleinkaras: *Dinter 5065*, ♂ fl. (B); Narudas: *Pearson 8166*, ♂ fl., fr. (BM, K, PRE); Namaqualand, Warmbad: *Pearson 4026*, fr. (BM, K); Hills SW. of Gründoorn: *Pearson 4276*, ♂ fl. (K, PRE).

BOTSWANA. 2 miles S. of Makoro Siding: *Leach & Noel 259*, ♀ fl., fr. (SRGH); Mahalapy Exp. Sta.: *Yalala 343*, fr. (SRGH, WAG).

REP. OF SOUTH AFRICA. — Transvaal, Zoutpansberg — Bechuanaland Prov., Kuruman: *Marloth 1092*, ♂ fl. (PRE) — Griqualand West, Barkley West Distr., Hardeveld: *Acocks 1561*, fr. (PRE); Motito: *Anon. s.n.*, fr. (K), *Burchell 2486/2*, ♂ fl. (K, type *Paschanthus repandus*; PRE), *McGregor. Mus. Kimberley (Jenar) s.n.*, st. (K), 6230, fr. (K) — Cape Prov., Prieska Div.: *Acocks 2547*, ♂ fl. (PRE), 2556, ♂ fl. (PRE), *Bryant 345*, ♂ fl., fr. (PRE); Postmasburg, 20 miles WNW. of Olifantshoek, 4300 ft.: *Leistner 2127*, ♀ fl., fr. (BM, K, M, PRE, SRGH); Windsorton, 1150 m: *Marloth 5840*, ♂ fl., ♀ fl., fr. (PRE).

ECOLOGY. Open places, partly shaded places in woodland, among rocks; sandy soils ("Kalahari sand"), red sand, granite; 500–1600 m. Flowers from

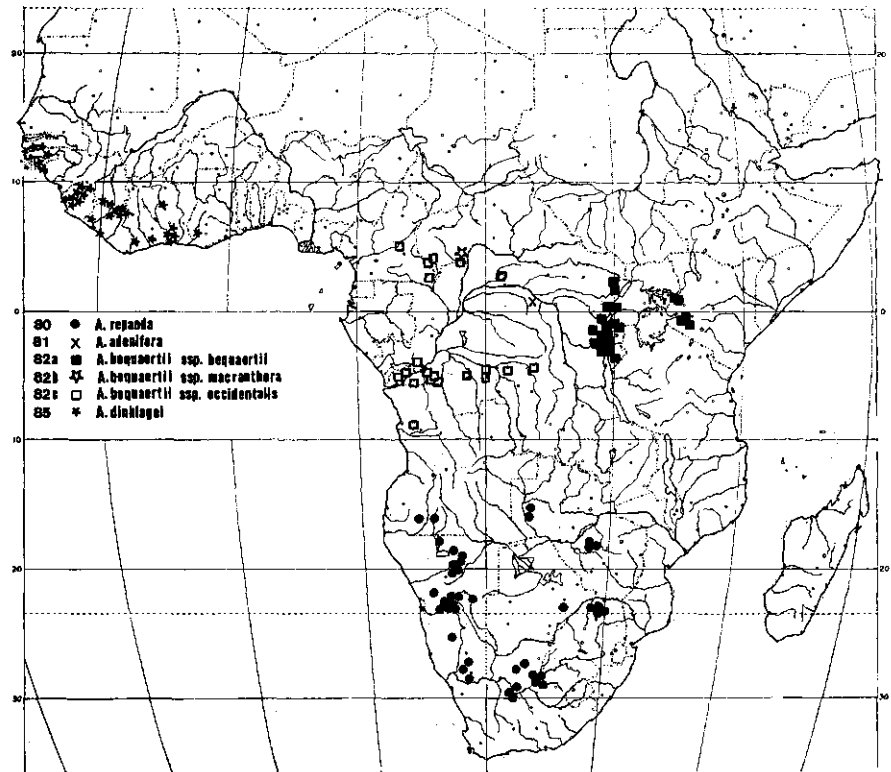


Fig. 38. Localities of species 80–82, 85.

Oct. to Febr., fruits from Nov. to April. Often reported as 'rare' or 'uncommon'.

USES. 'Greedily eaten by stock, which may partly account for its rarity' (according to *Bryant 345*), but also reported as 'deadly poisonous to man'.

NOTES. 1. In S. Rhodesia the species seems restricted to the Kalahari sand region.

2. Fresh leaves are reported as markedly glaucous, sometimes with red venation, flowers cream, greenish-cream, or yellow, fruits bright red. The aril of the seed is reported yellow or scarlet.

6. SECT. OPHIOCAULON (HOOK. F.) HARMS

in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; *ibid.* ed. 2, 21 (1925) 490; De Dalla Torre & Harms, Gen. Siph. (1903) 331; Engl., Pfl. welt Afr. 3, 2 (1921) 601; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 670; de Wilde, Acta Bot. Neerl. 17 (1968) 126-136. — *Ophiocaulon* Hook. f. in Benth. & Hook. f., Gen. Pl. 1 (1867) 813. — *Modecca* sect. *Ophiocaulon* (Hook. f.) Baill., Hist. Pl. (1885) 476. — Lectotype species: *Modecca cissampeloides* Planch. ex Hook. = *A. cissampeloides* (Planch. ex Hook.) Harms.

81. *Adenia adenifera* de Wilde, *sp. nov.* — Fig. 38.

Scandens potius validus. *Folia* ovata vel elliptica, integra, basi cordata, apice acuta, per c. 1 cm acuminata, 6-15 cm longa, $4\frac{1}{2}$ -10 cm lata, 3-5-subplinervia, nervis apicem versus arcuatis. *Glandula* 1 basalis appendice mediana spatulata instructa; glandulae laminales 15-45, dispersae. *Inflorescentiae* 1-cirrhiferae, pedunculo (5-)10-12 cm longo instructae; cirrhi $1-3\frac{1}{2}$ cm longi. *Flores* ♂ stipite $3-3\frac{1}{2}$ mm longo incl. $12-13\frac{1}{2}$ mm longi, 3 mm lati. Hypanthium $1\frac{1}{2}$ -2 mm longum. Calycis tubus nullus. Sepala $6\frac{1}{2}$ - $7\frac{1}{2}$ mm longa. Petala c. 8 mm longa, $1\frac{1}{4}$ mm lata. Antherae obtusae, $4\frac{1}{2}$ -5 mm longae. Filamenta 1-2 mm longa, parte inferiore in tubum $\frac{1}{3}$ - $\frac{3}{4}$ mm longum coalita. Septa ± absentia. Corona nulla. Disci glandulae nullae. *Flores* ♀ ac fructus ignoti.

Robust subligneous climber. Fertile branches 3-5 mm, pale greenish, not punctate; internodes 8-12 cm. *Leaves* subcoriaceous, dark brown-greenish above, paler, dull, faintly punctate or not beneath, entire, ovate-elliptic, base cordate, apex acute, c. 1 cm acuminate, 6-15 by $4\frac{1}{2}$ -10 cm, 3-5-plinerved, the upper pair springing from the midrib 3-6 mm above the base, not ending in the leaf margin, reticulation rather distinct, margin entire; petiole $2\frac{1}{2}$ - $7\frac{1}{2}$ cm. *Gland* at blade-base single, $1\frac{1}{2}$ -2 mm \varnothing , on a median spatulate appendage 2-3 mm; blade glands 15-40(-45), $\frac{1}{4}$ (- $\frac{1}{2}$) mm \varnothing , scattered; marginal glands minute, 5-10 on either side of the blade. *Stipules* reniform to orbicular, minutely serrulate, $\frac{1}{2}$ (-1) mm. *Inflorescences* peduncled for (5-)10-12 cm, 10-40(-60)-flowered in ♂; tendrils 1- $3\frac{1}{2}$ cm. Sterile tendrils not known. Bracts and bracteoles triangular, acute, c. 1 mm. ♂ *fl.* ± campanulate, incl. the $3-3\frac{1}{2}$ mm long stipe $12-13$ (- $13\frac{1}{2}$) by 3 mm, lobes spreading in anthesis to 8-10 mm. Pedicel 1-10 mm. Hypanthium cup-shaped $1\frac{1}{2}$ -2 mm, calyx tube 0, calyx lobes oblong-lanceolate, acutish, subentire, $6\frac{1}{2}$ - $7\frac{1}{2}$ by $1\frac{3}{4}$ - $2\frac{1}{2}$ mm, not- or inconspicuously punctate. Petals (ob-)lanceolate, obtuse c. 8 by $1\frac{1}{4}$ mm, 3-5-nerved, c. 0.2 mm fimbriate-dentate in the upper half, not punctate. Filaments 1-2 mm, $\frac{1}{3}$ - $\frac{3}{4}$ mm connate, inserted at the base of the hypanthium. Anthers $4\frac{1}{2}$ -5 by $1-1\frac{1}{4}$ mm, obtuse. Septa ± 0. Corona 0. Disk glands 0. Vestigial ovary, incl. gynophore $\frac{1}{2}$ - $\frac{3}{4}$ mm. ♀ *fl.* and *fruit* not known.

REP. OF THE CONGO. For. Central, Terr. Isangi, Rive gauche du Lomami Yabahondo c. 0° 42'N-23° 58'E: *Germain 8100*, ♂ fl. (BR, type).

ECOLOGY. Secondary forest.

- NOTES. 1. The leaves resemble those of *A. stolzii*
2. The species seems most related to *A. reticulata*.

82. *Adenia bequaertii* Robijns & Lawalrée, Bull. Jard. Bot. Brux. 18 (1947) 284; de Wilde, Acta Bot. Neerl. 17 (1968) 131, fig. 1b, 3. — Type: *Bequaert 3814*.

Subligneous climber up to 20 m, up to 10 cm thick at base. Fertile branches $1\frac{1}{2}$ –4(–8) mm, grey-green or pruinose, spotted or not; internodes 1–15 cm. Leaves membranous, greenish-brown above, paler or grey(-glaucous) beneath, punctate or not, entire or rarely \pm 3-lobed in the upper half, orbicular to ovate, base rounded to cordate, apex acute, up to $1\frac{1}{2}$ cm acuminate, ($2\frac{1}{2}$ –)4–14 by ($1\frac{1}{2}$ –)2 $\frac{1}{2}$ –11 cm, 3–5-plinerved and with or without 1(–2) pairs of nerves from the midrib, nerves not ending in the leaf margin, reticulation distinct or not, margin entire or faintly toothed; petiole 2–10 cm. Gland at blade-base single, $\frac{1}{2}$ –2 mm \varnothing , on a \pm convex, subspathulate median appendage 1–3 mm; blade glands 2–5, $\frac{1}{4}$ – $\frac{3}{4}$ mm \varnothing ; 1(–2) in or close to the axils of the nerves, sometimes only to the upper nerves, or glands absent; marginal glands minute, up to 12 on either side of the blade. Stipules broadly reniform, margin \pm lacinate, $\frac{1}{2}$ –1(–1 $\frac{1}{2}$) mm. Inflorescences peduncled for ($\frac{1}{2}$ –)2–16 cm, up to 40-flowered in ♂, 2–4-flowered in ♀; tendrils 1 or 3, 1–3 cm, or absent. Sterile tendrils simple or 3-fid, 10–25 cm. Bracts and bracteoles narrowly triangular, acute, margin serrulate, $\frac{1}{2}$ –2 mm. ♂ fl. \pm campanulate, incl. the $1\frac{1}{2}$ –4 mm long stipe 8–17 by 2–4 $\frac{1}{2}$ mm, sepals spreading anthesis to c. 15 mm. Pedicel 2–10 cm. Hypanthium fleshy, shallowly cup-shaped $\frac{3}{4}$ –1 $\frac{1}{2}$ (–2) mm, calyx tube 0, sepals (oblong-) lanceolate, obtuse, subentire, 5 $\frac{1}{2}$ –10(–11) by 2–3 mm, sparingly punctate or not. Petals oblanceolate, obtuse to acute, 6–10(–11) by $1\frac{1}{2}$ –3 mm, 3–5-nerved, \pm punctate, 0.1–0.2 mm serrulate-laciniate in the upper $\frac{1}{2}$ – $\frac{3}{4}$. Filaments $1\frac{1}{2}$ –3 mm, $\frac{1}{2}$ –1 $\frac{1}{2}$ mm connate, inserted at the base of the hypanthium. Anthers 3–5 $\frac{1}{2}$ by $\frac{3}{4}$ –1 $\frac{1}{4}$ mm, obtuse to acute. Septa \pm 0. Corona consisting of 5 cap-shaped parts, alternating with the petals, $\frac{1}{4}$ (– $\frac{1}{2}$) mm high, sometimes superposed by a row of wart-like appendages. Disk glands 0. Vestigial ovary incl. gynophore $\frac{1}{2}$ –1 mm. ♀ fl. \pm campanulate, incl. the $\frac{1}{2}$ –4 mm long stipe (5–)6–12 by 2–3 $\frac{1}{2}$ mm. Pedicel 2–6 mm. Hypanthium fleshy, saucer-shaped, $\frac{1}{2}$ – $\frac{3}{4}$ mm, calyx tube 0, sepals oblong-lanceolate, obtuse to acute, subentire, 4 $\frac{1}{2}$ –8 $\frac{1}{2}$ by $1\frac{1}{4}$ –4 mm, punctate. Petals lanceolate, obtuse to acute, 3–7 by $\frac{1}{2}$ –1 $\frac{1}{2}$ mm, 1–3-nerved, serrulate towards the apex. Stamines c. $\frac{3}{4}$ mm, \pm free. Septa 0. Corona consisting of an inconspicuous rim \pm interrupted by the petals, 0.1– $\frac{1}{3}$ mm. Disk glands 0. Pistil 4–7 mm. Gynophore c. $\frac{1}{2}$ mm. Ovary ovate, 2–4 by $1\frac{1}{2}$ –2 $\frac{3}{4}$ mm, finely punctate. Style 1–1 $\frac{1}{2}$ mm. Stigmas sessile, reniform or subglobular,

papillate-laciniate, each $1\frac{1}{2}$ –2 mm \varnothing . *Fruit* 1–3 per inflorescence, ovate, apex acutish, excl. the 1–2(–3) mm long gynophore 2–4 $\frac{1}{2}$ (–5) by $1\frac{1}{2}$ –2 $\frac{1}{2}$ (–3) cm. Pericarp woody-coriaceous, $\frac{1}{4}$ – $\frac{1}{2}$ mm, smooth or minutely pitted or granulate. Seeds 50–60 per capsule, obliquely ovate, 4–5 by 3–3 $\frac{1}{2}$ by $1\frac{3}{4}$ –2 mm, finely pitted; funicles $1\frac{1}{2}$ –3 mm; embryo 3 $\frac{1}{4}$ –4 mm; cotyledons ovate, obliquely truncate, 2 $\frac{1}{2}$ –3 by 2 $\frac{1}{4}$ –2 $\frac{3}{4}$ mm.

DISTRIBUTION. SE. Cameroons, south to N. Angola, east to W. Kenya. — Fig. 38.

ECOLOGY. Forests, forest edges, scrub; often in secondary vegetation; 0–2500 m. See further under the subspecies.

KEY TO THE SUBSPECIES

1. ♂ fl. incl. stipe 10–17 mm. Anthers 4–5 $\frac{1}{2}$ mm. Leaves 3(–5)-plinerved with in addition a pair of nerves from the midrib, not punctate beneath.
 2. Blade glands close to the axils of basal and upper nerves. Leaves grey-glaucous beneath. Filaments 2–3 mm, $\frac{1}{2}$ –1 $\frac{1}{2}$ mm connate. Anthers 4–5 mm. Fruit 3–5 cm. a. ssp. **bequaertii**
 2. Blade glands absent. Leaves grey-green beneath. Filaments c. 2 mm, c. 1 $\frac{1}{2}$ mm connate. Anthers c. 5 $\frac{1}{2}$ mm. Fruit not known. b. ssp. **macranthera**
1. ♂ fl. incl. stipe 8–9 mm. Anthers c. 3 mm. Leaves mostly strictly 5-plinerved, grey-green, punctate beneath. Blade glands close to the axils of only the upper pair of the basal nerves. Filaments c. 1 $\frac{1}{2}$ mm, 1–1 $\frac{1}{4}$ mm connate. Fruit 2–3 cm. c. ssp. **occidentalis**

a. ssp. **bequaertii** — Fig. 38.

Stems not spotted. *Leaves* grey-glaucous beneath, not punctate, ovate, 2 $\frac{1}{2}$ –12 by $1\frac{1}{2}$ –9 cm, 3(–5)-plinerved with in addition 1(–2) pair(s) of nerves from the midrib, reticulation distinct; petiole 2–10 cm. *Blade glands* close to the axils of the basal- and upper nerves. ♂ fl. incl. the 3–4 mm long stipe 10–17 by 2 $\frac{1}{2}$ –4 $\frac{1}{2}$ mm. Hypanthium 1–1 $\frac{1}{2}$ mm, sepals (6–)8–11 mm. Petals (6–)8–10(–11) mm. Filaments (2–)2 $\frac{1}{2}$ –3 mm, $\frac{1}{2}$ –1 $\frac{1}{2}$ mm connate. Anthers straight, 4–5 by 1–1 $\frac{1}{4}$ mm. Corona caps $\frac{1}{4}$ – $\frac{1}{2}$ mm high, superposed by a row of \pm wart-like appendages or by a knobby rim. Vestigial ovary $\frac{3}{4}$ –1 mm. ♀ fl. incl. the $\frac{1}{2}$ –4 mm long stipe 7 $\frac{1}{2}$ –12 by 2 $\frac{1}{2}$ –3 $\frac{1}{2}$ mm. Hypanthium $\frac{1}{2}$ – $\frac{3}{4}$ mm, sepals 6–8 $\frac{1}{2}$ mm. Petals 5–7 mm (1–)3-nerved. Pistil 6–7 mm. Ovary 3–4 by 2–2 $\frac{3}{4}$ mm. Style 1–1 $\frac{1}{2}$ mm. Stigmas reniform, c. 2 mm broad. *Fruit* 3–5 by 1 $\frac{3}{4}$ –2 $\frac{1}{2}$ (–3) cm, \pm smooth to granulate. Seed 4–5 by 3–3 $\frac{1}{2}$ by 1 $\frac{3}{4}$ –2 mm, c. 7 pits along its length.

REP. OF THE CONGO. Kikuku, 1752 m: *Deru* 260, ♀ fl. (BR); Mwendo: *Hendrickx* 3962, ♂ fl. (BR, EA) — Lac Albert, Nioka, 1750 m: *De Craene* 123, st. (BR); Lekwa à Djugu: *Devillé* 464, ♀ fl. (BR); Parc Nat. Albert, volcan Niamlagyra, 1750 m: *Germain* 1384, ♂ fl. (BR); Busogo

à Rusayo, 1800 m: *Lebrun 8664*, fl. (BR, K, P) — Lac Edouart et Kivu, Terr. Rutshuru, 2200 m: *Anon. 177*, ♂ fl. (BR); Ruwenzori, 1800 m: *Bequaert 3814*, ♂ fl. (BR, type); Cirque de Ganjo, 2000 m: *Humbert 8310*, ♂ fl. (BR, P); Chaîne des Virunga, volcan Karisimbi, 1940 m: *Lebrun 4941*, ♀ fl., fr. (B, BR); Lake Kivu, Idjwi I., 5500 ft.: *Loveridge 531*, fr. (K); Nyamunyuye, 1650 m: *Pierlot 448*, fl. (BR); km 28 route Ribabi-Kikoma, 1950 m: *Pierlot 1987*, ♂ fl. (BR); Mulungu, 2000 m: *Pierlot 2869*, fr. (BR); S. of Mulenge: *Schaller 139*, st. (EA); Kibati (Virunga vulc.), 1900 m: *Stauffer 529*, ♂ fl. (BR, K, P, WAG, Z).

RWANDA. Terr. Shangugu, route Astrida-Bukava, 2050 m: *Troupin 11459*, ♂ fl. (BR).

BURUNDI. Karuzi, Kitega, 1500 m: *van der Ben 1854*, fl., fr. (BR); Terr. Muramuya, Bugarama, 2200 m: *Lewalle 213*, ♂ fl. (BR, L, WAG), *1277*, st. (BR, L, M).

UGANDA. E. Ruwenzori, Bwamba, 2100 m: *Eggeling 3986*, ♀ fl. (BR, K); Kigezi, 4500–5000 ft.: *Purseglove P. 814*, ♂ fl. (K), *P. 3481*, ♂ fl. (K).

KENYA. Mt. Elgon, 6500–7500 ft.: *Jackson 433*, fl., fr. (K); Kitale, 6000 ft.: *Tweedie 3630*, ♂ fl. (K, WAG); Kericho Distr., 7000–7500 ft.: *Kerfoot 2836*, fr. (EA, K), *2896*, ♂ fl. (EA), *4038*, ♀ fl., fr. (BR, EA, FI, K).

ECOLOGY. Montane forest and scrub, gallery forest; 1500–2500 m; found on 'steep slopes', 'lava soil', 'heavy clay soil', and basalt. Flowers and fruits found during the whole year.

USES. According to field notes the leaves and bark are eaten, and used as a remedy for sickness.

NOTE. 1. The flowers are reported as green to yellow-green, once as orange-buff, the anthers as yellow. Latex white.

b. ssp. *macranthera* de Wilde, ssp. nov. — Fig. 38.

Scandens. *Folia* late ovata, integra, $3\frac{1}{2}$ –8 cm longa, $3\frac{1}{2}$ –6 cm lata, 3–5-subplinervia. *Glandula* 1 basalis appendice mediana spatulata instructa; glandulae laminales nullae. *Flores* ♂ stipite 2– $2\frac{1}{2}$ mm longo incl. 12–13 mm longi, $2\frac{1}{2}$ mm lati. Hypanthium $1\frac{1}{2}$ –2 mm longum. Calycis tubus nullus. Sepala 8– $8\frac{1}{2}$ mm longa. Petala c. 9 mm longa. Antherae lineares, subacutae, c. 0.2 mm apiculatae, c. $5\frac{1}{2}$ mm longae. Filamenta c. 2 mm longa, parte inferiore in tubum c. $1\frac{1}{2}$ mm longum coalita. Corona ex partibus 5 cucullatis parvis constituta, hypanthii basin versus inserta. *Flores* ♀ ac fructus ignoti.

Stems not spotted. *Leaves* grey-green beneath, not punctate, broadly ovate, $3\frac{1}{2}$ –8 by $3\frac{1}{2}$ – $6\frac{1}{2}$ cm, 3-plinerved with in addition 1 pair nerves from the midrib, or (4–)5-plinerved, reticulation rather distinct; petiole 2– $6\frac{1}{2}$ cm. *Blade glands* absent. ♂ *fl.* rather slender, incl. the 2– $2\frac{1}{2}$ mm long stipe 12–13 by $2\frac{1}{2}$ mm. Hypanthium $1\frac{1}{2}$ –2 mm, sepals 8– $8\frac{1}{2}$ mm. Petals c. 9 mm. Filaments c. 2 mm, $1\frac{1}{2}$ mm connate. Anthers straight, c. $5\frac{1}{2}$ by 1 mm, subacute, c. 0.2 mm apiculate. Corona caps c. $\frac{1}{4}$ mm high, inserted about halfway in the hypanthium. Vestigial ovary c. $\frac{1}{2}$ mm. ♀ *fl* and *fruit* not known.

CENTR. AFR. REP. M'baiki, Boukoko: *Tisserant* in herb. *Le Testu 2275*, ♂ fl. (BM, type; L, P).

ECOLOGY. Forest edge; c. 400 m. Flowers in Oct.

NOTES. 1. Reported as an herbaceous liana with pale brown-yellow male flowers.

2. The cap-shaped corona parts are inserted remarkably low in the hypanthium which suggest that they are homologous with the disk glands as found in other *Adenia*-species.

c. ssp. *occidentalis* de Wilde, Acta Bot. Neerl. 17 (1968) 135, fig. 1a, 3; A. & R. Fernandes, Consp. Flor. Angol. 4 (1970) 224. — Type: *Vanderyst* 2930. — Fig. 38; 39 a-d, f-g.

Stems finely spotted. *Leaves* grey-green beneath, finely punctate, suborbicular to broadly ovate, $2\frac{1}{2}$ –14 by 2–12 cm, mostly strictly 5-plinerved, reticulation mostly indistinct; petiole 2–8 $\frac{1}{2}$ cm. *Blade glands* close to the axils of only the upper pair of basal nerves. ♂ *fl.* incl. the $1\frac{1}{2}$ –2 mm long stipe 8–9 by 2–2 $\frac{1}{2}$ (–3) mm, sepals 5 $\frac{1}{2}$ –7 mm. Petals 5 $\frac{1}{2}$ –6 $\frac{1}{2}$ mm. Filaments $1\frac{1}{2}$ (–1 $\frac{3}{4}$) mm, 1–1 $\frac{1}{4}$ mm connate. Anthers slightly curved, c. 3 by $\frac{3}{4}$ mm. Corona caps $\frac{1}{3}$ (– $\frac{1}{2}$) mm high. Vestigial ovary c. $\frac{1}{2}$ mm. ♀ *fl.* incl. the $\frac{1}{2}$ –1 mm long stipe 5–6 by 2 mm. Hypanthium c. $\frac{1}{2}$ mm, sepals 4 $\frac{1}{2}$ –5 mm. Petals 3–4 mm, 1-nerved. Pistil 4–4 $\frac{1}{2}$ mm. Ovary c. 2 by 1 $\frac{1}{2}$ –2 mm. Style ($\frac{3}{4}$ –)1 mm. Stigmas subglobose, c. 1 $\frac{1}{2}$ mm \varnothing . *Fruit* 2–3 by 1 $\frac{1}{2}$ –2 cm, finely shallowly pitted. Seed c. 4 by 3 by 1 $\frac{3}{4}$ mm, finely pitted, 8–12 pits along its length.

CAMEROON. Batouri, Deng-Deng: *Jacques-Félix* 4696, ♂ *fl.* (P); Yokadouma, Yokadouma à Moloundou, c. 500 m: *Leeuwenberg* 6120, ♀ *fl.*, fr. (WAG).

CENTR. AFR. REP. Km. 49 Garigombo – Sose, 550 m: *Leeuwenberg* 6260, ♂ *fl.*, ♀ *fl.*, fr. (WAG); M'baiki, Boukoko: *Tisserant* 216, ♀ *fl.* (BM, P).

CONGO. Brazzaville, 42 km. route de Kinkala: *De Nere* 194, ♀ *fl.* (P).

REP. OF THE CONGO. Bas Congo, Léopoldville (Kinshasa), Ngembo: *Allard* 66, st. (BR); Kinsantu: *Vanderyst* 37540, ♀ *fl.* (BR), 37592, ♀ *fl.* (BR), 38394, ♀ *fl.* (BR); Thysville: *Vanderyst* s.n., fr. (BR); M'vuazi R. (Gimbi): *Devred* 656, ♂ *fl.* (BR), *Toussaint* 763, ♂ *fl.* (BR); Kinsako: *Compère* 1452, fr. (BR) — Kasai, Kikwit: *Vanderyst* 2930, ♂ *fl.* (BR, type); Ipamu: *Vanderyst* 8592, ♂ *fl.* (BR), 8723, fl. (BR); Idiofa: *Vanderyst* 8663, ♂ *fl.* (BR); Kakenge, terr. Bakuba, 170 m: *Gillardin* 340, ♂ *fl.* (BR); Sangaie, terr. Lusambo, 100 m: *Gillardin* 511, ♂ *fl.* (BR) — For. Central, Likimi: *Malchair* 371, st. (BR).

ANGOLA. Cuanza Norte, Golungo Alto: *Welwitsch* 870 *fol.* 4, st. (LISU).

ECOLOGY. Secondary forest, forest edges; 0–1000 m. Flowers mainly in Jan., but also in Feb., July, Sept., and Dec., fruits in Feb. and July.

USES: Once reported that the leaves are used for capturing fish.

NOTE. 1. In fresh specimens the calyx is greenish; petals whitish, anthers yellow.

83. *Adenia cissampeloides* (Planch. ex Hook.) Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; *ibid.*, ed. 2, 21 (1925) 490; Engl., Pfl. welt Afr. 3, 2 (1921) 602; Hutch. & Dalz., Fl. W. Tr. Afr. ed. 1, 1 (1927) 173, 174, fig.

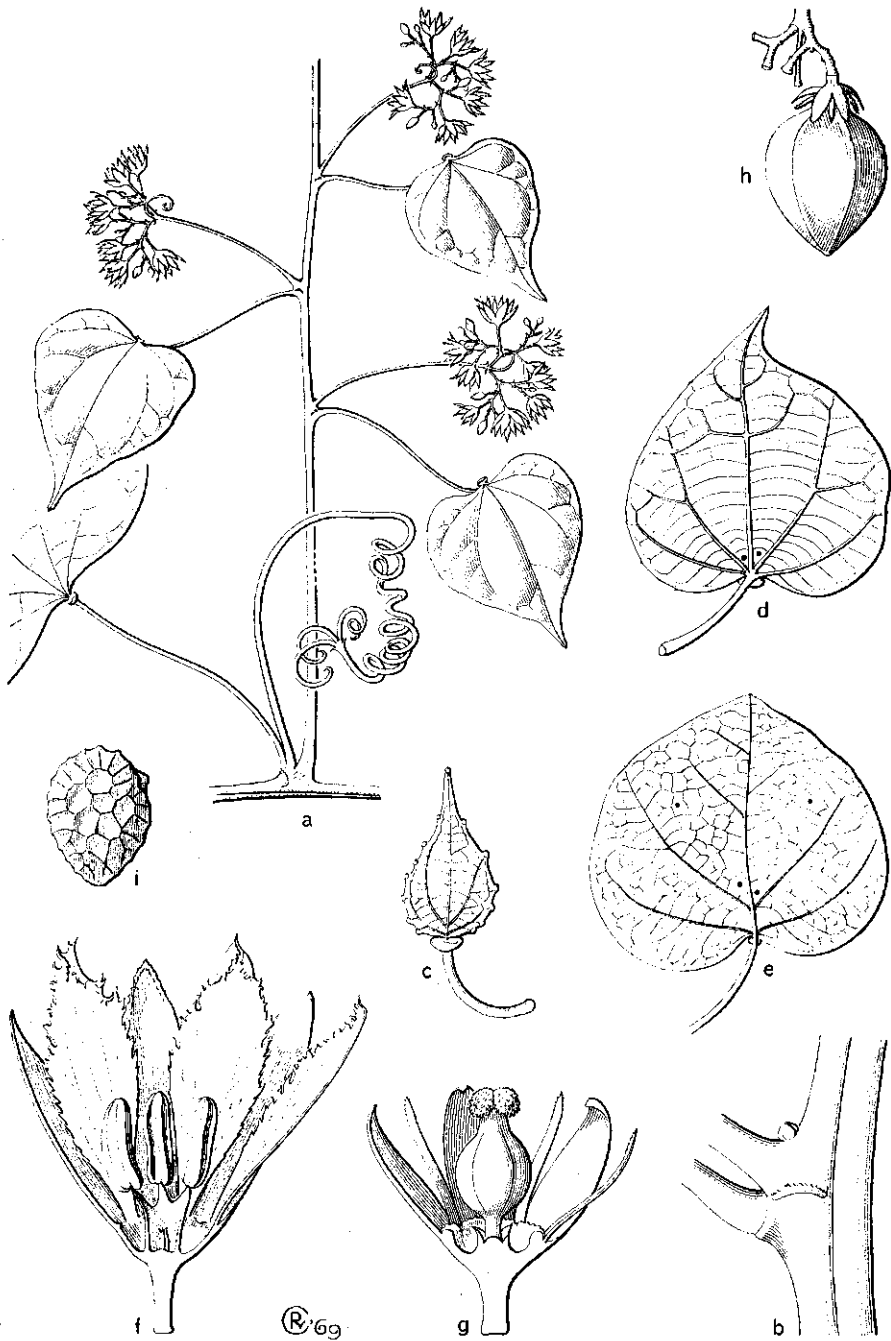


FIG. 39. a-d, f-g. *Adenia bequaertii* ssp. *occidentalis*; a. habit of branch with ♀ inflorescences $\times \frac{1}{2}$; b. node with stipule and serial bud, $\times 5$; c. young leaf, $\times 2\frac{1}{2}$; d. leaf, $\times \frac{3}{4}$ (all *Leeuwenberg 6120*); f. ♂ flower, longitudinal section, $\times 5$ (*Leeuwenberg 6260*); g. ♀ flower, longitudinal section, $\times 5$ (*Leeuwenberg 6120*). — e, h-i. *Adenia cissampeloides*; e. leaf, $\times \frac{3}{4}$ (*de Wilde 2641*); h. fruit, $\times 1$ (*de Wilde 2641*); i. seed, $\times 6$ (*Liben 2384*).

76; Dalziel in Hutch. & Dalz., Fl. W. Tr. Afr. Append. (1937) 50; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202, fig. 80; Obaton, Ann. Sc. Nat. Bot. 12, 1 (1960) 142, fig. 126-128; de Wilde, Acta Bot. Neerl. 17 (1968) 132, fig. 2 i. — *Modecca cissampeloides* Planch. ex Hook., Fl. Nigr. (1849) 365. — *Ophiocaulon cissampeloides* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 518; Gard. Chron. (1871, Feb.) 235, fig. 51; Engl., Bot. Jahrb. 14 (1891) 385; Durand & Schinz, Étud. Fl. Congo (1896) 140; de Wild., Miss. Laurent. (1906) 258; Durand, Sylloge Fl. Congol. (1909) 225, p.p. — Type: *Vogel 162*. — Fig. 39 e, h-i; 40.

Passiflora marmorea Linden, Cat. n. 8 (1853) 3; *Hort.*, Gard. Chron. (1871) 235, fig. 51.

Ophiocaulon rowlandii Bak., Kew Bull. (1895) 16 — *Adenia rowlandii* Harms, in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255. — Type: *Rowland s.n.*

Ophiocaulon tropaeoloides A. Chev., Expl. Bot. Afr. Occ. Fr. 1 (1920) 287, *nom. nud.* (*pro majore parte*).

Adenia triloba Engl., Veg. der Erde 9, Pfl. welt Afr. 3, 2 (1921) 602; Harms, Notizb. Berl.-Dahl. 8 (1923) 293; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202. — Type: *Schröder 168*.

Subligneous climber up to 25 m, up to 10 cm thick at base. Fertile branches pale green to grey-green, mostly pruinose, spotted or not, ($1\frac{1}{2}$ –)2–4 mm; internodes 2–11 cm. *Leaves* membranous to subcoriaceous, brown to green above, pale green to grey, slightly to strongly punctate beneath, entire, suborbicular to blunt 5-angular, base cordate to truncate, apex subobtuse to rounded, sometimes retuse, 3–14 cm, 3(–5)-plinerved, and 1(–2) pairs of \pm straight nerves from the midrib ending in marginal glands, reticulation only well visible in the coarser veins, margin entire; petiole 2–9 cm. *Gland* at blade-base single, ($\frac{1}{2}$ –)1–2 mm \varnothing , on a median circular to spatulate appendage 1–3 mm; blade glands (0–)2–4, ($\frac{1}{4}$ –) $\frac{1}{2}$ –1 mm \varnothing , rather approximate to the axils of the upper main nerves; marginal glands minute (up to $\frac{1}{3}$ mm \varnothing), blackish, 2–7 at either side of the blade. Stipules broadly rounded, sometimes lacerate, c. $\frac{1}{2}$ mm. *Inflorescences* peduncled for $1\frac{1}{2}$ –15(–20) cm, up to 20-flowered in σ , 2–6-fl. in ρ ; tendrils 0 or 1–3, $\frac{1}{2}$ –2(–4) cm. Sterile tendrils simple or 3-fid, 10–20 cm. Bracts and bracteoles narrowly triangular, acute, serrulate, ($\frac{1}{2}$ –)1 mm. σ fl. \pm campanulate, incl. the 2–4 $\frac{1}{2}$ mm long stipe (10–)12–15 by 2–3 mm, sepals spreading in anthesis to 8–10 mm. Pedicel 2–5(–10) mm. Hypanthium cup-shaped c. 1(– $1\frac{1}{2}$) mm, calyx tube 0, sepals oblong-lanceolate, obtuse to subacute (6–)7–9 by 2–3 mm, subentire, \pm punctate. Petals (ob-)lanceolate, obtuse to subacute, $7\frac{1}{2}$ –10 by $1\frac{1}{2}$ –2 $\frac{1}{2}$ mm, 3–5-nerved, up to $\frac{1}{2}$ mm fimbriate-laciniate in the upper half or $\frac{2}{3}$, sparingly punctate or not. Filaments $1\frac{1}{2}$ –2 $\frac{1}{2}$ mm, free or up to halfway connate, inserted at the base of the hypanthium. Anthers $3\frac{1}{2}$ –5 by 1 mm, obtuse. Septa 0– $\frac{1}{3}$ mm high. Corona 0 or consisting of 5 small cap-shaped parts up to $\frac{1}{4}$ mm high. Disk glands 0. Vestigial ovary incl. gynophore c. $\frac{1}{2}$ mm. ρ fl. campanulate, incl. the $\frac{1}{2}$ –1 $\frac{3}{4}$ mm long stipe 6–10 by 2–3 mm, sepals spreading in anthesis to 8–10 mm. Pedicel 1–6 mm. Hypanthium shallowly cup-

-shaped $\frac{1}{2}$ - $\frac{3}{4}$ mm, calyx tube 0, sepals oblong-lanceolate, subacute, 5-8 by 2-2 $\frac{1}{2}$ mm, entire, punctate or not. Petals lanceolate to linear, subobtusate to acute, 3-6 $\frac{1}{2}$ by $\frac{1}{4}$ - $\frac{3}{4}$ mm, 1-nerved, 0.1 mm laciniate near the apex, punctate or not. Staminodes $\frac{1}{2}$ - $\frac{3}{4}$ mm, $\frac{1}{4}$ mm connate. Septa 0-0.2 mm high. Corona consisting of a fleshy annulus 0.1- $\frac{1}{4}$ mm high. Disk glands 0. Pistil (4-)5-8 mm. Gynophore $\frac{1}{3}$ -1 mm. Ovary broadly ovate to ovate-ellipsoid, \pm 3(-6)-ribbed or -angled, 3-6 by 2 $\frac{1}{2}$ -4 mm, smooth or finely warty-punctate. Styles connate for $\frac{1}{2}$ -1 mm, style-arms 0- $\frac{1}{4}$ mm. Stigmas (sub)sessile, subglobular or flattened, papillate, each 1-1 $\frac{1}{2}$ mm \varnothing . *Fruit* 1-3 per inflorescence, broadly ovate to ellipsoid or \pm fusiform, sometimes distinctly (3-)4-6(-8)-angular, excl. the 1-2 mm long gynophore 1 $\frac{1}{2}$ -3 $\frac{1}{2}$ by 1 $\frac{1}{4}$ -2 $\frac{1}{2}$ cm. Pericarp coriaceous or woody, $\frac{1}{2}$ - $\frac{3}{4}$ mm, smooth or inconspicuously warty or pitted, spotted or not. Seeds 30-60 per capsule, ovate, 3-3 $\frac{1}{2}$ by 2 $\frac{1}{2}$ -3 by 1 $\frac{1}{2}$ mm, 5-7 pits along the length; funicles c. 2 mm; embryo c. 3 mm; cotyledons orbicular to ovate, subtruncate at one side, c. 2 $\frac{1}{2}$ by 2 $\frac{1}{2}$ mm.

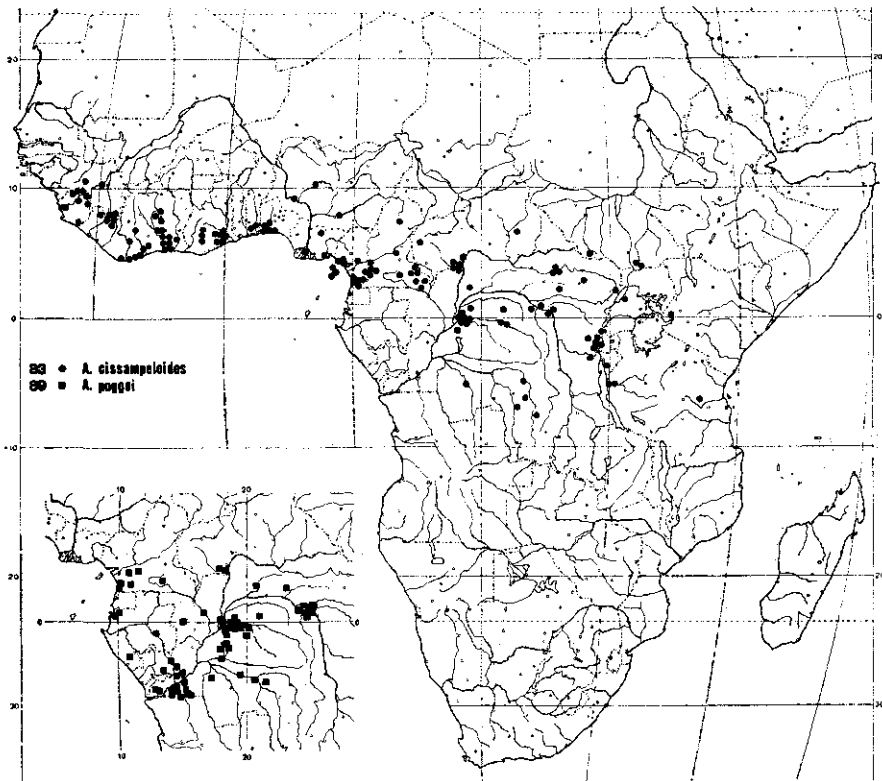


Fig. 40. Localities of species 83, 89.

GUINEA. Fouta Djallon, entre Ditinn et Diaguissa: *Chevalier 12903*, fr. (P, syntype *Ophiocaulon tropaeoloides*); Diaguissa, 1300–1400 m: *Chevalier 12641*, ♀ fl. (P, syntype *O. tropaeoloides*); Entre Timbo et le Haut Niger: *Chevalier 13603*, fr. (P, syntype *O. tropaeoloides*); Kouroussa: *Pobéguin 1114*, ♀ fl. (P); Cercle de Nzérékoré: *Adam 5338*, ♂ fl. (P).

SIERRA LEONE. Freetown: *Scott Elliot 5921*, ♂ fl. (K); Talla Hills, Likuru: *Scott Elliot 4975*, ♂ fl. (BM, K); Falaba: *Scott Elliot 5420*, ♂ fl., ♀ fl. (BM, K); Kurubonla to Serdu: *Morton 3689*, fr. (K, WAG); Koinadugu Distr.: *Haswell 120*, st. (K); 4 miles W. of Gberia Timbako: *Ba(k)shi 527*, ♀ fl., fr. (BR, K, P); Musai: *Deighton 5376*.

LIBERIA. Peáhtah: *Linder 1074*, ♂ fl. (K, P); North of Zorzor: *Bos 2234*, ♂ fl. (WAG); Nimba Mts., 500–900 m: *Adam 21358*, ♂ fl. (K, P), *21382*, ♀ fl., fr. (K, P); Harper: *Baldwin 5990*, ♂ fl. (K).

IVORY COAST. Environs Ahinta (Sanvi): *Chevalier 17672*, ♂ fl. (P, syntype *Ophiocaulon tropaeoloides*); 25 km SW. of Greyo, c. 100 m: *Leeuwenberg 4542* (EA, WAG, a small fruited deviating specimen); *Nozeran s.n.*, st. (MPU); Bassin du Cavally, Tai: *Schnell 1610*, st. (P); Bériby: *Chevalier 19879*, fr. (P, syntype *O. tropaeoloides*); San Pedro: *Thoiré 130*, ♂ fl. (P), *297*, fr. (P); Sassandra, Moyenne Sassandra: *Chevalier 16466*, ♂ fl., ♀ fl., fr. (P, syntype *O. tropaeoloides*); km 64 N. of Sassandra: *W. de Wilde 207*, ♂ fl., ♀ fl., fr. (WAG); 20 km NW. of Sassandra: *Leeuwenberg 4560*, ♂ fl. (WAG); Rég. de Bouaké: *W. de Wilde 109*, ♂ fl. (WAG), *Geerling & Bokdam 2723*, ♂ fl. (WAG); Thiébessou: *Maire s.n.*, ♂ fl. (P); Orumba-boka (40 km S. of Toumodi), c. 500 m: *Bokdam 2794*, ♀ fl., fr. (WAG), *2799*, ♂ fl. (WAG); Région d'Abidjan; Bingerville: *Chevalier 15526*, fr. (P, syntype *O. tropaeoloides*); Komoë-R., Mbaso: *W. de Wilde 595*, ♀ fl., fr. (WAG).

GHANA. W. Prov.; Eastern Prov., Odumase: *Howes 1231*, ♂ fl. (K).

TOGO. Siafi Mts.: *Schröder 168* (B †, n.v., type *Adenia triloba*).

DAHOMÉY. *Poisson 028–117*, juv. (P); Dogba: *Estève 36* (herb. *Le Testu*), ♂ fl. (BM).

NIGERIA. N. Prov., Zaria: *Keay FHI. 22969*, ♀ fl. (K); Jebba: *Kamphorst 167*, st. (WAG); Abinsi: *Dalziel 737*, ♂ fl. (K) — W. Prov., Lagos: *Rowland s.n.*, ♂ fl. (K, type *Ophiocaulon rowlandii*) — Eastern Prov., Enugu: *Daramola FHI. 55178*, ♂ fl. (K); Degema Distr.: *Talbot s.n.*, ♂ fl. (BM); Eket Distr.: *Talbot 3264*, ♂ fl. (BM).

FERNANDO POO. *Barter s.n.*, ♂ fl. (K), *Mann 413*, fr. (K, P), *Vogel 102 (162?)*, ♀ fl. (UPS), *162*, ♂ fl., ♀ fl. (K, 3 specimens, type *Modecca cissampeloides*).

CAMEROUN. Ngaoundéré, Lac Tison, 1200 m: *de Wilde 4363*, st. (WAG) — Yokadouma — Abong Mbang, Lomié: *Mildbraed 5440*, ♂ fl. (HBG) — Kribi — Kumba, S. of Mbongwe: *Bos 5108*, fr., fl. (WAG) — Batouri, piste Manjoun (Deng-Deng to Gere): *Letouzey 2290*, fl. (P) — Yaoundé, c. 700 m — Edea, Masok: *Leeuwenberg 5362*, ♂ fl. (WAG) — Victoria, Station Johann Albrechtshöhe (Buea): *Staudt 946*, ♂ fl. (BM, W), *986*, ♀ fl. (B †, G).

CENTR. AFR. REP. Rég. de Bouar: *Mildbraed 9144*, ♂ fl. (B †, BM, K); Oubangui: *Tisserant 2814*, ♂ fl. (P); Rég. de Mbaïki, Boukoko; Haute Kotto, Yalinga: *Le Testu 4677*, ♂ fl. (BM, P).

REP. OF THE CONGO. Kasai, Kikwit: *Vanderyst 2795*, st. (BR); Lusambo: *Laurent s.n.*, st. (BR) — Bas Katanga, Kaniama, 870 m: *Mullenders 2263*, st. (BR); Miabi (Bakwanga): *Liben 1973*, ♂ fl. (BR); Dibaya: *Liben 2382*, fr. (BR) — For. Central — Ubangui-Uele, Bambesa: *Gérard 1814*, ♂ fl. (BR), *2822*, ♂ fl. (BR) — Lac Albert, Munza (Monbuttu-Land): *Schweinfurth 3361*, st. (B †, K) — Kivu, Rutshuru, 1300 m: *Lebrun 8437*, ♂ fl. (BR, K); Birava, 1550 m: *Meurillon 693*, ♂ fl. (BR); Terr. Kalehe, 800–1000 m: *Pierlot 1127*, ♂ fl. (BR), *1172*, ♂ fl. (BR), *Troupin 5444*, ♂ fl. (BR), *10179*, ♂ fl. (BR), *12473* (BR).

BURUNDI. Terr. Burundi, Rumonge, 1060 m: *Lewalle 2777*, ♂ fl. (BR, L, M).

SUDAN. Equatoria Prov., Loti (Torit Distr.): *Andrews 1711*, ♂ fl. (BR, K); Yambio Distr.: *Jackson 3217*, ♂ fl. (K); Katire, 900 m: *Jackson 4242*, ♀ fl. (K).

UGANDA. Kissango, 4000 ft.: *Dümmer 746*, ♂ fl. (BM, Z); Kitoba, Bunyoro, 3500 ft.: *Purse-glove P. 1215*, ♀ fl. (EA, K).

KENYA. N. of Kakemega: *Maas Geesteranus s.n.*, fr. (WAG).

TANGANYIKA. Western Prov., Kigoma Distr.: *Azuma (Kyoto Un. Exp.) 1036*, fr. (EA); 50 m S. of Kigoma: *Itani 22*, fr. (EA) — Eastern Prov., Luriani-Mhonda Mission Road: *Semsei 2663*, ♂ fl. (K).

ECOLOGY. Primary and secondary forest, forest edges, gallery forest, savanna forest, swamp forest; 0–1600 m. Flowers and fruits in W. and C. Africa during the whole year, in E. Africa flowers found mainly from March to July. Found on sand, clay, volcanic soil, rock and alluvial soil.

USES. Several times reported as a fish-poison, both the roasted and pounded whole plant as especially the red juice from the stem. Various medicinal properties are attributed to the species.

NOTES. 1. The inflorescences mostly develop in the distal part of the branches, in the axils of slightly smaller leaves, thus sometimes forming large panicle-like inflorescences.

2. In *A. cissampeloides* the leaves are never lobed, contrary to most of the related species. In specimens from Central- and East Africa the blade glands are sometimes absent.

3. In most specimens the filaments are free or nearly so; *Gérard 2822* deviates by largely connate filaments.

4. *Leeuwenberg 4542* is a specimen with remarkably small fruits, c. 1½ mm long.

5. Beside normal 3-carpellate gynoecea, not rarely (as in *de Wilde 2641*) flowers with 4-carpellate pistils and fruits (with 4 placentas) are found. Sometimes 4- or 6-merous male flowers are found.

6. In fresh specimens the leaves are observed as dark green or glaucous green above, whitish or glaucous beneath, calyx (dirty) greenish. The ripe fruits are yellowish- or pale green, or glaucous. Older stems when cut exude a red fluid in concentric rings.

84. *Adenia cynanchifolia* (Benth.) Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; Engl., Pfl. welt Afr. 3, 2 (1921) 603; Hutch. & Dalz., Fl. W. Tr. Afr. 1, 1 (1927) 173; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202; de Wilde, Acta Bot. Neerl. 17 (1968) 129, fig. 1c. — *Modecca cynanchifolia* Benth. in Hook., Fl. Nigrit. (1849) 366. — *Ophiocaulon cynanchifolius* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 519, (*p.p.*, *excl. specim. Welwitsch*). — Type: *Vogel 196*. — **Fig. 4 a-d, 41.**

Ophiocaulon lanceolatum Engl., Bot. Jahrb. 14 (1891) 386; Harms, Bot. Jahrb. 15 (1893) 563; Durand & Schinz, Étud. Fl. Congo (1896) 140; Durand, Sylloge Fl. Congol. (1909) 225; Walker & Sillans, Pl. Utiles Gabon (1961) 345 — *Adenia mukengensis* Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; Engl., Pfl. welt Afr. 3, 2 (1921) 603. — Type: *Pogge 954*.

Slender subherbaceous climber up to 10 m. Fertile branches 1–2½ mm, (greyish-)green, finely spotted or not; internodes 1½–12 cm. *Leaves* mostly herbaceous, green above, paler beneath, finely punctate especially distinct near the margin, entire, (ovate-)elliptic to lanceolate, base cordate to truncate, apex acute, up to 1½ cm acuminate, 3½–18 by 1–8½ cm, 3–5-plinerved and in addition 2–4 pairs of nerves from the midrib, reticulation mostly indistinct, margin entire, sometimes up to ¼ cm sinuate-dentate towards the base; petiole ½–8 cm.

Gland at blade-base single, 1–2 mm \varnothing , on a median spatulate appendage $1\frac{1}{2}$ –3 mm; blade glands c. 5–35, 0.2–1 mm \varnothing , scattered; marginal glands dot-like, c. $\frac{1}{4}$ mm \varnothing , 0–15 at either side of the blade. Stipules triangular, serrulate, c. $\frac{1}{2}$ mm. *Inflorescences* peduncled for $\frac{1}{2}$ – $2\frac{1}{2}$ cm, up to 20-flowered in δ , 1–3-flowered in φ ; tendrils 0. Sterile tendrils simple or 2- or 3-fid, 5–15 cm. Bracts and bracteoles narrowly triangular, acute, $\frac{1}{2}$ –1 mm. δ *fl.* campanulate, incl. the $1\frac{1}{2}$ –3 mm long stipe (5–) $6\frac{1}{2}$ – $8\frac{1}{2}$ by 2–3 mm, sepals spreading in anthesis to c. 6 mm. Pedicel 2–8 mm. Hypanthium shallowly cup-shaped, $\frac{1}{4}$ –1 mm, calyx tube 0, sepals (oblong-) lanceolate, subacute, (4–)5–6 by $1\frac{1}{2}$ –2 mm, subentire. Petals (ob-)lanceolate, obtuse, (4–)5– $6\frac{1}{2}$ by $1\frac{1}{2}$ mm, 3–5-nerved, 0.1 mm serrulate in the upper $\frac{2}{3}$, sparingly dotted. Filaments 2– $2\frac{1}{2}$ mm, $1\frac{1}{2}$ –2 mm connate, inserted at the base of the hypanthium. Anthers $2\frac{1}{2}$ –3 by $\frac{3}{4}$ mm, obtuse. Septa (0–) $\frac{1}{2}$ mm high. Corona consisting of 5 conspicuous cap-shaped parts, $\frac{1}{2}$ – $\frac{3}{4}$ mm. Disk glands 0. Vestigial ovary incl. gynophore c. $\frac{1}{2}$ mm. φ *fl.* incl. the $\frac{1}{4}$ – $\frac{1}{2}$ mm long stipe 5–6 by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. Pedicel 1–5 mm. Hypanthium saucer-shaped, c. $\frac{1}{2}$ mm, calyx tube 0, sepals (oblong-)lanceolate, subacute, 4–5 by 1 – $1\frac{1}{2}$ mm, subentire. Petals lanceolate, $\frac{1}{2}$ (–1) by $\frac{1}{4}$ mm, 1-nerved, minutely serrulate. Staminodes c. $\frac{1}{2}$ mm, free. Septa 0. Corona consisting of 5 conspicuous cap-shaped parts, c. $\frac{1}{2}$ mm. Disk glands 0. Pistil ($3\frac{1}{2}$ –)4 mm. Gynophore $\frac{1}{2}$ – $\frac{3}{4}$ mm. Ovary ovate, 2–3 by $1\frac{1}{2}$ –2 mm. Style 0– $\frac{1}{2}$ mm. Stigmas sessile, subreniform with lacerate-papillate margin, each 1 – $1\frac{1}{2}$ mm \varnothing . *Fruit* 1–2 per inflorescence, \pm fusiform, excl. the c. 1 mm long gynophore $1\frac{1}{2}$ –2 by $\frac{3}{4}$ –1 cm. Pericarp coriaceous, punctate. Seeds not known.

NIGERIA. Eastern, Oban: *Talbot 472*, φ *fl.* (BM).

FERNANDO POO. *Vogel 196*, δ *fl.* (K, type).

CAMEROON. Kribi, Kribi: *Bos 5519*, φ *fl.* (WAG); 60 km S. of Edea, 100 m: *Leeuwenberg 5558*, φ *fl.* (WAG) — Yaoundé, N'Kolbisson, 650 m: *de Wilde 1633 A*, φ *fl.* (WAG), *1633 B*, st. (WAG) — Eséka, near Kélé R., 300 m: *De Wilde 1296*, φ *fl.* (WAG); c. 30 km N. of Eséka, c. 300 m: *de Wilde 1620*, δ *fl.* (WAG).

GABON. Setté Cama: *Dybowski 52*, δ *fl.* (P), *58*, δ *fl.* (P); Cefa Ayem, 10 km SW. de Njolé: *Hallé 1932*, fr. (P); Bélinga, 900–950 m: *Hallé 3933*, δ *fl.* (P); Noumba, 750–800 m: *Hallé & Cours 6073*, δ *fl.* (P); Tohibanga: *Le Testu 2340*, φ *fl.* (BM).

CONGO. Sibiti, I.R.H.O. (3°45'S, 13°25'E): *Farron 4191*, δ *fl.* (P).

REP. OF THE CONGO. Kasai, Dima: *Vanderyst 893*, δ *fl.* (BR); Munungu (Sankuru): *Sapin s.n.*, δ *fl.* (BR); Sankuru: *van den Bossche 133*, δ *fl.* (BR); Baschilangebiet, Mukenge (6°S): *Pogge 954* (B†, n.v., type *A. mukengensis*) — Bas Katanga, Gandajika: *Matagne 201*, δ *fl.* (BR); Kaniama, 875 m: *Mullenders 1610-bis*, δ *fl.* (BR) — For. Central, Route de Bikoro (Lac Tumba): *Léonard 623*, δ *fl.* (BR); Isangi, Yangambi, c. 470 m: *Louis 649*, δ *fl.* (BR), *2257*, φ *fl.*, fr. (BR, K, P), *5714*, δ *fl.* (BR), *7950*, δ *fl.* (BR, K), *9268*, δ *fl.* (BR), *12779*, δ *fl.* (BR, P); Maniéma, Vrega, 850 m: *Lebrun 5696*, δ *fl.* (BR); route Monkoto (Watsi-Kengo): *Evrard 2980*, δ *fl.* (BR) — Kivu, Walikale à Kelehe, 1090 m: *Lebrun 5286*, δ *fl.* (BR).

ECOLOGY. (Secondary) forest, forest edges; 0–1200 m. Flowers mainly from June to Dec., fruits collected in April.

NOTES. 1. Recorded on field labels as with greenish sepals, white petals, anthers dark yellow to orange, ovary green, stigmas white; the fruits are reported as pale green, dark mottled, the seeds covered by a whitish aril.

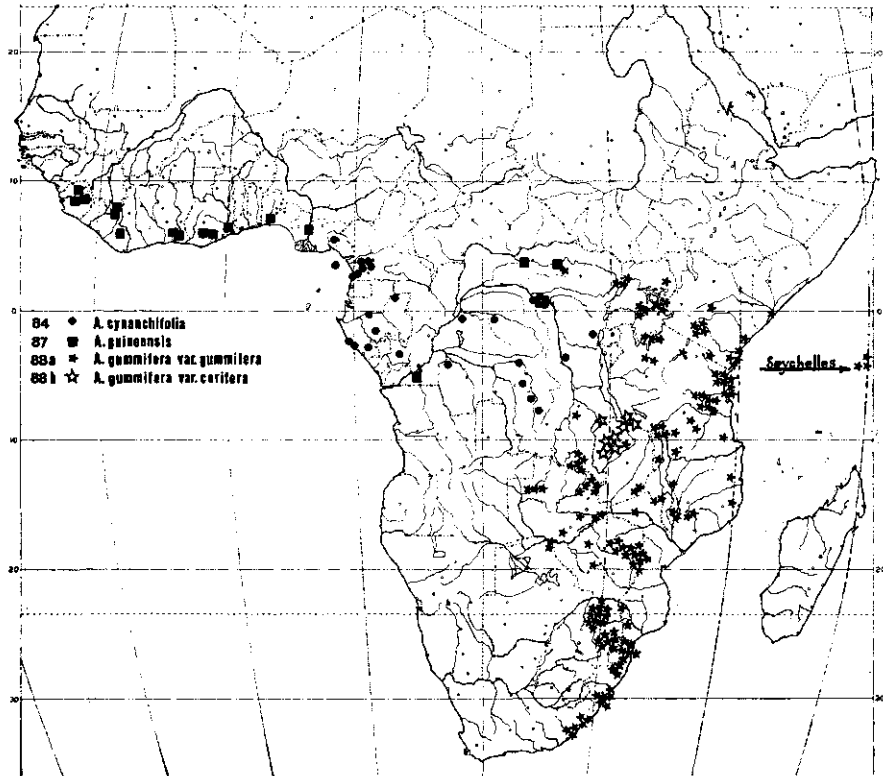


Fig. 41. Localities of species 84, 87-88.

2. *Farron 4191* is a deviating specimen by the exceptionally broad, more or less distinctly palmately nerved (not pinninerved) leaves, the large male flower buds which contain large anthers (c. $3\frac{1}{2}$ mm) and the filaments being for less than half way connate.

85. *Adenia dinklagei* Hutch. & Dalz., Fl. W. Tr. Afr. 1, 1 (1927) 174; Kew Bull. (1928) 214; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202; de Wilde, Acta Bot. Neerl. 17 (1968) 132, fig. 2 n. — Type: *Dinklage 2109*. — Fig. 38.

Adenia cissampeloides (non Planch.) Berhaud, Fl. Senegal (1967) 258.

Subligneous climber up to 20 m. Fertile branches 10-40 cm, $1\frac{1}{2}$ -3(-4) mm thick, greyish-green, often pruinose, mostly spotted; internodes 2-10 cm. *Leaves* when dry herbaceous to coriaceous, brownish above, pale brown to grey beneath, punctate, entire, orbicular to ovate, base hastate to truncate, apex subobtuse to acute, up to $\frac{1}{2}$ cm acuminate, (3-)5-14 by ($2\frac{1}{2}$ -)4-12 cm, 3-5

Meded. Landbouwhogeschool Wageningen 71-18 (1971)

-plinerved and 1-2(-3) pairs of ascending nerves from the midrib, reticulation coarse, distinct or not, margin entire; petiole $1\frac{1}{2}$ -9 cm. *Gland* at blade-base single, $\frac{3}{4}$ -2 mm \varnothing , on a median spatulate \pm concave appendage 1-3 mm; blade glands (0-2-)4-15, $\frac{1}{4}$ -1 mm \varnothing , scattered and partly approximate to the nerve axils; marginal glands c. $\frac{1}{4}$ mm \varnothing , 0-6 at either side of the blade. Stipules triangular, obtuse, serrulate, c. $\frac{1}{2}$ mm. *Inflorescences* peduncled for ($\frac{1}{2}$ -)1-9 cm, up to 15-flowered in δ , 2-6-flowered in η ; tendril 0 or 1, $\frac{1}{2}$ -2 cm. Sterile tendrils simple or 3-fid, 10-20 cm. Bracts and bracteoles triangular, acute, subentire, $\frac{1}{2}$ -1 mm. δ fl. \pm campanulate, incl. the (1-)1 $\frac{1}{2}$ mm long stipe 8-10 (-11) by 2-3 mm, sepals spreading in anthesis to c. 8 mm. Pedicel 1-10 mm. Hypanthium cup-shaped, c. 1 mm, calyx tube 0, sepals oblong-lanceolate, subacute, $5\frac{1}{2}$ -7 by 2-2 $\frac{1}{2}$ mm, subentire, punctate. Petals oblanceolate, obtuse to acute, 7-8 $\frac{1}{2}$ by 1 $\frac{1}{2}$ -2 mm, 3(-5)-nerved, up to 0.2 mm serrulate-laciniate, sometimes sparsely punctate. Filaments (1 $\frac{1}{2}$ -)2-2 $\frac{1}{2}$ mm, (1-)1 $\frac{1}{2}$ -2 mm connate, inserted at the base of the hypanthium. Anthers 2 $\frac{1}{2}$ -3 $\frac{1}{2}$ (-4) by 1 mm, obtuse. Septa 0. Corona 0. Disk glands 0. Vestigial ovary incl. gynophore $\frac{1}{3}$ - $\frac{1}{2}$ mm. η fl. incl. the $\frac{1}{4}$ - $\frac{1}{2}$ mm long stipe 6-8 by 2-3 mm, sepals spreading in anthesis to c. 7 mm. Pedicel 2-8 mm. Hypanthium shallowly cup-shaped $\frac{1}{2}$ - $\frac{3}{4}$ mm, calyx tube 0, sepals oblong-lanceolate, subacute, (5-)7 by 2-2 $\frac{1}{2}$ mm, subentire, punctate. Petals lanceolate-linear, subacute, 3 $\frac{1}{2}$ -4 by $\frac{1}{4}$ - $\frac{3}{4}$ mm, 1-nerved, subentire, \pm punctate. Staminodes $\frac{1}{2}$ - $\frac{3}{4}$ mm, \pm free. Septa \pm 0. Corona consisting of a thickened rim, 0.1(-0.2) mm. Disk glands 0. Pistil 4 $\frac{1}{2}$ -6 $\frac{1}{2}$ mm. Gynophore $\frac{1}{4}$ - $\frac{1}{2}$ mm. Ovary ovate-oblong, 4-5 $\frac{1}{2}$ by 1 $\frac{3}{4}$ -2 $\frac{1}{2}$ mm, minutely warted and spotted. Style 0- $\frac{1}{2}$. Stigmas sessile, reniform, lacerate, each c. 1 $\frac{1}{2}$ mm \varnothing . *Fruit* 1-3 per inflorescence, (broadly) ovate, excl. the c. 1 mm long gynophore 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ by 1 $\frac{1}{4}$ -2 cm. Pericarp woody-coriaceous, brittle, $\frac{1}{4}$ - $\frac{1}{3}$ mm, \pm spotted. Seeds 30-45 per capsule, obliquely ovate, c. 3 $\frac{1}{2}$ by 3 by 1 $\frac{1}{2}$ mm, 4-6 pits \varnothing ; funicles 2-3 mm; embryo c. 2 $\frac{3}{4}$ mm; cotyledons suborbicular, broadly emarginate at one side, c. 2 by 2 mm.

SENEGAL. Casamance: *Adam* 18358, ? (P); Tendoux (Casamance): *Adam* 13559, st. (P).

PORT. GUINEA. Cacine: *Espirito Santo* 634, δ fl. (COI); Saucunda to Buba: *Espirito Santo* 2178, η fl. (COI, K, LISC, WAG); Madina de Joladu to Chenel: *Espirito Santo* 3097, δ fl., fr. (BR, COI, K, LISC, M).

GUINEA. Guékédou: *Adam* 5756, fr. (P); Macenta: *Adam* 6076, δ fl. (P).

SIERRA LEONE. Funkudeh (Samu Chiefdom): *Adams* 241, δ fl. (K); Njala: *Deighton* 2805, st. (K); Magbena: *Jordan* 681, δ fl. (K); Makurboata (?): *Marmo* 233, δ fl. (K); SW. of Leicester, 1250 m: *Melville* 89, δ fl. (BR, K, P); path to York, 400 ft.: *Melville & Hooker* 462, fr. (K, P); Mayoso, 350 ft.: *Thomas* 1401, δ fl. (K); Jigaya, 1100 ft.: *Thomas* 2695, fr. (K) — Northern Prov., Makump: *Deighton* 1369, δ fl. (K); Freetown: *Deighton* 2050, η fl. (BM, K); Kombile (Seli R.): *Small* 454, st. (K); Bumban, 650 ft.: *Thomas* 1902, δ fl. (K); Kabala, 1200 ft.: *Thomas* 2602, fr. (P); Fundembaia, 1000 ft.: *Thomas* 2873, fr. (K); Yonibana: *Thomas* 4834, δ fl. (BM).

LIBERIA. Western Prov., Zorzor to Gharnga: *Bos* 2180, δ fl. (WAG); Bomi Hills: *Bos* 2057, δ fl. (WAG) — Centr. Prov., Nimba Mts., 500-1000 m: *Adam* 021534, δ fl. (K, P), *Adames* 464, δ fl. (K), *Leeuwenberg & Voorhoeve* 4653, δ fl. (WAG); Grand Bassa: *Dinklage* 2109, η fl. (B. type; K, Z).

IVORY COAST. Bassin du Cavally: *Chevalier* 19605, δ fl. (P, syntype *O. trapezoides*); Bassin du Sassandra: *Portières* 1019, fr. (P); Sassandra to Gagnoa: *J. de Wilde* 387, δ fl. (WAG);

Katiola: *Nozeran s.n.*, st. (MPU); vicinity of Adiopodoumé (Abidjan): *Anon. s.n.*, st. (WAG, cult. from Forêt du Banco), *Hallé s.n.*, ♂ fl. (P), *J. de Wilde 153*, ♂ fl. (WAG); Yapo: *Nozeran s.n.*, st. (MPU), 1, st. (MPU), 2, st. (MPU), 3, st. (MPU).

GHANA. Aiyinari (?): *Irvine 5042*, ♂ fl. (K).

ECOLOGY. Forest, forest edges, gallery forest; 0–1100 m. Flowers from July to Nov., fruits in Sept. and Oct.

NOTES. 1. The calyx of fresh flowers is reported as greenish, the petals as whitish, the anthers as orange.

2. *Box 12* (K), consisting of seedlings of two seasons old, with strongly variegate leaves probably belongs to the present species or to *A. gracilis* ssp. *pinnata*.

86. *Adenia gracilis* Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; Bot. Jahrb. 26 (1899) 236; Engl., Pfl. welt Afr. 3, 2 (1921) 602; De Wild., Pl. Bequaertianae (1932) 144; Hutch. & Dalz., Fl. W. Tr. Afr. ed. 1, 1 (1927) 173; Dalz. in Hutch. & Dalz., Fl. W. Tr. Afr. Append. (1937) 50; Keay in Hutch. & Dalz., Fl. W. Tr. Afr. ed. 2, 1, 1 (1954) 202; Walker & Sillans, Pl. Utiles Gabon (1961) 344; de Wilde, Acta Bot. Neerl. 17 (1968) 129, 132, fig. 2 k; A. & R. Fernandes, Consp. Fl. Angol. 4 (1970) 224. — *Ophiocaulon gracile* Pellegr., Mém. Soc. Linn. Norm. 26, 2 (1924) 123. — Syntype: *Zenker & Staudt 383, 457*. — Fig. 4 h-i.

Subherbaceous climber up to 10 m. Fertile branches brownish- or grey-green, sometimes pruinose, faintly spotted or not, 1–2½ mm; internodes (1–)2–10 cm. *Leaves* membranous to subcoriaceous, green to dark brown above, pale green to grey-glaucous beneath, punctate or not, entire or up to halfway 3–5(–7)-lobed or irregularly sinuate, orbicular or ovate to oblong or 3–5-angular in outline, base cordate to rounded, apex obtuse to acute-acuminate, sometimes up to 2 mm mucronate, 1–7(–8) by 1–5½(–8) cm, 3-plinerved and 1–5 pairs of nerves from the midrib, hence often ± pinninerved, reticulation fine, distinct or not, margin entire or minutely toothed; lobes triangular to rounded, up to 2 cm; petiole ¾–7 cm. *Gland* at blade-base single, ½–1½ mm ∅, on a median subcircular to spatulate appendage 1–3 mm; blade glands 0–6, ½–1 mm ∅, submarginal or scattered; marginal glands mostly tooth-like, ¼–½ mm long, blackish, 1–6 at either side of the blade. *Stipules* broadly rounded, finely lacerate, ½(–¾) mm. *Inflorescences* peduncled for ¼–5 cm, up to 10-flowered in ♂, 1–3-flowered in ♀, mostly in the axils of slightly smaller leaves in inflorescences-bearing twigs 10–40 cm; tendrils 0 or 1, ½–1½ cm. Sterile tendrils simple or 3-fid, 6–15 cm. *Bracts* and *bracteoles* narrowly triangular, acute, mostly serrulate, ½(–1) mm. ♂ *fl.* ± campanulate, incl. the 1½–5 mm long stipe 9–13 by 2–3 mm, sepals spreading in anthesis to c. 9 mm. *Pedicel* 3–10 mm. *Hyp-anthium* shallowly cup-shaped, ¾–1½ mm, calyx tube 0, sepals lanceolate, subobtuse to subacute, 5–8 by 1½–2½ mm, subentire, punctate or dotted. *Petals* oblanceolate-linear, obtuse, 5–8½ by 1¼–2, 3(–5)-nerved, sparingly punctate or not, ¼–¾ mm lacerate-fimbriate in the upper half. *Filaments* 1¼–2½(–3) mm,

up to $1(-1\frac{1}{2})$ mm connate, inserted at the base of the hypanthium. Anthers $(2-3)-5$ by $\frac{3}{4}-1$ mm, obtuse, up to 0.2 mm apiculate. Septa up to $\frac{1}{3}$ mm high. Corona conspicuous, either as a 5-parted fleshy annulus or as 5 cap-shaped parts, $\frac{1}{4}-\frac{1}{2}$ mm. Disk glands 0. Vestigial ovary, incl. gynophore, $\frac{1}{2}-1(-2)$ mm. ♀ *fl.* campanulate, incl. the $\frac{1}{4}(-\frac{1}{2})$ mm long stipe $3\frac{1}{2}-5\frac{1}{2}$ by $1\frac{1}{2}-2$ mm, sepals spreading in anthesis to c. 5 mm. Pedicel 2-5 mm. Hypanthium saucer-shaped, $\frac{1}{3}-\frac{1}{2}$ mm, calyx tube 0, sepals oblong-lanceolate, subacute, $2\frac{1}{2}-5$ by $\frac{3}{4}$ mm, entire, sparingly punctate. Petals linear, subacute, c. 1 by $0.2-\frac{1}{3}$ mm, 1-nerved, subentire, not punctate. Staminodes $\frac{1}{4}-\frac{1}{3}$ mm, free or \pm connate. Septa $0.2-\frac{1}{4}$ mm high. Corona a fleshy 5-sinuate annulus $\frac{1}{4}-\frac{1}{3}$ mm high. Disk glands 0. Pistil $3\frac{1}{2}-4\frac{1}{2}$ mm. Gynophore $\frac{1}{3}-\frac{1}{2}$ mm. Ovary ovate, 2-3 by $1\frac{1}{4}-1\frac{1}{2}$ mm, faintly 3(-6)-angular. Style $\frac{3}{4}-1$ mm. Stigmas subsessile, subreniform, laciniate-papillate, each c. $\frac{3}{4}$ mm \varnothing . *Fruit* 1(-2) per inflorescence, ovoid to ellipsoid(-oblong), \pm fusiform, faintly 3(-6)-angular, excl. the $\frac{1}{2}-1$ mm long gynophore $1-2\frac{1}{2}(-3)$ by $\frac{3}{4}-1\frac{1}{2}(-1\frac{3}{4})$ cm. Pericarp (woody-)coriaceous, brittle, $\frac{1}{4}-\frac{1}{2}$ mm, smooth or finely pitted or warted. Seeds 25-50 per capsule, subovoid, 3-4 by $2\frac{1}{2}-3$ by $1\frac{1}{2}-2$ mm, 6-11 pits along the length; funicles c. $1\frac{1}{2}$ mm; embryo c. 3 mm; cotyledons ovate $2-2\frac{1}{4}$ by $1\frac{3}{4}-2$ mm.

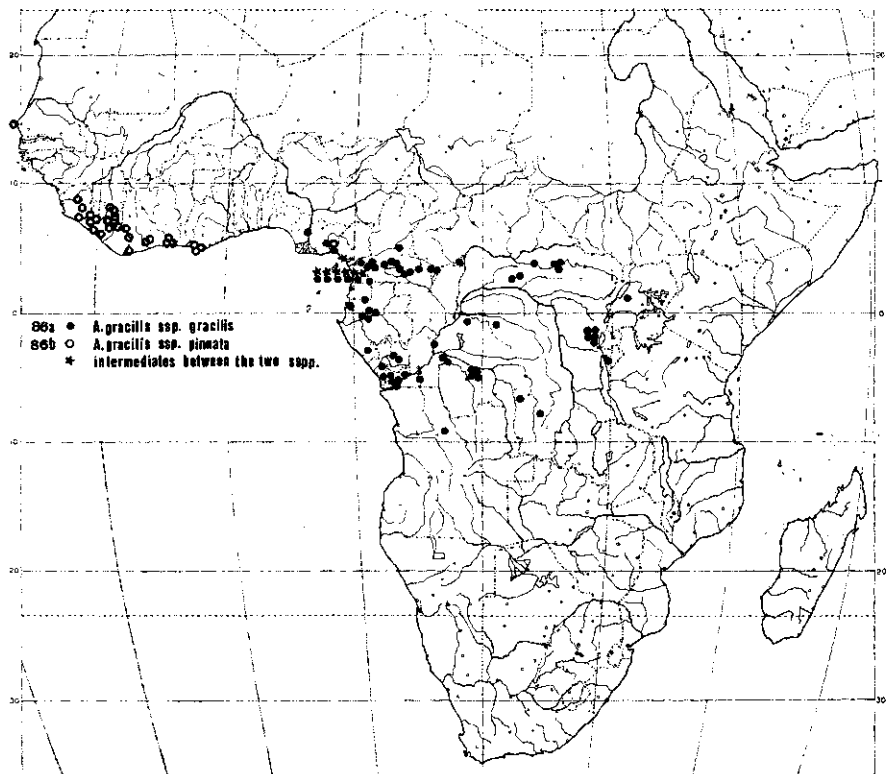


Fig. 42. Localities of species 86.

DISTRIBUTION. W. and C. Africa: Senegal, Sierra Leone, east to Uganda, south to N. Angola. — Fig. 42.

ECOLOGY. (Secondary) forest; 0–1300 m. Found on sand and clay soil. Flowers and fruits during the whole year.

NOTES. 1. *Modecca parviflora* G. Don is the oldest name for the present species (see under the subspecies); it cannot be conveyed to *Adenia*, however, because of *Adenia parviflora* (Blanco) Cusset from Asia.

2. The species is usually dioecious, but sometimes inflorescences with male and female flowers mixed are found.

3. The lower surface of dry leaves shows mostly distinct spots caused by blackish tannin conglomerations pushed through the epidermal layer; this coarser punctation is often mixed with scattered finer reddish-brown spots, apparently due to tannin-containing epidermal cells.

4. Juvenile specimens usually have deeply lobed or incised leaves.

5. Two subspecies are recognized. Some specimens from the area where the ranges of both subspecies touch, namely from the Buea-region and W. Cameroon, appear to be more or less intermediate.

KEY TO THE SUBSPECIES

1. Leaves orbicular to ovate with (1–)2 pairs of ascending nerves from the midrib. Peduncles of ♂ inflor. $\frac{1}{2}$ – $1\frac{1}{2}$ (–3) cm. Filaments connate for about the half. Anthers $3\frac{1}{2}$ –5 mm. Fruits 1–2 cm. a. ssp. **gracilis**
1. Leaves ovate to oblong, \pm pinninerved by (2–)3–5 pairs of subpatent nerves. Peduncles of ♂ inflor. 1–5 cm. Filaments free to connate for the lower third. Anthers 2–4(– $4\frac{1}{2}$) mm. Fruits 2– $2\frac{1}{2}$ (–3) cm. b. ssp. **pinnata**

a. ssp. **gracilis** — Fig. 42.

Leaves membranous, mostly warty-punctate beneath, orbicular to ovate, or \pm 3–5-angular in outline, entire or 3–5(–7)-lobed, 1–6(– $7\frac{1}{2}$) by 1– $5\frac{1}{2}$ (–8) cm, nerves (1–)2 pairs from near the base of the midrib, ascending or \pm straight with sharp angles from the midrib and ending in marginal glands, reticulation fine, mostly distinct. ♂ *inflor.* peduncled for $\frac{1}{4}$ – $1\frac{1}{2}$ (–3) cm. ♂ *fl.*: Filaments 2– $2\frac{1}{2}$ (–3) mm, connate for the half. Anthers $3\frac{1}{2}$ –5 mm. ♀ *fl.* incl. stipe $3\frac{1}{2}$ – $4\frac{1}{2}$ mm, sepals $2\frac{1}{2}$ – $3\frac{1}{2}$ mm. *Fruit* 1–2 cm.

NIGERIA. Benin Prov., Asaba: *Onochie FHI. 33435*, fr. (K); Calabar Prov., Oban: *Talbot 468*, ♀ fl. (BM), *469*, ♂ fl. (BM, K), *473*, ♀ fl., fr. (BM), *475*, ♀ fl. (BM), *Ujor FHI. 30155*, fr. (K).

CAMEROON. Dept. Abong Mbang — Dept. Kribi — Dept. Batouri, Deng-Deng: *Jacques-Félix 4668*, fr. (P); Bertoua: *Breteler c.s. 2397*, ♀ fl., fr. (BR, K, P, WAG) — Dept. Yaoundé, Yaoundé: *Zenker 383*, ♂ fl. (B†, syntype *Adenia gracilis*; BM, K), *Zenker & Staudt 457*, fr. (B †, syntype *A. gracilis*; BM, BR, K, S); N'Kolbisson: *de Wilde 1179*, ♂ fl. (WAG); Biteye: *Bates 871*, ♂ fl. (BM), *906*, ♀ fl. (BM) — Dept. Ebolowa, S. of Ambam: *Raynal 9918*, ♀ fl.,

fr. (P) — Dept. Eséka, 60 km W. of Yaoundé, 300 m: *de Wilde 3913*, fr. (WAG) — Dept. Edea, 60 km S. of Édea: *Leeuwenberg 5487*, ♀ fl., fr. (WAG).

CENTR. AFR. REP. Rég. de Nola, Garigombo-Soso (3°58N–15°32E), 550 m: *Leeuwenberg 6260*, ♀ fl., fr. (WAG); Nola to Salo: *Leeuwenberg 7176*, ♀ fl., fr. (WAG) — Rég. de Mbaïki: *Tisserant (Hb. Le Testu) 3421*, ♂ fl., fr. (BM, P), *3778*, ♂ fl. (BM, P).

GABON. Libreville: *Klaine 1573*, fr. (P); Medouneu: *Hallé & Villiers 4907*, fr. (P); Biobomagola (sur l'Orimbo): *Chevalier 26141*, fr. (P); Elrinanghã (sur Lac Ayem): *Chevalier 26430*, fr. (P); Ogooué: *Thollon 588*, fl. (P), *819*, ♀ fl., fr. (P), *843*, ♀ fl., fr. (P); Tchibanga: *Le Testu 1077*, ♀ fl. (BM, P).

CONGO. Forêt de Mayombe: *Thollon 1103*, ♂ fl. (P); Monfouma (près Sibiti): *Farron 4289*, st. (P); Komono: *Bouquet 969*, st. (P).

REP. OF THE CONGO. Mayumbe — Bas Congo, Kisantu: *Vanderyst 37899*, ♂ fl. (BR); Matadi à Boma: *Evrard 6572*, ♂ fl. (BR); Songololo (Vunda): *Compère 1075*, ♀ fl., fr. (BR) — Kasai — Bas Katanga. Nsadi à Kalenda (terr. Dibaya): *Liben 2305*, ♂ fl. (BR); Haut Lomami, Kaniama, 900 m: *Mullenders 1508*, ♂ fl. (BR). — Forestier Centr. — Ubangui-Uele. — Lac Edouard et Kivu.

BURUNDI. Kigwena (entre Rumonge et Nyanza), 850 m: *Lewalle 4245*, ♂ fl. (L).

UGANDA. Kipayo, 4000 ft.: *Dümmer 860*, ♂ fl. (BM, K).

ANGOLA. Cabinda. Mayombe, Chiloango: *Gossweiler s.n.* (LISJC; K. n.v.); Buco Zau: *Gossweiler 6911*, ♀ fl., fr. (BM, p.p.; COI) — Malange, Quela, 1200 m: *Nolde 99*, ♂ fl. (BM).

ECOLOGY. (Secondary) forest, forest edges, thickets and scrub in forest- and savanna regions; 0–1300 m.

USES. Known as poisonous in the Cameroons; in Congo used as fish poison: it is shattered and thrown in the water.

NOTE. 1. On field labels the following was observed: leaves dark green, sometimes ± glaucous above, pale green, glaucous or whitish-green beneath. Younger stems often pruinose. Flowers dirty (purplish-)green to greenish-yellow, petals creamy or whitish, anthers yellow. Fruits pale green or glaucous- or yellowish-green, often dark green on the angles.

b. ssp. *pinnata* de Wilde, *ssp. nov.*; Acta Bot. Neerl. 17 (1968) fig. 2 m. — Type: *de Wilde & Voorhoeve 3843*. — Fig. 42.

Modecca parviflora G. Don, Gen. Syst. 3 (1834) 59. — Type: *not known*.

Modecca incisa A. Chev., Expl. Bot. Afr. Occ. Fr. 1 (1920) 286, *nom. nud.* — Type: *Chevalier 19713*.

Adenia mannii (*non* Mast.) A. Chev., Expl. Bot. Afr. Occ. Fr. 1 (1920) 286.

Scandens, usque ad 10 m alta. *Folia* ovata vel oblonga, 1½–8 cm longa, 1–4 cm lata, pinninervia, nervis (2–)3–5 paribus. *Glandula* 1 basalis, appendice mediana spathulata instructa. *Inflorescentiae* ♂ pedunculo 1–5 cm longo instructae. *Flores* ♂: *Antherae* (2–)3–4(–4½) mm longae. *Filamenta* 1–3 mm longa, libera vel parte inferiore in tubum usque 1 mm longum coalita. *Flores* ♀ stipite incl. 4½–5½ mm longi. *Fructus* 2–2½(–3) cm longus.

Leaves membranous to subcoriaceous, warty-punctate or blackish spotted especially near the margin or not, ovate to oblong, entire or rarely 3–5-lobed

or with shallowly sinuate margin, $1\frac{1}{2}$ –8 by 1–4 cm, nerves 3–5 pairs from the midrib, rather patent, interlooping or partly ending in marginal glands, reticulation distinct or not. ♂ *inflor.* peduncled for 1–5 cm. ♂ *fl.*: Filaments 1–3 mm, free or up to 1 mm connate. Anthers (2–)3–4(– $4\frac{1}{2}$) mm. ♀ *fl.* incl. stipe $4\frac{1}{2}$ – $5\frac{1}{2}$ mm, sepals 4–5 mm. *Fruit* 2– $2\frac{1}{2}$ (–3) cm.

SENEGAL. Cap Vert: *Hb. Maille (Hb. E. Cosson) s.n.*, fl. (P).

GUINEA. Cercle de Macenta-Seredou: *Adam 4775*, ♂ fl. (P); Cercle de Nzerékoré: *Adam 5101*, ♂ fl. (P), 5228, fr. (P); pied du Monts Nimba: *Schnell 513*, st. (P).

SIERRA LEONE. Mabonto, 550 ft.: *Thomas 3548*, ♂ fl. (K); Pujehum, S. Prov.: *Morton & Jarr S.L. 1695*, st. (K, WAG); Bo: *Thomas 7457*, fr. (K).

LIBERIA. Western Prov., Bomli Hills: *de Wilde & Voorhoeve 3843*, ♂ fl. (BR; WAG, type); Mecca (Boporo Distr.): *Baldwin 10421*, ♂ fl. (K) — Centr. Prov., Nimba Mts., 450–1200 m: *Adam 20559*, st. (K), 20847, ♂ fl., fr. (K, P), 21607, ♂ fl. (K, P), *Bos 2387*, ♂ fl. (WAG); Gbanga (Gbarnga): *Linder 546*, ♂ fl. (K); Tapeta: *Bos 2738*, ♂ fl., fr. (WAG); Sanokwele Distr., Gbau: *Baldwin 9441*, ♂ fl. (K); Monrovia: *Baldwin 13326*, ♂ fl. (K); Brewerville: *Barker 1426*, ♂ fl. (K); Grand Bassa, c. 3 m: *Dinklage 1783*, ♀ fl., fr. (B, BM, BR, W, Z).

IVORY COAST. Bassin du Cavally, Tai: *Schnell 1595*, st. (P), *Chevalier 21347*, fr. (P); Bas Cavally, Prolo: *Chevalier 19860*, ♂ fl. (P); Grabo: *Chevalier 19713*, st. (P, type *Modecca incisa*); Béyo (c. 55 km N. of Sassandra): *Leeuwenberg 2209*, ♀ fl., fr. (WAG), *de Wilde 266*, ♂ fl. (WAG); Abidjan à Adiopodoumé, Forêt du Banco: *Leeuwenberg 3345*, ♂ fl. (WAG); Forêt d'I.D.E.R.T: *de Wilde 303*, ♀ fl., fr. (WAG).

GHANA. Western Prov., Axim: *Irvine 2149*, ♂ fl. (K); W. of Takoradi: *Morton 8510*, ♂ fl. (K); between Dixcove and Busua junction: *Morton A. 278*, ♀ fl. (K).

NIGERIA. E. Prov., Oban: *Talbot 1380*, ♂ fl. (BM).

The following specimens are ± intermediate between ssp. *gracilis* and ssp. *pinnata*:

CAMEROON. Kribi, Batanga: *Bates 89*, ♂ fl., fr. (K); *Bos 3000*, ♀ fl. (WAG), 3544, ♂ fl. (WAG), 3550, fr. (WAG), 3551, ♂ fl. (WAG), 3748, ♂ fl. (WAG), 4425, fr. (WAG), 4596, ♂ fl. (WAG), 4929, ♂ fl. (WAG), 5250, ♂ fl. (WAG); Ebea: *Dinklage 225*, fr. (HBG); Lolodorf: *Hb. d'Alleizette 2600*, fr. (L); Bipindi: *Zenker 887*, fr. (BM, K) — Victoria, Buea, 3000–5000 ft.: *Maitland 228*, ♂ fl. (K), 679, fr. (K).

ECOLOGY. Primary and secondary forests, thickets; 0–1200 m.

NOTES. 1. Habit and colours of fresh specimens are much alike ssp. *gracilis*, but leaves mostly paler, whitish or grey-green beneath.

2. The type-specimen of *Modecca incisa* is a juvenile plant with pinnately incised leaves.

3. Specimens which are more or less intermediate with the type subspecies are found in W. Cameroon.

87. *Adenia guineensis* de Wilde, *sp. nov.* — Fig. 41.

Scandens, usque ad 10 m alta. *Folia* suborbiculata vel ovata, integra vel usque ad 5(–7)-lobata, 2–8 cm longa, $1\frac{1}{2}$ –8 cm lata, 5-subplinervia, subtus distincte minuteque reticulata. *Petiolus* $1\frac{1}{2}$ –8 cm longus. *Glandula* 1 basalis appendice mediana spathulata instructa; glandulae alia 0–6 submarginales. *Inflorescentiae* pedunculo 1–7 cm longo instructae. *Flores* ♂ stipite $2\frac{1}{2}$ –4 mm longo incl. 12–16 mm longi, 3–5 mm lati, epunctati. *Hypanthium* 1–2 mm longum. *Calycis* tubus nullus. *Sepala* (7–)8–12 mm longa. *Petala* fimbriata,

(7-)9-13 mm longa, $1\frac{3}{4}$ - $2\frac{3}{4}$ mm lata. Antherae 4-5 mm longae. Filamenta $1\frac{1}{2}$ -2 mm longa, parte inferiore in tubum $\frac{1}{2}$ -1 mm longum coalita. Septa 0- $\frac{1}{2}$ mm alta. Corona ex annulo (sub)carnoso ($\frac{1}{3}$ -) $\frac{1}{2}$ - $\frac{3}{4}$ mm alto composita. Disci glandulae nullae. Flores ♀ stipite incl. 5-6 mm longi. Fructus 1-2 cm longi.

Subherbaceous climber up to 10 m. Fertile branches pale green, often pruinose, not spotted, $1\frac{1}{2}$ -3(-4) mm; internodes 2-12 cm. Leaves membranous, (brown-)green above, pale green to glaucous, punctate or not beneath, entire to 3-5(-7)-lobed, orbicular to ovate in outline, base cordate to rounded, apex obtuse to acute, 2-8 by $1\frac{1}{2}$ -8 cm, 3-plinerved and with one pair strong, ± straight nerves from the midrib, ending in marginal glands, reticulation fine, distinct, margin entire; lobes triangular, acute to rounded, up to 2 cm; petiole $1\frac{1}{2}$ -8 cm. Gland at blade-base single, $\frac{1}{3}$ - $1\frac{1}{2}$ mm \varnothing , on a median subcircular to spatulate appendage 1- $2\frac{1}{2}$ mm; blade glands (0-)2(-6), $\frac{1}{2}$ - $1\frac{1}{2}$ mm \varnothing , submarginal; marginal glands minute, tooth-like, blackish, c. $\frac{1}{3}$ mm, 2-4 at either side of the blade. Stipules broadly rounded, lacerate, c. $\frac{1}{2}$ mm. Inflorescences peduncled for 1-7 cm, 2-10-flowered in ♂, 1-4(-7)-flowered in ♀; tendril 0 or 1, $\frac{1}{2}$ - $1\frac{1}{2}$ cm. Sterile tendrils simple or 3-fid, 10-15 cm. Bracts and bracteoles (narrowly) triangular, subacute, c. $\frac{1}{2}$ mm. ♂ fl. ± campanulate, incl. the $2\frac{1}{2}$ -4 mm long stipe 12-16 by 3-5 mm, sepals spreading in anthesis to 15 mm. Pedicel 3-10 mm. Hypanthium shallowly cup-shaped, 1-2 mm, calyx tube 0, sepals lanceolate, subobtuse to subacute, (7-)8-12 by 2- $3\frac{1}{2}$ mm, subentire, not punctate. Petals (ob-)lanceolate-linear, obtuse, (7-)9-13 by $1\frac{3}{4}$ - $2\frac{3}{4}$ mm, 3-5-nerved, $\frac{1}{2}$ - $\frac{3}{4}$ mm fimbriate-lacerate in the upper ($\frac{1}{2}$ -) $\frac{2}{3}$, not punctate. Filaments $1\frac{1}{2}$ -2 mm, $\frac{1}{2}$ -1 mm connate, inserted at the base of the hypanthium. Anthers 4-5 by 1- $1\frac{1}{4}$ mm, obtuse. Septa up to $\frac{1}{3}$ mm high. Corona conspicuous, consisting of a fleshy sometimes ± 5-lobed annulus, ($\frac{1}{3}$ -) $\frac{1}{2}$ - $\frac{3}{4}$ mm high. Disk glands 0. Vestigial ovary incl. gynophore $\frac{1}{2}$ -1 mm. ♀ fl. incl. the $\frac{1}{4}$ - $\frac{1}{2}$ mm long stipe 5-6 by 2- $2\frac{1}{2}$ mm, sepals spreading in anthesis to c. 6 mm. Pedicel 2-5(-8) mm. Hypanthium saucer-shaped, c. $\frac{1}{2}$ mm, calyx tube 0, sepals oblong-lanceolate, subacute, $4\frac{1}{2}$ -5 by 1- $1\frac{1}{2}$ mm, subentire, not punctate. Petals linear, $1\frac{1}{2}$ - $2\frac{1}{2}$ by $\frac{1}{3}$ - $\frac{1}{2}$ mm, 1-nerved, finely serrulate in the upper half. Staminodes $\frac{1}{2}$ - $\frac{3}{4}$ mm free. Septa ± 0. Corona conspicuous, consisting of a fleshy annulus $\frac{1}{3}$ - $\frac{1}{2}$ mm high. Disk glands 0. Pistil $4\frac{1}{2}$ - $5\frac{1}{2}$ mm. Gynophore $\frac{1}{3}$ - $\frac{1}{2}$ mm. Ovary ovate, faintly 3(-6)-angular, $3\frac{3}{4}$ -4 by 3 mm. Style $\frac{1}{3}$ - $\frac{1}{2}$ mm. Stigmas sessile, subglobular, papillate, each $\frac{3}{4}$ -1 mm \varnothing . Fruit 1-3(-4) per inflorescence, subglobular to ovoid, faintly 3-ribbed, excl. the $\frac{1}{2}$ -1 mm long gynophore 1-2 by 1- $1\frac{3}{4}$ cm. Pericarp woody-coriaceous, ± brittle, $\frac{1}{4}$ - $\frac{1}{2}$ mm, rather smooth, not punctate. Seeds 30-40 per capsule, subovoid, c. 3 by $2\frac{1}{4}$ by $1\frac{1}{2}$ mm, 7-9(-10) pits along the length; funicles $1\frac{1}{2}$ -2 mm; embryo c. $2\frac{1}{2}$ mm; cotyledons suborbicular, faintly truncate near the apex, c. 2 by 2 mm.

GUINEA. Monts Nimba: Schnell 6290, ♂ fl., fr. (BR, K).

SIERRA LEONE. Kondembaia to Foreh: Morton SL. 4571. ♂ fl. (K); Yonibana: Thomas 4129, ♂ fl. (K, Z); Njala: Deighton 2816, st. (K).

LIBERIA. Centr. Prov., Nimba Mts.: *Leeuwenberg & Voorhoeve 4636*, ♂ fl. (WAG) — Eastern Prov., Tchien Distr.: *Baldwin 6740*, ♂ fl. (K).

IVORY COAST. Adzopé à Azaguié: *Roberty 12651*, fr. (G); Mbasso (55 km NE. of Abidjan): *de Wilde 557*, ♂ fl. (WAG, type).

GHANA. *Irvine 767*, fr. (K); Dunkwa Distr.: *Goggie 4433*, p.p., fr. (K); Manso (Centr. Prov.): *Howes 959*, ♂ fl., ♀ fl. (K); Volta R. Forest Res.: *Morton A. 4672*, fr. (K, WAG).

NIGERIA. Western Prov., Lagos: *Millen 33*, ± ♂ fl. (K); Eastern Prov., Benin, Asaba: *Onochie FHI. 33437*, ♂ fl. (K).

REP. OF THE CONGO. Bas Congo, Kisantu (Nyanga): *Vanderyst 28862* (BR) — For. Centr., La Kulu: *van de Brande 138*, ± ♂ fl. (BR) — Ubangui-Uele, Bambesa: *Pittery 662*, ♀ fl. (BR).

ECOLOGY. Primary and secondary forest; 0–800 m. Once reported from sandy soil. Flowers and fruits mostly from July to Nov.

NOTES. 1. Specimens of this species have been mixed up with *A. cissampeloides* and *A. gracilis*. It has a more robust habit than the latter and is distinguished by the characters given in the key to the species.

2. According to field observations the leaves are sometimes glaucous beneath, the flowers (hypanthium and sepals) pale greenish- to yellowish-green, the petals pale yellow.

88. *Adenia gummifera* (Harv.) Harms in E. & P., Nat. Pfl. fam. 3, 6a, Nachtr. 1 (1897) 255; ed. 2, 21 (1925) 490; Burt Davy, Ann. Transv. Mus. 3 (1912) 121; Engl., Pfl. welt Afr. 3, 2 (1921) 602; Fries, Notizbl. Berl.-Dahl. 8 (1923) 567; Burt Davy, Man. Flow. Pl. and Ferns Transv. & Swazil. 1 (1926) 222; Summerhayes, Trans. Linn. Soc. Lond. 2, Zool. 19 (1931) 279; Henkel, Woody Pl. Natal Zulul. (1934) 110; Norlindh, Bot. Not. (1934) 107; Liebenberg, Bothalia 3, 4 (1939) 535, 523, 532, fig. 10–11; Brenan & Greenway, Checklist For. Tr. and Shrubs Brit. Emp. n. 5, Tang. Terr. Pt. 2 (1949) 447; Garcia, Est. Ens. Doc. Junta Univ. Ultr. 12 (1954) 162; A. & R. Fernandes, Garcia de Orta 6, 2 (1958) 256; Watt & Breyer-Brandwijk, Med. Pois. Pl. ed. 2 (1962) 828; White, For. Fl. North Rhod. (1962) 267; Dyer c.s., Wild Flow. Transv. (1962) 225; de Wilde, Acta Bot. Neerl. 17 (1968) 131, fig. 2 h. — *Modecca gummifera* Harv. in Harv. & Sond., Fl. Cap. 2 (1862) 500. — *Ophiocaulon gummifer* Mast. in Oliv., Fl. Tr. Afr. 2 (1871) 518; Harms in Engl., Pfl. welt Ost Afr. 2, C (1895) 281 ('*gummiferum*'); Fries, Wiss. Ergebn. Rhod. Kongo (1914) 157 ('*gummiferum*') — Type: *Drège 5211*.

Ophiocaulon cissampeloides (non Planch.) Bak., Fl. Maur. and Seychell. (1877) 106; Fl. Gazal. in J. Linn. Soc. Bot. 40 (1910) 74.

Adenia rhodesica Suess., Trans. Rhod. Sc. Ass. 43 (1951) 13. — Type: *Dehn 696*.

Adenia spec. 1 White, For. Fl. North Rhod. (1962) 268.

Subligneous climber to 30 m, up to 10 cm thick at base. Fertile branches (grey-)green or glaucous, often pruinose, 1½–3 mm; internodes 1–12 cm. *Leaves* when dry membranous, dark brown to green above, grey-green or glaucous

beneath, rarely punctate, entire to deeply 3(-5)-lobed, orbicular to ovate or rhomboid or \pm 3(-5)-angular in outline, base cordate to truncate or cuneate, apex obtuse or retuse, rarely subacute, (1-)1 $\frac{1}{2}$ -11 by (1-)1 $\frac{1}{2}$ -11 cm, 3-plinerved and with 1 pair of straight nerves from the midrib ending in marginal glands, reticulation fine, distinct or not, margin entire; lobes obtuse, up to 4 cm; petiole (1-)1 $\frac{1}{2}$ -11 cm. *Gland* at blade-base single, $\frac{1}{2}$ -1 $\frac{1}{2}$ mm \varnothing , on a median circular to spatulate appendage 1-3 mm; blade glands 0-4, $\frac{1}{2}$ -1(-2) mm \varnothing , or 2 rather approximate to the axils of- or contiguous with the upper side nerves; marginal glands up to $\frac{1}{2}$ mm \varnothing , 3-7 on either side of the blade. Stipules broadly rounded to triangular, finely lacerate, $\frac{1}{2}$ (-1) mm. *Inflorescences* peduncled for ($\frac{1}{2}$ -)1-12(-16) cm, up to 35-flowered in σ , 2-6-flowered in ρ ; tendrils 0 or 1, 1-4 cm. Sterile tendrils simple or 3-fid, 5-20 cm. Bracts and bracteoles narrowly triangular, acute, \pm serrulate, $\frac{1}{2}$ -1 mm. σ *fl.* \pm campanulate, incl. the 2-8 mm long stipe (11-)12-18(-20) by 2-4 mm, sepals spreading in anthesis to c. 10 mm. Pedicel 2-10(-15) mm. Hypanthium cup-shaped, 1-2 (-2 $\frac{1}{2}$) mm, calyx tube 0, sepals lanceolate, subobtuse, (7-)8-10 by 2-3 mm, up to 0.2 mm lacinate, punctate. Petals (ob)lanceolate, obtuse, (6-)8-11 by 1 $\frac{1}{2}$ -2 mm, 3-nerved, up to 0.2 mm lacinate-serrulate in the upper $\frac{2}{3}$, remotely punctate. Filaments (1-)2-3 $\frac{1}{2}$ mm, (0-) $\frac{1}{2}$ -1 $\frac{1}{2}$ (-2) mm connate, inserted at the base of the hypanthium. Anthers (3-)4-6 by 1-1 $\frac{1}{4}$ mm, obtuse, up to 0.1 mm apiculate. Septa 0- $\frac{1}{4}$ mm high. Corona 0. Disk glands 0. Vestigial ovary $\frac{1}{2}$ -1(-2) mm, gynophore $\frac{1}{4}$ - $\frac{1}{2}$ (-1 $\frac{1}{2}$) mm. ρ *fl.* \pm campanulate incl. the $\frac{1}{3}$ - $\frac{1}{2}$ mm long stipe 5 $\frac{1}{2}$ -8 by 2-2 $\frac{1}{2}$ (-3) mm, sepals spreading in anthesis to c. 9 mm. Pedicel 2-5 (-10) mm. Hypanthium saucer-shaped c. $\frac{1}{2}$ mm, calyx tube 0, sepals oblong (-lanceolate), obtuse to subacute, (4-)4 $\frac{1}{2}$ -6 $\frac{1}{2}$ by 1 $\frac{1}{2}$ -2 mm, entire, punctate. Petals lanceolate-linear, subobtuse, 2-4 $\frac{1}{2}$ by $\frac{1}{3}$ - $\frac{1}{2}$ mm, 1-3-nerved, entire or finely serrulate near the apex, sparingly punctate or not. Staminodes c. $\frac{1}{2}$ mm, free. Septa. 0. Corona 0. Disk glands 0. Pistil 3 $\frac{1}{2}$ -6 mm. Gynophore $\frac{1}{3}$ - $\frac{1}{2}$ mm. Ovary ovoid, 3-4 $\frac{1}{2}$ by 2-3 $\frac{1}{2}$ mm. Style 0- $\frac{1}{2}$ mm. Stigmas sessile, subreniform, lacinate-papillate, each 1-1 $\frac{1}{2}$ mm \varnothing . *Fruit* 1-4 per inflorescence, subglobular to ovate or ellipsoid, sometimes \pm 3(-6)-angular, excl. the c. 1 mm long stipe 2 $\frac{1}{2}$ -4(-4 $\frac{1}{2}$) by 1 $\frac{3}{4}$ -3 cm. Pericarp woody-coriaceous, c. $\frac{1}{4}$ mm, smooth or finely pitted or granulate. Seeds 30-50 per capsule, \pm ovate, 3 $\frac{1}{2}$ -5 $\frac{1}{2}$ by 3-4 by 2 mm, 5-10 pits along the length; funicles 2-3 mm; embryo 2 $\frac{3}{4}$ -4 $\frac{1}{2}$ mm, cotyledons ovate 2-3 $\frac{3}{4}$ by 2-3 mm.

DISTRIBUTION. From E. Rep. of the Congo east to the Seychelles, south to the Rep. of South Africa. The most south-reaching *Adenia*, south to the mouth of the Kei River in Cape Province. See further under the type-variety. — Fig. 41.

KEY TO THE VARIETIES

1. Leaves green, 2 $\frac{1}{2}$ -11 by 2 $\frac{1}{2}$ -11 cm, reticulation on lower surface distinct, base cordate to truncate. Stems green to grey-green, often \pm pruinose. Stipe

- of ♂ fl. 2–6 mm. a. var. **gummifera**
 1. Leaves distinctly glaucous, 1–4½ by 1–4½ cm, reticulation on lower surface indistinct, base cuneate to subtruncate. Stems pruinose or with a thick whitish waxy cover. Stipe of ♂ fl. (4–)5–8 mm. Plants often precocious flowering. b. var. **cerifera**

a. var. gummifera — Fig. 41.

Stems green or grey-green, often ± pruinose. *Leaves* variable, green to brown above, pale green to grey-green beneath, base cordate to truncate, 2½–11 by 2½–11 cm, reticulation distinct; petiole 1½–11 cm. Flowers and mature leaves simultaneously present. *Inflorescences* peduncled for ½–12(–16) cm. ♂ fl. incl. the 2–6 mm long stipe 11–17 mm. Anthers 3–6 mm. *Fruit* ovate to ellipsoid, 2½–4(–4½) by 1¾–3 cm, finely granulate or pitted, sometimes smooth.

SOMALIA. Lago Margherita: *Vatova 1573*, st. (FI).

REP. OF THE CONGO. Bas Katanga, Kiala: *Thiébaud 415*, fr. (BR) — Uele, Bambesa: *Pitery 663*, ♀ fl. (BR) — Lac Albert, Mahagi: *van der Ben 1308*, ♂ fl. (BR, K), *1362*, ♀ fl., fr. (BR, K) — Haut Katanga.

UGANDA. Northern, Moroto: *Wilson 741*, fr. (EA) — Buganda, mile 4 Entebbe Rd., 4000 ft.: *Hansford 2339*, ♂ fl. (BR, EA), *Laboratory Staff 2339*, ♂ fl. (K); Kazi (Lake Victoria), 3700 ft.: *Lind 2339*, ♂ fl. (EA) — Eastern, Busoga, Busia: *Drummond & Hemsley 4494*, fr. (EA, K).

KENYA. Meru Distr. (K4), 1500–2500 m — Nyanza (K5), Port Victoria: *Glasgow 48/3*, fr. (EA) — Coastal (K7), 0–700 m.

TANZANIA. Tanganyika, Lake Prov. (T1) — Northern Prov. (T2), Lake Manyara Nat. Park: *Dingle 123*, st. (EA); Kilimanjaro: *Volkens 1728*, ♂ fl. (BM, K) — Tanga Prov. (T3) — Eastern Prov. (T6), 300–1500 m — Southern Highlands (T7) — Southern Prov. (T8), Mahenge, 900–1000 m: *Schlieben 1693*, ♂ fl. (BR); 100 km W. of Lindi, 260 m: *Schlieben 6003*, ♂ fl. (B, BM, BR, HBG, M, P, S); Matengo Mt. (SW. of Songea): *Zerny 141*, ♀ fl. (W) — Zanzibar.

SEYCHELLES. Hillwoods of Mahé & Silhouette: *g.H.459*, ♂ fl. (K); Silhouette: *Stanley Gardiner s.n.*, ♀ fl. (K); Seychelles: *Thomasset 160*, ♂ fl. (K), *Wright s.n.*, ♀ fl., fr. (K).

ZAMBIA. *Macaulay 1092*, ♂ fl. (K) — Northern Prov., Kasama, 4000 ft.: *Astle 1099*, ♂ fl. (SRGH) — Western Prov., Kabompo: *Angus 613*, ♂ fl. (BM, BR, FHO), *617*, fr. (BM, BR, FHO, K), *White 613*, ♂ fl. (BR); Ndola Distr.: *Fanshawe 730*, fr. (BR, EA, K, SRGH), *1562*, ♀ fl. (BR, K, SRGH), *1574*, ♂ fl. (BR, EA, K, SRGH) — Eastern Prov., Fort Jameson, 3500 ft.: *Bush 20*, st. (K); Katete: *Grout 281*, ♂ fl. (FHO); Chadiza, 850 m: *Robson 772*, ♀ fl., fr. (BM) — Southern Prov., Nazabuka: *Duff 458/38*, st. (K); Kalomo, Siakaunda Hill: *Mitchell 12/17*, ♂ fl. (SRGH); Kafue Gorge: *Robinson 5858*, ♀ fl., fr. (K, M, SRGH).

SOUTH RHODESIA. Nyumkombe Valley, 4500 ft.: *Gilliland 1653*, st. (BM) — Northern Prov., Gokwe Distr., Juridga R.: *Bingham 866b.*, fr. (LISC, SRGH); S. bank of Zambesi, 3000 ft.: *Rogers 13053*, ♂ fl. (K); Chirundu: *Wild 2083*, ♂ fl. (SRGH) — Centr. Prov., Marandellas: *Dehn 696/52 (a & b)*, ♂ fl., ♀ fl., fr. (BR; M, type *Adenia rhodesica*, also drawing; SRGH) — Eastern Prov., Inyanga Distr., 2300–6000 ft.: *Fries c.s. 3922*, ♂ fl., fr. st. (BM, BR, LD, P, S, SRGH), *Miller 4917*, fr. (SRGH), *Plowes 2102*, fr. (M, SRGH); Umtali Distr., 3600–5200 ft.; Melsetter Distr. — W. Prov., Victoria Falls: *Kräusel 901*, st. (M).

MALAWI. Dedza Distr.: *Salubeni 851* (WAG); Nlwa Luribzi Forest: *Adlard 358*, st. (SRGH); Bemoeke Mission: *Chapman 1155*, fr. (COI, FHO, SRGH); Mlanje Mt., 4500–5000 ft.: *Chapman 469*, ♂ fl. (FHO, K); Blantyre Distr.: *Chapman 1074*, fr. (FHO, SRGH).

MOZAMBIQUE. Cabo Delgado, Porto Amélia: *Myre & Aguiar Macédo 3517*, st. (SRGH) —

Niassa, Vila Cabral: *Pedrogás* 3660, st. (EA); Monapo: *Torre & Paiva* 9421, fr. (LISC) — Zambézia: *Kirk s.n.*, ♂ fl., ♀ fl., fr. (K); Gúrùe, 1500 m: *Mendonça* 1318, fr. (BR, LISC); Morumbala (near M'bolo): *Torre* 5326, ♀ fl., fr. (LISC) — Tete, Chicoa, 900 m: *Torre & Correia* 13957, fr. (LISC) — Manica e Sofala — Gaza, Chipenke: *Barbosa c.s.*, ♂ fl. (LISC); Kurumadzi, 2000 ft.: *Swynnerton s.n.*, ♂ fl. (BM), 2090, ♂ fl. (BM) — Lourenço Marques, Inhaca I.: *Mogg* 5370, ♂ fl. (SRGH), 27536, st. (K).

REP. OF SOUTH AFRICA. Omsamculo and Omcomas: *Drège* 5211, fr. (P, type *Modecca gummifera*; S) — Transvaal, Zoutpansberg, 500–1000 m; Louis Trichardt, 4000 ft.: *Gerstner* 5752, fr. (PRE); Sibasa Distr., 2400 ft.: *van Warmelo* 5156/2, st. (PRE); Letaba R., 3000 ft.: *Scheepers* 744, ♂ fl. (BM, BR, K, M, PRE, SRGH); Pietersburg Distr.; Lydenburg Distr., 4500–6500 ft.; Pilgrimsrest. Distr.: *van der Schijff* 6382, fr. (PRE), *Strey* 3573, st. (K, PRE); Barberton Distr., 4000 ft.: *Liebenberg* 2636, ♂ fl. (P, PRE), *Galpin* 782, ♂ fl. (PRE); Kaapmuiden, 1500 ft.: *Thorncroft* 1199, ♂ fl. (PRE); Kruger Nat. Park, Sabie R.: *Louw* 2398, ♀ fl. (PRE); Numbi, 2000 ft.: *van der Schijff* 2683, ♂ fl. (PRE); Matimba Gate: *Jones s.n.*, ♂ fl. (PRE) — Natal & Zululand: *Gerrard & McKen s.n.*, ♀ fl. (K; Coll. Trin. Dubl., n.v.) — Transkei (Cape Prov.), Elliotdale Distr., Bashi R. mouth, 300 ft.: *Acocks* 12269, ♂ fl. (PRE); Kei Mouth: *Flanagan* 1156, ♂ fl., ♀ fl. (PRE); Port St. John: *Galpin* 3461, ♀ fl., fr. (PRE), *Pegler* 1542, ♀ fl., fr. (BM, K, PRE), *Schonland* 3842, ♂ fl. (P, PRE); Kentani Distr.: *Pegler* 869, ♂ fl. (PRE).

SWAZILAND, Mbabane Distr., Gobolo, 3500 ft.: *Compton* 30370, ♂ fl. (K, SRGH).

ECOLOGY. (Gallery) forest, scrub, stony slopes, termite mounds, savanna; 0–1800 m. Rocks, sand and clay soil, near the coast on coral-rock. Flowers and fruits during the whole year, but mostly from Sept. to April.

USES. Several times mentioned as a fish poison (wood, bark and leaves). The leaves are said to be eaten. Several medicinal properties, among which a remedy (in the root) for arrow injuries and snake bites, and gonorrhoea.

NOTES. 1. A locally common vigorous trailer sometimes covering large bushes.

2. Young stems are extremely pliable; older stems when cut exude a red fluid in concentric rings. Also reported as having copious watery sap.
3. Fresh flowers are reported as pale green to pale yellow, the anthers yellow to orange-yellow, the fruits as greenish.
4. Variable in nearly all parts; *Schlieben* 6003 is noteworthy for the small anthers (c. 3 by 1 mm) on c. 3 mm long almost free filaments.

b. var. *cerifera* de Wilde, var. nov. — Fig. 41.

Scandens, usque ad 15 m longa; rami glauco-pruinosi. *Folia* ± rhombiformia, integra vel 3-lobata, basi cuneata vel subtruncata, apice acuta vel obtusa, 1–4½ cm longa, 1–4½ cm lata, glauca, subtus indistincte reticulata. *Glandula* 1 basalis, appendice mediana spathulata instructa. *Inflorescentiae* pedunculo ½–1½(–8) cm longo instructae. *Flores* ♂ stipite 5–8 mm longo incl. 15–20 mm longi. *Antherae* 5–6 mm longae.

Stems distinctly pruinose, whitish-glaucous. *Leaves* ± glaucous green-brown above, grey-green to glaucous beneath, subentire to 3-lobed, subrhom-

boïd in outline, base cuneate to subtruncate, apex acute to broadly rounded, 1-4½ by 1-4½ cm, reticulation indistinct; petiole 1-4 cm. Flowers and fruits often precocious. *Inflorescences* peduncled for (¼-½)-1½(-8) cm. ♂ fl. incl. the 5-8 mm long stipe 15-20 mm. Anthers 5-6 mm. *Fruit* globular to ellipsoid, 2½-3½ by 2-2½ cm, finely granulate.

ZAMBIA. Northern Prov., Abercorn Distr., Ulungu: *Glover 6396*, fr. (BR); 5 miles from Kawimbi, 1500 m: *Richards 18222*, fr. (K); Kalambo Falls, 850 m: *Robson 490*, ♂ fl. (BM, type); Abercorn, 5500 ft.: *Siame 4*, fr. (BR, K); Mpulungu (Lake Tanganyika): *White 3685*, ♂ fl. (BR, K); Mwewe-Mpundu Distr. (8°50S-29°45E): *Bullock 1352 (I & II)*, ♂ fl. (K); Museshia: *Fanshawe 4926 (1 & 2)*, fr., st. (K); Kasama Distr.: *Hoyle 1304*, ♂ fl., ♀ fl., fr. (FHO, spirit); escarpment above Kapata, 780 m: *Richards 20669*, fr. (EA, K); Mbalo Distr., Kalalo Hill, 5800 ft.: *Sanane 289*, ♀ fl. (K, P); Fort Rosebery Distr., N. of Samfya (Lake Bangweolo): *Brenan & Greenway 8046* (FHO, K).

ECOLOGY. Rocky slopes, *Brachystegia*-woodland; 800-1800 m. Flowers and fruits from Sept. to Dec.

NOTES. 1. The variety has a distinct grey-glaucous to dirty purplish appearance.

2. With a lens the lower surface of the dry leaves shows a distinct whitish warty-knobby structure similar to that in *A. reticulata* var. *cinerea* or some Malagasy species.

3. Fresh leaves are reported as chartaceous or rather fleshy, anthers as orange, filaments green.

89. *Adenia poggei* (Engl.) Engl., Pfl. welt Afr. 3, 2 (1921) 603; de Wilde, Acta Bot. Neerl. 17 (1938) 129, fig. 1 d-e. — *Ophiocaulon poggei* Engl., Bot. Jahrb. 14 (1891) 386; Harms, Bot. Jahrb. 15 (1893) 567; Durand & Schinz, Études Fl. Congo 1 (1896) 140; Durand, Sylloge Fl. Congol. (1909) 225 — Type: *Pogge 947*. — Fig. 40.

Ophiocaulon dewevrei De Wildem. & Dur., Compt. Rend. Soc. Bot. Belg. 38 (1899) 85; Reliq. Dewevr. (1901) 99; De Wildem., Étud. Fl. Bas- et Moy. Congo 1 (1906) 294; Durand, Sylloge Fl. Congol. (1909) 255. — *Adenia dewevrei* Engl., Pfl. welt Afr. 3, 2 (1921) 603. — Type: *Dewèvre 539*.

Ophiocaulon apiculatum De Wildem. & Dur., Compt. Rend. Soc. Bot. Belg. 38 (1899) 85; Durand, Sylloge Fl. Congol. (1909) 224; De Wildem., Pl. Bequaertianae (1932) 414. — *Adenia apiculata* Engl., Pfl. welt Afr. 3, 2 (1921) 603. — Type: *Dewèvre 648*.

Subligneous climber, up to 20 m, up to 7 cm thick at base. Fertile branches 1-2½ mm, green, often pruinose, not spotted, terete, later on ± triangular; internodes 1-11 cm. *Leaves* herbaceous to thinly coriaceous, dark brown to greenish above, grey(-green) beneath, very finely punctate or not, entire or rarely shallowly 3-lobed or inconspicuously sinuate-dentate; in sterile shoots

or when sustaining inflorescences-bearing twigs broadly ovate, base cordate to rounded, apex acute, up to $\frac{1}{2}$ cm acuminate, often c. 1 mm mucronate, $3\frac{1}{2}$ –10 by $2\frac{1}{2}$ – $7\frac{1}{2}$ cm, 3-plinerved and one pair of nerves from the midrib, ascending, often yellowish or reddish-brown, reticulation mostly indistinct, margin entire; petiole 1–7 cm; leaves sustaining inflorescences ovate-elliptic to oblong, base rounded to acute, apex acute-acuminate, $1\frac{1}{2}$ –6 by $\frac{1}{2}$ – $3(-3\frac{1}{2})$ cm, \pm pinnivered; petiole $\frac{1}{2}$ –2 cm. *Gland* at blade-base single, $\frac{1}{2}$ – $1\frac{1}{2}$ mm \varnothing , on a median subcircular to spatulate appendage 1–3 mm; blade glands 0; marginal glands minute, c. 0.2 mm, up to 8 at either side of the blade. Stipules reniform, crenulate-laciniate, $\frac{1}{2}$ –1 mm. *Inflorescences* in special twigs (5–)10–30 cm; peduncled for $\frac{1}{2}$ –2 (–10) cm, up to 40-flowered in δ , 2–10-flowered in φ ; tendril 0 or 1, $\frac{1}{2}$ –1(–2) cm. Sterile tendrils simple or 3-fid, 7–15 cm, sometimes ending in small adhesive discs. Bracts and bracteoles narrowly triangular, acute, \pm serrulate, ($\frac{1}{2}$ –)1 mm. δ fl. \pm campanulate, incl. the $2\frac{1}{2}$ –5 mm long stipe 8– $13\frac{1}{2}$ by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, lobes spreading in anthesis to c. 8 mm. Pedicel $\frac{1}{2}$ –5(–10) mm. Hypanthium shallowly cup-shaped, $\frac{1}{2}$ – $1\frac{1}{2}$ mm, calyx tube 0, sepals oblong-lanceolate, obtuse to subacute, ($4\frac{1}{2}$ –)5–8 by $1\frac{1}{2}$ –3 mm, subentire, not punctate. Petals lanceolate-linear, subobtusate to acute, 5– $7\frac{1}{2}$ by ($\frac{1}{2}$ –) $\frac{1}{2}$ –1 mm, 1-nerved, entire or 0.1 mm serrulate near the apex, not punctate. Filaments $\frac{1}{2}$ – $1\frac{1}{2}$ mm, 0– $\frac{3}{4}$ mm connate, inserted at the base of the hypanthium or on an androgynophore up to 2 mm. Anthers (3–) $3\frac{1}{2}$ – $5\frac{1}{2}$ by $\frac{3}{4}$ –1 mm, slightly curved, obtuse, sometimes 0.1 mm apiculate. Septa 0– $\frac{1}{4}$ mm high. Corona 0. Disk glands 0. Vestigial ovary $\frac{1}{2}$ mm, gynophore $\frac{1}{4}$ – $\frac{1}{2}$ mm. φ fl. \pm campanulate, incl. the 1– $1\frac{1}{2}$ mm long stipe 6–7 by $1\frac{1}{2}$ –2 mm. Pedicel 1–2 mm. Hypanthium cup-shaped, $\frac{1}{2}$ –1 mm, calyx tube 0, sepals oblong-lanceolate, subacute, 4–5 by 1(– $2\frac{1}{2}$) mm, entire, not punctate. Petals linear, acute, 3–4 by 0.1– $\frac{1}{4}$ mm, 1-nerved, entire, not punctate. Staminodes c. $\frac{1}{2}$ mm, half-way connate. Septa c. $\frac{1}{4}$ mm high. Corona a 0.2– $\frac{1}{2}$ mm high annulus. Disk glands 0. Pistil 4–5 mm. Gynophore $\frac{1}{2}$ – $\frac{3}{4}$ mm. Ovary ellipsoid, 2– $2\frac{1}{2}$ by $1\frac{1}{2}$ – $1\frac{3}{4}$ (–2) mm, often \pm glaucous. Style 1– $1\frac{1}{2}$ mm. Stigmas sessile, subreniform, longly laciniate-papillate, each 1– $1\frac{1}{2}$ mm \varnothing . *Fruit* 1–4 per inflorescence, ovate to subglobular, excl. the 1–2 mm long gynophore 1– $1\frac{3}{4}$ by $\frac{3}{4}$ – $1\frac{1}{2}$ cm. Pericarp woody-coriaceous, c. $\frac{1}{4}$ mm, smooth. Seeds 15–25 per capsule, obliquely ovate, c. 4 by $2\frac{1}{2}$ by $1\frac{1}{2}$ mm, 7–9 pits along the length; funicles c. 2 mm; embryo c. $3\frac{1}{2}$ mm; cotyledons ovate c. $2\frac{1}{2}$ by 2 mm.

CAMEROUN. Dept. Abong Mbang, c. 50 km E. of Lomié: *Letouzey 5629*, δ fl. (P, WAG) — Dept. Monatélé, c. 40 km W. of Yaoundé, c. 500 m: *de Wilde 2684*, δ fl. (WAG) — Dept. Kribi, Kribi: *Bos 4702*, δ fl. (WAG), *5342*, δ fl. (WAG) — Dept. Yaoundé, Bitye: *Bates 1393*, δ fl. (BM) — Dept. Ebolowa: *Mildbraed 5577*, δ fl. (HBG).

CENTR. AFR. REP. Rég. de Mbaïki, 20 km NW. de Mbaïki: *Badré 67*, δ fl. (P); Boukoko: *Tisserant (Hb. Le Testu) 301*, δ fl. (BM, P).

GABON. Libreville: *Klatne 1093*, δ fl. (P), *1761*, δ fl. (P); Latourville: *Le Testu 7347*, δ fl. (BM, P); Tchibanga: *Le Testu 2340*, p.p., δ fl. (BM).

CONGO. Likilamba (Ikelemba), Sangha R., c. 1°15'N: *Mildbraed 3829*, δ fl. (HBG); Brazzaville: *Koechlin 20*, δ fl. (P), *2330 (4420)*, φ fl., fr. (P); near Sibibi: *Farron 4290*, fr. (P); Gambia to Baya: *Descoings 7017*, δ fl. (P); Entoumbi to Kellé: *Descoings 8815*, δ fl. (P); Léfindi (rég. de Kindamba): *Descoings 11396*, \pm fl. (P).

REP. OF THE CONGO. — Mayombe, Luki (INEAC): *Toussaint 112*, ♂ fl. (BR), *Wagemans 2395*, st. (BR) — Bas Congo — Kasai, Mukenge: *Pogge 947*, ♂ fl. (B†, type *O. poggei*, n.v.). — For. Centr., Rég. de Coquilhatville (Mbandaka): *Dewèvre 539*, ♀ fl. (BR, type *Ophiocaulon dewevrei*), *603*, ♀ fl., fr. (BR), *648*, ♂ fl. (BR, type *Ophiocaulon apiculatum*), *Schlechter 12614*, ♂ fl. (BR, K, Z); Kalamba to Ingende: *Evrard 3718*, ♂ fl. (BR); Eala and vicinity; Lac Tumba (Bikoro), 350 m: *Thonet 100*, fr. (BR); Ikua: *Hulstaert 656*, fr. (BR); Bokatola: *Goossens 6154*, ♂ fl. (BR); Bokuma: *Hulstaert 552*, ♂ fl. (BR); Likimi: *Malchair 160*, ♂ fl. (BR); Befale: *Dubois 566*, ♂ fl. (BR); Mobwasa: *De Giorgi 713*, ♂ fl. (BR); Lac Léopold II; Yangambi and vicinity, c. 470 m.

ECOLOGY. Primary and secondary forest, temporarily inundated forest, gallery forest; 100–800 m. Flowers and fruits during the whole year.

USES. Leaves once reported as edible.

NOTES. 1. In the field the leaves are noted as distinctly silvery-grey or grey-glaucous beneath; the flowers as green to yellowish, petals whitish-green or yellowish, anthers yellow or orange, ovary green, stigmas white; fruits green, yellow at maturity.

2. Older stems become \pm triangular or 3-grooved.

3. In male flowers the corona is absent, in female flowers, on the contrary, it is well developed, annular.

90. *Adenia reticulata* (De Wildem. & Dur.) Engl., Pfl. welt Afr. 3, 2 (1921) 602; de Wilde, Acta Bot. Neerl. 17 (1968) 129, 132, fig. 2 j, 1.; A. & R. Fernandes, Consp. Fl. Angol. 4 (1970) 224. — *Ophiocaulon reticulatum* De Wildem. & Dur., Compt. Rend. Soc. Bot. Belg. 38 (1899) 86; Mat. Fl. Congo 4 (1899) 9; Reliq. Dewevr. (1901) 1000; De Wildem., Miss. Laurent. (1905) 158; Durand, Sylloge Fl. Congol. (1909) 225. — Type: *Dewèvre 691a*.

Adenia cissampeloides (non Planch.) Exell, J. Bot. 67, Suppl. Polypet. (1929) 193, p.p.; Walker & Sillans, Pl. Util. Gabon (1961) 344.

Adenia lobulata Engl., Pfl. welt Afr. 3, 2 (1921) 602; Harms, Notizbl. Berl.-Dahl. 8 (1923) 293. — Syntype: *Hückstädt 44*, *Pogge 949*.

Subligneous climber up to 15 m, up to 10 cm thick at base; older stems \pm 3-angular in cross-section. Fertile branches $1\frac{1}{2}$ – $2\frac{1}{2}$ mm, grey to green, sometimes pruinose, spotted or not; internodes 2–8 cm. *Leaves* herbaceous to subcoriaceous, when dry brown-green to blackish, often variegated above, grey-green to whitish beneath, punctate or not, entire to 3–5-lobed or with sinuate margin, broadly ovate to \pm triangular or rhomboid, base cordate to rounded, or truncate, apex obtuse to acute, up to 2 cm acuminate, sometimes 1 mm mucronate, 2–11 by $1\frac{1}{2}$ –10 cm, 3–5-plinerved and with (0–)1–2(–4) pairs of nerves from the midrib, nerves ending in the leaf margin or not, reticulation distinct or not, margin entire; lobes \pm triangular or rounded, up to 2 cm; petiole 1–6 $\frac{1}{2}$ cm. *Gland* at blade-base single, $\frac{1}{2}$ –1 mm \varnothing , on a median circular to spatulate appendage 1–2 $\frac{1}{2}$ mm; blade glands 0–30, $\frac{1}{4}$ –1 mm \varnothing , scattered or submarginal

or more or less (not tightly) axillary to the nerves; marginal glands c. $\frac{1}{4}$ mm \varnothing , blackish, 2-7 at either side of the blade. Stipules broad, rounded, finely lacerate, c. $\frac{1}{2}$ mm. *Inflorescences* peduncled for $\frac{1}{2}$ -5 cm, up to 20-flowered in σ , 2-3(-5)-flowered in φ ; tendrils 0 or 1, $\frac{1}{2}$ -1 $\frac{1}{2}$ cm. Sterile tendrils simple or 3-fid, 10-20 cm, sometimes ending in adhesive discs. Bracts and bracteoles (narrowly) triangular, acute, $\frac{1}{2}$ -1 mm. σ *fl.* \pm campanulate, incl. the 1 $\frac{1}{2}$ -4 $\frac{1}{2}$ mm long stipe 7-14 by 2-3 $\frac{1}{2}$ mm, sepals spreading in anthesis 5-9 mm. Pedicel 1-5(-12) mm. Hypanthium cup-shaped, $\frac{1}{2}$ -1(-2) mm, calyx tube 0(-1) mm, sepals oblong-lanceolate, obtuse to subacute, subentire, 5-8 by 2-3 mm, punctate. Petals oblanceolate, obtuse, 5 $\frac{1}{2}$ -8 $\frac{1}{2}$ by 1 $\frac{1}{2}$ -2 mm, 3(-5)-nerved, sparingly punctate, c. $\frac{1}{2}$ mm fimbriate in the upper $\frac{2}{3}$. Filaments 1-2 mm, 0-1 mm connate, inserted at the base of the hypanthium. Anthers 3-4 by $\frac{3}{4}$ -1 mm, obtuse. Septa 0-1 mm high. Corona 0. Disk glands 0. Vestigial ovary incl. gynophore $\frac{1}{2}$ (-1) mm. φ *fl.* \pm campanulate, incl. the $\frac{1}{4}$ -1 mm long stipe 5-7 $\frac{1}{2}$ by 3-3 $\frac{1}{2}$ mm, sepals spreading in anthesis 5-6 mm. Pedicel 1-6 mm. Hypanthium shallowly cup-shaped $\frac{1}{2}$ -1 mm, calyx tube 0, sepals oblong to lanceolate, subacute, 4 $\frac{1}{2}$ -5 $\frac{1}{2}$ by 1 $\frac{1}{2}$ -2 mm, punctate, (sub)entire. Petals lanceolate-linear, subobtusate to acute, 2 $\frac{1}{2}$ -3 by $\frac{1}{4}$ - $\frac{1}{2}$ mm, 1-nerved, not punctate, entire or finely lacinate. Staminodes c. $\frac{1}{2}$ mm, 0- $\frac{1}{3}$ mm connate. Septa 0- $\frac{1}{3}$ mm. Corona a rather distinct fleshy \pm 5-lobed annulus, $\frac{1}{4}$ - $\frac{1}{3}$ mm high. Disk-glands 0. Pistil 4-5 $\frac{1}{2}$ mm. Gynophore c. $\frac{1}{2}$ mm. Ovary ovate, \pm 3-ribbed, 3-4 $\frac{1}{2}$ by 2 $\frac{1}{2}$ -3 $\frac{1}{2}$ mm, smooth or finely warty or granulate. Style (0-) $\frac{1}{2}$ - $\frac{3}{4}$ mm. Stigmas sessile, reniform to globular, papillate, each 1-1 $\frac{1}{2}$ mm \varnothing . *Fruit* 1(-2) per inflorescence, subglobular or ovoid or ellipsoid, sometimes \pm 3(-6)-angular, excl. the $\frac{1}{2}$ -1 $\frac{1}{2}$ mm long gynophore 2-3 (-3 $\frac{1}{2}$) by 1 $\frac{1}{2}$ -2(-2 $\frac{1}{2}$) cm. Pericarp coriaceous to woody, ($\frac{1}{2}$ -) 1-2 mm, strongly warty to nearly smooth, or pitted. Seeds 30-50 per capsule, ovate, 4-4 $\frac{1}{2}$ (-5) by 2-3 by 1 $\frac{3}{4}$ mm, 7-10 pits along the length; funicles c. 1 $\frac{1}{2}$ mm, embryo 4(-4 $\frac{1}{2}$) mm; cotyledons ovate, c. 3 by 2 mm.

DISTRIBUTION: S. Nigeria, W. and S. Cameroon, Gabon, Congo, Rep. of the Congo, Uganda, N. Angola. — Fig. 43.

KEY TO THE VARIETIES

1. Leaves about as long as to longer than wide, acute to acuminate, grey- to pale green beneath. Nerves ascending, or \pm straight and ending in marginal glands. Filaments connate for the lower $\frac{1}{3}$ - $\frac{1}{2}$. Septa $\frac{1}{2}$ -1 mm high.
 - a. var. *reticulata*
1. Leaves mostly broader than long, rounded or obtuse, sometimes retuse, dull grey to grey-white beneath. Main nerves \pm straight, ending in marginal glands. Filaments free to halfway connate. Septa 0. b. var. *cinerea*

a. var. *reticulata* — Fig. 43.

Leaves ovate to triangular or \pm rhomboid, mostly longer than wide, entire or 3–5-lobed or with sinuate margin, apex subacute to 2 cm acuminate; lobes \pm triangular, acute to obtuse. Nerves ascending, interlooping or \pm straight and ending in marginal glands; reticulation distinct or not. Dry leaves brown to brown-green above, grey to grey-green beneath. δ fl. filaments $1\frac{1}{2}$ –2 mm, $\frac{1}{2}$ –1 mm connate. Anthers $3\frac{1}{2}$ –4 mm. Septa ($\frac{1}{4}$)– $\frac{1}{2}$ –1 mm high. Corona 0. \varnothing fl. incl. stipe 6–7 $\frac{1}{2}$ mm.

NIGERIA. Umudike (Agr.Res.St.): *Arnwaodo* 362 (Tuley), δ fl. (K); Eket Distr. (East Prov.): *Talbot s.n.*, δ fl. (BM).

FERNANDO POO. Nun R.: *Mann* 497, δ fl. (K, P).

CAMEROUN. *Braun* 89, fr. (B \dagger , HBG, M) — Dept. Kribi, Kribi: *Bos* 2975, δ fl. (WAG), 3473, fr. (WAG), 4812, δ fl. (WAG), 5167, fr. (WAG), 5256, δ fl. (WAG), 5518, \varnothing fl. (WAG); Lolodorf: *Staudt* 387, δ fl. (B \dagger , G, K, P, S, Z) — Dept. Batouri, Djemiong: *Letouzey* 4796, st. (P) — Dept. Yaoundé, Yaoundé: *de Wilde* 1177, \varnothing fl. (WAG) — Dept. Douala, Manoka: *Hückstädt* 44 (B \dagger , n.v., syntype *A. lobulata*).

GABON. near Libreville: *Klaine* 537, fr. (P), 968, \pm δ fl. (P); Bélinga, 700–1000 m: *Hallé* 3794, δ fl. (P); Cap Lopez: *Chevalier s.n.*, st. (P).

CONGO. Ngokamina II (route de Zanaga): *Bouquet* 1013, δ fl. (P).

REP. OF THE CONGO. Bas Congo, Iles Kabongo, Kisantu: *Pauvels* 4767, fr. (BR) — Kasai, Terr. Kole (Booke): *Robin* 81, δ fl. (BR); Luebo: *Achten* 194B, δ fl. (BR); Mukenge: *Pogge* 949 (B \dagger , n.v., syntype *A. lobulata*) — For. Centr. Coquillatville: *Dewèvre* 691a, fr. (BR, type); Eala: *Chevalier* 28261, fr. (P), *Pynaert* 36 HV. 7, δ fl. (BM, BR), 1240, δ fl. (BM, BR), 1628, fr. (BR); Kombo (Ruki): *Dubois* 227, δ fl. (BR); Lac Tumba: *Laurent s.n.*, δ fl. (BR); Bokuma: *Hulstaert* 256, δ fl. (BR); Flandria: *Hulstaert* 1456, \varnothing fl., fr. (BR); Lac Léopold II: *Goossens* 5047-bis, δ fl. (BR); Mbongo: *Evrard* 1755, fr. (BR); Dundu (Sana): *Mortehan* 1022, δ fl. (BR), *Vermoesen* 183, \pm δ fl. (BM, BR); Djolu: *Evrard* 5760, δ fl. (BR); Mobwasa: *Lemaire* 180, δ fl. (BR); Yangambi and vicinity, 450–500 m: *Bolema* 847, \varnothing fl., fr. (BR), *Elekem s.n.*, δ fl. (BR), *Léonard* 894-bis, δ fl. (BR), 1148, δ fl. (BR), 1659, st. (BR), *Louis* 571, δ fl. (BR, K), 2247, fr. (BR), 2514, δ fl. (BR, K, P), 2665-bis, δ fl. (BR), 5867, fr. (BR), 7156, δ fl. (BR), 7660, δ fl. (BR), 11098, δ fl. (BR), 11769 (BR), 11904 (BR), 11987, δ fl. (BR, C, K, P), 12486, \varnothing fl. (BR, C), 15868, δ fl. (BR); Nzowo (Terr. Shabunda): *Léonard* 3850, fr. (BR); *Avakubi* 1737, \varnothing fl. (BR); Walikate, 710 m: *Léonard* 4684, fr. (BR) — Ubangi-Uele, Bodangabo: *Evrard* 316, δ fl. (BR) — Kivu, Beni: *Bequaert* 3387, δ fl. (BR).

UGANDA. Kipayo (?), 4000 ft.: *Dümmer* 794, st. (BM); Ginja (?) Road: *Liebenberg* 804, st. (K) — Masaka Distr., c. 3800 ft.: *Chandler* 1379, δ fl., fr. (BR, EA, K); 1140 m: *Drummond & Hemsley* 4713, δ fl. (EA, K) — Mengo Distr., Entebbe, Nyanga: *Bagshawe* 719, δ fl. (BM); Kajansi Forest: *Chandler* 1248, δ fl. (BR, K).

ECOLOGY. (Secondary) forest, inundated forest, forest edges, gallery forest; 0–1400 m. Flowers and fruits found throughout the year.

USES. The leaves are once reported as edible.

NOTES. 1. The leaves are sometimes variegated, that is irregularly blotched on and near the midrib.

2. On field labels the calyx is noted as greenish, the petals greenish with whitish or creamy fimbriate edge, the anthers dark yellow or orange, the ovary green with whitish stigmas. The fruit is reported as dirty green to glaucous-green. DEWÈVRE mentions a brownish resin exuding from the stem when cut.

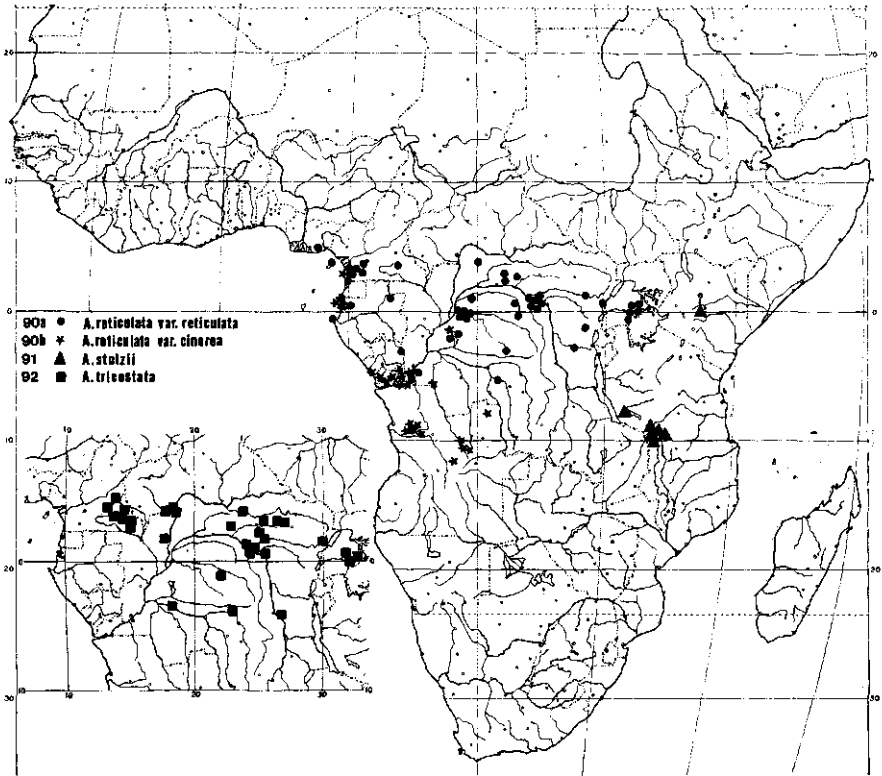


Fig. 43. Localities of species 90-92.

b. var. cinerea de Wilde, var. nov.; A. & R. Fernandes, Consp. Fl. Angol. 4 (1970) 224 (as *A. reticulata*). — Type: *Devred 657*. — Fig. 43.

Ophiocaulon cissampeloides (non Planch.) Hiern, Cat. Welw. Pl. 1 (1898) 385. — *Adenia cissampeloides* (non Planch.) Gossw. & Mendonça, Cart. Fito-geogr. Angol. (1939) 91; A. & R. Fernandes, Garcia de Orta 6, 4 (1958) 661, p.p.

Scandens, c. 10 m alta. *Folia* integra vel 3-5-lobata, plerumque quam longa latiora, apice plerumque obtusa vel \pm retusa, subtus cinero-alba. Nervi basales rectiusculi, foliorum marginem petentes. *Flores* δ : Filamenta libera vel dimidio inferiore in tubum coalita. Antherae 3-4 mm longae. Septa \pm nulla. Corona \pm nulla. *Flores* η stipite incl. 5-6 mm longi.

Leaves broadly ovate to orbicular or broadly triangular or rhomboid, mostly wider than long, entire or 3-5-lobed, apex obtuse to rounded, sometimes retuse; lobes triangular to ellipsoid, with rounded apex. Nerves \pm straight, ending in marginal glands; reticulation indistinct. Dry leaves blackish-brown

above, distinctly grey-white or cinereous beneath. ♂ fl. filaments 1-1½(-2) mm, free or up to halfway connate. Anthers 3-4 mm. Septa and corona 0 or inconspicuous. ♀ fl. incl. stipe 5-6 mm.

CAMEROON. Dept. Kribi, Batanga: *Dinklage 1448*, ♂ fl. (HBG).

RIO MUNI. Kogo (Terr. du Muni): *Debeaux 382*, st. (K, P).

GABON. S.loc.: *Duparquet s.n.*, st. (P); vicinity of Libreville: *Hb. d'Alleizette s.n.*, st.(L), *Klaine 1622*, ♂ fl. (P); Gabon R.: *Mann 993*, ♂ fl., fr. (K, P).

CONGO. Loango: *Soyaux 217*, fr. (K).

REP. OF THE CONGO. Mumpemba (Mumbemba?): *Allard 35*, st. (BR), *403*, ♂ fl. (BR), *420*, fr. (BR), *460*, fr. (BR); Kaniomia (?): *Bredo 2711*, ♀ fl. (BR); Gandayanga (?): *Capt. Caha (?) 64*, st. (fr. in spirit) (BR); s. loc.: *Flamigni 10430* (BR), *Vanderyst 20923*, ♂ fl. (BR), *40188*, fr. (BR) — Côtier, Katala: *Bequaert 7894*, ♂ fl. (BR); Malela: *Vermoesen 1209*, st. (BR) — Mayombe, Ganda Sundi: *De Briey s.n.*, ♂ fl. (BR); Luki (INEAC): *Devred 3128*, fr. (BR) — Bas Congo, Kisantu and vicinity: *Callens 323*, ♀ fl., fr. (BR), *2956*, ♀ fl., fr. (BR), *Gillet 270*, ♂ fl. (BR), *291*, ♀ fl., fr. (BR), *Vanderyst s.n.*, st. (BR), *34839*, st. (BR), *40001*, st. (BR); Thysville: *Delhaye 366*, st. (BR); M'vuazi: *Devred 657*, ♂ fl. (BR, type; K); Kitobola: *Flamigni 501*, ♀ fl. (BR, K); Mayidi: *Jans 358*, ♂ fl. (BR); Gimbi Plateau: *Toussaint 660*, ♂ fl. (BR) — For. Centr., Iboko (Lac Léopold II): *Anon. s.n.*, st. (BR).

ANGOLA. Cabinda, Maiombe, Buco-Zau: *Gossweiler 6911*, ♂ fl. (BM; COI, p.p.) — Congo (Uige), Cuango: *Gossweiler 13546*, fr. (LISC) — Cuanza Norte, Golungo Alto: *Welwitsch 795 fol. 2-3*, st. (BM, K, LISU), *866* ♂ fl. (BM, COI, K, P), *868*, st. (BM), *868 fol. 2*, ♂ fl. (BM); Salazar: *Santos 1400* (LISC; LUA, n.v.); Cazengo (Vila Salazar): *Gossweiler s.n.*, ♂ fl. (COI), *4652*, ♀ fl., fr. (BM, COI, K), *4710*, ♂ fl. (BM, COI, K), *5447*, ♂ fl. (BM), *5547*, ♂ fl., ♀ fl., fr. (COI, FHO), *5547a*, ♂ fl., fr. (BM, COI) — Malange, Pungo Andongo: *Welwitsch 867*, ± fr. (BM); Duque de Bragança: *Santos 1372* (LISC, n.v.) — Lunda, Xá-Sengue: *Exell & Mendonça 401*, ♀ fl., fr. (COI), *448*, ♂ fl., ♀ fl., fr. (COI); Luachima R. (c. 7°-8° S × 21° E): *Marques 268*, fr. (COI; LISU, n.v.) — Bié, General Machado, 1365 m: *Teixeira 9126* (LUA, n.v.).

ECOLOGY. Dense humid forest, forest edges, secondary scrub, marshy scrub, savannas; 0-1200 m. Found on 'quartzite' and 'mica-schist' soil. Flowers and fruits mainly from Nov. to June.

NOTES. 1. The leaves are often coarsely whitish variegated above.

2. The lower surface of the blade differs, especially in extreme specimens, markedly in aspect from that of the type-variety. It is grey-white or ash-coloured, caused by a layer of whitish wart-like appendages or scales. When softened (and probably also in fresh leaves) the scales are not visible.

3. On field labels fresh leaves are reported as glaucous beneath; the flowers are noted as greenish or pale yellowish, the anthers as yellow.

4. The variety resembles small-leaved forms of *A. cissampeloides*.

5. *Welwitsch 795* represents most probably juvenile specimens. They have large leaves, up to 9 by 11 cm, which are deeply 7-12-lobed.

91. *Adenia stoltzii* Harms in Fedde, Rep. 11 (1913) 35; de Wilde, Acta Bot. Neerl. 17 (1968) 131, fig. 2 g. — Type: *Stolz 147*. — Fig. 43.

Subligneous climber up to 20 m. Fertile branches greyish-green, 3-6 mm; internodes 2½-12 cm. Leaves chartaceous, brown-green above, grey-glaucous,

not- or sparsely punctate beneath, (sub)entire, orbicular to ovate, base cordate, apex obtuse to acute, 4–12 by $3\frac{1}{2}$ –10 cm, 3(–5)-plinerved, and with 1(–2) pairs of nerves from the midrib ascending towards the apex, reticulation distinct, margin entire or rarely $\frac{3}{4}$ cm deep sinuate; petiole $1\frac{1}{2}$ –11 cm. *Gland* at blade-base single, 1–2 mm \varnothing , on a median spatulate to wart-like appendage $1\frac{1}{2}$ – $2\frac{1}{2}$ mm; blade glands (0–)2–4, $\frac{1}{2}$ –1 mm \varnothing , rather approximate to the axils of the upper lateral nerves; marginal glands dot-like c. $\frac{1}{4}$ mm \varnothing , up to 6 at either side of the blade. Stipules reniform, finely lacerate, $\frac{1}{2}$ –1 mm. *Inflorescences* axillary to normal leaves or sometimes in the axils of \pm reduced leaves in short-shoots up to 10 cm, peduncles $\frac{1}{2}$ –5 cm, up to 15-flowered in σ , 1–3-flowered in ρ ; tendrils 0 or 1, 1–2 cm. Sterile tendrils simple, 10–25 cm. Bracts and bracteoles narrowly triangular, acute, serrulate, $\frac{1}{2}$ – $1\frac{1}{2}$ mm. σ fl. campanulate, incl. the 2–3 mm long stipe 12–15 by 2–4(–5) mm, sepals spreading in anthesis to c. 10 mm. Pedicel $\frac{1}{2}$ –5(–12) mm. Hypanthium shallowly cup-shaped 1– $1\frac{1}{2}$ mm, calyx tube 0, sepals lanceolate, obtuse, $8\frac{1}{2}$ –13 by 2–3 mm, subentire, remotely punctate. Petals (ob)lanceolate, obtuse, 8–13 by 2– $3\frac{1}{2}$ mm, 3–5-nerved, finely serrulate in the upper half, remotely punctate. Filaments 2–3 mm, 1–2 mm connate, inserted at the base of the hypanthium. Anthers $4\frac{1}{2}$ –5 by 1(– $1\frac{1}{2}$) mm, obtuse. Septa 0. Corona 0 or consisting of a low annulus, c. 0.1 mm. Disk glands 0. Vestigial ovary incl. gynophore 1– $1\frac{1}{2}$ mm. ρ fl. campanulate, incl. the c. $\frac{1}{2}$ mm long stipe c. 10 by 4 mm. Pedicel $\frac{1}{2}$ –4 mm. Hypanthium saucer-shaped c. 1 mm, calyx tube 0, sepals lanceolate, subobtuse, 8–9 by 3 mm, subentire. Petals linear, subacute, c. $3\frac{1}{2}$ by $\frac{1}{3}$ – $\frac{1}{2}$ mm, 1-nerved, entire. Staminodes c. $\frac{1}{2}$ mm, free. Septa 0. Corona 0. Disk glands 0. Pistil 7– $7\frac{1}{2}$ mm. Gynophore c. $\frac{1}{2}$ mm. Ovary ovate-ellipsoid, c. $5\frac{1}{2}$ by 3 mm. Style 0– $\frac{1}{2}$ mm. Stigmas sessile, reniform with papillate-laciniate margins, each c. $1\frac{1}{2}$ mm \varnothing . *Fruit* 1(–2) per inflorescence, ovate-oblong, subfusiform, excl. the 1– $1\frac{1}{2}$ mm long gynophore c. 4(– $4\frac{1}{2}$) by 2– $2\frac{1}{2}$ cm. Pericarp coriaceous, $\frac{1}{4}$ – $\frac{1}{2}$ mm, smooth. Seeds c. 30 per capsule, \pm ellipsoid, c. 4–5 by $2\frac{1}{2}$ by 2 mm, 5–8 pits along the length; funicles c. $2\frac{1}{2}$ mm; embryo not known.

KENYA. K3, Mt. Aberdare Reg., between Meru and Niti: *R. E. & Th. C. E. Fries 1958*, st. (UPS, a slightly doubtful specimen).

TANZANIA. Tanganyika, Western Prov. (T4), Mufindi, 6000–6500 ft.: *Paget-Wilkes 188*, σ fl. (EA); Kyimbila Distr., 1300–1600 m: *Stolz 147*, σ fl. (B \dagger , type; BM, K, L, M, S, W, Z), 541, σ fl. (C, L, LD, M, S, W, Z), 2035, σ fl. (C, L, LD, M, S, W, WAG, Z), 2131, ρ fl., fr. (BM, BR, K, P, Z); Sumba Wanga Distr., Nsanga Forest, Ufipa, 6000 ft.: *Richards 13005*, σ fl. (BR, K, SRGH).

MALAWI. Northern Prov., Wilindi Forest Res.: *Chapman 230*, fr. (FHO).

ECOLOGY. Montane forest and scrub; 1000–2000 m. Flowers in August, Nov. and Jan., fruits in Sept.

NOTES. 1. The specimen *R. E. & Th. C. E. Fries 1958* from Mt. Aberdare, Kenya, is sterile and somewhat doubtful; the leaves remind certain forms of *A. gummifera*.

2. Fresh fruits are reported as green.

92. *Adenia tricolorata* de Wilde, Acta Bot. Neerl. 17 (1968) 133, 127, fig. 1 f, 3.
— Type: *Breteler 1465*. — Fig. 43-44.

Slender subherbaceous climber up to 8 m. Fertile branches 1–2½ mm, pale green, not punctate; internodes 2–8 cm. *Leaves* membranous, (brown-)green above, pale green, not punctate beneath, entire, broadly ovate to oblong, base cordate to subacute, apex acute, up to 2½ cm acuminate, (2½–)4–14 by (1½–) 2–7½ cm, 3-plinerved, nerves arching towards the apex with distinct trabeculate venation in between, margin entire with minute glandular teeth; petiole 1–7 cm. *Gland* at blade-base single, ½–1 mm \varnothing , at the base of a median spatulate appendage 1–3½ mm; blade glands 0; marginal glands minute, ¼–½ mm, 0–10 at either side of the blade. Stipules reniform, crenulate-lacerate, ½–1½ mm. *Inflorescences* peduncled for 3–15 cm, lax, up to 30-flowered in ♂, 1–4-flowered in ♀; tendrils (0–)1 or 3, ½–2 cm. Sterile tendrils simple or 3-fid, 8–16 cm. Bracts and bracteoles (narrowly) triangular, acute, entire or minutely serrulate, ½–1 mm. ♂ *fl.* tubular-campanulate, incl. the 2½–4 mm long stipe (12–)15–21 by 2–3½(–4) mm, lobes spreading in anthesis to c. 8 mm. Pedicel 5–10 mm. Hypanthium cup-shaped ¾–2½ mm, calyx tube 4–8 mm, calyx lobes lanceolate, subacute, subentire, 6–8 mm, not punctate. Petals inserted in or up to 2½ mm below the throat of the calyx tube, lanceolate-linear, acute, 6–10 by (½–)1 mm, 1-nerved, minutely serrulate near the apex. Filaments 2–3 mm, 1¼–2¼ mm connate, inserted at the base of the hypanthium. Anthers 7½–11 by ¾ mm, obtuse. Septa 0. Corona consisting of a lower fleshy rim ½(–1) mm high, superposed by an up to ½ mm high 5-lobed or -hooded undulate rim. Disk glands 0. Vestigial ovary incl. gynophore ½–¾ mm. ♀ *fl.* (tubular-)campanulate, incl. the 1–1½ mm long stipe 8–15 by 2½–3 mm. Pedicel 2–8 mm. Hypanthium cup-shaped c. 1½ mm, calyx tube 0–2 mm, calyx lobes (or sepals) lanceolate, obtuse to acute, entire, 5–11 mm, not punctate. Petals inserted in or up to 1½ mm below the throat of the calyx tube, linear, subacute, 3–5 by ½ mm, 1-nerved, entire. Staminal nodes ¾–1 mm, \pm connate at base. Septa 0–¼ mm. Corona consisting of a lower rim c. ¼ mm, superposed by a fleshy 5-lobed or -hooded \pm undulate upper rim c. ½ mm, or as a single fleshy rim up to 1 mm high. Disk glands 0. Pistil 7–11 mm. Gynophore ½–2½ mm. Ovary ovate-oblong, 3½–4½ by 2 mm, smooth. Style 2–2½ mm. Stigmas sessile, \pm reniform, longly lacinate-papillate, each c. 1½ mm \varnothing . *Fruit* 1(–2) per inflorescence, not known at maturity, ovate-ellipsoid with acutish apex, excl. the c. 6 mm long stipe at least 2½ by 1¾ cm. Seeds not known.

CAMEROON. Dept. Yokadouma, 6 km Moloundou road: *Breteler 1503*, ♂ *fl.* (WAG); 17 km W. of Yokadouma, path to Lomié, 550 m: *Leeuwenberg 6169*, ♂ *fl.* (WAG); Bange (Yokadouma to Moloundou): *Letouzey 5110*, ♂ *fl.* (P); Mopwa (road to Batouri): *Letouzey 5211-bis*, ♂ *fl.* (P) — Dept. Batouri, Bertoua, 650 m: *Breteler 1465*, ♂ *fl.* (WAG, type); 27 km SW. of Bertoua: *Breteler c.s. 2410*, ♂ *fl.* (WAG); Djemiong (50 km SW. of Batouri): *Letouzey 4815*, *fl.* (P, WAG).

CENTR. AFR. REP. Lobé R., 5 km NW. of Boubatiki: *Badré 57*, ♂ *fl.* (P); Mbaiki (Boukoko): *Tisserant (Hb. Le Testu) 236*, ♂ *fl.*, ♀ *fl.* (BM, P), 2433, ♀ *fl.* (BM, P), 2560, ♂ *fl.* (BM, P).

CONGO. Impfondo (Mohitou road): *Bouquet 2005*, st. (P).



FIG. 44. *Adenia tricostata*. — a. habit of branch with ♂ inflorescences, $\times \frac{1}{2}$ (Leeuwenberg 2410); b. young shoot with sterile tendrils, $\times 1$ (Leeuwenberg 6169); c. detail of node with stipule, $\times 10$ (Leeuwenberg 6169); d. blade-base, $\times 2\frac{1}{2}$; e. gland at blade-base in longitudinal section, $\times 2\frac{1}{2}$; f. ♂ flower, longitudinal section, $\times 2\frac{1}{2}$ (all Leeuwenberg 2410); g. ♀ flower, longitudinal section, $\times 2\frac{1}{2}$ (Tisserant in *Hb. Le Testu* 2433).

REP. OF THE CONGO. S.loc.: *Claessens s.n.*, st. (BR); Kwea: *Van der Gucht 19, 19a*, st., ♂ fl. (BR) — Kasaï, Forêt Sankuru: *Anon.*, ♀ fl. (BR); Makaw: *Jans 955*, st. (BR) — For. Centr., Mobwasa (Aketi): *Vermoesen 351*, st. (BR); Barumbu (Basoko): *Bequaert 1148*, st. (BR); La Kulu: *van den Brande 728*, st. (BR); Yangambi and vicinity, c. 470 m: *Germain 966* (BR), *Louis 13033*, st. (BR), *15828*, st. (BR); Lutshi R.: *Louis 16103*, st. (BR); Buta to Banalia: *Robijns 1340*, ♂ fl. (BR); Kisangani (Stanleyville): *Laurent s.n.*, st. (BR); Mandindi (Banalia): *Bequaert 1451*, ♂ fl. (BR); Bambesa: *Gerard 2910*, st. (BR); Madabu (Zobia): *Gerard 2830*, st. (BR); Batite (Zobia): *Gerard 1991*, st. (BR); Beketa (INEAC): *Evrard 657*, ♂ fl. (BR) — Uele, Bas Uele: *DeWulf 904*, fl. (BR) — Lac Albert, Irumu (Mt. Homas), 1300–1400 m: *Germain 5217*, fr. (BR).

UGANDA. Natagulo Forest, Bayo, 4000 ft.: *Dümmer 2996*, ♂ fl. (BM), *4093*, ♂ fl. (BM); N.T.B. region, 3842 ft.: *Maitland 679*, st. (K); Buganda, Mengo, Entebbe (Kajansi Forest), 3900 ft.: *Chandler 1162*, ♂ fl. (BR, K), *1245*, ♂ fl. (K), *1641*, st. (B, BR, EA, K, P).

ECOLOGY. (Secondary) forest, forest-edges, gallery forest; according to LETOUZEY locally common in degraded forest in SE. Cameroon; 500–1400 m. Flowers in Dec., Jan., Apr., May, June, and Aug., fruits (once) in June.

USES. Once reported as used as soap (rubbed), and as a remedy for fever.

NOTES. 1. On field labels reported as flowers greenish to pale yellow, anthers orange-yellow.

2. In three specimens conspicuous tuberculate galls, up to $1\frac{1}{2}$ cm \varnothing , developed from the hypanthium of male flowers were found.

DOUBTFUL INCOMPLETE SPECIMENS

The following specimens of *Adenia* remained unnamed due to incompleteness, mainly as a consequence of dioecism and precocious (leafless) flowering.

1. *Herb. Jard. Bot. Tananarive 1140* (P), collected in the botanical garden, Tananarive, 28-10-1935, origin not known. This is a precocious flowering ♀ specimen, reminding of 19. *A. firingalavensis*, but the styles are largely free, instead of connate.
2. *Herb. Jard. Bot. Tananarive 2192* (P), flowers white-cream, collected in the botanical garden, Tananarive, 10-1935, origin not known. This is a precocious flowering ♂ specimen. The structure of the flowers and the position of the basal blade glands on the very young leaves point to the group of 16. *A. antongilliana*. It is possibly this latter species, or 19. *A. firingalavensis*, or 21. *A. longestipitata*.
3. *Léandri 360* (P), Madagascar, 1932-1933, exact locality not known, is a precocious flowering ♂ specimen. The glands on the very young leaves and the structure of the not yet fully developed flowers point to 18. *A. elegans* or 21. *A. longestipitata*.
4. *Melville 608* (BM, K), Fernando Poo, Moka, 4550 ft., 19-9-1949, ♀ flowers. This is a specimen, belonging to sect. *Ophiocaulon*, which comes closest to 90. *A. reticulata*, *i.a.* by the strongly warty-punctate ovary. It differs, however, in aspect and various small characters, from a more typical specimen of this species from the same island. The specimen is also somewhat reminiscent of 83. *A. cissampeloides*, and is possibly a hybrid of the two mentioned species.

EXCLUDED FROM ADENIA

Modecca aliena Wall. Cat. n. 6766 (1832); G. Don, Gen. Syst. 3 (1834) 59. — *Microblepharis aliena* (Wall.) Roem., Syn. Mon., 2 Pepon. (1846) 202. = *Asclepiadaceae*; see Mast. in Hook. f., Fl. Brit. Ind. 2 (1879) 603.

Modecca bracteata Lamk., Encycl. Méth. 4 (1797) 210; Spreng., Syst. Veg. 3 (1826) 45; DC., Prod. 3 (1828) 337; G. Don, Gen. Syst. 3 (1834) 59. — Type: *Sonnerat* in *Herb. Lamarck, n.v.* = *Trichosanthes* sp. (*Cucurbitaceae*); see Vahl, Skriv. Nat. Selsk. 6 (1810) 104; W. & A., Prod. Fl. Penins. Ind. Or. 1 (1834) 353.

Modecca membranifolia Baker, J. Linn. Soc. Bot. 25 (1890) 317. — Type: *Baron next 5866, n.v.* = *Deidamia bipinnata* Tul. (*Passifloraceae*); see Perrier de la Bâthie, Not. Syst. 9 (1940) 57; Harms in E. & P., Nat. Pfl.fam. 3, 6a, Nachtr. 1 (1897) 254; *ibid.* ed. 2, 21 (1925) 487.

Modecca quercifolia A. Chev., Expl. Bot. Afr. occ. Franç. 1 (1920) 287, nom. subnud. — Type: *Chevalier 16362.* = *Crossostemma laurifolium* Planch. ex Benth. (*Passifloraceae*).

Modecca saponaria (Blanco) Blanco, Fl. Filip. ed. 2 (1845) 453; ed. 3, 3 (1879) 53 — *Passiflora saponaria* Blanco, Fl. Filip. ed. 1 (1837) 650. — Type not known. = *Momordica* sp. (*Cucurbitaceae*); see Merr., Philip. J. Sc. Bot. 10 (1915) 331; Spec. Blanc. (1918) 371.

Modecca septemloba E. Meyer in Drège, Zwei Pfl. Dokum., in Flora 2 (1843) 202, nom. nud. — Type not known. = *Ceratiosicyos ecklonii* Nees (*Achariaceae*); see Index Kewensis.

Ophiocaulon sandersoni (Harv.) Schinz, comb. inval., Bot. Jahrb. 15, Beibl. 33, 1 (1892) 3 = *Tryphostemma sandersonii* Harv. (*Passifloraceae*).

INDEX

Accepted names have been printed in plain type, new names and combinations in **bold type**, synonyms in *italics*. The numbers refer to the number of the species, the letters to the infra-specific taxa. 'Excl.' refers to the list of excluded names.

Generic and infrageneric names are referred to the section to which they belong.

Adenia Forsk. : sect. 2

- 'groupe I' Perr. : sect. 1
- 'groupe II' Perr. : sect. 2
- sect. Adenia (Euadenia) : sect. 2
- sect. Blepharantes (W. & A.) Engl. (*Blepharanthus*) : sect. 3
 - series *Nanae* Harms : sect. 3
 - series *Scandentes* Harms : sect. 3
- sect. *Erythrocarpus* (Roem.) de Wilde : sect. 4
- sect. *Hildebrandtiothamnus* Engl. : sect. 2
- sect. *Keramanthus* (Hook. f.) Harms : sect. 3
- sect. *Microblepharis* (W. & A.) Engl. : sect. 1
- sect. *Microblepharis* [*non* (W. & A.) Engl.], *p.p.* : sect. 4
- sect. *Ophiocaulon* (Hook.f.) Harms : sect. 6
- sect. *Paschanthus* (Burch.) Harms : sect. 5
- sp.* Bartlett : 78
- sp.* I White : 88
- aculeata* (Oliv.) Engl. : 4
 - ssp.* *aculeata* : 4a
 - ssp.* *inermis* de Wilde : 4c
 - ssp.* *manganiana* (Chiov.) de Wilde : 4b
- acuminata* (Bl.) King : 74
- acuminata* (*non* Bl.) : 77
- acuta* de Wilde : 32
- adenifera* de Wilde : 81
- ambongensis* Clav. : 17
- angustisecta* Burt Davy : 60
- angustisecta* Engl. & Harms, *non* Burt Davy : 48
- angustisepala* Craib : 12b
- antongilliana* (Tul.) Schinz : 16
- apiculata* (De Wildem. & Dur.) Engl. : 89
- apiculata* (Mast.) Chakravarty, *non* (De Wildem. & Dur.) Engl. : 14
- aspidophylla* Harms : 52
- australis* (R. Br. *ex* DC.) Engl. : 74 c
- ballyi* Verdc. : 36
- banaensis* Cusset : 11
- bequaertii* Robijns & Lawalrée : 82
 - ssp.* *bequaertii* : 82a
 - ssp.* *macranthera* de Wilde : 82b

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- ssp.* *occidentalis* de Wilde : 82c
- boivinii* de Wilde : 28
- borneënsis* Hall. f. : 77
 - var.* *microcarpa* Hall. f. : 77
- buchananii* Harms : 60
- cardiocarpa* (Hassk.) Kds. : 74
- cardiophylla* (Mast.) Engl. : 73
 - var.* *arcta* Craib : 74d
- cardiophylla* (*non* Mast.) : 74e, 75.
- catharinae* Merr. : 12
- celebica* (Kds.) Kds. : 74b
- chevalieri* Gagnep. : 74
- cissampeloides* (Planch. *ex* Hook.) Harms : 83
- cissampeloides* (*non* Planch.) : 85, 90, 90b
- cladosepala* (Bak.) Harms : 17
- clementis* Merr. : 77
- coccinea* (Blanco) Merr. : 74
- cordifolia* (Bl.) Engl. : 78
- cordifolia* (*non* Bl.) : 74
- craibii* Chatterjee : 14
- crassa* Merr. : 79
- cynanchifolia* (Benth.) Harms : 84
- densiflora* (Bak.) Harms : 15
- dewevrei* (De Wildem. & Dur.) Engl. : 89
- digitata* (Harv.) Engl. : 60
- dinklagei* (Hutch. & Dalz.) : 85
- diversifolia* Hall. f. : 74
- dolichosiphon* Harms : 49
- ecirroza* de Wilde : 31
- elegans* Perr. : 18
- ellenbeckii* Harms : 56
- epigea* Perr. : 26
 - var.* *stylosa* Perr. : 19b
- erecta* de Wilde : 66
- fasciculata* de Wilde : 33
- firingalavensis* (Drake) Harms : 19
 - var.* *firingalavensis* : 19a
 - var.* *stylosa* (Perr.) de Wilde : 19b
- formosana* (Hayata) Hayata : 74
- fruticosa* Burt Davy : 5
 - ssp.* *fruticosa* : 5a
 - ssp.* *simplicifolia* de Wilde : 5b
 - ssp.* *trifoliolata* de Wilde : 5c

Adenia

- gedoensis* de Wilde: 1
glauca Schinz: 6
globosa Engl.: 37
 ssp. *curvata* (Verdc.) de Wilde: 37c
 ssp. *globosa*: 37a
 ssp. *pseudoglobosa* (Verdc.) de Wilde: 37b
globosa (non Engl.): 36
goetzei Harms: 67
gracilis Harms: 86
 ssp. *gracilis*: 86a
 ssp. *pinnata* de Wilde: 86b
grandifolia Ridl.: 77
guineensis de Wilde: 87
gummifera (Harv.) Harms: 88
 var. *cerifera* de Wilde: 88b
 var. *gummifera*: 88a
harmandii Gagnep.: 75
hastata (Harv.) Schinz: 51
 var. *glandulifera* de Wilde: 51b
 var. *hastata*: 51a
hederaefolia (Bak.) Schinz: 29
heterophylla (Bl.) Kds.: 74
 ssp. *andamanica* de Wilde: 74e
 ssp. *arcta* (Craib) de Wilde: 74d
 ssp. *australis* (R. Br. ex DC.) de Wilde: 74c
 ssp. *heterophylla* var. *celebica* (Kds.) de Wilde: 74b
 ssp. *heterophylla* var. *heterophylla*: 74a
heterophylla (non Bl.): 73
hondala (Gaertn.) de Wilde: 39
huillensis (Welw.) A. & R. Fernandes: 68
isaloensis (Perr.) de Wilde: 20
karibaensis de Wilde: 7
keramanthus Harms: 57
kinabaluensis de Wilde: 76
kirkii (Mast.) Engl.: 61
koutiensis (*kontiensis*) (A. Chev.) Obaton: 46
lanceolata Engl.: 59
 var. *grandifolia* Engl.: 59
 ssp. *lanceolata*: 59a
 ssp. *scheffleri* (Engl. & Harms) de Wilde: 59b
latepetala de Wilde: 2
letouzeyi de Wilde: 42
lindiensis Harms: 53
 var. *lindiensis*: 53a
 var. *submarginalis* de Wilde: 53b
linearis Craib: 12b
lobata (Jacq.) Engl.: 43
 var. *elegans* (P. Beauv.) Engl.: 43
 var. *elegans* (non P. Beauv.): 45

Adenia

- var. *grandiflora* Fries: 45
lobata (non Jacq.): 42, 45, 45b
lobulata Engl.: 90
longestipitata de Wilde: 21
longifolia Merr.: 74
longipedunculata Merr.: 77
maclurei Merr.: 74
macrophylla (Bl.) Kds.: 77
 var. *macrophylla*: 77a
 var. *singaporeana* (Wall. ex G. Don) de Wilde: 77c
 var. *smilacina* (Hall. f.) de Wilde: 77b
malangeana Harms: 69
manganiana Chiov.: 4b
mannii (Mast.) Engl.: 41
mannii (non Mast.): 86b
megalantha Harms: 45
metriosiphon de Wilde: 50
miegei Aké Assi: 45b
mildbraedii Engl. & Harms: 43
monadelpha Perr.: 27
mossambicensis de Wilde: 62
mukengensis Harms: 84
multiflora Potts: 60
natalensis de Wilde: 47
nicobarica (Kurz) King: 12
 var. *obliqua* Craib: 12
nicobarica (non Kurz): 74
oblonga (Hassk.) Kds.: 74
oblongifolia Harms: 41
obtusata (Bl.) Engl.: 78
olaboensis Clav.: 35
 var. *olaboensis*: 35a
 var. *parva* de Wilde: 35b
ovata de Wilde: 70
pachyphylla de Wilde: 34
palmata (Lamk.) Engl.: 39
palmata (non Lamk.): 77
palmatifolia Merr.: 74
panduraeformis Engl.: 44
panduraeformis (non Engl.): 46
pandurata Hall. f.: 74
parviflora (Blanco) Cusset: 74
parviflora (non Blanco): 75
parvifolia Pierre ex Gagnep.: 12b
 var. *insularis* Craib: 12b
 var. *nervosa* Craib: 12b
pechuëlii (Engl.) Harms: 9
peltata (Bak.) Schinz: 29
penangiana (Wall. ex G. Don) de Wilde: 12
 var. *parvifolia* (Pierre ex Gagnep.) de Wilde: 12b
 var. *penangiana*: 12a
perrieri Clav.: 25

Adenia

- pierrei* Gagnep.: 74d, 75
pinnatisecta (Craib) Craib: 14
var. *muricata* de Wilde: 14b
var. *pinnatisecta*: 14a
pinnatisecta (non Craib): 74
poggei (Engl.) Engl.: 89
poilanei Cusset: 13
populifolia (Bl.) Engl.: 74c
populifolia (non Bl.): 74, 78
var. *pentamera* King: 78
pseudoglobosa Verdc.: 37b
ssp. *curvata* Verdc.: 37c
ssp. *pseudoglobosa*: 37b
pyromorpha (Perr.) de Wilde: 23
quadrifida Merr.: 78
quadrifida (non Merr.): 79
quintuplinervia (Miq.) Hall. f.: 77
racemosa de Wilde: 3
refracta (Tul.) Schinz: 30
repanda (Burch.) Engl.: 80
reticulata (De Wildem. & Dur.) Engl.: 90
var. *cinerea* de Wilde: 90b
var. *reticulata*: 90a
rhodesica Suess.: 88
rowlandii (Bak.) Harms: 83
rumicifolia Engl. & Harms: 45
var. *miegei* (Aké Assi) de Wilde: 45b
var. *rumicifolia*: 45a
saxicola Craib: 14
scheffleri Engl. & Harms: 59b
schlechteri Harms: 51
schliebenii Harms: 54
schweinfurthii Engl.: 46
senensis (Klotzsch) Engl.: 60
singaporeana (Wall. ex G. Don) Engl.: 77c
smilacina Hall. f.: 77b
sphaerocarpa Clav.: 22
ssp. *isaloensis* Perr.: 20
ssp. *mandrarensis* Perr.: 22
spinosa Burtt Davy: 8
staudtii Harms: 52
stenodactyla Harms: 48
var. *kondensis* Harms: 48
stenophylla Harms: 60
stolzii Harms: 91
stricta (Mast.) Engl.: 55
subsessilifolia Perr.: 24
forma *pyromorpha* Perr.: 23
sumbawana Hall. f.: 74
tenuispira (Stapf) Engl.: 41
tisserantii A. & R. Fernandes: 71
toxicaria Harms: 56
tricostata de Wilde: 92
triloba Engl.: 83

Adenia

- trilobata* (Roxb.) Engl.: 40
trisecta (Mast.) Engl.: 63
tuberifera R. E. Fries: 72
venenata Forsk.: 38
vespertilio Hall. f.: 78
viridiflora Craib: 75
vitifolia Hutch. & Bruce: 56
volkensis Harms: 58
welwitschii (Mast.) Engl.: 64
wightiana (Wall. ex W. & A.) Engl.: 10
ssp. *africana* de Wilde: 10b
ssp. *wightiana*: 10a
wilmsii Harms: 65
zucca (Blanco) Merr.: 74
- ### Anthactinia
- penangiana* (Wall. ex G. Don) Roem.: 12
singaporeana (Wall. ex G. Don) Roem.: 77c
Blepharantes J. E. Smith: sect. 3
Bryonia palmata L. (*p. p.*, excl. lectotype): 39
Clemanthus Klotzsch: sect. 3
senensis Klotzsch: 60
Convolvulus paniculatus (non L.) var. β
Modecca Burman f., *p. p.*: 39
Disemma penangiana (Wall. ex G. Don)
Miq.: 12
Echinothammus Engl.: sect. 1
pechuëlii Engl.: 9
Erythrocarpus Roem.: sect. 4
populifolius (Bl.) Roem.: 74c
Granadilla hondala Gaertn.: 39
Jaggia Schinz: sect. 5
repanda Schinz: 80
Keramanthus Hook. f.: sect. 3
kirkii Hook. f.: 57
Kolbia P. Beauv.: sect. 3
elegans P. Beauv.: 43
Machadoa Welw. ex Benth.: sect. 3
huillensis Welw.: 68
Microblepharis (W. & A.) Roem.: sect. 1
acuminata (Bl.) Roem.: 74
aliena (Wall.) Roem.: excl.
cordifolia (Bl.) Roem.: 78
heterophylla (Bl.) Roem.: 74
macrophylla (Bl.) Roem.: 77
obtusata (Bl.) Roem.: 78
wightiana (Wall.) Roem.: 10
- ### Modecca
- Lamk.: sect. 3
sect. *Blepharantes* (W. & A.) Endl. (*Blepharantes*): sect. 3
sect. *Eumodecca* Baill.: sect. 3
sect. *Keramanthus* (Hook. f.) Baill.: sect. 3
sect. *Microblepharis* (W. & A.) Endl.: sect. 1
sect. *Ophiocaulon* (Hook. f.) Baill.: sect. 6
subg. *Blepharantes* W. & A.: sect. 3

Modecca

- subg. *Erythrocarpus* (Roem.) Miq.: sect. 4
- subg. *Microblepharis* W. & A.: sect. 1
- subg. 'Modeccae verae' Miq., p.p.: sect. 3, 4
- sp. Ridl.: 77
- abyssinica* Hochst. ex A. Rich.: 38
- aculeata* Oliv. ex Hook. f.: 4
- acuminata* Bl.: 74
- aliena* Wall.: excl.
- antongilliana* Tul.: 16
- apiculata* Mast.: 14
- australis* R. Br. ex DC.: 74c
- bracteata* Lamk.: excl.
- cardiophylla* Mast.: 73
- cardiophylla* (non Mast.): 74
- caricifolia* A. Chev.: 43
- celebica* Kds.: 74b
- cissampeloides* Planch. ex Hook.: 83
- cladosepala* Bak.: 17
- coccinea* (Blanco) Blanco: 74
- cordifolia* Bl.: 78
- cordifolia* (non Bl.): 74c
- cynanchifolia* Benth.: 84
- densiflora* Bak.: 15
- digitata* Harv.: 60
- diversifolia* Wall., non Schum.: 10
- diversifolia* Schum.: 43
- dubia* Roxb.: 77
- formosana* Hayata: 74
- furfuracea* Wall.: 14
- glauca* Schinz ex Engl.: 6
- gummifera* Harv.: 88
- hastata* Harv.: 51
- hederaefolia* Bak.: 29
- heterophylla* Bl.: 74, 74c
- incisa* A. Chev.: 86b
- integrifolia* Lamk.: 39
- kardiocarpa* Hassk.: 74
- kirkii* Mast.: 61
- koutiensis* A. Chev.: 46
- lobata* Jacq.: 43
 - var. A. Chev.: 43
 - var. *elegans* (P. Beauv.) Mast.: 43
 - var. *elegans* (non P. Beauv.): 45b
- lobata* (non Jacq.): 74
- macrophylla* Bl.: 77
- mannii* Mast.: 41
- membranifolia* Bak.: excl.
- nicobarica* Kurz: 12
- nigricans* A. Chev.: 41
- oblonga* Hassk.: 74
- obtusa* Bl.: 78
- palmata* Lamk.: 39
 - var. *integrifolia* (Lamk.) Miq.: 39
- palmata* (non Lamk.): 77

Modecca

- parviflora* G. Don: 86b
- parviflora* (Blanco) Blanco, non G. Don: 74
- paschanthus* Harv.: 80
- peltata* Bak.: 29
- pinnatisecta* Craib: 14
- populifolia* Zipp. ex Bl.: 74c
- populifolia* (non Bl.): 74
- quercifolia* A. Chev.: excl.
- quintuplinervia* Miq.: 77
- refracta* Tul.: 30
- repanda* (Burch.) Druce: 80
- saponaria* (Blanco) Blanco: excl.
- senensis* (Klotzsch) Mast.: 60
- septemloba* E. Mey.: excl.
- singaporeana* (Wall. ex G. Don) Mast.: 77c
- stricta* Mast.: 55
- tenuifolia* Planch. ex Hook. (incl. *tamnifolia*): 43
- tenuispira* Stapf: 41
- trilobata* Roxb.: 40
- trilobata* (non Roxb.) (incl. *triloba*): 74
- trisecta* Mast.: 63
- tuberosa* Roxb.: 39
- venenata* (Forsk.) Greshoff: 38
- welwitschii* Mast.: 64
- wightiana* Wall. ex W. & A.: 10
- Ophiocaulon* Hook. f.: sect. 6
- apiculatum* De Wildem. & Dur.: 89
- cissampeloides* (Planch. ex Hook.) Mast.: 83
- cissampeloides* (non Planch.): 88, 90b
- cynanchifolius* (Benth.) Mast.: 84
- cynanchifolius* (non Benth.): 45
- dewevrei* De Wildem. & Dur.: 89
- firingalavense* Drake: 19
- gracile* (Harms) Pellegr.: 86
- gummifer* (Harv.) Mast.: 88
- lanceolatum* Engl.: 84
- poggei* Engl.: 89
- reticulatum* De Wildem. & Dur.: 90
- rowlandii* Bak.: 83
- sandersonii* (Harv.) Schinz: excl.
- tropaeoloides* A. Chev. (*pro maj. parte*): 83
- Paschanthus* Burch.: sect. 5
- jäggii* Schinz: 80
- repandus* Burch.: 80
- Passiflora*
- coccinea* Blanco: 74
- hondala* (Gaertn.) Steud. ('*itondala*'): 39
- marmorea* Linden (& Hort.): 83
- parviflora* Blanco: 74
- penangiana* Wall. ex G. Don: 12
- singaporeana* Wall. ex G. Don: 77c
- zucca* Blanco: 74