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Novitates Gabonenses 8*
Seven new *Begonia* species from Gabon

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Contents

	Summary	86
1.	Introduction	87
2.	Descriptions	88
2.1	<i>Begonia atroglandulosa</i> Sosef	88
2.2	<i>Begonia dewildei</i> Sosef	93
2.3	<i>Begonia erectocaulis</i> Sosef	96
2.4	<i>Begonia erectotricha</i> Sosef	98
2.5	<i>Begonia heterochroma</i> Sosef	102
2.6	<i>Begonia susaniae</i> Sosef	105
2.7	<i>Begonia wilksii</i> Sosef	109
3.	Acknowledgements	112
	References	112

Summary

Seven new species of the closely related sections *Loasibegonia* and *Scutobegonia* are described one of which has two subspecies. Their discovery resulted from an intensified investigation of the flora of Gabon. A full revision of the sections is in preparation.

Keywords: *Begonia*, Gabon, flora.

1. Introduction

When the Department of Plant Taxonomy of the Wageningen Agricultural University decided to choose Gabon as the focus area for her collecting activities, the flora of this country was scantily investigated. As of that time the number of plant collections has increased rapidly and new species are being discovered regularly in this country which accommodates one of the richest rain forest vegetations in Africa. The exploration takes place in close cooperation with CENAREST (Centre National de la Recherche Scientifique et Technologique) at Libreville. The activities of mr. Mounquengui Pambo, director of CENAREST, and the assistance mainly during field trips of drs A. Louis, Head of the National Herbarium at Libreville, are gratefully acknowledged.

The investigation of African *Begoniaceae* at Wageningen is being coordinated by dr ir J.J.F.E. de Wilde. Recently the present author started a research project under his guidance on the taxonomy of the sections *Loasibegonia* and *Scutobegonia* (sensu De Wilde in Van den Berg, 1985: 13-14) and their relation with glacial rain forest refuges in Africa (see also Sosef, 1991). These sections consists of mainly yellow-flowering, rhizomatous species which were already brought to general attention by Doorenbos (1980a, 1980b, 1982). It remains dubious whether or not a clear distinction between the two sections can be made as was already pointed out by Hallé (1967: 507) and De Wilde (1985: 125-127). The original distinction made by Warburg (1895) was based on the measure of bifurcation of the style, but this cannot be maintained due to frequent occurrence of intermediate states. The same condition precludes the use of the shape of the ovary as a segregating character (prismatic versus obtrigonus). The division into several series by Engler (1921) does not seem to be appropriate either. An investigation of the anatomy of leaves and ovaries is in progress. Van den Berg (1985) studied the pollen of African *Begoniaceae* while De Lange & Bouman (1991) did so for the seeds but they were not able to make any subdivision within the group concerned. A more detailed study is anticipated. The results of these investigations may shed some light on the status of the two sections. Collectively they form a well-defined group within African *Begoniaceae* and *Begoniaceae* in general.

In the course of investigating these begonias, some of which could be studied in vivo at Wageningen, a comparatively large number of new species was recognized. Seven of them are presented here.

2. Descriptions

The sections *Loasibegonia* and *Scutobegonia* are characterized as follows:

Plants rhizomatous. Inflorescence a contracted cincinnal monochasium. Both male and female flowers with two perianth segments. Androecium a zygomorphic fascicle with the anthers opening by longitudinal slits and the filaments fused at base. Fruit indehiscent, desintegrating with age.

The description of the shape of the ovary and fruit refers to the outline in side view.

2.1 *Begonia atroglandulosa* Sosef spec. nov.

Fig. 1, Map 1, Plate 1

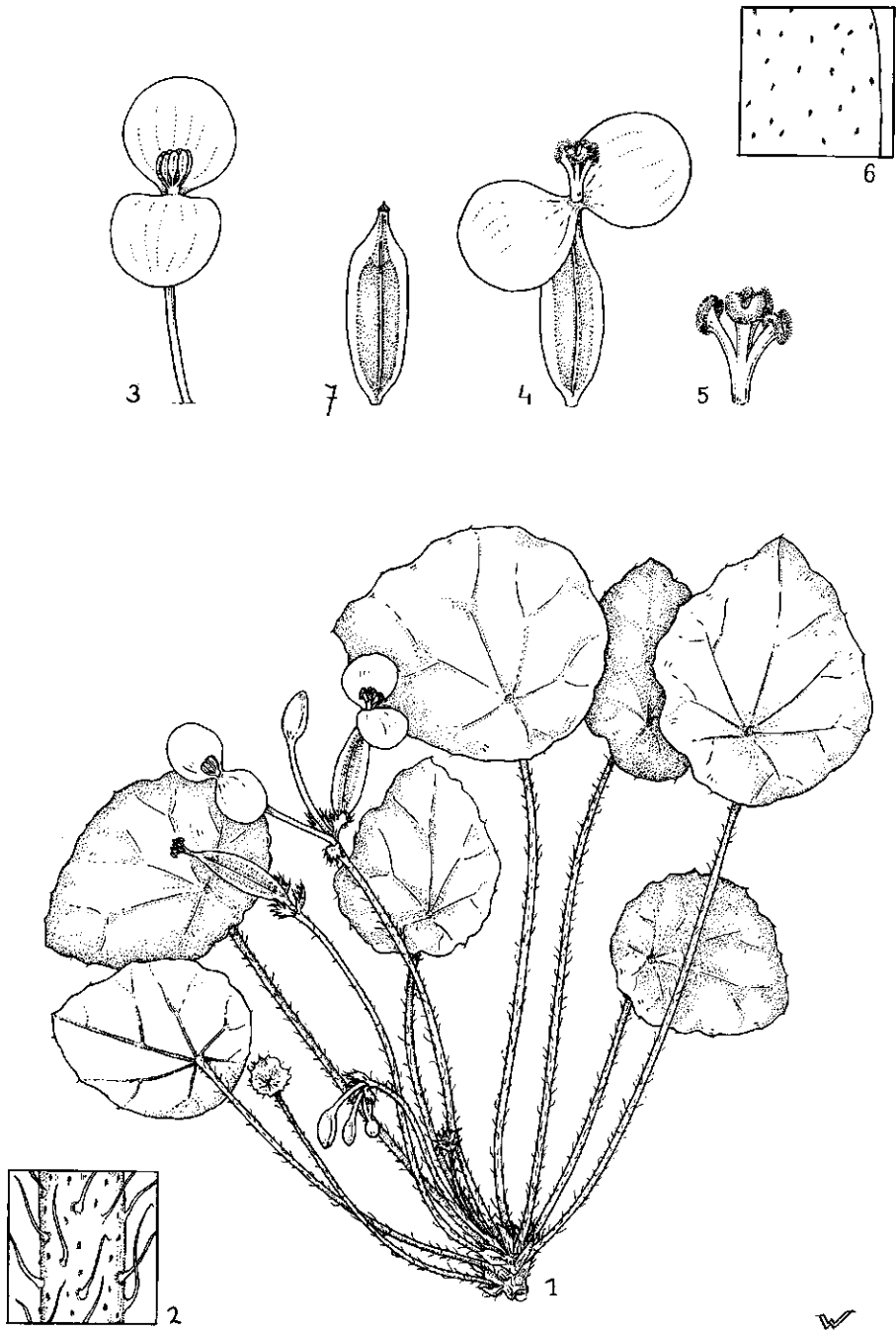
a. ssp. *atroglandulosa*

– TYPE: Breteler 7727 (WAG!, holo): 'Gabon, 40 km Mimongo-Lebamba, 11 27E, 1 47S, alt. \pm 400-500 m, 30-V-1981.'

Diagnosis: Folia peltata, late ovata vel orbiculata, tota fere planta glandulosa, glandulis parvis, exsiccatis nigris.

Plant up to 11 cm high. **Rhizome** slender but rather compact and knotted, glabrous except for the sparsely hirsute to hirsute youngest parts, with a short ascending apical part. **Stipules** very broadly triangular to narrowly triangular-ovate, acute to acuminate, (0.6-)1.3-5.2 mm long, green to bronze-green; margin entire to dentate, ciliate or not. **Leaves** peltate; *petiole* making a distinct angle with the main nerve, inserted at (1-)3-27 mm from the nearest margin, 0.5-10 cm long, juicy, bronze-green to pinkish red, almost glabrous or sparsely to densely hirsute with rather short to long, straight or somewhat wavy, white hairs and in addition scattered with two types of minute glandular hairs; *leaf-blade* in more or less horizontal position, slightly to distinctly asymmetric, ovate to circular, not acuminate or rarely indistinctly so in the upper 1/3, 1.4-8.5 \times 0.7-7.6 cm, herbaceous to slightly succulent, with 5-9 palmate main nerves, scattered with two types of minute glandular hairs, sometimes sparsely so but usually at least near the margin; margin entire to irregularly, shallowly sinuate-dentate, con-

Fig. 1. *Begonia atroglandulosa* Sosef ssp. *atroglandulosa*. – 1: habitus (x1); 2: detail of petiole with hairs and minute dark coloured glands (x10); 3: male flower (x2); 4: female flower (x2); 5: styles (x4); 6: detail of wing of the ovary with dark coloured glands (x10); 7: fruit (x2). – 1-6: van Veldhuizen 968, 7: Breteler 7727.

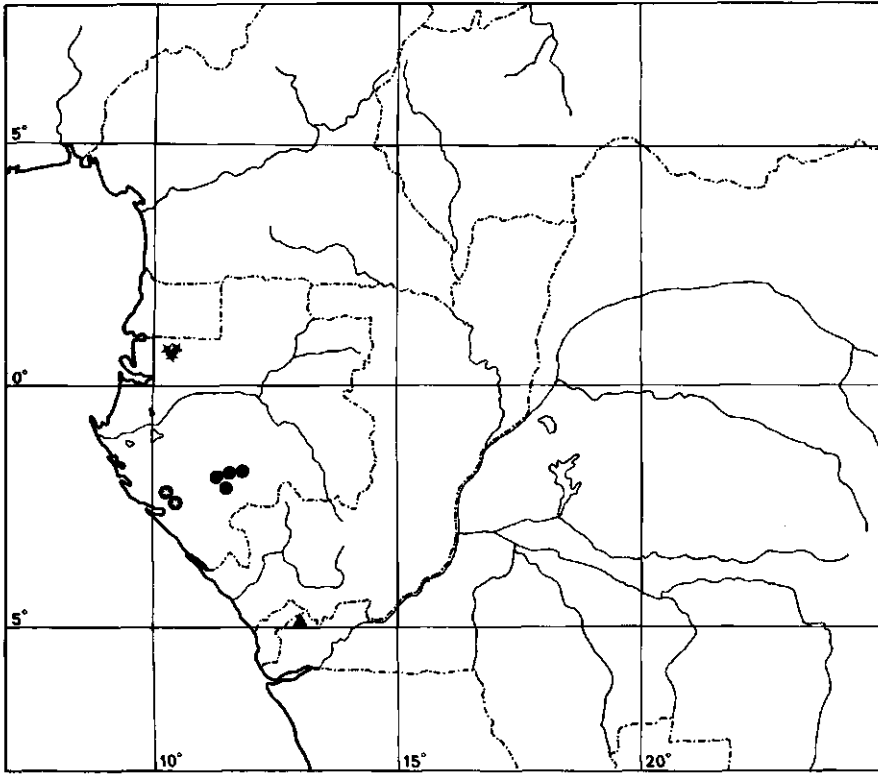


lorous with the blade, glabrous or sparsely ciliate; base rounded, top rounded; upper surface light to dark green, shining to dull, smooth, glabrous to sparsely pilose with short hairs in a regular pattern, usually at least near the margin, rarely more densely pilose; lower surface paler, hirsute in between the nerves or not; *nerves*: the main and larger secondary nerves on the lower surface not prominent, bronze-green or green to reddish green and with or without few patent hairs, on the upper surface sometimes slightly prominent, smaller secondary nerves indistinct, tertiary nerves not visible. **Inflorescence** containing 2-5(-9) male flowers and 1(-2) terminal female one(s); flowers positioned at about the same level as or extending beyond the leaves; *peduncle* simple or branched once (up to 3 times in glasshouse conditions), up to 5.5 cm long or when branched the primary axis 2-3 cm and the secondary 0.5-5 cm long, bronze-green to pinkish red, glabrous or sparsely hirsute with patent, white hairs and in addition scattered with two types of minute glandular hairs; *bracts* 3-6(-10), broadly ovate to obovate or ovate, sometimes elliptic, 1.5-5.2 mm long, bronze-green, sometimes with red nerves, usually scattered with two types of minute glandular hairs; margin entire to dentate, ciliate or not. **Male flower**: *pedicel* elongated at anthesis up to 17 mm, cream coloured to reddish, glabrous or with few hairs, sparsely scattered with two types of minute glandular hairs; *perianth segments* broadly elliptic to very broadly ovate or transversely broadly elliptic, with a rounded to cuneate base, 3.4-9.5 × 3.2-13.0 mm, glabrous but usually the outer side scattered with two types of minute glandular hairs in the basal half or all over; the upper segment yellow to orange-yellow or orange-red with red nerves on the outer side, the inner side yellow with or without a red patch and nerves in the lower half; the lower yellow; *androecium* with 6-14 stamens; anthers 0.65-1.6 mm long. **Female flower**: similar to the male but sessile or shortly pedicellate, the pedicel elongated in fruit up to 1.8 mm; *perianth segments* broadly to very broadly ovate, 5.3-10.1 × 6.6-13.4 mm; *styles* 4, 2.1-3.5 mm long, fused in the lower $\frac{1}{4}$ to up to halfway; the top split and forming half a circle, the arms ca. 0.25 mm long and covered with a terminal, non-twisted, stigmatic band; *ovary* elliptic to narrowly so, 4.1-12.0 × 1.6-5.7 mm, reddish green, 4-locular, 4-winged all along, scattered with two types of minute glandular hairs, base cuneate; beak present or absent, 0-1.4 mm long; wings oblong to narrowly elliptic-obovate, usually ribbon shaped or sometimes slightly broadening upwards, 0.25-1.7 mm wide, green, without glandular hairs; **Infructescence**: peduncle not recurved towards the substrate; *fruit* erect, elliptic-oblong or narrowly so to ovate-elliptic, 7.9-13.0 × 2.9-6.9 mm, dry, thin-walled, brown or reddish brown.

Distribution: GABON: Massif du Chaillu (12 coll.).

Altitude: 400-600 m.

Ecology: Primary or old secondary forest; in moist places, along banks of streamlets or rivers, close to a waterfall or rapids; on moss-covered sometimes vertical



Map 1. Distribution of *B. atroglandulosa* Sosef ssp. *atroglandulosa* (circles), *B. atroglandulosa* Sosef ssp. *tshelaensis* Sosef (triangle), *B. dewildei* Sosef (stars in circles) and *B. erectocaulis* Sosef (solid stars).

face of boulders in shade, in rocky creekbed; shaded moist roadside; open, somewhat cave-like steep slope.

Notes: The plants bear two types of minute glandular hairs. The first type is more or less sausage shaped and is rather common within the two sections. The second type has a short stalk and a globose head. In sicco this latter type becomes dark red or dark purple and is rather prominent, hence the name. This second type of glands is also found in *Begonia minuta* Sosef (see Sosef, 1991).

Two accessions were studied in vivo at Wageningen.

b. ssp. tshelaensis Sosef ssp. nov.

Fig. 2, Map 1

– TYPE: F. Hallé 1905 (P!, holo): 'Zaire, région de Tshela, Mayombe, Congo K., 7 mars 1971.'

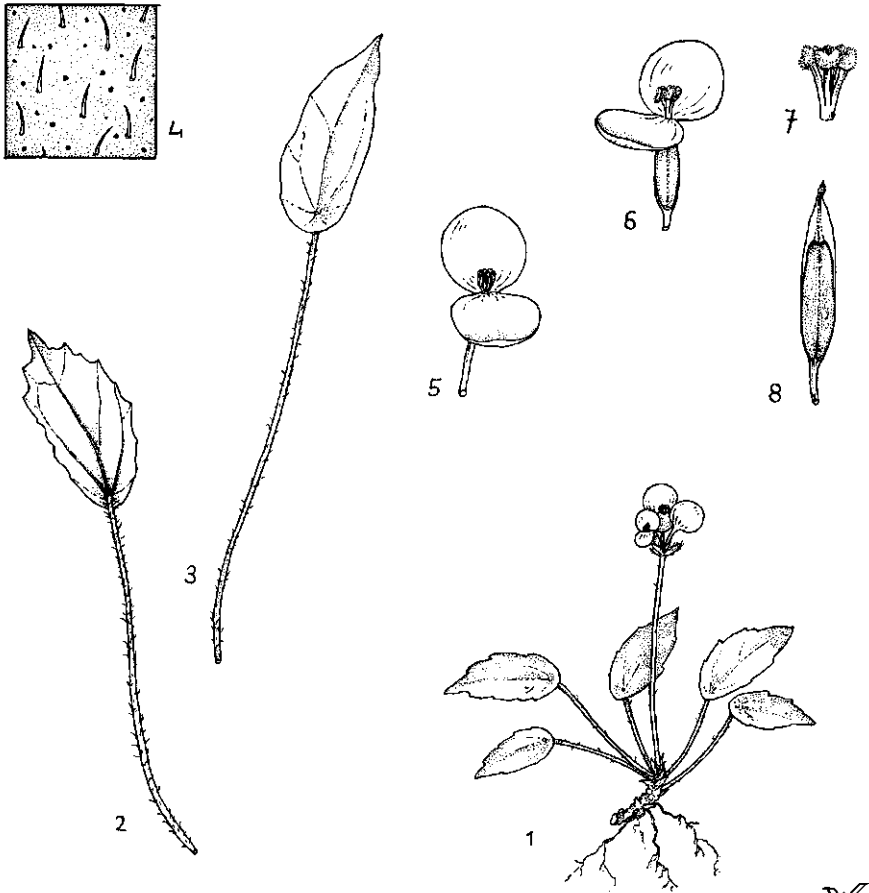


Fig. 2. *Begonia atroglandulosa* Sosef ssp. *tshelaensis* Sosef. – 1: habitus (x1); 2: leaf lower surface (x2/3); leaf upper surface (x2/3); 4: detail of upper leaf surface with hairs and dark coloured glands (x4); 5: male flower (x2); 6: female flower (x2); 7: styles (x4); 8: fruit (x2). – 1, 5-7: *N. Hallé* 1905, 2: *Breyne* 4509, 3-4, 8: *Breyne* 2644.

Diagnosis: A subspecie typica differt foliis angustis et floribus albis.

Differs from the typical subspecies by:

Leaf-blade narrowly elliptic or narrowly ovate to elliptic-ovate or ovate, 0.9-4.1 × 0.3-1.8 cm, with 3-7 palmate main nerves. Peduncle up to 14 cm long. Pedicel of the female flower elongated in fruit up to 6 mm; perianth segments 4.7-6.5 × 4.4-6.6 mm, white; styles 1.7-2.1 mm long; beak up to 3.3 mm long. Fruit 5.3-10.8 × 1.6-3.0 mm.

Distribution: ZAIRE: zone Tshela (6 coll.).

Altitude: probably at around 500 m.

Ecology: On wet rocks; on very wet vertical face of a cavity in the rock; in association with *Hymenophyllaceae* or *Begonia lacunosa* Warb. The observation of the association with the latter species is written on the label of Breynia 2644. Tilquin 111 also represents *B. lacunosa* while his collection numbers 112, 115 and 116 contain *B. atroglandulosa* subsp. *tshelaensis*.

Notes: A subspecies easily distinguished by its white flowers. There is a tendency towards narrower leaves in relation to the typical subspecies. Several miniature flowering plants were collected which gave rise to many differences in size with the typical subspecies. I do not regard these as being of much taxonomic importance.

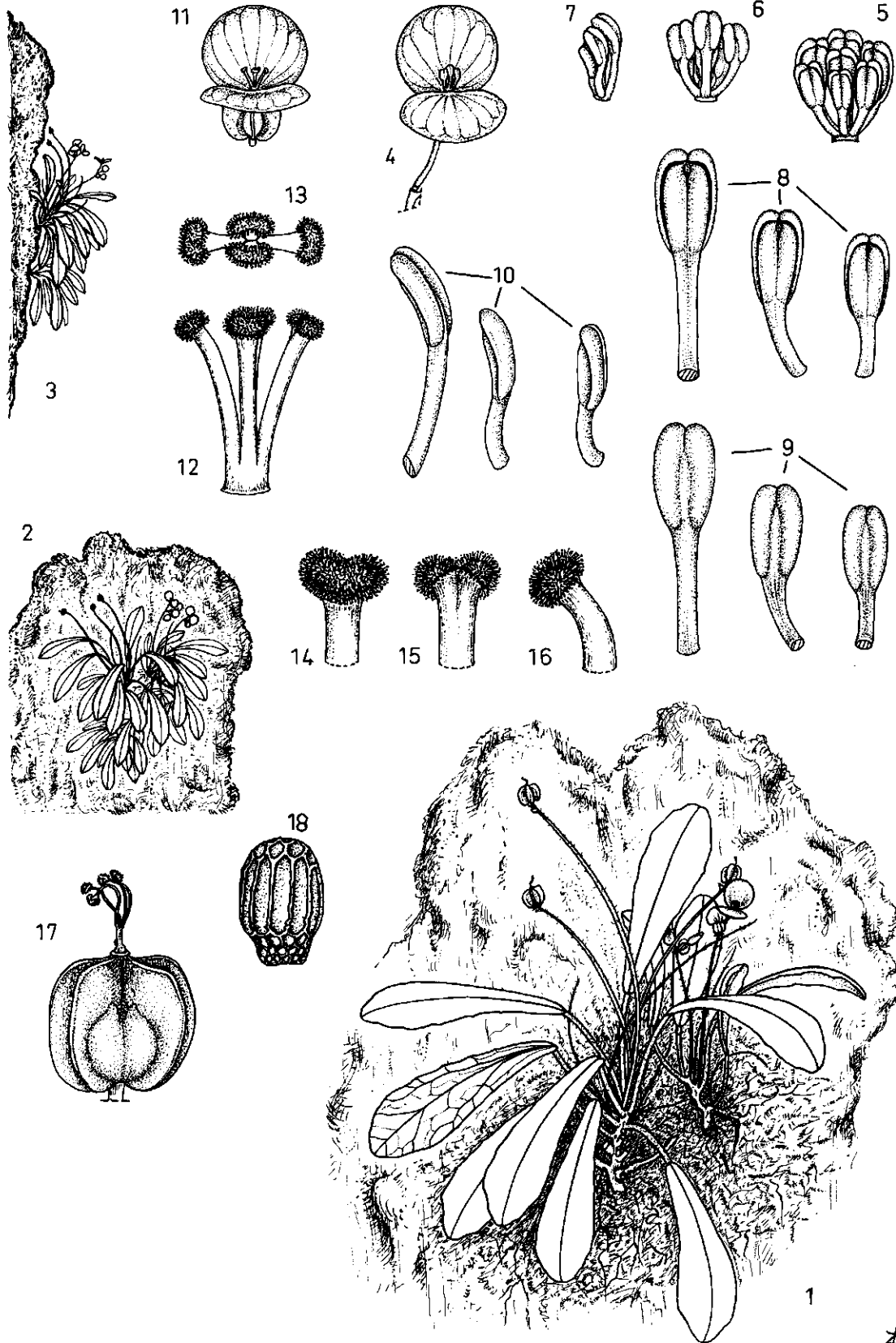
2.2 *Begonia dewildei* Sosef spec. nov.

Fig. 3, Map 1, Plate 2a

– TYPE: Arends, A. Louis & J.J. de Wilde 700 (WAG!), holo: 'Gabon, Doudou Mountains. Moss forest starting at alt.: \pm 700m, 2 15 S, 10 20 E, 8-xii-1984.'

Diagnosis: *B. vankerckhovenii* similis, a qua differt foliis anguste obovatis, ovario magis orbiculato et floribus albis vel dilute roseis.

Plant up to 9 cm high. **Rhizome** rather slender, hirsute, with a short ascending or upright apical part. **Stipules** transversely broadly elliptic to broadly triangular-ovate, blunt to acute, 0.5-0.9 mm long, green to bronze-green; margin entire to shallowly dentate, ciliate. **Leaves** subpeltate; *petiole* not continuing fluently into but making a slight but obvious angle with the main nerve, inserted at 0.1-0.5 mm from the nearest margin, 0.3-6.0 cm long, fleshy, brown-red, densely velutinous pilose with short to medium sized, curly, pale pink hairs (soon becoming brown) and in addition sparsely scattered with minute glandular hairs; *leaf-blade* in more or less vertical position, symmetric, narrowly obovate to narrowly elliptic-obovate, obovate when young, 1.5-5.9 \times 0.5-1.4 cm, firm and fleshy, palmately-pinnately nerved with 1-3(-5) main nerves; margin with a few distant and shallow blunt teeth in the apical half, concolorous with the blade, glabrous to sparsely shortly ciliate; base and top rounded; upper surface dark to medium green, dull, smooth, glabrous but usually sparsely scattered with minute glandular hairs; lower surface pale green, scattered with minute glandular hairs, otherwise glabrous in between the nerves; *nerves*: the main and larger secondary nerves not prominent on the upper surface, on the lower slightly prominent, green and glabrous or with a few short curly hairs at base, smaller secondary and tertiary nerves indistinct. **Inflorescence** containing (1-)2-4 male flowers and 1 terminal female one, flowers usually overtopping the leaves; *peduncle* simple, 2.5-7.0(-9.0)



cm long, with an indumentum similar to that of the petioles but especially distally much more sparse; *bracts* 3-6(-8), some of them not subtending flowers, broadly ovate to elliptic, 0.65-2.0 mm long, bronze-green, often with a few minute glandular hairs; margin entire to shallowly dentate, ciliate. **Male flower:** *pedicel* elongated at anthesis, up to 10(-13) mm long, pale bronze-green, glabrous or with a few minute glandular hairs; *perianth segments* broadly elliptic to somewhat transversely broadly elliptic or broadly obovate, with a rounded to cordate base, 4.4-8.7 × 5.2-8.2 mm, glabrous, white to pale pink on the inner side, usually slightly darker tinged on the outer side; *androecium* with 7-13 stamens; anthers 0.8-1.3 mm long. **Female flower:** similar to the male but its pedicel very short and only slightly elongated in fruit, up to 0.5 mm long; *perianth segments* very broadly elliptic-ovate to broadly obovate, 3.5-7.4 × 4.8-8.8 mm; *styles* 4, 1.2-2.7 mm long, fused only at base to up to halfway; the top split into a reniform shape and covered with a terminal broad stigmatic band; *ovary* transversely broadly obovate to circular, 2.1-3.4 × 2.1-4.3 mm, pale bronze-green or slightly reddish tinged, 4-locular, 4-winged all along, usually sparsely scattered with minute glandular hairs, with a rounded to distinctly cordate base and usually emarginate apex; beak absent or short, 0-0.3(-0.65) mm long; wings broadly or transversely broadly elliptic to obtriangular-obovate, sometimes widening upwards and then erecto-patent, 0.25-1.3 mm wide, pale bronze-green. **Infructescence:** peduncle curved backwards towards the almost vertical substrate; *fruit* erect, circular to transversely broadly elliptic, 2.3-3.4 × 2.1-4.7 mm, dry, thin-walled, light to medium brown.

Distribution: GABON: Monts de Doudou (2 coll.).

Altitude: 650-700 m.

Ecology: Moss forest; growing abundantly on moss-covered sheer rock faces, relatively dry, sometimes mixed with *Begonia vankerckhovenii* De Wild.

Notes: This species is dedicated to dr ir J.J.F.E de Wilde whose research and knowledge on African begonias has already led to the discovery of many new species and above all to a stable taxonomic system.

Living material of the type collection was studied at WAG where it flowered almost continuously throughout the year.

Fig. 3. *Begonia dewildei* Sosef. – 1: habitus (x2/3); 2-3: habitus front and side view (x1/6), note in the latter the peduncles which are curved back towards the rock; 4: male flower (x2); 5-7: androecium, front, back and side (x6); 8: stamens from different parts of the androecium, front (x12); 9: idem, back; 10: idem, side; 11: female flower (x2); 12: styles (x12); 13: styles, top view (x12); 14-16: stigma, front, back and side (x24); 17: fruit (x4); 18: seed (x60). – Living coll. at WAG and slides taken at the type locality, voucher *Arends, Louis & de Wilde 700*.

2.3 *Begonia erectocaulis* Sosef spec. nov.

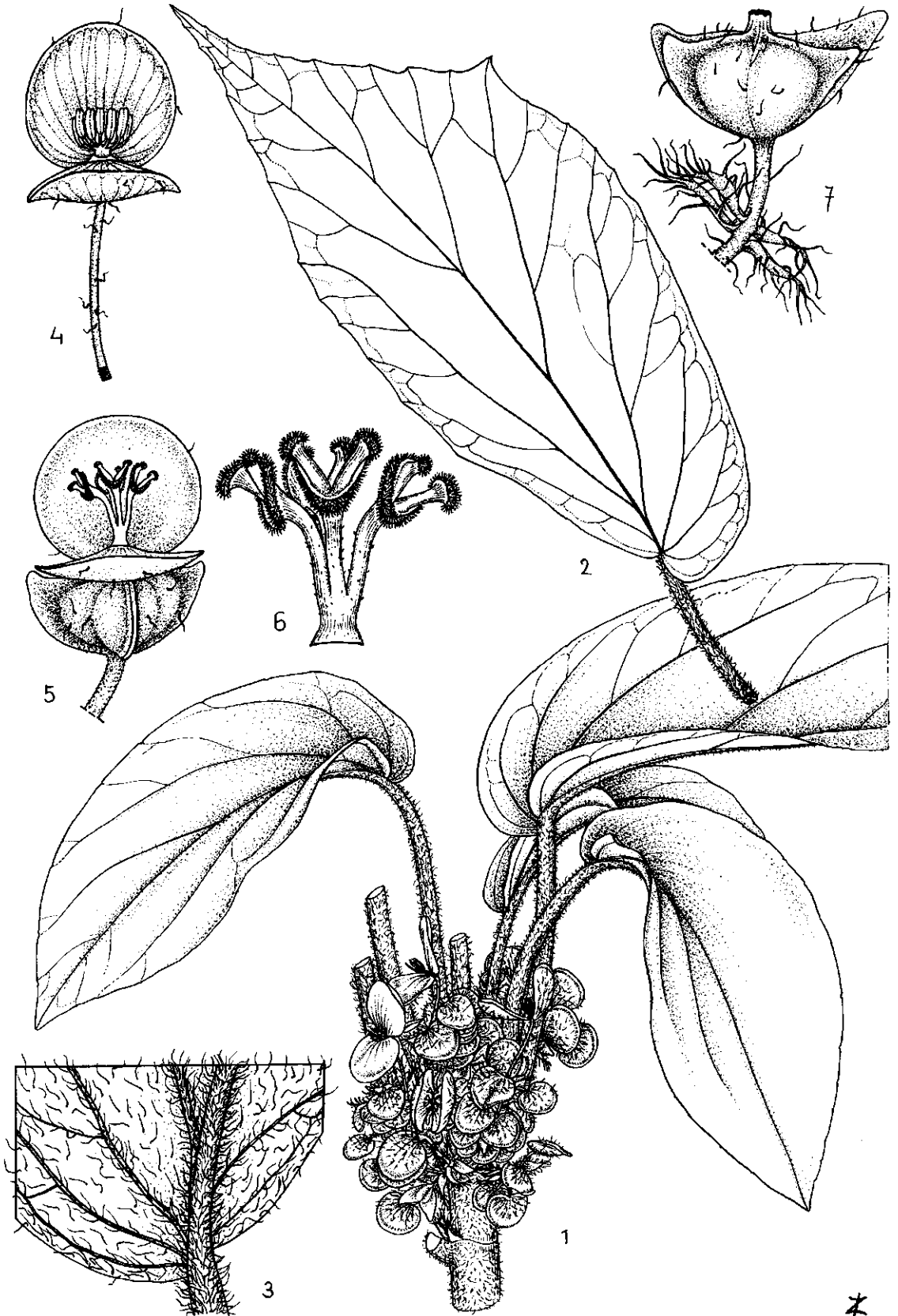
Fig. 4, Map 1, Plate 3a

– TYPE: Breteler & J.J. de Wilde 176 (WAG!, holo): 'Gabon, forest, about 15 km NE of Asok, Cristal Mountains, alt. \pm 600-700 m, 21-VIII-1978.'

Diagnosis: *B. zenkeri* similis, a qua differt floribus luteis et fructu longius alato et pilis sparsis vel glabro.

Plant up to 30(-40) cm high. **Rhizome** stout and elongated, glabrous, producing distinct erect stems. **Stems** 4-15 cm long, fleshy, bronze-green to slightly reddish brown tinged, hirsute or not and in addition sparsely to densely scattered with minute glandular hairs. **Stipules** narrowly to broadly triangular or triangular-ovate, acute, 3.0-13.0 mm long, green; margin dentate, ciliate. **Leaves** not peltate; *petiole* continuing into the main nerve without a distinct angle, 5-13(-20) cm long, firm, fleshy, bronze-green, reddish tinged, hirsute to densely hirsute with rather short appressed wavy to curly white hairs and in addition sparsely to densely scattered with minute glandular hairs; *leaf-blade* usually in more or less vertical position at least in the lower half, slightly to distinctly asymmetric, narrowly elliptic-ovate to narrowly elliptic-obovate, sometimes elliptic-ovate to elliptic-obovate, gradually attenuate towards the top or slightly acuminate in the upper 1/4 to 1/6, 12.0-21.0 \times 3.8-8.8 cm, herbaceous to slightly fleshy or thick leathery, palmately-pinnately nerved with 6-9 main nerves; margin entire to distantly finely serrate (usually in the upper half) or with a few larger teeth, concolourous with the blade, glabrous or with a few cilia; base usually very unequal, one side rounded to cuneate, the other deeply to very deeply cordate, the sides not overlapping, top acute; upper surface medium to dark green, slightly glossy or young leaves very glossy, smooth, glabrous or very sparsely hirsute and in addition scattered with minute glandular hairs; lower surface pale green, usually shortly hirsute and in addition scattered minute with glandular hairs in between the nerves; *nerves*: the main and larger secondary nerves not prominent to slightly impressed on the upper surface, on the lower prominent, pale brown-green to reddish brown, shortly densely hirsute to hirsute with patent hairs and in addition scattered with minute glandular hairs, the smaller secondary nerves distinct, the tertiary ones less so but still well visible in sicco, often slightly prominent and creating a typical reticulate pattern. **Inflorescence** containing 4-6(-9) male flowers and 1(-2) terminal female one(s); flowers at the base of the plant; *peduncle* simple, 0.3-2.6 cm long, sparsely pubescent with white hairs and in addition scattered with minute glandular hairs; *bracts* 5-7(-10), elliptic to broadly elliptic-ovate or almost circular, 2.6-7.0 mm long, reddish green to brown-red, with or without minute glandular hairs; margin dentate, ciliate.

Fig. 4. *Begonia erectocaulis* Sosef. – 1: habitus (x1/2); 2: leaf, upper surface (x1/2); 3: detail of leaf base lower surface (x1 1/2); 4: male flower (x1 1/2); 5: female flower (x1 1/2); 6: styles (x4) 7: fruit, upside down (x1 1/2). – 1: living coll. at WAG, voucher Breteler & de Wilde 300, 3-7: Breteler & de Wilde 300.



Male flower: *pedicel* elongated at anthesis up to 20 mm, cream coloured with a reddish tinge, scattered with minute glandular hairs and besides hirsute or sparsely so; *perianth segments* ovate to obovate or broadly so, with a rounded base, 6.1-13.0 × 5.9-12.0 mm, the outer side yellowish-red or purple-red, scattered with minute glandular hairs, usually with a few additional longer hairs, glabrous on the inner side; the upper segment yellow with a red patch and nerves in the basal 1/2 or up to the top on the inner side; the lower yellow on the inner side; *androecium* with 19-24 stamens; anthers 2.0-3.0 mm long. **Female flower:** similar to the male but almost sessile to shortly pedicellate, the *pedicel* elongated in fruit up to 6(-10) mm; *perianth segments* broadly obovate or circular, 6.8-11.7 × 7.1-13.0 mm; *styles* 3-4, 3.5-7.2 mm long, fused in the lower half, the top split and horse-shoe shaped, the arms 1.3-2.7 mm long and bearing a slender stigmatic band which is spirally twisted for one turn; *ovary* very shallowly obtriangular-obovate, 4.2-9.1 × 6.5-14.0 mm, dark purplish brown to greenish red or light yellowish green, 3-4-locular, 3-4-winged at the apical part to all along, with a few long hairs and in addition densely scattered with minute glandular hairs, base cuneate; beak present, 0.8-1.6 mm long; wings patent to erecto-patent, distinctly widening upwards, usually very shallowly obtriangular-elliptic to very broadly obtriangular, 1.5-3.6 mm wide, usually one wing somewhat larger than the others, bronze-green to greenish red, the margin sparsely ciliate; **Infructescence:** peduncle recurved towards the substrate; *fruit* pendulous, very shallowly obtriangular-obovate, 5.5-10.4 × 11.0-20.0 mm, dry, with a tough thick wall, brownish green or greenish red to purplish brown.

Distribution: GABON: Monts de Cristal (5 coll.).

Altitude: 500-700 m.

Ecology: Primary or exploited high forest, also in highly disturbed conditions beneath oil-palms; on (very steep) slope, on high bank of creek; on forest floor in dark shade.

Notes: From 1978 until 1983 two accessions of the species were in cultivation at WAG. One of these almost invariably bore inflorescences with 2 female flowers.

2.4 *Begonia erectotricha* Sosef spec. nov.

Fig. 5, Map 2, Plate 2b,c

– TYPE: J.J. de Wilde c.s. (WALK-B) 57 (WAG!, holo): 'Gabon, Cristal Mountains, on forested slope just on the left hand side of the Kinguéle falls, alt. 200 m, 18-I-1983.'

Diagnosis: *B. hirsutula* similis, a qua differt foliis plus fere horizontaliter dispositis, majoribus et magis orbiculatis, superne pilis rubris rigidis erectis.

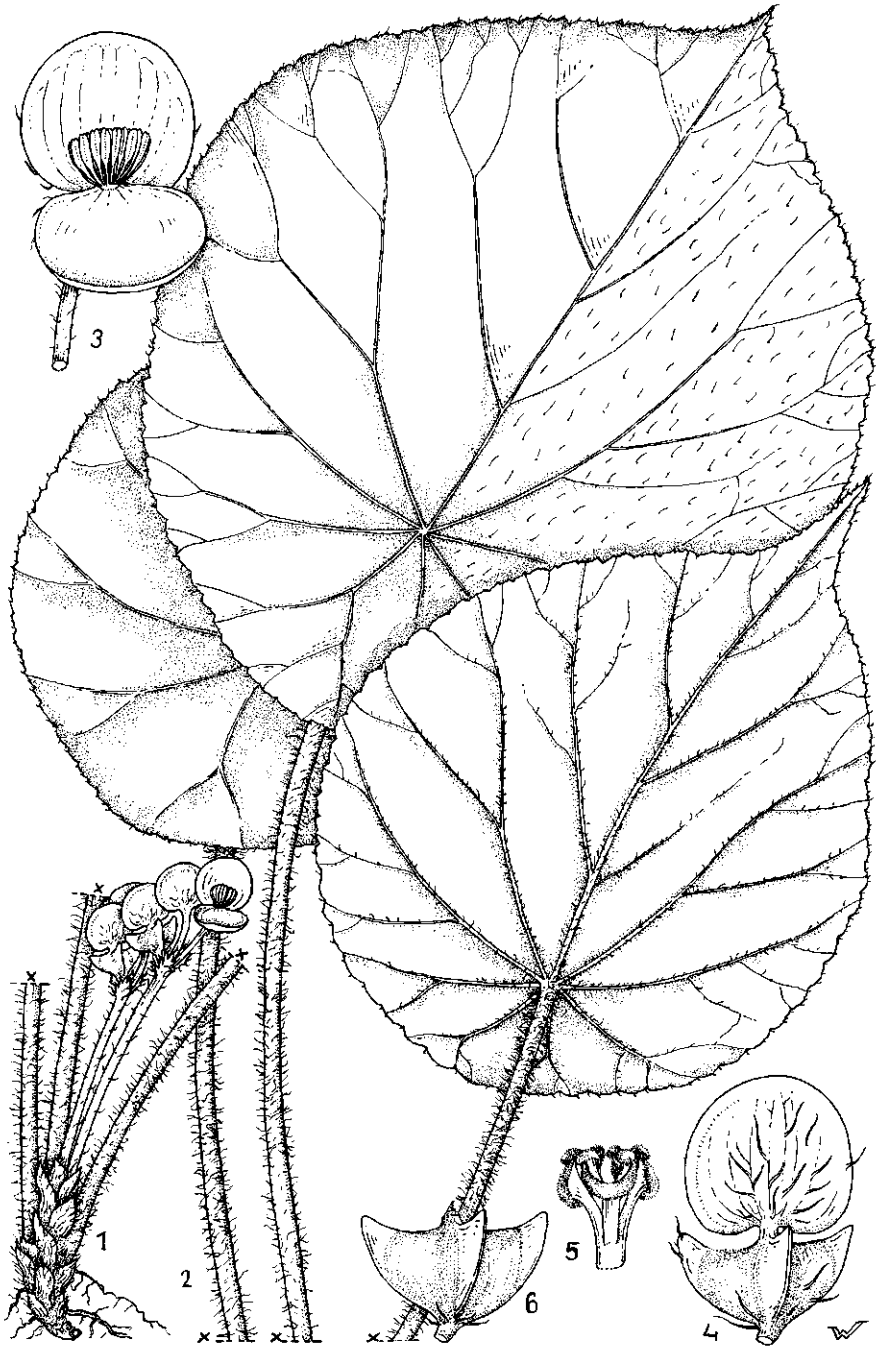


Fig. 5. *Begonia erectotricha* Sosef. — 1: habitus, partly with inflorescence (x2/3); 2: leaves (x2/3); 3: male flower (x2); 4: female flower (x2); 5: styles (x4); 6: fruit (x2). — 1-5: *J.J. de Wilde et al.* 57, 6: *Breteler & de Wilde* 159.

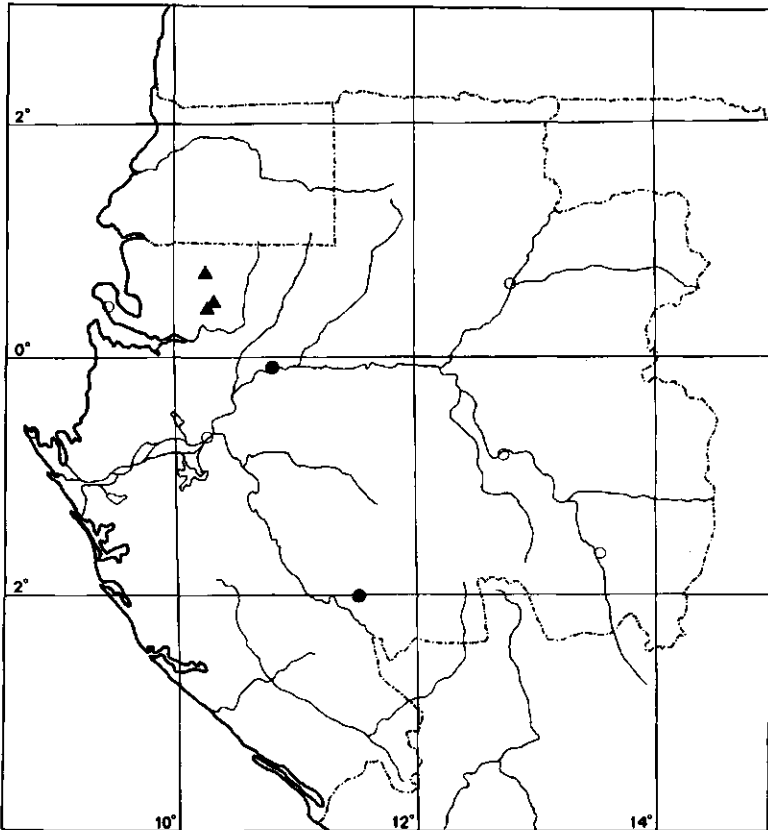
Plant 14-30 cm high. **Rhizome** rather stout and elongated, the apical parts more compact, sparsely hirsute, the younger parts hirsute and in addition scattered with minute glandular hairs; the top of the foliated part upright to form a short stem of up to 3 cm. **Stipules** very broadly triangular to elliptic or ovate, with an acute to long attenuate apical part, 2.0-9.2 mm long, pale green; margin more or less entire to denate, ciliate. **Leaves** peltate; *petiole* continuing into the main nerve with a distinct angle, inserted at (14-)19-65 mm from the nearest margin, 10.0-28.0 cm long, firm, fleshy, wine red, hirsute to densely so with long, downward directed, wavy, white hairs and in addition densely to sparsely scattered with minute glandular hairs; *leaf-blade* in more or less horizontal position, \pm symmetric to slightly asymmetric, circular to broadly elliptic-obovate or broadly elliptic, rarely elliptic (3:2), usually with a shortly acuminate top, 12.5-22.5 \times 8.4-17.0 cm, crisply-herbaceous, with 8-10 palmate main nerves, the midnerve sometimes more pronounced; margin shallowly, usually indistinctly and irregularly crenate, sometimes denticulate or almost entire, concolorous with the blade, ciliate, not seldom with two cilia together in between the teeth; base rounded or rarely slightly indented, top acute, sometimes rounded; upper surface medium to light green, smooth, set with erect, usually red or dark red but sometimes whitish hairs and in addition densely scattered with minute glandular hairs; lower surface pale green, densely scattered with minute glandular hairs in between the nerves; *nerves*: the main and larger secondary nerves not prominent to slightly impressed on the upper surface, on the lower prominent, dark red, hirsute to sparsely so with patent, stiff, usually red but sometimes whitish hairs and in addition usually densely scattered with minute glandular hairs, smaller secondary nerves distinct, prominent or slightly so, tertiary nerves less distinct but in sicco still well visible, often slightly prominent and creating a typical reticulate pattern. **Inflorescence** containing 2(-3) male flowers and 1 terminal female one; flowers at the base of the plant; *peduncle* simple, 1.0-5.5 cm long, sparsely hirsute with white hairs, and densely scattered with minute glandular hairs; *bracts* 3(-4), elliptic to broadly elliptic-obovate, 0.8-3.3 mm long, pale orange-green, scattered with minute glandular hairs; margin dentate, ciliate. **Male flower**: *pedicel* elongated at anthesis up to 16 mm, sparsely hirsute and in addition scattered with minute glandular hairs; *perianth segments* very broadly ovate to circular, with a cordate base, 6.2-10.7 \times 6.5-11.1 mm; the outer side salmon, hirsute or sparsely so with long red or white hairs and in addition scattered with minute glandular hairs, glabrous on the inner side; the upper segment yellow with or without a red patch and nerves at base on the inner side; the lower yellow on the inner side; *androecium* with 28-46 stamens; anthers 1.2-2.3 mm long. **Female flower** similar to the male but shortly though distinctly pedicellate, the pedicel elongated in fruit up to 5.7 mm and sometimes sparsely hirsute; *perianth segments* very broadly ovate, 7.0-9.5 \times 6.6-13.0 mm; *styles* 3-4, 3.9-5.2 mm long, fused in the lower 1/3 to only at base; the top split and horse-shoe shaped, the arms 1.3-2.1 mm long and bearing a slender stigmatic band which is spirally twisted for one turn; *ovary* very shallowly obtriangular-obovate to very broadly obtriangular, 2.7-7.3 \times 6.5-9.5 mm, dark brownish red to pale

purplish, 3-4-locular, 3-4-winged at the apical part to all along, scattered with minute glandular hairs and sometimes with a few additional long hairs, with a cuneate base; beak present, 0.25-1.6 mm long; wings patent to slightly curved upwards, distinctly widened upwards, very shallowly obtriangular-obovate to shallowly obovate, 1.2-3.3 mm wide, margin glabrous or sometimes with a very few hairs. **Infructescence:** peduncle recurved towards the substrate; *fruit* pendulous, shallowly obtriangular, 8.7 × 9.0-10.0 mm, dry, with a thick wall, brownish green.

Distribution: GABON: Monts de Cristal (7 coll.).

Altitude: 70-310 m.

Ecology: Primary forest; on comparatively dry river banks or forested slopes; in deep shade.



Map 2. Distribution of *B. erectotricha* Sosef (triangles) and *B. wilksii* Sosef (solid-circles).

Notes: Closely related to *B. hirsutula* Hook.f. Distinguished mainly by the rather dense indumentum of erect and often red hairs on the upper leaf surface and its usually much broader leaves which are displayed horizontally. Additional differences were observed in the field by J. Wieringa on a location where both species grew closely together. They concern characters of the texture of the leaves and colour of leaves, bracts and tepals. There might also be a slight ecological difference. *B. erectotricha* was found on somewhat dryer slopes while *B. hirsutula* grows directly along streams or on wet rocks.

2.5 *Begonia heterochroma* Sosef spec. nov.

Fig. 6, Map 3, Plate 3b,c

– TYPE: Bos 5677 (WAG!, holo; BR!, K!, MO, P, YA!): 'Cameroun, 13 km N. of Kribi. Steep slope in high forest, 3 01 N., 9 57 E., 20-XI-1969.'

Diagnosis: *B. mildbraedii* similis, a qua differt foliis fere reniformibus superne pilis erectis at ovario late vel anguste obovato-obtriquetro.

Plant up to 14 cm high. **Rhizome** rather slender, rather compact to slightly elongated, the apical part glabrous to sparsely hirsute and in addition sparsely scattered with minute glandular hairs or not, the top of the foliated part ascending to upright and forming a short stem of up to 3 cm high. **Stipules** depressed triangular-ovate to triangular-ovate, acute to blunt, 1.6-6.4 mm long, greenish; margin dentate to entire, ciliate. **Leaves** peltate; *petiole* continuing into the main nerve with a distinct angle, inserted at 4-22 mm from the nearest margin, 1.5-16 cm long, crispy and juicy, pale brown-greenish to red, sparsely to densely hirsute with long, patent, wavy to curly, red to pale purple or whitish hairs and in addition sparsely scattered with minute glandular hairs; *leaf-blade* in more or less horizontal position, asymmetric to distinctly so, often more or less kidney-shaped, circular to broadly elliptic-ovate or elliptic-obovate, with a rounded apical part, 3.7-12.8 × 2.6-7.7 cm, herbaceous to crispy, with 8-9 palmate main nerves; margin entire to shallowly dentate, concolorous with the blade, ciliate to very sparsely so; base rounded, top rounded or rarely acute; upper surface dark green or bronze-green to violet or reddish, sometimes with a silvery gloss, shiny, smooth, sparsely to densely hirsute with longer red or purple to silvery white, upright hairs and in addition scattered with minute glandular hairs especially when young; lower surface violet or dull red or brown-red to purplish green, sparsely to densely scattered with minute glandular hairs in between the nerves; *nerves*: the main and larger secondary nerves not prominent to slightly sunken on the upper surface, on the lower prominent or slightly so, violet to greenish red, hirsute to very sparsely so with patent hairs and in addition sparsely to densely scattered with minute glandular hairs, the smaller secondary nerves distinct, the tertiary ones distinct to fairly indistinct, not prominent. **Inflorance** containing 3-6 male flowers and (0-)1 terminal female one; flowers positioned just below or at about the same level as the leaves; *peduncle* simple,

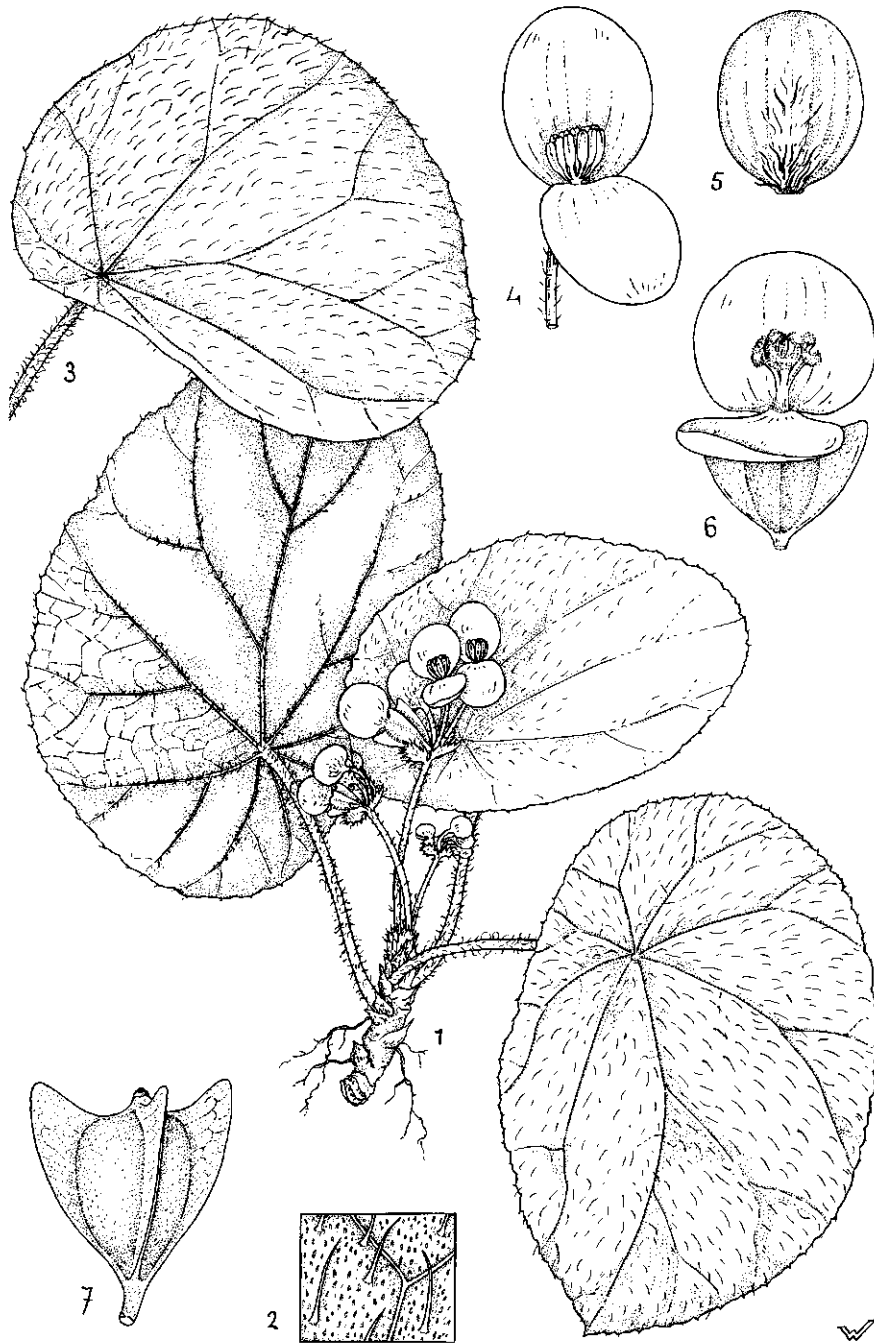


Fig. 6. *Begonia heterochroma* Sosef. - 1: habitus (x2/3); 2: detail of upper leaf surface with long hairs and minute glandular hairs (x4); 3: leaf (x2/3); 4: male flower (x2); 5: perianth segment of male flower, back (x2); 6: female flower (x2); 7: fruit (x2). - 1-2: *Bos* 5677, 3: *J.J. de Wilde et al.* 8870, 4-5: *N. Hallé & Villiers* 5197, 6: *J.J. de Wilde et al.* 161, 7: *Bos* 3834.

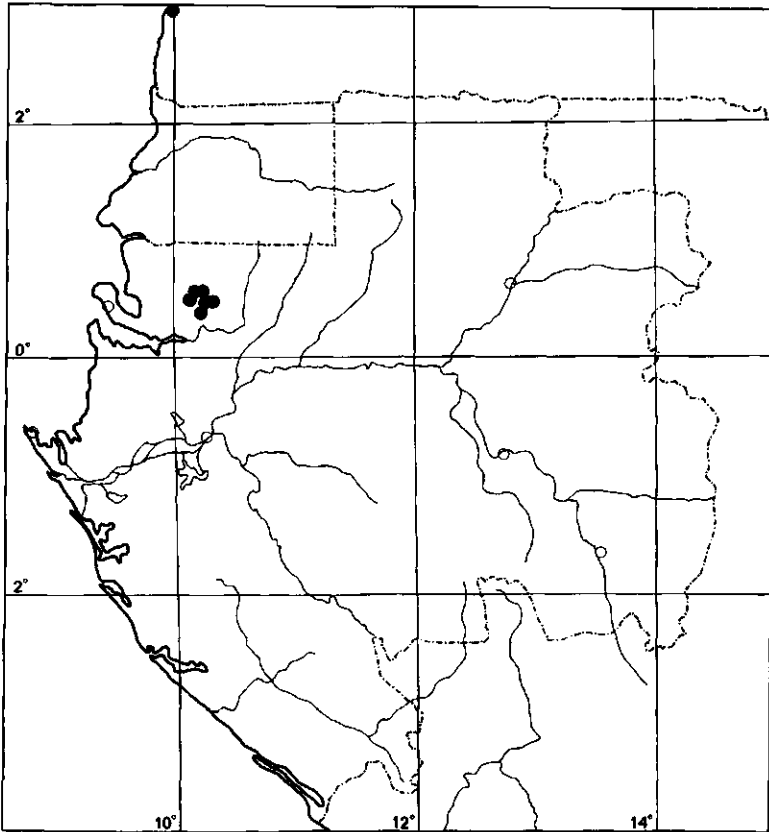
1.0-6.0(-10.0) cm long, pink to pale pinkish green, hirsute to sparsely so with red or purple to silvery white hairs and in addition scattered with minute glandular hairs; *bracts* 4-7, elliptic to broadly elliptic or broadly elliptic-ovate, 1.0-4.4 mm long, pinkish to pale greenish, scattered glabrous or with minute glandular hairs or not; margin dentate, ciliate. **Male flower:** *pedicel* elongated at anthesis up to 18 mm, pale red, sparsely hirsute and in addition scattered with minute glandular hairs; *perianth segments* elliptic-obovate or broadly elliptic to very broadly elliptic-ovate, with a cuneate to slightly cordate base, 6.5-11.5 × 5.2-10.5 mm, the outer side hirsute or sparsely so with white hairs, especially at base or in the basal half and in addition scattered with minute glandular hairs in the basal half or sometimes all over, glabrous on the inner side; the upper segment yellow to salmon or white with red nerves on the basal half on the outer side, the inner side yellow or white with a red patch and nerves in the basal half; the lower yellow or white on both sides; *androecium* with 15-20 stamens; anthers 1.3-2.0 mm long. **Female flower:** similar to the male but shortly pedicellate, the pedicel elongated in fruit up to 1.0 mm; *perianth segments* transversely broadly elliptic or very broadly elliptic-ovate to broadly elliptic-ovate, with a rounded to slightly cordate base, 6.2-12.0 × 7.0-14.0 mm; *styles* 3, 3.0-4.9 mm long, fused in the lower 1/3, the top split and horse-shoe shaped, the arms 1.2-1.6 mm long and bearing a rather slender stigmatic band which is spirally twisted for up to 1/2 a turn; *ovary* broadly obtriangular-obovate to depressed obtriangular-obovate, 3.0-9.7 × 6.0-14.0 mm, pale greenish to dirty red, 3-locular, 3-winged in the apical half to almost all along, sparsely hirsute and in addition scattered with minute glandular hairs, with a cuneate to rounded base; beak absent or short, usually elongated in fruit, 0-1.6 mm long; wings widening upwards, sometimes distinctly so, enlarged in fruit, broadly obtriangular to depressed obtriangular-obovate, 1.3-5.1 mm wide, pale green to dirty red, sometimes with a red tip, the margin glabrous or with a few hairs. **Infructescence:** peduncle not recurved towards the substrate; *fruit* erect, broadly obtriangular to very broadly obtriangular-obovate, 9.1-11.7 × 8.1-13.0 mm, dry, with a relatively thin to slightly thickened wall, pale green.

Distribution: CAMEROON: N. of Kribi (3 coll.); GABON: Monts de Cristal (9 coll.).

Altitude: 100-360 m.

Ecology: Terrestrial or on decaying trees; on clayey slopes and banks in (high) forest; in very deep shade in understory.

Notes: Collections from Cameroon bear yellow flowers, those from the Monts de Cristal in Gabon have either yellow or white ones, hence the name.



Map 3. Distribution of *B. heterochroma* Sosef.

2.6 *Begonia susaniae* Sosef spec. nov.

Fig. 7, Map 4, Plate 4a

- TYPE: Breteler & J.J. de Wilde 25 (WAG!, holo): 'Gabon, about 11 km along the road from Asok to the Hydroelectric power station in the Tchimbélé River, 15-VIII-1978.'

Diagnosis: *B. hirsutula* similis, a qua differt foliis fere bullatis superne pubescentibus; ovario perspicue rostrato et aliis sursum arcuatis.

Plant up to 15(-20) cm high. **Rhizome** rather stout to fairly slender, usually rather compact, glabrous except for the apical parts which are sparsely hirsute and sometimes in addition scattered with minute glandular hairs, the top of the foliated part ascending or not. **Stipules** narrowly to very broadly triangular or triangular-ovate, acute, sometimes long attenuate, 1.7-6.0(-9.1) mm long, green; margin entire to dentate, ciliate. **Leaves** peltate; *petiole* continuing into the main

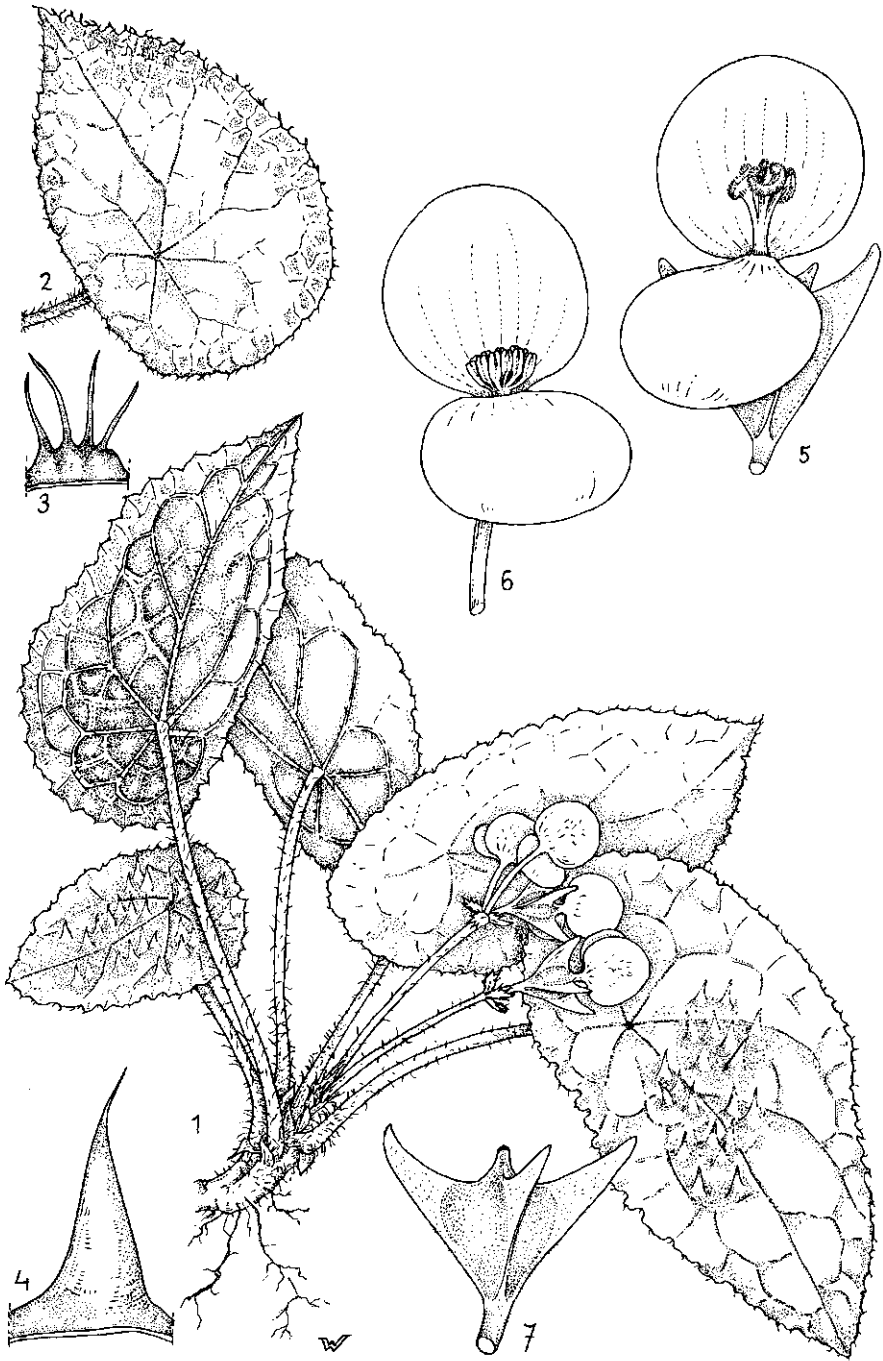
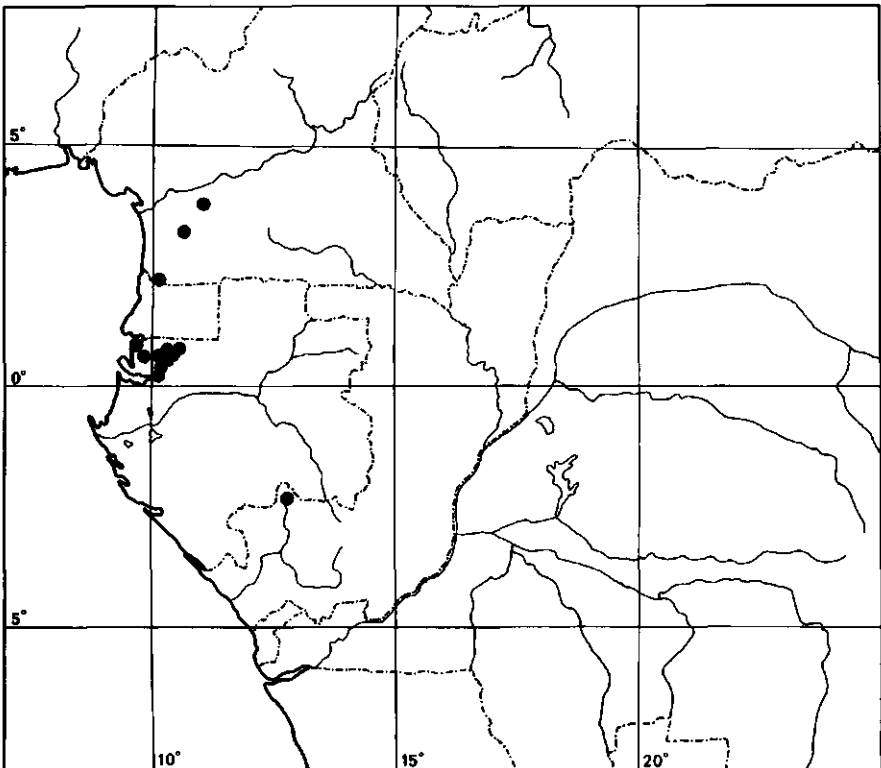


Fig. 7. *Begonia susaniae* Sosef. – 1: habitus (x2/3); 2: leaf (x2/3); 3: detail of group of small bullae (x4); 4: detail of solitary large bulla (x4); 5: female flower (x2); 6: male flower (x2); 7: fruit (x2). – 1, 4-6: *Breteler & de Wilde* 274, 2-3: *Breteler & de Wilde* 273, 7: *Breteler & de Wilde* 25.

nerve with a distinct angle, inserted at 6-20(-28) mm from the nearest margin, 1.5-15.0(-22.0) cm long, firm, fleshy, dark purple-red to green, usually densely hirsute (but glabrescent) with long patent wavy red hairs which turn whitish with age and in addition scattered with minute glandular hairs or sparsely so, sometimes a few to many of the long hairs are fused at base to form comb-like structures all along the petiole; *leaf-blade* in more or less horizontal position, almost symmetric to distinctly asymmetric, usually broadly elliptic-ovate, sometimes ovate to elliptic-ovate or almost circular, usually gradually tapering into the blunt top or sometimes slightly acuminate at the top, 3.5-12.5(-15.3) × 2.4-7.0(-8.0) cm, usually somewhat crispy-leathery, with 7-8 palmate main nerves; margin usually irregularly denticulate, sometimes more coarsely dentate or only slightly sinuate to entire, ciliate or sparsely so; base rounded, top blunt, rarely acutish; upper surface very variable in colour, uniformly light or medium green to dark purplish brown or medium to dark green with a broad dark purplish brown marginal zone or with a large dark purplish brown central spot which extends along the nerves, dull to shiny, very variably bullate, from almost smooth or scattered with a few small solitary bullae to densely bullate with many small bullae in groups of 3 to 5 together or bullate with few to many large solitary bullae, scattered with minute glandular hairs all over but glabrescent and in addition each bulla usually bearing a single long stiff erect red or whitish hair, rarely lacking any long hairs; lower surface pale green to reddish or purplish green, scattered with minute glandular hairs in between the nerves but glabrescent; *nerves*: the main and larger secondary nerves not prominent to slightly or distinctly sunken on the upper surface, on the lower prominent, green to reddish tinged, in sicco those of mature leaves not contrasting with the interveinal parts, sparsely to densely hirsute with patent hairs and in addition scattered with minute glandular hairs, smaller secondary nerves distinct, tertiary nerves in sicco fairly distinct and prominent, creating a typical reticulate pattern. **Inflorescence**: containing 2(-3) male flowers and (0-)1(-2) terminal female one(s); flowers positioned at about the same level as the leaves to halfway up the petioles; *peduncle* simple, 1.0-6.0 cm long, sparsely hirsute to hirsute with red hairs and in addition scattered with minute glandular hairs; *bracts* (2-)3-4, elliptic or elliptic-ovate to narrowly so, (0.9-)1.7-5.2 mm long, bronze-green, scattered with minute glandular hairs; margin dentate, ciliate. **Male flower**: *pedicel* at anthesis elongated up to 25(-36) mm, whitish to reddish, sparsely scattered with minute glandular hairs and besides hirsute or (very) sparsely so; *perianth segments* variously broadly to very broadly ovate/obovate, with a cuneate to cordate base, (5.9-)6.8-19.0 × (6.5-)7.2-17.0 mm, the outer side yellow or orange to reddish, usually with a few or rarely many additional longer red hairs mainly in the basal half and along the margin or rarely all over and in addition sparsely scattered with minute glandular hairs or not, glabrous on the inner side; the upper segment entirely yellow or yellow with a red patch and nerves in the basal 1/2 on the inner side; the lower yellow, sometimes also with a red patch and nerves in the basal 1/2 on the inner side; *androecium* with (15-)19-30 stamens; anthers 1.2-2.0(-2.6) mm long. **Female flower**: similar to the male though shorter but

still distinctly pedicellate, the pedicel elongated in fruit up to 8.0(-10.5) mm; *perianth segments* very broadly ovate to very broadly obovate, with a rounded to cordate base, (6.1-)8.0-20.0 × (7.0-)8.5-20.0 mm; *styles* 3(-4), 2.7-6.2 mm long, fused at the base or up to halfway, the top split and horse-shoe shaped, the arms (0.5-)1.0-2.6 mm long and bearing a slender stigmatic band which is spirally twisted for one turn; *ovary* very shallowly to shallowly obtriangular, (2.5-)3.0-7.5(-9.0 × (6.5-)7.0-15.0(-17.5) mm, green or light yellowish green, 3(-4)-locular, 3(-4)-winged at the apical half, scattered with minute glandular hairs, without additional long hairs, base cuneate; beak usually very distinct, slightly elongated in fruit, 0.7-4.3 mm long; wings often curved upwards, sometimes patent, distinctly widening upwards, usually very shallowly obtriangular-obovate, sometimes shallowly obtriangular-obovate, (1.0-)1.3-6.0(-7.9) mm wide, reddish green to green, the margin glabrous or with one or two hairs at the apex. **Infructescence:** peduncle recurved towards the substrate; *fruit* pendulous, very shallowly to shallowly obtriangular, sometimes shallowly obtriangular-obovate, (3.9-)5.0-7.5 × (6.4-)8.8-14.0 mm, dry, with a rather tough wall, bright green or sometimes reddish.



Map 4. Distribution of *B. susaniae* Sosef.

Distribution: CAMEROON: Centre-Sud Prov. (5 coll.); GABON: Monts de Cristal (50 coll.); CONGO: Région de Niari (1 coll.).

Ecology: Primary or old secondary forest; usually on forested slopes, sometimes along or near streams, on steep road shoulders, on mossy (wet) rocks or rock-faces; in deep shade; growing together with *B. scutulum* but in a slightly more open place.

Notes: A quite attractive species with showy flowers inspiring to further investigate these begonias. In a similar way my wife Susan incites inspiration and offers encouragement to continue my research. I gladly dedicate this new species to her.

The species is obviously closely related to both *B. hirsutula* Hook.f. and *B. erectotricha*. Plants in which the bullate character is only slightly developed are particularly difficult to identify. However, *B. hirsutula* has its leaves displayed in a vertical rather than horizontal orientation and they usually show entire to crenate and not finely dentate margins while the ovary is almost sessile and is not or only shortly beaked. *B. erectotricha* is in general a much coarser species with much larger and broader leaves, it has longer petioles and lacks the distinctive long beak of the ovary.

2.7 *Begonia wilksii* Sosef spec. nov.

Fig. 8, Map 2, Plate 4b,c

– TYPE: Wilks 1314 (WAG!, holo; LBV!): 'Gabon, Ngounié, 11 km E.S.E. de Bilengui, 1°59'S 11°30'E, 8/06/86.'

Diagnosis: *B. lacunosa* similis, a qua differt foliis rugulosis anguste vel angustissime elliptico-ovatis, floribus supra laminas foliorum dispositis.

Plant up to 7 cm high. **Rhizome** slender, not elongated, sparsely scattered with minute glandular hairs, the apical part hirsute, the top of the foliated part ascending or upright. **Stipules** triangular-ovate to narrowly so, often long attenuate, 1.8-8.6 mm long, bright green to cream coloured pink; margin more or less entire, ciliate. **Leaves** subpeltate to peltate; *petiole* continuing into the main nerve with a more or less distinct angle, inserted at 1-5 mm from the nearest margin, 0.5-4.5 cm long, fleshy, reddish when young, becoming greenish brown with age, densely hirsute with medium-sized patent to slightly appressed curly white or red hairs and in addition sparsely scattered with minute glandular hairs; *leaf-blade* drooping, symmetric to slightly asymmetric, narrowly to very narrowly elliptic-ovate, rarely with a few large teeth at the apical part, gradually tapering towards the top, 3.9-16.0 × 0.6-2.3 cm, crispy-herbaceous, palmately nerved with 3-5(-9) main nerves; margin variously almost entire to denticulate or finely serrate, concolorous with the blade, sparsely ciliate; base rounded, top acute; upper surface light to dark green, dull, rugulose due to the sunken nerves, with or without



Fig. 8. *Begonia wilksii* Sosef. – 1: habitus (x2/3); 2: inflorescence (x2); 3: female flower (x3); 4: style (x4); 5: fruit (x3). – 1, 5: *Wilks 1314*, 2-4: *J.J. de Wilde & Sosef 10325*.

a few erect white hairs and in addition scattered with minute glandular hairs; lower surface paler than the upper, scattered with minute glandular hairs, sometimes only very few; *nerves*: the main and larger secondary nerves sunken on the upper surface, on the lower prominent, green brown to pinkish brown, red when young, densely to sparsely hirsute with patent or appressed hairs and in addition scattered with minute glandular hairs, the smaller secondary nerves distinct, glabrous, tertiary nerves less distinct but in sicco still well visible, slightly prominent and creating a typical reticulate pattern. **Inflorescence** containing 1-3 male flowers and 1 terminal female one; flowers positioned below or at about the same level as the leaves; *peduncle* simple, 1.7-6.5 cm long, hirsute with white or red hairs and in addition scattered with minute glandular hairs; *bracts* 2-4, broadly elliptic, 0.7-3.3 mm long, pale green or green to wine red, scattered with minute glandular hairs or not; margin dentate, ciliate. **Male flower**: *pedicel* elongated at anthesis up to 11(-13) mm, pale pinkish, sparsely hirsute and in addition sparsely scattered with minute glandular hairs; *perianth segments* elliptic-ovate to broadly ovate or sometimes circular, with a rounded to cuneate base, 5.5-11.3 × 4.3-7.0 mm, the outer side hirsute with long red hairs and in addition scattered with minute glandular hairs; the upper segment white with a red patch and nerves at the base; the lower segment white; *androecium* with 8-13 stamens; anthers 1.2-1.3 mm long. **Female flower**: similar to the male but shortly pedicellate, the pedicel elongated in fruit, 0.7-4.3 mm long; *perianth segments* 4.2-9.1 × 5.1-6.8 mm; *styles* 3, 2.3-3.3 mm long, fused in the lower 1/2 to 2/3; the top split and horse shoe shaped, the arms 0.7-1.0 mm long and covered with a slender stigmatic band which is sometimes slightly twisted but usually spirally twisted for almost one turn; *ovary* transversely obtriangular to broadly obovate-obtriangular, 2.9-4.8 × 2.5-5.7 mm, olive green to reddish, 3-locular, 3-winged at the apical part, hirsute to very sparsely so with white or red hairs and in addition scattered with minute glandular hairs, base rounded to cuneate; beak present, 0.2-1.6 mm long; wings rarely absent, when present obovate to transversely obtriangular, 0-1.6 mm wide, olive to pale green, the margin ciliate or rarely glabrous. **Infructescence**: peduncle recurved towards the substrate; *fruit* pendulous, broadly obovate or transversely obovate-obtriangular to almost circular, 3.5-7.3 × 3.9-7.4 mm, dry, with a comparatively thick wall, bright green to brown.

Distribution: GABON: N. of Ndjolé (J.J. de Wilde & Sosef 10325); Massif du Chaillu (Wilks 1314).

Ecology: Primary forest; on large rocks in a gully, on vertical rockfaces along a stream; in deep shade.

Notes: The species is named after Mr. Chris Wilks who was the first to discovered it. The author gratefully received photographs taken by Mr. Wilks of the plants in their natural habitat.

The species has fruits which much resemble those of *B. lacunosa* Warb. and *B. scutulium* Hook.f. Presumably *B. wilksii* is closely related to those two species.

3. Acknowledgements

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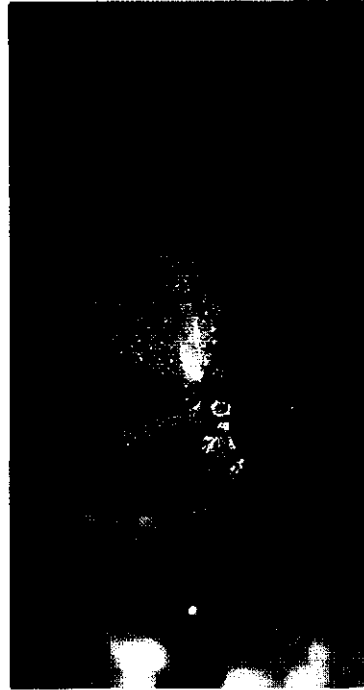
Dr ir J.J.F.E. de Wilde graciously left several new species which he had already recognized as such for me to describe. He and dr ir J.J. Bos corrected the manuscript while dr D.O. Wijnands and dr A.J.M. Leeuwenberg kindly provided the latin transcriptions. Thanks to the efforts of drs A. Louis (LBV) a number of species could be studied in vivo at WAG.

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b

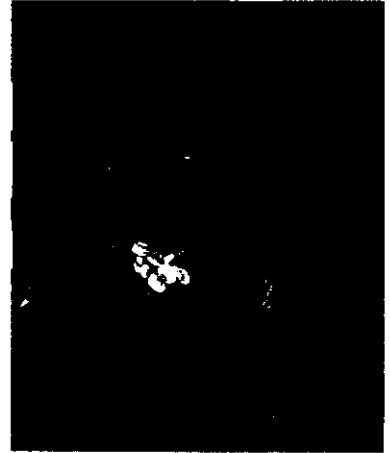


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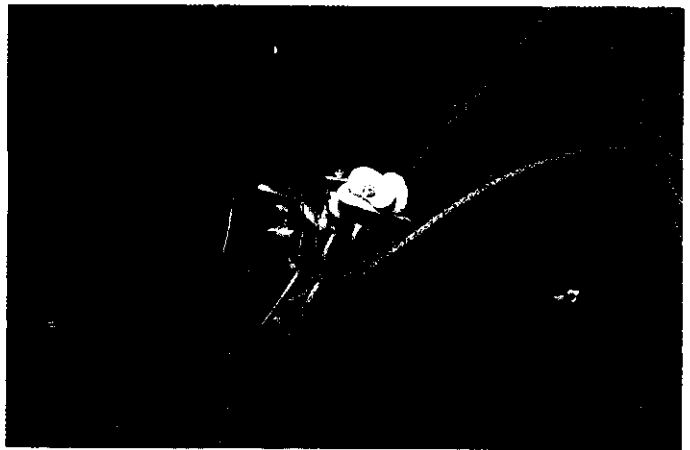
Plate 1. a: *Begonia atroglandulosa* Sosef ssp. *atroglandulosa*, photo by prof H.C.D. de Wit, 1984, glasshouse at WAG, no. 83PTGA077, coll. *J.J. de Wilde c.s. s.n.*; b: idem, young fruit; c: idem, photo by ir J.C. Arends, 1983, Gabon, Massif du Chaillu.



a

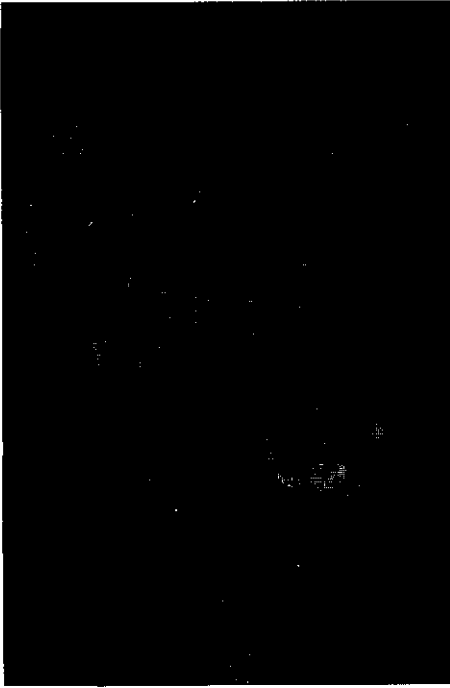


b



c

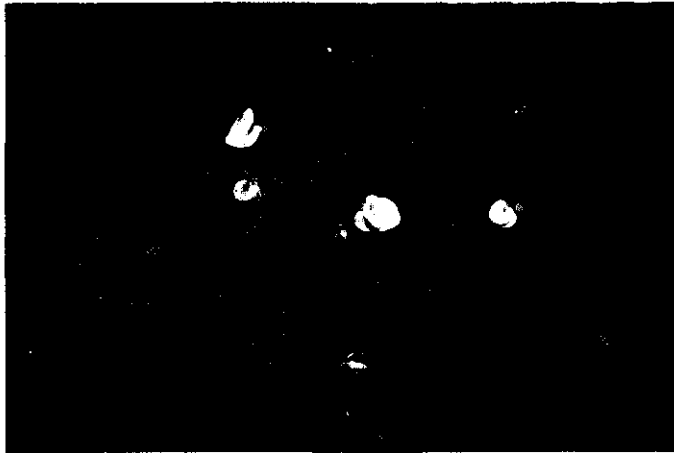
Plate 2. a: *Begonia dewildei* Sosef, photo by prof H.C.D. de Wit, glasshouse at WAG, no. 84PTGA191, coll. *Arends c.s. 700*; b, c: *Begonia erectotricha* Sosef, photos by drs M.S.M. Sosef, 1991, Gabon, Kinguélé, coll. *J.J. de Wilde c.s. 10189*.



a



b



c

Plate 3. a: *Begonia erectocaulis* Sosef, photo by J.J. Wieringa, 1990. Gabon, Tchimbélé, coll. *Wieringa* 701; b, c: *Begonia heterochroma* Sosef: photos by drs M.S.M. Sosef, 1991, Gabon, Kinguélé, coll. *J.J. de Wilde c.s.* 10194.



a



b



c

Plate 4. a: *Begonia susaniae* Sosef: photo by drs M.S.M. Sosef, 1991, Gabon, Tchimbélé-Assok, coll. *J.J. de Wilde c.s. 10131*; b, c: *Begonia wilksii* Sosef, photos by drs. M.S.M. Sosef, 1991, Gabon, N.E. of Ndjolé, coll. *J.J. de Wilde & Sosef 10325*.