ORIGIN OF THE EUROPEAN CULTIVATED CARROT

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TAXONOMIC VIEWPOINTS

The cultivated carrot belongs to the genus *Daucus* L. This genus contains a great variety of wild forms. These grow mostly in the Mediterranean areas and in South West Asia, but some representatives are found in tropical Africa, Australia, New Zealand and the American continents.

As far as known cultivated forms have only been derived from the species *Daucus carota* L. Classification of the wild forms of this species is difficult because of a more or less continuous variation in the material. But THELLUNG (20) classifies them in two groups (*eucarota* and *gummiferi*) each consisting of five main types (subspecies). Plants of the group *eucarota* are mostly annuals or biennials; this group comprises the subspecies *maritimus*, *carota*, *maior*, *sativus* (cultivated carrot), and *maximus*. Plants of the group *gummiferi* are often perennials but they die after flowering once; this group includes the subspecies *commutatis*, *hispanicus*, *fontanesii*, *bocconei* and *gummifer*.

Daucus carota s.sp. *carota* is the commonest wild carrot of Europe and S.W. Asia. Once it was generally thought to be the direct source of the cultivated carrot. In the last century an experiment was recorded, in which, in a few generations, a cultivated carrot was bred from seeds collected from wild plants. But in other experiments this result was not obtained, if the wild seeds were collected in an area where previous hybridization between the wild plants and cultivated carrots was excluded (16, 25). So it must be concluded that in the first mentioned experiment the wild plants which, after selection produced a cultivated form, did so only because they themselves had previously been hybridized in nature with cultivated carrots. As the wild type of root is dominant over the cultivated type, the difference between a wild plant and a hybrid is not evident.

THELLUNG (34, 35) has suggested that it is much more probable that the cultivated carrot has developed from a crossing between *D. carota* s.sp. *carota* and *D. carota* s.sp.

maximus. He bases this opinion on the observation that most of the morphological characters of the cultivated carrot are intermediate between those of the two subspecies mentioned.

The subspecies *maximus* grows in inland regions round the Mediterranean. According to VAVILOV (36) there are gene-centres of *Daucus carota* in Asia Minor, Transcaucasia, Iran and Turkmenistan, and in addition in N.W. India, Afghanistan, Tadjikistan, Uzbekistan and western Tian-Shan. An unusually wide variety of cultivated forms is found in Anatolia. So it is possible that the subspecies *sativus* might have originated there.

ANCIENT WRITINGS

Studies in the history of horticulture have not revealed any indication that, in the ancient civilizations of Asia Minor, Egypt and Greece, the carrot had any importance as a food crop (16, 19, 23). It was certainly used as a medicinal herb, at least in Greece, but for this purpose improvement of the edibility of the root of the wild plants was unnecessary.

It is very probable that at the time of the Romans our type of carrot was still unknown as a food crop. As this opinion is not in compliance with that of most authors on this subject, I shall have to discuss the validity of their arguments.

REINHARDT (32) cites the poem "moretum" of VERGILIUS (78-19 B.C.), from which it appears that in the garden of a simple Roman farmer several crops were grown, among which were cabbage, beetroot, leeks, and in his opinion, also carrot. Checking the text of this poem in the edition of the Loeb Classical Library (12) reveals that VERGILIUS mentions the *siser*, which probably is the skirret, but certainly not the carrot.

REINHARDT (32) also cites PLINIUS (23-79 A.D.) from his Naturalis Historiae, to prove the existance of our cultivated carrot at that time. This quotation, according to REINHARDT, says that the emperor TIBERIUS (ruling from 14–37 A.D.) procured his carrots every year from a place in Germania. But here again the word siser is wrongly translated by carrot. That PLINIUS did not speak here of our cultivated carrot is definitely proved by his statement that the siser contains a hard and bitter core running through its whole length, which can be drawn out when it has been boiled, though nevertheless a great part of the bitterness remains (For PLINIUS see 17, 22, 31).

PLINIUS also mentions a cultivated carrot ("pastinaca") that is sown at the beginning of the spring or autumn, and is fairly good in the first year, but better in the second though still very pungent. Evidently he speaks of a perennial type of root crop. If this really belongs to *Daucus carota* it might be a member of the group *gummiferi*, as in this group the perennial character is known. This perennial character and pungency have never been observed as a regular feature in our type of cultivated carrot. Therefore it is incorrect to identify this cultivated "pastinaca" of PLINIUS with our cultivated carrot, as many authors do (5, 16, 19, 30).

PLINIUS knew another kind of "pastinaca", which the Latins called *Gallic pastinaca*, and the Greeks called *daucos*. This contained some different forms. These, however, are not described in book XIX which treats horticulture, but in book XXV which discusses medicinal plants. This proves that they did not belong to the food crops. Only the seed was used of all these forms, except one. The exception was the variety from

Creta, the root of which was valued. This was probably the so called *Daucus creticus* of ancient authors, which later was renamed *Anthamanta cretensis* L. as it was not a *Daucus* at all (10, 13, 20). Therefore, the conclusion of GIBAULT (16), that the Romans used our cultivated carrot, and that the adjective Gallic might suggest its origin in the Gallic lands (e.g. France) is not well founded.

GIBAULT (16) also thought to have recognized carrots in a reproduction of a mural painting of the Roman town Pompeï, that was covered by lava from Vesuvius in the year 79 A.D., and excavated in recent times. However, by checking the reproduction in Pitture d'Ercolano (1), one can be certain that the foliage of the two bunches of roots painted is not *Daucus carota* foliage.

So, of all the arguments I found none is valid. The Romans certainly grew crops with fleshy roots; possibly even some kind of perennial *Daucus* though this is not at all certain; but there is no indication that they knew our type of cultivated carrot (*Daucus carota* s.sp. *sativa*).

As the Romans carried on an extensive trade with a large part of the world, and brought to Italy anything of value, it is very probable that it was not present anywhere else at that time.

REVIVAL OF ROMAN SCIENCE IN EARLY-MEDIAEVAL EUROPE

After the deterioration of the Pax Romana in the fifth century the direct Roman influence in western Europe ended. For a number of centuries the situation was rather troubled and chaotic. But from the eighth and ninth century onwards monks from the south penetrated into the more northern European countries to bring Christianity, but also knowledge and crops from the declined Roman Empire. CHARLEMAGNE temporarily restored much of the former Roman political unity in continental western Europe. He reigned from 768–814, and did a lot to further agriculture and horticulture with the aid of the old Roman knowledge revived by the monks.

This is testified by a number of writings, the contents of which I have studied through VON FISCHER-BENZON (13).

This author mentions first the Hermeneumata. These were originally Roman instruction books for schools, and afterwards periodically copied by successive generations of monks. Among other things they contain a list of names of vegetables in Greek and Latin, and they say that the Latin name *pastinaca* is considered a synonym of the Greek names *stafilinos*, *karota* and *daukos*. But they do not tell us what kind of root crops are indicated by these names.

Then there are some communications from the ninth century. Two inventories of gardens from the time of CHARLEMAGNE have been saved. They contain several names of vegetables but nothing which reminds of a carrot. The Capitulare de villis imperialibus of CHARLEMAGNE is also known. This is a kind of instruction book describing the plants that he wanted grown in gardens. It mentions *carvitas* and *pastinacas*. It is assumed that these names mean carrot and parsnip respectively. Carvitas is thought to be a faulty copy of the name caroita which comes from carota. In the 14th century a carrot was called garroite in France (See 16). Here the o was also replaced by oi. But it is not certain, of course, that *carvitas* was originally *caroitas*.

From the above it is clear that the Greek-Roman names *carota* (or *carvita*) and

pastinaca were adopted, and probably the plants the Romans indicated by these names as well. There is no proof that they were actually grown. But if they were, it is still uncertain which plants they really were.

There are also communications from two monasteries. WALAFRIDUS STRABUS (807–849), who became abbot of the Benedictine monastery at Reichenau in 843, composed a hymn on agronomy and horticulture and on the plants grown then, but he did not mention anything that might be a carrot or a parsnip. In the building plan for a new monastery at St. Gallen near the lake Constance, which also contained the planting scheme for a vegetable garden, the name *pastinachus* is mentioned. What plant was meant is again uncertain. It may have been the parsnip or another plant the Romans called *pastinaca*.

The problem here is similar to that presented by the ancient Roman writings. There is no evidence that our type of cultivated carrot was known. Probably, with the revival of Roman science there was also a return of several plants known to the Romans.

That the carrot was not indigenous in Europe at that time is confirmed by the inventory of plants in the "Physica" of the holy HILDEGARD, who lived from 1098–1179, and was abbess of convents at Disibodenberg and Bingen. In this inventory the parsnip is mentioned (under the Latin name *Pastinaca* and the German name *Morkrut*), but not the carrot.

PREHISTORIC SEED FINDS IN EUROPE

Since a few millennia B.C. agriculture has been practised on the loess lands north and west of the Danube, stretching from Hungary to Northern Germany and from Galicia to Belgium and the south eastern point of the Netherlands, and on the black earth areas from the Balkans to the Dnieper in Southern Russia (6). During this long period there must have been ample opportunity to find a useful type of wild carrot, to improve it and derive a form worthy of cultivation from it. Indeed some authors have claimed the existence of an indigenous cultivated carrot in Europe before the time of the Romans (BERTSCH, 4).

They base this conclusion on the fact that *Daucus* seeds were found in some excavations of neolithic and bronze age sites in Switzerland and Southern Germany.

NEUWEILER (27) found a dozen seeds at the Utoquai in Zürich dating from about 2000–3000 B.C., and small quantities of seeds in many places in the ancient lake dwelling "Sumpf" near Zug from the late bronze period. In one case these *Daucus* seeds were sticking to a potsherd together with seeds of spelt, barley, broad beans and some other plants. This suggests that the *Daucus* seeds were not present by chance but had been put there intentionally.

BERTSCH (3) found two seeds on a neolithic site in the Schussen valley near Ravensburg, and he cites a find of seven seeds in a late neolithic lake dwelling in the Lake Constance.

NEUWEILER (27) also found some seeds at sites of ancient Celtic and Roman settlements in Switzerland.

From this evidence (especially Sumpf) it seems plausible to conclude that *Daucus* seeds were intentionally collected for human use at that time, but there is no proof, that they were collected for cultivation. Since it is known that in ancient times *Daucus* seeds were very generally used for medicinal purposes, it is much more probable that they were collected for medicinal use. The fact, that there is no definite evidence that

the Romans or the Europeans at the time of CHARLEMAGNE knew our kind of cultivated carrot supports this opinion.

PURPLE AND YELLOW CARROTS FROM THE ARAB COUNTRIES

The first clear description of carrots which are related to our present cultivated types comes from the Arab countries after the spread of Mohammedanism.

LAUFER (24) who studied the history of cultivated plants in Iran and China, concluded, after having criticized earlier authors, that the Persians became acquainted with the cultivated carrot in the 10th century A.D. He is of the opinion that there is no valid evidence that the carrot was known in India before that time. He cites a Chinese author who says that the carrot was introduced into China during the Yuan dynasty (A.D. 1260–1367), probably from Iran.

The communications of the Arab author IBN-AL-AWAM (7) are very interesting. He wrote a book on agriculture in Spain in the 12th century A.D., and cited still older authors. He includes pieces from a book on Nabathean agriculture, which according to CLÉMENT-MULLET (a translator of the book of AL-AWAM) was composed in the 10th century. The Nabatheans lived in the north-west fringe of Arabia, but the data in his book may apply to all Asia Minor.

According to this book the carrot is a plant the root of which is eaten, but not the foliage. There are two kinds, one is red, which is the most juicy and tasty, and the other has a green colour blending into yellow; the latter is coarser than the former. In the climate of Babylonia they are sown between August 26 and October 5, and grown during the winter season. Warmth deteriorates their tastiness and makes them acrid, whereas cold, irrigation with fresh water, frequent northern winds, and even snow are favourable. The carrot is eaten with vinegar, salt, olive oil, and certain vegetables or cereals. The common people also eat it instead of bread.

At Sevilla, in the Arab part of Spain, the carrots were also grown during the winter season.

During the following centuries more and more communications on carrots appeared in Europe. As the types that are described in the book of the Nabatheans can be recognized in the early European descriptions, and even many of the cooking recipes are more or less the same, it seems highly probable that the European carrots have been developed from material originating from the Arab countries.

Written documents prove the acquaintance with carrots in the 13th century in Italy, in the 14th century in France, Germany and the Netherlands, and in the 15th century in England.

PIER DE CRESCENZI (8), an Italian writer on husbandry, who lived 1231–1320, and probably wrote just after 1300, mentioned *Pastinaca sylvestris*, *Daucus creticus*, and a third 'pastinaca' that was red, and could be eaten raw, or cooked with turnips as a beautifully red compote.

GIBAULT (16) quoted from a 14th century French book, titled *Ménager de Paris* "Carrots are red roots which are bought in the market in bunches, and in every bunch a white one".

From the papers of a guild from the 14th century at Lübeck in Germany it appears, according to HOFMANN (21), that onions, garlic, cabbage, turnips, a kind of peas ('krickelarften') and carrots were grown there by the vegetable growers.

According to SANGERS (33) in the 14th century onions, garlic, cabbage and carrots were grown around most towns in the Netherlands. In 15th century documents from a convent at Rijnsburg near

Leyden he saw that the inhabitants had eaten 'white carrots' (probably parsnips) and red carrots.

ALICIA AMHERST (2) states that in a list of plants at the beginning of an English book of cooking recipes from the 15th century, under the heading 'rotys for a gardyn', karettes = carrots are also mentioned.

More detailed indications are found in some herbals and botanical works from the 16th, 17th and 18th centuries. A survey of the names, descriptions and drawings given herein has been composed in table 1.

As in the book of the Nabatheans, two types of carrots are described, a red type and a yellow one. From the colour-indications "brown red", "blackish red", "atrorubens" or "atrorubente" (= dark red), and "redder than a red beet", it is evident that the carrots that formerly were called red, were indeed purple, like red beet and red cabbage. In several writings of a somewhat later period, which will be discussed in a following article, it is said that the purple carrot is tender, juicy and tasty.

Orange red carrots appear at a much later date. As the first specimens of this new type were not praised for their tastiness or tenderness, the qualifications "tasty" and "tender" in writings prior to about 1700, given to a "red" carrot are another indication that the purple carrot is meant. Consequently the "red" carrot in the book of the Nabatheans must also be a purple one. In Egypt today they still grow a carrot variety with "small purple roots which are sweet and tender" (24a).

Lastly the following cooking recipes suggest a strong relation to the Nabathean recipe.

DE VILLE (37) writes in 1680: the roots are eaten fried or cooked with oil, salt or vinegar.

ELSSHOLTZ (11) says in 1684 that the Walloons, the French, the Brabanders, and the Hollanders cook the purple carrot in the ordinary way, or they make a winter salad from it. Therefore they are first cooked until soft in water, then peeled and sliced, and then vinegar, oil, salt and pepper are added. They can also be fried in different ways with butter and onions, or with flour and butter.

Similar recipes are found in the herbal of ZWINGER (38).

In conclusion it may be stated that all the evidence produced makes it highly probable that the initial European carrot material originally came from the Arab countries. The first carrots may indeed have been selected in the gene-centre of Anatolia.

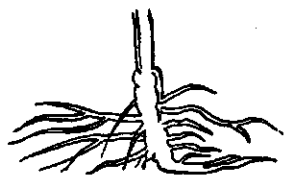
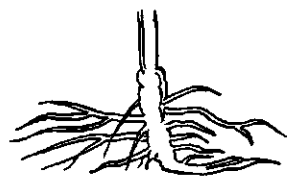
ACKNOWLEDGEMENTS

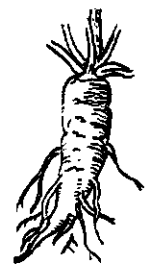
The author wants to express his sincere thanks to Mr. G. DE BRUYN for his untiring cooperation in finding writings relevant to this study.

SUMMARY

1. Ancient and modern literature, as far as accessible to the author, has been studied to find indications of the origin of the European cultivated carrot.
2. Contrary to most writers on the same subject, it is concluded that there is no evidence that our type of cultivated carrot (*Daucus carota* s.sp. *sativa*) was known to the Romans, or to the Europeans at the time of CHARLEMAGNE (± 800 A.D.) or before.

TABLE 1. SURVEY OF NAMES, DESCRIPTIONS AND DRAWINGS OF CARROTS

Author	Time, locality	Purple carrot	Yellow carrot
FUCHS (14)	1543 Germany	Carote or Red Carrot (*Pastinaca sativa prima*) Root long and brown red. 	Yellow Carrot (*Pastinaca sativa altera*) Root long and yellow. 
DODOENS (9)	1554 Belgium Mecheln	Red Carrot or Carote (*Staphylinus niger*) Root long, thick, internally and externally brown red. 	Yellow Carrot (*Staphylinus luteus*) Root long, thick, internally and externally yellow. 
GERARDE (15)	1597 England London	Red Carrot or Black Carrot (*Pastinaca sativus tenuifolia*) Root long, thick, single, of a blackish red colour.	Yellow Carrot (*Pastinaca sativus tenuifolia*) Root long, thick, single, of a fair yellow colour. 
PARKINSON (29)	1640 England London	Common Red Carrots (*Pastinaca sativa altera tenuifolia atrorubens*). 	Common Yellow Carrots (*P. tenuifolia sativa lutea*). 

Author	Time, locality	Purple carrot	Yellow carrot
MUNTING (26)	1672 Netherlands Groningen	Red Carrot (*Daucus sativus radice rubra*)	Yellow carrot (*Daucus sativus radice lutea*)
DE VILLE (37)	1680 France Lyon	Red Carrot (*Pastinaca tenuifolia sativa, radice atrorubente*) 	
NYLANDT (28)	1682 Netherlands Amsterdam		Yellow Carrot (*Pastinaca tenuifolia sativa lutea*) Root long, thick.
ZWINGER (38)	1774 Switzerland Basel	Red Carrot (*Pastinaca tenuifolia, sativa radice atrorubente or Carota rubra*) Root as large or larger than that of the yellow carrot; completely red, even much redder than the root of the red beet. 	Yellow Carrot (*Pastinaca tenuifolia sativa, radice lutea vel alba or Pastinaca sativa lutea*) Root one foot long, round, juicy, thick, yellow. 

3. It is highly probable that the initial European carrot material originally came from the Arab countries, and found its way into Europe in about the 13th and 14th centuries.

SAMENVATTING

Oorsprong van de Europese cultuurwortel

1. Oude en nieuwe literatuur, voor zover toegankelijk voor de schrijver, is bestudeerd om aanwijzingen te vinden over de oorsprong van de Europese cultuurwortel.
2. In tegenstelling met de meeste schrijvers over hetzelfde onderwerp, wordt geconcludeerd dat er geen houdbaar bewijs is dat ons type cultuurwortel (*Daucus carota* s.sp. *sativa*) reeds bekend was aan de Romeinen of aan de Europeanen ten tijde van KAREL DE GROTE (± 800 n. Chr.) of daarvoor.
3. Het is zeer waarschijnlijk dat het eerste Europese wortelmateriaal in oorsprong afkomstig was uit de Arabische landen, en zijn weg in Europa heeft gevonden omstreeks de 13e en 14e eeuw.

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THE DEVELOPMENT OF THE ORIGINAL EUROPEAN CARROT MATERIAL

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CONTENTS

INTRODUCTION

In a former article (5) it was shown that it is highly probable that the original European carrot material was imported from the Arab countries about the 13th or 14th century. This original material consisted of two types, one purple, the other yellow.

The purple type used to be called "red" like red cabbage and red beet, until about 1700. Later, when the purple carrot was more or less forgotten, the word "red" was used for the orange carrot, which came into existence later.

In the following article the development from the original material to the first orange red carrots is traced.

HISTORY OF THE PURPLE CARROT IN EUROPE

We have seen that the "red" carrot was mentioned in Italy at about the end of the 13th or the beginning of the 14th century. Venice had an important trade with the Arab countries at that time. Therefore it is quite possible that the purple carrot entered Italy through this channel, and found its way from here into France, where it was mentioned in the 14th century. Later, in 1744, ZWINGER (33) writes that the "red" carrot was first an Italian garden crop, and later also grown in Switzerland.

According to AL-AWAM (10) carrots were grown near Sevilla in Spain in the 12th century, but he does not specify the varieties. As the purple variety was the best of the two at that time, why should not they have grown the purple one? Therefore the purple carrot may have had a second introduction into France from Spain.

In the Netherlands the "red" carrot was mentioned in the 15th century. It is very probable that it had come from France, for its specific Dutch name until some time in the 16th century was the French word *carote*.

FIG. 1. DETAIL OF MARKET SCENE BY NICOLAAS MAES (1634–1693). A woman selling cabbages and bunches of carrots in the market of Dordrecht. The colour of the darkest carrots is purple, that of the lightest is yellow.

Courtesy Rijksmuseum, Amsterdam (Neth.)

In Germany the purple carrot probably spread at the end of the 17th or in the first part of the 18th century. For in 1684 ELSSHOLTZ (15) said that the "red" carrot was well known by the Walloons, the French, the Brabanders and the Hollanders, but the Germans were not very well acquainted with it, whereas HESSEN (19) in 1740 wrote a whole paragraph on its use in Germany. The purple carrot was then called in Germany *Holländische carotte*. This suggests that the purple carrot had been introduced into Germany from Holland. HESSEN's remark that the best seed came from Holland, suggests that the purple carrot was sufficiently important in the Netherlands at that time to give its production and selection due care.

I did not find any indication that the purple carrot was grown in England as a real garden crop. It is mentioned, of course, in the herbals of GERARDE (17) and PARKINSON (28) but not by a horticulturist like GARDINER (18) writing in 1603. PHILIP MILLER (25), in 1768, discusses it as a curiosity only, which he grew from seeds he had received from Aleppo in Syria.

The seed firm of SUTTON & SON at Reading (Eng.) had the *Long Purple* in their cata-

logue in 1872 and 1874, with the remark "French import"; PETER LAWSON & SON Edinburgh, carried the *Purple* from 1854–1859. Evidently they had this type only temporarily and also more or less as a curiosity.

Now we shall turn to a more detailed discussion of its role in horticulture in France, the Netherlands and Germany.

As has been cited before, in 14th century France, bunches of "red" carrots could be bought in the markets. This could only have been possible if they were regularly cultivated. In 1684 ELSSHOLTZ said that the French knew very well how to make use of the purple carrot, but in 1752 DE COMBLES (11) stated, that it had never been very popular in France, however good its taste. He thought the reason was, that its anthocyanin pigment coloured the soups or ragouts to which it was added.

This objection was repeated by later authors, e.g. by NOISETTE in 1825 (26). JOIGNEAUX (20, 21) described another one: after cooking the root turns a dirty yellow colour. Some authors complained that the plants bolted too quickly (2, 4), others said that they had no trouble in this respect (21). But NOISETTE's remarks showed that there were varietal differences. The *Long Red* and the so called *Round Red*[1] did not bolt when grown in the summer; they, evidently, were already adapted to the more northern growing conditions. But the *Violette d'Espagne*, and also a variety from Provence in southern France (possibly similar), bolted in summer cultures in more northern regions of France.

An investigation made at the Institute of Horticultural Plant Breeding, Wageningen, showed that this may be caused by a difference in sensitivity to day length (BRAAK, 8). The usual varieties of north-west Europe are insensitive in this respect. They run to seed after vernalization by cold. But several varieties, indigenous to the Mediterranean and Asia Minor, are sensitive to day length and rapidly bolt when grown at Wageningen.

During the 19th century the catalogues of several French seed firms mentioned the *Carotte Violette* or *Carotte Violette Longue*. After 1900 this name disappeared and was replaced by *Carotte Longue Rouge Sang*, the *Long Bloodred*, which was also purple. A picture of it was given by VILMORIN-ANDRIEUX & Co, Paris (Fr.) (see Fig. 3). This firm classified the variety in 1904 with the forage carrots, where it was still found in 1925.

According to HESSEN the purple carrot must have been of importance in the Netherlands. It can also be found in paintings of old Dutch masters, e.g. in a painting by PIETER AERTSEN (1509–1575) dated 1559 (Fig. 2), and in a market scene by N. MAES (1634–1693) from the 17th century (Fig. 1).

Evidently, in the 17th century it was still quite usual for purple carrots to be sold in a Dutch market. In 1721 DU VIVIE (32) said that "red" carrots were eaten in the Netherlands as a winter salad. Later authors do not mention the purple carrot any more. It is true that UILKENS (31) in 1855 used three names of purple carrots in his survey of carrot varieties, but this survey gives the impression of a list of all the variety names found by him in international literature, rather than varieties actually grown in the Netherlands.

Nevertheless, the purple carrot seems to have been retained by some growers in the southern part of Holland and in Belgium till very recent times. This is apparent from an article by DICKS (13) in 1924, in which he says that a long, dark-violet variety, called *Brabanter*, was grown in Belgium and the southern part of the Netherlands. It

[1]) This variety was not round, but relatively short, top-shaped.

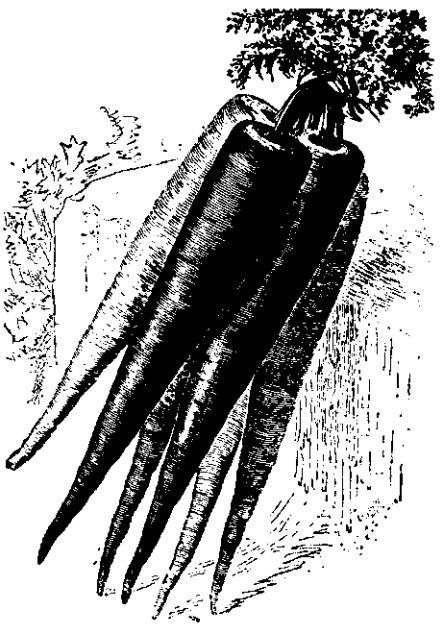

Fig. 3

FIG. 2. DETAIL OF THE PAINTING "CHRIST AND THE ADULTERESS" MADE AT AMSTERDAM IN 1559 BY PIETER AERTSEN (1509–1575). In the foreground is a market scene, where vegetables are offered for sale, among which are carrots. The colour of the dark carrots is purple, that of the light ones is yellow.

Courtesy Städelsches Kunstinstitut, Frankfurt am Main (Germany)

FIG. 3. LONG BLOODRED (LONGUE ROUGE SANG, VICTORIA), A VARIETY OF THE PURPLE CARROT.

Drawing published by Vilmorin Andrieux & Cie, Paris (France)

makes a popular dish cut and dressed like red cabbage, he wrote. About 1935 NIEK ZWAAN, from Enkhuizen, found a purple carrot being grown in the south-eastern part of the Netherlands. After re-selection, he introduced it in 1946 into the trade under the name of *Wobbie*, but the commercial vegetable growers were not very interested in it. We ourselves found a grower in 1949 who had retained the purple carrot. Both looked like *Long Bloodred*. A variety *Brabant Violet Autumn* figured during the years 1917–1920 in the seed catalogue of SLUIS & GROOT, Enkhuizen.

HESSEN (19), in Germany, stated in 1740, that a large area of the purple variety of carrot was not needed, as it was only used for preservation and for colouring food. CALWER (9) in 1852 mentioned a large and a small purple variety, without further commentary.

In the second half of the 19th and the beginning of the 20th century, several German seed firms carried a purple variety. BENARY, Erfurt, mentioned *Violet*, *New Violet* or *Long Violet* from 1844–1900; from 1900–1919 or later these names are replaced by *Victoria Long Bloodred*. This evidently was the same as the *Carotte Longue Rouge Sang*, for HEINEMANN, Erfurt, gave VILMORIN's picture of figure 3 with the name *Victoria*.

Summarizing, it may be said that:

a. The purple carrot played a role in France during the 14th–17th centuries, in the Netherlands during the 15th–18th centuries, and in Germany during the 18th and possibly the 19th centuries.

b. In France and the Netherlands the purple variety was in the beginning probably the main type grown.

FIG. 4. DETAIL OF A PAINTING BY FLORIS VAN DIJCK (1575–1651). Yellow carrots.

Courtesy Rijksmuseum, Amsterdam (Neth.)

FIG. 5. DETAIL OF A PAINTING "YOUNG MOTHER WITH CRADLE" MADE IN 1658 BY GERARD DOU (1613–1675). Yellow carrots.

Courtesy Museum Mauritshuis, The Hague (Neth.)

c. Later on, when other types appeared, its use was limited. In Germany it was introduced when this phase of limited use had been reached.

If the drawings of FUCHS and DODOENS are compared with those of the later herbalists and with the pictures in figures 1, 2 and 3, one gains the impression that the shape of the purple carrot was considerably improved during the 16th and 17th centuries. But it is doubtful whether the carrots at the time of FUCHS and DODOENS were as bad as their drawings suggest. The carrots painted in 1559 by PIETER AERTSEN already had a very good shape. As the herbalists drew plants complete with flower stalks, it is quite possible that the pictures of FUCHS and DODOENS just represent the badly developed root of an early bolter. Their character suggests so.

Fig. 6

Fig. 7

FIG. 6. DETAIL OF THE PAINTING "JESUS IN THE HOUSE OF MARTHA AND MARIA" BY PIETER AERTSEN (1509–1575), MADE IN 1553 PROBABLY AT ANTWERP, WHERE HE WORKED TILL 1555. In the foreground a kitchenscene with ordinary people, and also two yellow coloured carrots, which are very long in proportion to their diameter; the shoulders are relatively narrow. *Courtesy Museum Boymans, Rotterdam (Neth.)*

FIG. 7. "WOMAN SCRAPING CARROTS" BY GERARD DOU (1613–1675), AT LEYDEN. The carrots are yellow with a tinge of orange. *Courtesy Staatliches Museum, Schwerin (Germany)*

DEVELOPMENT OF THE YELLOW CARROT

According to the description by AL-AWAM the Arab yellow carrot had a green colour blending into yellow. As every carrot becomes green as far as it grows above the soil, this evidently was a type that largely grew above ground.

The entry of this carrot into Europe is not so clear as in the case of the purple carrot. But the first signs of its presence as a horticultural crop are found in the Netherlands in the 16th century. According to BLINK (7) the yellow carrots from Hoorn were already famous for their quality in the Netherlands in the 16th century. Two pictures of the Netherlands painter PIETER AERTSEN (1509–1575) show that their shape was quite regular. There were two yellow types. Figures 4 and 5 show a common, long, conical shape, figure 6 shows a narrow shouldered type that is very long in proportion to its diameter; the latter was painted at Antwerp, Belgium.

The shape of the yellow carrots in the drawings from the herbals of GERARDE (27) and PARKINSON (28) corresponds to that in figures 4 and 5. The same shape is also found in figures 7, 9 and 10.

The yellow carrots gradually superseded the purple. On reading DODOENS and

GERARDE (16th century) one gains the impression that they payed most attention to the yellow carrots. In the 17th century there are several authors who discuss only the yellow carrots, and not the purple.

In 1603 GARDINER (18) in England only mentioned two cultivated varieties, the *Great Long Yellow Carrot* and the *Great Short Carrot*. Involuntary one tends to recognize the two types painted by PIETER AERTSEN. In 1682 NYLANDT (27) in the Netherlands spoke only of the yellow carrot. In 1684 ELSSHOLTZ (15) mentioned the yellow carrot as the only one that was fairly common in Germany. In 1697 DE LA QUINTINYE (30) in France wrote about the yellow carrot but not the purple one. In the 18th century the yellow carrot was generally described as the most popular for kitchen purposes (1, 3, 12, 19). PHILIP MILLER (25) said in 1768 that in England the yellow carrot was generally grown for kitchen use, but in London the orange carrot was preferred to all others. In France two yellow varieties were known, the *Long Yellow* and the so called *Round Yellow*, which in fact was a relatively short top-shaped type. In Germany HESSEN mentioned two short varieties only, the *Holländische Weisse Gelbe Kurze Dicke* (which he said had the better quality of the two), and the *Quedlinburgische Weiss Gelbe Kurze Frühe*.

In the first half of the 19th century the yellow carrot was still widely grown for winter use, but gradually it declined to the position of cattle-food. In the country, however, it was used for human consumption during the winter until the beginning of the 20th century. Many appreciated its mild flavour, but, eventually, it was definitely replaced by the orange red carrot.

HAVE THE WHITE CULTIVATED CARROTS BEEN DERIVED FROM THE YELLOW?

PARKINSON (28) said in 1640 that he had seen that the yellow carrot, when sown, sometimes became white. This suggests a genetical segregation of white carrots from the yellow.

Furthermore, white cultivated carrots were not mentioned in the herbals of the 16th and 17th centuries. NYLANDT (27) described in 1682 what he called a "White Carrot", but this was a parsnip. This is clear from the details he gave, and from its Latin name *Pastinaca latifolia sativa* whereas that of the carrot was *Pastinaca tenuifolia sativa*.

Prior to the end of the 17th century there is no evidence from which the existance of white cultivated carrots can be derived with certainty. In 1684 ELSSHOLTZ (15) in Germany discussed the parsnip and the carrot. He mentioned yellow, white and purple types of the carrot. In his opinion the white were inferior to the yellow and not popular in Germany. According to later German authors (6, 9) they have never become popular there, though LANGETHAL (22) stated that in the country in South-Germany they were still used for human consumption in the second half of the 19th century. In 1697 DE LA QUITINYE (30) in France mentioned two garden carrots, the yellow and the white. Later French authors recommended white carrots for kitchen use throughout the 18th century (1, 3, 11, 23, 24). But gradually they gave way to the yellow. In 1825 NOISETTE (26) still mentioned the *Long White* and the *Short White*, but he said that they were not so good and little grown. Later the white carrot was no longer recommended for kitchen use.

In the Netherlands the white carrot has not been important as a root vegetable. In

1721 it was mentioned by DU VIVIE (32), with the remark that it was more nourishing than other types of carrots; in 1763 DE LA COURT VAN DER VOORT (12) classified it as the most unpalatable of the carrots.

According to PHILIP MILLER (25) in the 18th century white carrots were not widely grown in England. HENRI PHILLIPS (29) in 1822 wrote: "The white carrot, or carotte blanche of the French, is but little known in our markets, and seldom grown, excepting by those families who are fond of French dishes."

Summarizing, it seems certain that the white cultivated carrot is of a later date than the yellow. The observation made by PARKINSON, cited above, suggests the possibility that it may have segregated from the yellow, after hybridization with the wild white carrot or not. Only in France was it esteemed (and probably improved) for kitchen use.

THE FIRST APPEARANCE OF THE RED-ORANGE CARROTS

The first evidence from writings on orange-yellow or red-orange carrots is from the 18th century.

DU VIVIE (32) in 1721 in the Netherlands made a distinction between *Pale-yellow* and *Reddish-yellow* carrots, both of which were simultaneously mentioned as being extensively used in the kitchen, cooked with meat. By 1763 four types of orange coloured carrots had been developed in the Netherlands. P. DE LA COURT VAN DER VOORT (12) then gave the following classification:

1. Long yellow carrots, also called "Leyden carrots"; three varieties.
   - 1.1 *Long Yellow*, the most savoury.
   - 1.2 *Redder of this type*, thicker, more watery, not as savoury as 1.1.
   - 1.3 *Roep*, nearly white, the quickest grower, but unsavoury.
2. "Horn Carrots", shorter and more orange coloured.
   - 2.1 *Late Horn*, pale-orange, somewhat longer than 2.2 and less watery than 2.2 and 2.3.
   - 2.2 *Half-long Horn* (Utrecht-Horn seed), more orange coloured than 2.1, in length between 2.1 and 2.3; for early summer culture; before it is completely fullgrown very sweet and savoury, but in a fullgrown condition watery.
   - 2.3 *Short Horn*, more orange coloured than 2.1, very short, therefore suited for cultivation on heating manure; before it is completely fullgrown very sweet and savoury, but in a fullgrown condition watery.

Evidence from paintings is of an earlier date. Orange coloured carrots are found in a number of Dutch pictures from the 17th century already.

Figure 9 gives a detail from a picture of P. C. VAN RIJCK (1568–1633), probably painted at Delft between 1604 and 1633. The shape of the carrots is rather uniform, but the colour is variable. Most are yellow, but two or three are a reddish colour and one is whitish. They look exactly like a population more or less homogeneous for shape but segregating for colour. This painting seems to give a reason why DE LA COURT VAN DER VOORT classified *Long Yellow*, "*Redder of this kind*" and the whitish *Roep* all under the heading *Long Yellow*. Evidently they had all arisen from it during the 17th century.

FIG. 8. DETAIL OF "THE QUACKSALVER", A MARKET SCENE AT LEYDEN BY GERARD DOU (1613–1675). The carrots in the wheelbarrow are orange-yellow. They look sowewhat like the variety Late Horn. *Courtesy Museum Boymans, Rotterdam (Neth.)*

There is also a painting of a woman selling vegetables, by J. WTTEWAEL (1566–1638) at Utrecht (Neth.) of about 1618 (Central Museum, Utrecht) that shows long carrots of about the same shape as those mentioned above, and again varying in colour. Three of them are purple, four are yellow, and four red-orange. Here are too many colours to believe that this is a genetical segregation.

Figure 10 gives a detail from another picture by P. C. VAN RIJCK, painted in 1621. These carrots are pale orange-yellow. They look like *Long Orange*.

Figure 8 is from a market scene of 1652, painted by GERARD DOU (1613–1675). The carrots in the wheelbarrow are orange-yellow. They look like the variety *Late Horn*. Another painting by GERARD DOU, "Old woman with boy" (private collection of Mrs. A. E. VAN BEUNINGEN-CHARLOUIS, Vierhouten), apparently shows the same wheelbarrow with the same type of orange-yellow carrots (possibly even the same individual carrots). As it is known that this painting was made about 1650, that of figure 8 may also be of that time.

The carrots in figure 11 are from a picture by GERRIT VAN BATTEM (1636–1684). They are red-orange, and of a finer type. They look like *Half-long Horn*.

So it does not seem too bold a statement to say that in the Netherlands during the 17th century the varieties *Late Horn*, and *Half-long Horn* were developed, whereas the *Short Horn* probably was not produced before the 18th century.

FIG. 9. DETAIL OF A PAINTING BY P. C. VAN RIJCK (1568–1633) PROBABLY MADE BETWEEN 1604 AND 1633 AT HAARLEM. Most of the carrots in this picture are yellow, but two or three are of a reddish colour and one is whitish.

Courtesy
Rijksmuseum,
Amsterdam (Neth.)

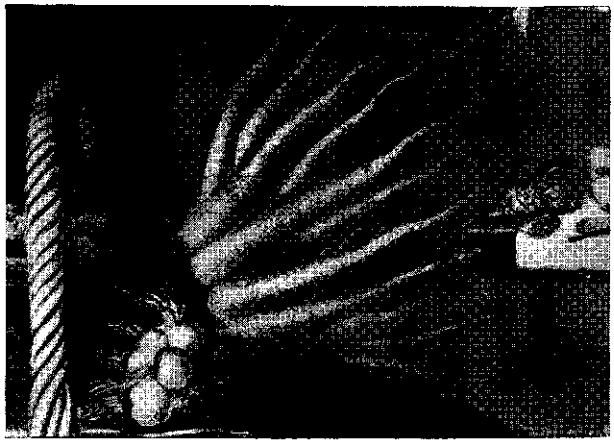

FIG. 10. DETAIL OF A KITCHEN SCENE, PAINTED BY P. C. VAN RIJCK (1568–1633) IN 1621. The colour of the carrots is pale orange yellow.

Courtesy
Frans Hals Museum,
Haarlem (Neth.)

FIG. 11. DETAIL OF A PAINTING BY GERRIT VAN BATTEM (1636–1684), POSSIBLY MADE AT UTRECHT. The carrots are red-orange, and of a finer type than those shown in the foregoing pictures. This may be the variety Half-long Horn.

Courtesy
Museum Boymans,
Rotterdam (Neth.)

The origin of the long orange carrot is not very clear. According to the paintings I have mentioned there were two types of long orange carrots as early as about 1600. One type was red-orange. The other was orange-yellow. There are indications that in the beginning the red-orange carrots were not as palatable as the yellow ones. Therefore I am inclined to think that a qualitatively improved long orange carrot has been produced by selecting orange roots from the yellow type possibly after artificial or spontaneous crossings with the red-orange type. Then the origin of the first red-orange carrots is still dark of course, but an explanation is found for the following facts:

a. The long orange-yellow type was more popular than the long red-orange type.
b. During the 17th and 18th centuries the colour of the long orange-yellow carrots gradually improved from pale-orange into red-orange, whereas the type that was red-orange at about 1600, evidently was discarded.

In Germany the first sign of the existence of a red-orange carrot is the description given by HESSEN (19) in 1740 of the variety *Brunsvic*. This was described as long and of a red-yellow colour. The quality was not yet too good, for, according to HESSEN, it was dry, hard, and coarse, and more suited to the fattening of pigs, than to human consumption. ELSSHOLTZ (15) in 1684 did not mention an orange coloured carrot, so the *Brunsvic* may have come into use between 1684 and 1740.

In England the *Orange Carrot* existed in 1768, and probably earlier, for in London it was preferred at that time to all other, according to PHILIP MILLER (25). As, on the other hand, the preference was limited to London, it probably at that time had not spread all over the country. As carrots had been imported already for a long time from the continent (18) originally it may have come from there.

In France the orange red carrot is not mentioned in the many writings before 1775. But in 1775 B., M. L. (3) said that the *Long Red* came into fashion. He added that it was very good, but not so thick, and its strong taste did not please everybody. Towards the end of the 18th and the beginning of the 19th century appreciative communications on the *Horn* carrots were found; also the *Long Red* was accepted more and more. In 1822 Madame ADANSON (2) preferred the *Long Red* because of its quality and its yield.

In 1825 NOISETTE (26) defined the orange-yellow carrot as a sub-variety of the yellow with the same qualities.

From the evidence produced it seems safe to conclude:

a. That the orange carrots fit for kitchen use were gradually developed from the yellow by selection.
b. The first orange coloured garden carrots were produced in the Netherlands. *Late Horn*, and *Half-long Horn* probably were developed in the 17th century, whereas *Short Horn* probably was produced in the 18th century.
It is possible that *Long Orange* types fit for kitchen use were produced in Holland during the 17th century by selection from the long yellow carrot, possibly after crossing with an unpalatable but more intensely coloured red-orange type.
c. The orange *Brunsvic* probably came into use in Germany between 1684 and 1740. Originally it had the character of a forage carrot.

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SUMMARY

1. European carrot improvement began with material imported from the Arab countries. It consisted of a purple type, called "red" by authors before about 1700, and a yellow type growing largely above the ground.
2. The purple carrot played a role in France during the 14th–17th centuries, in the Netherlands during the 15th–18th centuries, and in Germany during the 18th and possibly the 19th centuries. At first the purple carrot probably was the main type grown, later its use became very limited.
3. The yellow carrot became more generally used than the purple. It gradually spread throughout Europe and probably started superseding the purple in the 16th century.
4. The white and the orange carrots were probably selected from the yellow.
5. During the 17th and 18th centuries the white carrots were used in the French kitchen. In other countries they never became as popular as in France.
6. The first orange coloured garden carrots were produced in the Netherlands. *Late Horn* and *Half long Horn* probably were developed in the 17th century, whereas *Short Horn* probably was produced in the 18th century.
   It is possible that *Long Orange* types fit for kitchen use were produced in Holland during the 17th century by selection from the long yellow carrot, possibly after crossing with an unpalatable but more intensely coloured red-orange type. The orange *Brunsvic* appeared in Germany between 1684 and 1740. Originally it had the character of a forage carrot.

SAMENVATTING

De ontwikkeling van het oorspronkelijke Europese wortelmateriaal

1. De Europese wortelveredeling is uitgegaan van materiaal afkomstig uit de Arabische landen. Dit omvatte een paars type, dat door schrijvers van voor ongeveer 1700 werd aangeduid als "rood", en een geel type dat sterk bovengronds groeide.
2. De paarse wortel was van betekenis in Frankrijk gedurende de 14e–17e eeuw, in Nederland gedurende de 15e–18e eeuw en in Duitsland gedurende de 18e en misschien ook de 19e eeuw. In het begin was de paarse wortel waarschijnlijk het hoofdtype voor de teelt, maar later werd het gebruik zeer beperkt.
3. De gele wortel verkreeg een veel algemener gebruik dan de paarse. Langzamerhand verspreidde hij zich meer en meer over Europa. Vermoedelijk begon hij in de 16e eeuw de paarse al te overheersen.
4. De witte en de oranjerode wortelen zijn vermoedelijk ontstaan uit de gele.
5. Gedurende de 17e en 18e eeuw werden de witte wortels in de Franse keuken gebruikt. In andere landen zijn ze nooit zo populair geworden als in Frankrijk.
6. De eerste oranje tuinwortelen zijn in Nederland geproduceerd. De *Late Hoornse* en de *Halflange Hoornse* zijn vermoedelijk in de 17e eeuw ontstaan, de *Korte Hoornse* in de 18e eeuw.

Het is mogelijk dat de lange oranje typen, die geschikt waren voor gebruik in de keuken, in de 17e eeuw in Holland ontstonden door selectie uit de lange, gele wortel, mogelijk na kruising met een oneetbare doch sterker roodoranje gekleurd type. De oranje *Brunswijker* verscheen vermoedelijk tussen 1684 en 1740 in Duitsland. In het begin was het een voerwortel.

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DRUK: H. VEENMAN EN ZONEN, WAGENINGEN