ORIGIN, HISTORY AND TAXONOMY OF CHICKPEA

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The cultivated chickpea, *Cicer arietinum* L., was one of the first grain legumes to be domesticated in the Old World. Archaeological and linguistic evidence for the use of chickpea by early man is limited, but a reasonable picture can be drawn of its history. Of course, more documentation is certainly required. This chapter is an update of earlier publications on the same subject by van der Maesen (1972) and Ramanujam (1976).

I. ORIGIN

The chickpea most probably originated in an area of present-day south-eastern Turkey and adjoining Syria. Three wild annual species of *Cicer*, closely related to the chickpea, are found there: *C. bijugum* K.H. Rech., *C. echinospermum* P.H. Davis and *C. reticulatum* Lad. The latter, first described by Ladizinsky (1975), could also be classified as a wild variety or subspecies of *C. arietinum*. The former two were described recently (Rechinger 1952, Davis 1970). *Cicer reticulatum* can be considered as a progenitor, or perhaps had a common ancestor with chickpea. Since early botanists did not recognize these (relatively rare) close relatives, various diffuse origins have been postulated for chickpea.

De Candolle (1883) traced the origin of chickpea to an area south of the Caucasus and northern Persia. Vavilov (1926, 1949-50) designated two primary centres of origin (now centres of diversity), south-west Asia and the Mediterranean, and a secondary one, Ethiopia. He noticed that, like other grain legumes, large-seeded cultivars abounded around the Mediterranean basin, whereas small-seeded cultivars predominated eastwards. There are linguistic indications that the large-seeded, cream-coloured chickpea

reached India only two centuries ago, apparently through Afghanistan, as its Hindi name is *Kabuli chana* (chana = chickpea), an allusion to the Afghanistan capital Kabul. The small-seeded, dark-coloured chickpea is called *Desi* (local), and these denominations are now quite widely used to distinguish the two main groups of cultivars.

The most closely related wild species, *C. bijugum, C. echinospermum* and *C. reticulatum* would have attracted early food gatherers; the seed size of *C. bijugum* and *C. reticulatum* is quite reasonable (ca 9 and 10 g per 100 seeds), and unlike other species, they do not shatter their seeds immediately upon ripening. Domestication and crop evolution followed the usual process (Schwanitz 1966). Artificial selection favoured large palatable seeds, reduced pod dehiscence, non-dormancy, synchronous ripening, earliness and diversity of forms. If perennial species have played a role, their perennial nature and spiny or tendrillous leaves are absent in the cultivar. Mutation and selection would have been the major processes leading to the vast diversity of present-day cultivars. Recombination would have been less important, at least now, because as far as is known all *Cicer* species are almost exclusively self-pollinating. Even where two or more species occur together, introgression is unlikely, but cannot be entirely ruled out. Proof of natural hybridization has not been reported.

Apart from occasional escapes and volunteers from previous crops, *C. arietinum* does not occur in the wild state. Mention of chickpea in the wild state has been made by Pliny (cf. Murr 1890) for Greece, by Jaubert and Spach (1842) for Iran and India, by Lenz (1859) for Crete, and by Duschak (1871) for Palestine, but these could easily have been escapes.

II. ARCHAEOLOGICAL REMAINS

Chickpea seeds suffer in the carbonized stage rather more than pea and lentil seeds; the characteristic beak of the seed is often damaged, making the seed difficult to distinguish from pea seed, a grain legume rather more abundant in archaeological deposits (Helbaek 1959).

Helbaek (1970) reported the presently oldest known certain occurrence of chickpea from Hacilar near Burdur in Turkey, dated to about 5450 BC. Ancient Egypt left a bowl of chickpea seed dated to 1400 BC as a grave gift in Deir-el-Medineh (Darby et al. 1977). The scanty presence of grain legumes in general as grave gifts in Egyptian tombs is explained by the fact that they were considered unclean (Murr 1890). Chickpea seeds were not depicted on frescoes (Woenig 1897), but small faenza models were found in a Middle Kingdom tomb at Matarya (Darby et al. 1977).

Hopf (1969) listed proofs of cultivation from the Middle East: at Jericho great quantities were found in layers dating back to the Early Bronze Age (3200 BC), and perhaps from the Pre-Pottery B levels (6250 BC). A kind of *Cicer* was perhaps represented in Germany, near Frankfurt am Main, in the Upper Pliocene (Kinkelin, cf. Gams 1924). Mud impressions of chickpea seeds inside a silver water pot from a tomb in the Royal Cemetery at Ur (ca 2500 BC) excavated by Sir Leonard Woolley were not made public until 1978 (Ellison et al. 1978). Other Iraqi finds were from Tell Bazmosian and Nimrud (Helbaek, see Ellison et al. 1978).

Chickpea occurred during the Bronze and Iron Ages in Palestine at Lachish (Helbaek, ibid.). A cigarette tin (A 13677) at the University of Chicago contains a mixture of carbonized seeds from Megiddo, Palestine, obtained during the 1926 excavations. Found in a room on the summit, some of the seeds could be chickpea; others are *Vicia ervilia* and small *Vicia faba*, dating back to ca 1000 BC.

Ramanujam (1976) summarized the early history of chickpea. The earliest occurrence of chickpea in India dates from 2000 BC, at Atranjikhera in Uttar Pradesh (Chowdury et al. 1971; Vishnu-Mittre 1974), and may represent an overland introduction. Savithri (1976) cited fossil grains from ca 1000 BC in India, and it seems logical that the population of Mohenjo-daro would have known chickpea, although Theophrastus mentioned that the crop was not known in India during his time (Moreno 1985). At Nevasa (near Aurangabad) chickpea first appeared in finds dated to 300-100 BC.

III. WRITTEN HISTORY AND THE CHICKPEA'S VERNACULARS

The chickpea is known from ancient manuscripts. The word *halluru* denotes the chickpea from the earliest time (before 3000 BC) as a stable food of little importance in Mesopotamia. Its popularity diminished from the Old Akkadian to the Middle-Babylonian period; the Neo-Babylonian period texts from Nippur attest to its agricultural importance. The identification of *halluru* is based on etymological similarities to Hebrew, Aramaeic and Arabic (*hullar*) (Gelb et al. 1956). A papyrus school text in Egypt from the twentieth dynasty of the New Kingdom (1580-1100 BC) lists the pulse (very aptly) as *Hrw-b'k, falcon-faces'*, among a number of plant names (Dixon 1969). A more positive reference to chickpea from Egypt is rather late: ca 255 BC, referring to chickpea seeds bought at 5 drachmae per artaba from Sosus.

The Iliad by Homer (ca 1000-800 BC) compared the arrows of Helenus, son of Priam, King of Troy, bouncing away from the breastplate of Menelaos, his Greek opponent, with bean and *erebinthos* (chickpea seeds) bouncing on the winnower's basket. *Erebinthos* might have meant any pea here, but Theophrastus (370-285 BC) certainly meant chickpea when he wrote *erebinthos*, since he described the pod as round (Hehn 1874).

The name *Cicer* is of Latin origin (Horace) and is probably derived from the pre-indogerman *kickere* in the Pelasgian language of the tribes populating north Greece before Greek-speaking tribes took over. Don (1882) suggested that *Cicer* was derived from the Greek *Kikus*, force or strength. Duschak (1871) derived *Cicer* from the Hebrew *Kirkes*, where *kikar* means round; Gams (1924) compared it with the Hebrew *ketsech*.

The oldest reference to the Latin epithet *arietinum* was found in Columella's work, probably as a translation of the Greek *Krios*, another name for both ram and chickpea, alluding to the seed shape, similar to a ram's (*Aries*) head.

The Spanish vernaculars *garbanzo* and *garabanzo*, and the related French *garvanche, garvance, garavane* (and the derived German *Garabanze*) are unrelated to other names. De Candolle (1883) presumed a very ancient cultivation in Iberia. Gams (1924), however, saw a relationship between the Greek *orobos* and *erebinthos*, and the old German *arawiz* (in modern German *Erbse*).

Many of the vernacular names for chickpea are derived from *Cicer*. In France these are *pois chiche* (the commonest vernacular), *pois ciche, ciche, césé, céséron, cicérole, ciserolle, seses*; in Germany the common *Kichererbse* or *Kicher* has many pendants such as *Chicher, Chichina, Chichuria, Cicererbis, Cisa, Cyfer, Czycke* and *Keicheren, Kekeren, Keyker, Kicher(n)kraut, Kicherling, Sisern, Sekern, Venuskicher, Ziesererbsen, Zisererwedsen, Ziser* and *Ziserbohne*. In Great Britain and Anglophone countries *chickpea* is a corruption for *chich-pea*, the same root. The Dutch names are also derived from *Cicer: Keker, kekererwt, kicher, kikkererwt* and *cicererwt, citsers, sisser* and *sissererwt*. Even the Berber language from Northern Africa knows the chickpea as *ikiker* and *kiker*.

Some vernaculars of chickpea refer to a kind of pea: the French *pois bécu, pois blanc, pois de brebis* (sheep), *poisbreton, pois chabot, pois citron, pois cornu, pois gris, pois pointu* (because of the beak), *pois tete de bélier* (ramshead); the English *Egyptian pea* or *hamoos pea* (from the Arabic); the German *Fontanellerbse, graue Erbsen* (usually ordinary peas), *Malagaerbsen*, and the Russian *ovetche harokh* (sheep's pea) or *puzirnyi gorokh* (glandular pea). Popular usage even confounded chickpeas with beans: the American *garbanzo bean*, the German *Ziserbohne*, and the Ethiopian Galla vernacular *adungare*, a general term for bean.

Since chickpea, in particular the black-seeded type, was used as a coffee-surrogate, several vernaculars exist such as *Kaffeeerbse deutsche* or *franzosische Kaffeebohne, deutscher Kaffee, pois cafe*, the Finnish *kahviherne*, and the Swedish *Kaffeart*.

In Turkey, Rumania, Bulgaria, Iran, Afghanistan and the adjacent parts of the Soviet Union, the chickpea is called *nakhut, nohut* or derivations thereof, such as *nut, naut* or *nohot* .

De Candolle (1883) presumed that chickpea was not cultivated in Egypt or Palestine before the beginning of our era, as chickpea was not recorded on Egyptian tombs and the Arabic name *hommos* appeared unrelated to the name De Candolle knew in old Hebrew: *ketsech*. The latter probably refers to *Vicia sativa* or *Nigella sativa*. Duschak (1871) referred to the ancient Jews who took roasted chickpea

seeds to the field as provisions, and the Talmud knew the crop as *purkedan* or *kirkes*. Low (1924) gave more names in Aramaic and Hebrew.

Theophrastus stated that chickpea was not present in India, but other very similar grain legumes existed (he quoted from heresay), and that it did not come from the Syrian and Egyptian cultures, but from the Pontus area (north Anatolia) and the Caucasus (Hehn 1874). Athenaeus listed phrases from the Greek literature where *erebinthos* was mentioned, and Fraas (1870) listed names in Greek, Latin and contemporary Greek. As in Egypt, in ancient Greece and Rome, chickpea (and pulse in general) was mainly eaten by the poorer classes (Hehn 1874 mentioned Horace). Priests and scholars were cautioned not to eat the seeds as they might inhibit higher spiritual principles and clear thinking. Athenaeus, Pythagoras and several other ancient authors forbade their pupils to eat 'beans' and even to walk in a field of pulses.

Flatulence caused by chickpea would not have gone unnoticed, while the seed looks similar to the testis, suggesting an aphrodisiac effect. The second meaning of the Greek *erebinthos* is indeed testis. Pliny described the festive use of chickpea as a venerium in honour of goddesses (Murr 1890). At flower festivals chickpea seeds were thrown over crowds of people and caught with much hilarity. Dioscorides, Athenaeus, Apicius and Pliny recommended chickpea as a healthy food.

In ancient Indian literature of the 1st to 4th Century AD, the Puranas, chickpea was known as *chennuka* in Sanskrit (Allchin 1969). In most Sanskrit-derived languages of the Indian subcontinent chickpea is called *chana*. The Dravidians (South India) have entirely different names: *but, kadalai*, indicating a much older cultivation than that by the Aryans, or else an independent introduction possibly by sea; there were extensive maritime trade contacts with Egypt and Palestine. As stated above, Theophrastus mentioned that the crop was not known in India in his time (Moreno 1985), but this may be interpreted as an indication that the Mediterranean form (kabuli chickpea) was not available in India.

The versatility of the chickpea in Indian cuisine is exemplified by Shah Jehan, Moghul Emperor of India from 1628 to 1658. Given the choice of a food grain to take with him into captivity, he selected chickpea because it can be used in the preparation of a large number of dishes.

The Anglo-Indian name of chickpea, (*Bengal*) *gram* was derived from the Portuguese *grão* (*grain*). *Gram* is used for other pulses too, but always with a specification. Bengal points to the location of the earliest British conquests in India, without further implication in regard to origin of chickpea, just as the Royal Bengal Tiger does not really imply Bengali origin. Further research in Indian scriptures is needed, and more data, hitherto only accessible to scholars of Sanskrit, are likely to emerge (K.L. Mehra, National Bureau for Plant Genetic Resources, India, pers. commun.).

Charlemagne issued an order in 812, the 'Capitulare de Villis'. The 70th and last chapter treated horticulture and listed those plants the emperor wished to have cultivated in his gardens: the chickpea was among these.

Most mediaeval herbals list the chickpea, and facts were mingled with assumptions and popular beliefs. After about 1800 AD the medical properties of chickpea were no longer mentioned. St. Hildegard (1148-1179) (Gams 1924) listed chickpea as a light and healthy food and useful against fever.

Van der Maesen (1972) compiled the purported medicinal and dietetic properties. In western and central Europe, chickpea was found frequently in herbal gardens and apothecaries; more often than as a crop. Following Theophrastus, Columella and Pliny, Albertus Magnus distinguished white, red and dark or black chickpea types, and wild and cultivated ones, as did Von Megenberg and Hieronymus Bock (Gams 1924). We cannot now identify these forms with certainty, but they are well represented in current germplasm collections, as are the cultivars mentioned in other herbals.

Dodonaeus' herbal (1608, a posthumous version of the 1583 version) was one of the most complete of that time. He listed five 'species' of *Cicer* but only the one with the hooked seeds is really chickpea. Within the hooked chickpea Dodonaeus knew *C. nigrum*, the black-or red-seeded form (also *rubrum*), and the white-seeded *C. album* or *C. candidum*. The other 'species' were the tame or round *Cicer* (*Ervum ervilia* L., Gams 1924) and three wild species, applicable to *Astragalus* sp., *Hedysarum* sp. and *Ononis rotundifolia*.

Popular wisdom about medicinal and dietary use, as documented in this and other herbals, is interesting food for thought (van der Maesen 1972). The cultivation of chickpea in central and western Europe was extensive until the beginning of the twentieth century. In Germany, the decline was already clear late last

century (von Fischer-Benzon 1894). In Austria and Switzerland, chickpea was cultivated before 1914 (Gams 1924). Outside the Mediterranean area and Bulgaria, chickpea is typically a relict crop. In 1974, Kühn et al. (1976) collected chickpea as relicts in warmer parts of south Czechoslovakia and the Krupina mountains. In the Mediterranean area, Spain and Greece are large producers, while in Turkey production increased from 102,000 tonnes in 1966-70 to 174,000 tonnes in 1971-75.

Chickpea has now found its way into speciality health shops. The spread of exotic restaurants and 'ethnic food' widened the range of occasional users. In North America, kabuli chickpea is an indispensable item in bean salads and at salad bars. The main use of chickpea, however, is in a multitude of dishes used around the Mediterranean through India and Burma. As India's first legume, its importance as a daily protein food of people with a mainly vegetarian food intake is immense (see also Chapter 1).

IV. TAXONOMY OF *CICER*

Cicer originally was classified in the tribe Vicieae Alef., but its position is sufficiently distinct to consider the genus a tribe of its own, the Cicereae Alef. (Kupicha 1977, Nozzolillo 1985). Important accounts of the genus were written by Jaubert and Spach (1842), and Popov (1928-29). Since the relatively recent monograph (van der Maesen 1972), which included eight annual and 31 perennial species, five new species have been added, but one fell into synonym.

Ladizinsky (1975) described *C. reticulatum*, the probable wild progenitor of chickpea. Following Harlan and de Wet (1971) this species was considered a wild 'subspecies' of *C. arietinum*: subsp. *reticulatum* (Ladiz.) Moreno & Cubero (Moreno and Cubero 1978), because crosses with chickpea were successful and hybrids fertile. Its seed protein profile is similar to that of chickpea (Ladizinsky and Adler 1975). This usage of the category 'subspecies' does not conform to the International Code of Botanical Nomenclature; the category variety is more appropriate. See also Polhill and van der Maesen (1985).

Another species added to the genus is the perennial *Cicer heterophyllum* Contandriopoulos, Pamukuoğlu & Quézel (Contandriopoulos et al. 1972), belonging to the section *Polycicer* M.G. Popov. Examination of the type showed that similarity to both *C. montbretii* and *C. isauricum* is striking, but I agree with its separate status.

Czrepanov (1981) listed *C. laetum* Rassulova & Sharipova and *C. rassuloviae* Lincz. as new species for the Flora of the USSR, and put *C. garanicum* Boriss. into synonymy with *C. acanthophyllum* Boriss.

A surprising new endemic was found in the Canary Islands (Santos Guerra and Lewis 1985): *Cicer canariense* Santos Guerra & G.P. Lewis, a vetchlike vigorous perennial with relatively large flowers.

Among significant contributions in floras may be cited Boissier's Flora Orientalis (1872); Davis' Flora of Turkey (1970); and Linczevski's treatment for the Flora of the USSR (1948). A treatment for the Flora Iranica is also available (van der Maesen 1979).

1. Infrageneric Classification

Four sections can be distinguished in the genus *Cicer*. Firstly, Section *Cicer* (= *Monocicer* M.G. Popov), the most interesting one for breeders, has annual, small-flowered species with firm, erect to inclined or prostrate stems and imparipinnate leaves, or the rachis ending in a tendril. Secondly, section *Chamaecicer* M.G. Popov contains annual or perennial shrubby species with thin, creeping branches and 3-7 leaflets per leaf. Thirdly, Section *Polycicer* M.G. Popov contains the perennial, rather large-flowered species with imparipinnate leaves or the rachis ending in a tendril. And fourthly, Section *Acanthocicer* M.G.Popov accommodates those perennial species with large flowers and a persistent, spiny leaf rachis and spiny calyx teeth.

2. Habitat

The habitats of *Cicer* species can be generalized into four types: cultivated; weedy; open, dry rubble slopes; and more moist humus-rich forest soils (see Table 2.1), although some species are not exclusively restricted

to a single kind of habitat. The chickpea is adapted to the friable soils of agriculture, somewhat cloddy and stony rather than finely tilled. The plant is drought-resistant, but genetic variation exists; the taproot usually extends beyond 1 m deep. Proper drainage is required, as with many other species of mountainous areas. The annual *C. bijugum* and *C. echinospermum* are often found in disturbed habitats, such as field borders, fallow fields and areas reverting to grassland.

Table 2.1. Some morphological and ecological features of *Cicer* spp.

Species	Section	Cycle[a]	End of leaf rachis	Stem length (mm)
1. *C. acanthophyllum* Boriss.	Acanthocicer	P	Spine	20–35
2. *C. anatolicum* Alef.	Polycicer	P	Tendril	20–60
3. *C. arietinum* L.	Monocicer	A	Leaflet	20–95
4. *C. atlanticum* Coss. ex Maire	Polycicer	P	Leaflet	4–10
5. *C. balcaricum* Galushko	Polycicer	P	Tendril	30–60
6. *C. baldshuanicum* (M.Pop.)Lincz.	Polycicer	P	Tendril	30–40
7. *C. bijugum* K.H. Rech.	Monocicer	A	Leaflet	15–30
8. *C. canariense* Santos Guerra & Lewis	Polycicer	P	Tendril	50–200
9. *C. chorassanicum* (Bge) M. Pop.	Chamaecicer	A	Leaflet	5–15
10. *C. cuneatum* Hochst. ex Rich	Monocicer	A	Tendril	40–60
11. *C. echinospermum* P.H. Davis	Monocicer	A	Leaflet	20–35
12. *C. fedtschenkoi* Lincz.	Polycicer	P	Tendril	18–35
13. *C. flexuosum* Lipsky	Polycicer	P	Tendril	30–40
14. *C. floribundum* Fenzl.	Polycicer	P	Leaflet	15–30
15. *C. graecum* Orph.	Polycicer	P	Tendril	30–40
16. *C. grande* (M.Pop.) Korotk.	Polycicer	P	Tendril	20–50
17. *C. heterophyllum* Contandr. et al.	Polycicer	P	Tendril	40–70
18. *C. incanum* Korotk.	Acanthocicer	P	Spine	20–30
19. *C. incisum* (Willd.) K.Maly	Chamaecicer	P	Leaflet	5–15
20. *C. isauricum* P.H. Davis	Polycicer	P	Leaflet	20–40
21. *C. judaicum* Boiss.	Monocicer	A	Leaflet	15–40
22. *C. kermanense* Bornm.	Polycicer	P	Tendril	30–50
23. *C. korshinskyi* Lincz.	Polycicer	P	Tendril	50–80
24. *C. laetum* Rassulova & Sharipova	?	?	?	–
25. *C. macracanthum* M. Pop.	Acanthocicer	P	Spine	25–35
26. *C. microphyllum* Benth.	Polycicer	P	Spine	20–40
27. *C. mogoltavicum* (M.Pop.)Koroleva	Polycicer	P	Tendril	60–70
28. *C. montbretii* Jaub. & Sp.	Polycicer	P	Leaflet	40–60
29. *C. multijugum* van der Maesen	Polycicer	P	Leaflet	10–30
30. *C. nuristanicum* Kitamura	Polycicer	P	Tendril	25–40
31. *C. oxyodon* Boiss. & Hoh.	Polycicer	P	Tendril	25–55
32. *C. paucijugum* (M.Pop.)Nevski	Polycicer	P	Leaflet	20–35
33. *C. pinnatifidum* Jaub. & Sp.	Monocicer	A	Leaflet	10–40
34. *C. pungens* Boiss.	Acanthocicer	P	Spine	20–40
35. *C. rassuloviae* Lincz.	Polycicer	P	?	?
36. *C. rechingeri* Podlech	Acanthocicer	P	Spine	40
37. *C. reticulatum* Ladiz.	Monocicer	A	Leaflet	20–35
38. *C. songaricum* Steph. ex DC.	Polycicer	P	Tendril	25–40
39. *C. spiroceras* Jaub. & Sp.	Polycicer	P	Tendril	40–70
40. *C. stapfianum* K.H. Rech.	Acanthocicer	P	Spine	25
41. *C. subaphyllum* Boiss.	Polycicer	P	Spiny curl	30–40
42. *C. tragacanthoides* Jaub. & Sp.	Acanthocicer	P	Spine	15–35
43. *C. yamashitae* Kitamura	Monocicer	A	Leaflet	10–30

[a]P = Perennial, A = Annual.

Plant habit	Flower size (mm)	Flower colour	Leaflet no.	Habitat
Shrubby	16–22	Purplish blue	10–16	Rubble
Shrubby	19–23	Purplish blue	8–16	Rubble
Erect to prostrate	8–13	White/pink/blue	11–17	Cult.
Prostrate	13–15	Purplish pink	3–15	Rubble
Shrubby	20–25	Blue violet	12–18	Rubble
Shrubby	20	?	8–14	Rubble?
Prostrate to erect	9	Purplish pink	5–7	Weedy
Compact to scrambling	16–20	Pinkish + violet	50–60	Forest
± prostrate	5–6	Cream + violet	3	Rubble
± climbing	7	Pink, veined	8–10(–22)	Weedy
Prostrate to erect	9–12	Purplish	7–11	Weedy
Shrubby	20–30	Blue violet	9–15(–30)	Rubble
Shrubby	20–26	Blue purple	10–20	Rubble
Erect	15–17	Blue violet	9–13	Forest
Erect	18–25	Blue violet	9–16	Forest
Erect	23	?	8–12	Rubble?
Erect	18–20	?	11–17/5–13	Forest
Erect	20	Veined	8–12	Rocks
Prostrate	9–12	Purplish	3–5(–7)	Rubble
Erect	20	Veined white	7–11	Rubble
Prostrate to erect	5–6	Pink purple	11–13	Weedy
Shrubby	18	White to pink	12–24	Rubble
Erect	20?	?	10–12	Rubble
–	–	–	–	–
Shrubby	15–25	Violet	8–22	Rubble
Shrubby	18–25	White to purple	14–20(–30)	Rubble
Shrubby	17	Violet,veined	16–22	Rubble?
Erect	20	Creamy white	15–17	Forest
Shrubby	20–22	Purple/violet	28–36	Rubble
Shrubby	18–23	Bluish/violet	16–26	Forest/rubble
Shrubby	14	Lilac/white	8–10	Rubble
Shrubby	24	Blue violet	5–9	Rubble
Prostrate to erect	6–8	Pinkish purple	4–11	Rubble/weedy
Shrubby	17	Blue violet	6–10	Rubble
?	?	?	?	?
Erect	12–15	(Pale) violet	10–20	Rubble
Prostrate to erect	9–12	Mauve	7–11	–
Shrubby	22–30	Purplish	10–14	Rubble
Shrubby	12	Lavender	6–16	Rubble
Shrubby	18	?	6–10	Rubble
Shrubby	10	?	6–10	Rubble
Shrubby	18–25	Purplish	5–16	Rubble
Herb	7	Pink	5–7	Rubble

Most perennial species have a long woody tap root, the branches die off above ground after dispersal of the seeds and the plants hibernate under layers of snow. Perennial species rarely occur in dense stands; rubble slopes composed of not too large stones constitute a niche suited to these species. Most probably the seeds, which are rather large and attractive to birds and rodents, survive better if they fall in between the stones and germinate in the soil underneath, because they are less easily found. The fourth habitat is the (at least seasonally) moist, humus-rich forest floor of *Pinus* and *Quercus* vegetation on the hills bordering the Aegean Sea and in the Taurus Mountains. Contandriopoulos et al. (1972) described in detail the perennial *Cicer* species of the Mediterranean area and their habitat. Areas and the most suitable times to collect wild *Cicer* spp. are summarized by van der Maesen and Pundir (1984).

3. Key to the annual species of *Cicer*

1. Leaves with end leaflet, plant prostrate or erect.....2
- Leaves ending in a tendril, plant climbing *C. cuneatum*
2. Leaflets 3, cuneate-flabellate; stipules small, 1 mm; flowers 5-6 mm; plant up to 15 cm with prostrate branches *C. chorassanicum*
- Leaflets more than 3.....3
3. Leaflets in 2-3 pairs with end leaflet.....4
- Leaflets more numerous.....5
4. Leaflets oblong-obvate; stipules ovate-lanceolate, 2-5 mm; flowers ca 9 mm; arista 0-3 mm; plant up to 30 cm (Turkey, Syria) *C. bijugum*
- Leaflets cuneate-elliptic or lanceolate; stipules bidentate, ca 2 mm; flowers ca 7mm; arista very long, 5-20 mm; plant up to 20 cm, sometimes 30 cm (Afghanistan) *C. yamashitae*
5. Leaflets generally small, 4-7(-10) mm; flowers 5-8 mm; seeds 3-6 mm 6
- Leaflets larger, 5-12 mm; flowers 8-12 mm; seeds 5-12 mm.....7
6. Leaflets in 3-4 pairs, simply serrate, 4-10 mm; leaf petiole long, 10-17 mm; stipules ovate to flabellate, 5 (-7) mm, 2-3 teeth; flowers 6-8 mm; plant 10-30 (-40) cm; seeds 4-6 mm diameter *C. pinnatifidum*
- Leaflets in 3-6 pairs, often double-serrate at the top, 4-7 mm; leaf petiole short, 5-12 mm; stipules 2-3 mm, 2-5 teeth; flowers 5-6 mm; plant 15-40 cm; seeds 3-4 mm diameter *C. judaicum*
7. Stems erect to semi-spreading, rarely prostrate; leaflets in 3-7 pairs, elliptical, serrate; seeds large, 5-12 mm, smooth, rugose or tuberculate; plant cultivated *C. arietinum*
- Stems prostrate at first, then ascending; leaflets in 3-5 pairs, elliptical to elongate, serrate; seeds large, up to 8 mm, seeds echinate or reticulate 8
8. Seeds echinate *C. echinospermum*
- Seeds reticulate *C. reticulatum*

4. Key to the perennial species of *Cicer*

1. Leaf rachis ending in a tendril or leaflet 2
- Leaf rachis ending in a sturdy spine (Sect. Acanthocicer) 24
2. Flowers small, 8-10 mm; leaves imparipinnate, 5-7 leaflets; rootstocks slender; creeper of 5-15 cm (Greece, Middle East, Iran) *C. incisum*
- Flowers larger 3
3. Flowers medium large, ca 15 mm; leaves imparipinnate, 5-16 leaflets; rootstocks slender; habit sturdy, erect, 4-10 cm (Morocco) *C. atlanticum*
- Flowers medium large or large, plants taller, rootstocks woody (Sect. Polycicer) 4
4. Flowers medium large, ca 15 mm 5
- Flowers large, ca 20-27 mm 8
5. Leaflets spine-shaped, plant glabrous *C. subaphyllum*
- Leaflets normal, flat; plant pubescent 6

6. Leaflets rounded, 5-15 mm long, 5-17 mm wide, with 10 or more teeth, in 3-5 pairs; tendril often ramified *C. oxyodon*
- Leaflets fan-shaped, base cuneate, very remote; tendril sturdy, curled 7
7. Leaflets 3-7 mm long, 3-9 mm wide, with 5-7 (-10) teeth, in 3-8 pairs *C. spiroceras*
- Leaflets 5-9 mm long, 5-15 mm wide, with 5-9 (-10) teeth, in (3-) 6-12 pairs *C. kermanense*
8. Flowers 1-2 per peduncle, rarely more; bracts minute 9
- Flowers (1) 2-5 per peduncle 10
9. Stipules flabellate-rounded, about as large as or larger than the leaflets, toothed 11
- Stipules obliquely ovate or triangular, small or half as long as the leaflets, at some nodes sometimes nearly as large, incised 12
10. Leaflets in 20-30 linear leaflets of 15-30 mm long, ca 1 mm wide; bracts absent *C. canariense*
- Leaflets in fewer pairs, more rounded-serrate or reduced to spines; bracts more or less foliolate 16
11. Plant 18-35 cm, sticky, intensely glandular-pubescent; leaves imparipinnate, with 4-7 pairs of leaflets, obovate, 5-13 mm long, 4-7 mm wide; arista ending in a small leaflet, 1-5 mm *C. fedtschenkoi*
- Plant 25-40 cm, less densely pubescent; leaves ending in a tendril or tendrillous leaflet; leaflets 5-7 pairs, flabellate, 4-12 mm long, 2-8 mm wide; arista rarely ending in a small foliole *C. songaricum*
12. Leaflets small, up to 10 (-17) mm 13
- Leaflets larger, up to 25 (-27) mm, sometimes smaller 20
13. Leaflets in 2-4 (-5) pairs, rachis with end leaflet or ending in a slender spine *C. paucijugum*
- Leaflets more numerous 14
14. Plant densely pubescent, 10-30 cm; leaves imparipinnate; leaves in 9-18 pairs, obvate to oblong-lanceolate, top toothed, flower 1 per peduncle *C. multijugum*
- Plant less pubescent, 20-70 cm; leaflets less numerous; rachis ending in a tendril or an end leaflet at the lower leaves, flowers 1-2 per peduncle 15
15. Plant more or less glandular pubescent; tendril always simple; leaflets narrowly cuneate to cuneate-obovate, upper half of margin toothed; stipules triangular-incised, up to nearly as large as the leaflets, 2-12 mm *C. microphyllum*
- Plant thinly pubescent 16
16. Leaflets not very close, obovate or obovate-elliptic, 5-15 mm, in 8-13 pairs, margin toothed except near the base; tendril simple, stipules small, triangular-incised, 2-4 (-7) mm *C. nuristanicum*
- Leaflets very remote, broadly cuneate-flabellate, 3-7 mm, in 8-11 pairs, top truncate-toothed; tendril often ramified, stipules small, triangular-incised, 2-4 mm *C. mogoltavicum*
17. Hairs very long, 1-2 mm 18
- Hairs shorter, up to 1 mm 19
18. Leaves ending in a leaflet; leaflets elliptical; flowers white *C. montbretii*
- Leaves ending in a tendril, ramified or not, at lower leaves a top leaflet; flowers blue or purple; plant climbing *C. graecum*
19. Leaflets oblong-obovate, spiny toothed, 7-24 mm long, 5-15 mm wide; bracts 1-2 mm; flowers white *C. isauricum*
- Leaflets oblong-elliptical, finely toothed, 8-15 mm, 3-8 mm wide; bracts 2-3 mm; flowers blue-violet *C. floribundum*
20. Leaflets in 4-7 pairs, rather close, cuneate-obovate, elliptic or subrotundate, 7-15 (-18) mm long; stipules generally half as long as the leaflets (Asia Minor, Iran, Caucasus) *C. anatolicum*
- Leaflets in 4-8 pairs, rather close or more remote, ovate to subrotundate, 5-22 mm long. (Central Asia) 21
21. Plant densely glandular pubescent, 30-40 cm; stems flexuous; leaflets in 5-8 pairs, cuneate-obovate, up to 15 mm long, 12 mm wide; rachis ending in a ramified or simple tendril *C. flexuosum*
- Plant less glandular pubescent, stems straight or slightly flexuous 22
22. Plant sparsely mainly eglandular pubescent, 30-40 cm; leaflets in 4-8 pairs, rounded to cuneate-truncate, 5-18 mm long, 4-15 mm wide; rachis ending in a simple tendril *C. baldshuanicum*
- Plant glandular pubescent, 20-80 cm 23

23. Plant 20-50 cm; leaves ending in a simple or ramified tendril; 4-6 pairs of leaflets, elliptic, 10-25 mm long, 6-12 mm wide, teeth simple, triangular-acuminate *C. grande*
- Plant 50-80 cm; leaves ending in a spiny curl or a tendril; 5-6 pairs of leaflets, broadly cuneate or obovate, 10-17 (-20) mm long, 6-10 mm wide; teeth broadly acuminate, bipartite *C. korshinskyi*
24. Leaflets small, 1-5 mm long, in 5-11 pairs; inflorescences 1-2-flowered 25
- Leaflets larger, 5-10 (-13) mm long; inflorescences 1-flowered *C. pungens*
25. Stipules consisting of one long horizontal spine, 10-25 mm, and a vertical short spine, 1-10 mm; leaflets obovate or obovate-elongate, 3-5 (-8) mm long; inflorescences 1-flowered, rarely 2-3-flowered *C. macracanthum*
- Stipules shorter, vertical spinelets, up to 8 mm, or foliolate 26
26. Leaflets mostly spine-shaped *C. stapfianum*
- Leaflets foliolate 27
27. Stipules horizontal lanceolate perules, 2-5 mm long; leaflets in 3-7 pairs *C. acanthophyllum*
- Stipules minute foliolate perules, adpressed to the stem, triangular-lanceolate; leaflets very small, 1-5 mm 28
28. Plant upright, ca 40 cm; leaf rachis ending in a sturdy spine; leaflets in 5-10 pairs, rotundate-ovate, 2-5 mm long, top with 3-7 teeth *C. rechingeri*
- Plant low, sturdy or more slender, ascendent; leaf rachis ending in a sturdy spine or a slightly incurved spiny tendril; leaflets in 2-8 pairs, ovate to subrotundate, 1-5(-6) mm long, top with 1-3 (-5) teeth *C. tragacanthoides*
- Taller, slender forms from Kopet-dagh var. *turcomanicum*

5. Enumeration of *Cicer* species

Some salient features of *Cicer* species are listed in Table 2.1. The species are enumerated here with their synonymy in alphabetical order, following van der Maesen (1972), and brought up-to-date. The protologues (first descriptions) and abbreviated references of these paragraphs are not all repeated in the main reference list, as is common in taxonomic usage. The typification has been reviewed here and rectified where necessary.

1. *Cicer acanthophyllum* Borissova, Novit. Syst. Pl. Vasc., Leningrad 6: 167.1970; van der Maesen 24.1972.

A spiny perennial with spiny stipules of 2-6 (-15) mm, often with a second spinelet of 1-2 mm, at the base of the plant an incised foliate stipule (cataphyl) of 2-6 mm. Sometimes difficult to separate from *C. macracanthum*, which has larger and more leaflets and broader calyx teeth, and stipules up to 25 mm. Their areas overlap.

Type : USSR-Tadzhik SSR: Pamir, Schach-Darja river, Korshinsky s.n. (holotype: LE).

Heterotypic synonym: *Cicer garanicum* Borissova, Novit. Syst. Pl. Vasc., Leningrad 6:170-172.1970. Type: USSR-Tadzhik SSR, or Iskashim Castle, on Pyandsh river nr Mallodsh village, Alexeenko 3-7-1901 (holotype: LE).

Fls: July-Aug.

Distrib.: Afghanistan: Badakhshan; Pakistan: Chitral, Gilgit; USSR: Pamir (2500-4000 m).

Ecol.: Rubble slopes, dry valleys, near lakes, with *Artemisia persica* and *Polygonum coriarium*.

2. *Cicer anatolicum* Alefeld, Bonplandia 9:349.1861; Jaubert and Spach 230-231.1842; Popov 206.1928-29; Popova 67.1937; Linczevski, Fl. USSR 13:391.1948; Davis, Fl. Turkey 3:270.1970; van der Maesen 27.1972; id. 7.1979.

A bushy glandular perennial with large violet or pale violet flowers, well known as *Yapane nohut*, wild chickpea, in Turkey. One of the most often collected wild perennial chickpeas.

Type: Turkey, in shrubs on the Boz dağ, Boissier s.n. (holotype: G; isotypes: BM, C, K, P, WU).

Heterotypic synonyms: *Cicer glutinosum* Alefeld, Bonplandia 9:349-1861. Type: Iran, road from Kermanshah to Hamadan, Olivier s.n. (holotype: B; isotype: P).

Cicer songaricum Jaub. et Spach non Steph., Jaubert and Spach 231.1842. Type: Iran, Kuh-e-Alvand,

Aucher-Eloy 1127 (Hololectotype: P; isolectotypes: BM, G, K, MPU, OXF, WU). Paratypes: ibid., Michaux s.n. (P): hills nr Aras river, Aucher-Eloy s.n. (P).

Fls.: May-Aug (Sep).

Distrib.: Turkey, NW and W Iran, N Iraq, Armenian SSR (1100-3300 m).

Ecol.: Sandy or rocky slopes, rubble, calcareous or not, also igneous, schistous, metamorphic rocks, in scrub or pine forest, with junipers, near water or in dry places.

3. *Cicer arietinum* Linnaeus, Species Plantarum ed. 1-2: 738.1753; mentioned in all floras pertaining to its area of occurrence.

The cultivated chickpea, with a wide range of diversity (see cultivars). Occasionally found as an escape, never really wild.

Type: Spain or Italy, Hortus Cliffortianus 370 (lectotype: BM, see Verdcourt, Fl. Trop. E. Africa, Leguminosae part 4:1065.1971).

Synonyms: *Cicer grossum* Salisbury, Prodr. 340.1796. Type: ex Samuel Cotta, misit. Gul. Roxburgh (?).

Cicer sativum Schkuhr, Handb. 2:367, t. 202.1805. Homotypic.

Cicer physodes Jord. ex Alef., Oest. Bot Zeitschr. 9-11:356.1859. Type: ? As variety of *C. arietinum*.

Cicer nigrum hort., see Alefeld, Oest. Bot. Zeitschr. 9-11:356.1859, as var. *nigrum*.

Cicer album hort., see Alefeld, as var. *album roman*.

Fls.: Spring and early summer; winter (rabi season) in the Indian subcontinent.

Distrib.: Mediterranean area to Burma, Ethiopia, Mexico, Chile and cooler part of the tropics (0-2400 m).

Ecol.: A cool-season crop of the semi-arid tropics, spring crop of the warm temperate zones. Sandy to clay-loam soils. (See also Chapters 8 and 10).

4. *Cicer atlanticum* Cosson ex Maire, Bull. Soc. Hist. Nat. Afr. Nord 19:42.1928; Cosson ex Battand and Trab. Fl. Alger. 267.1889 (nomen); Popov: 188.1928-29.

A small perennial, creeping with slender rootstocks between stones, and purplish veined flowers up to 15 mm long. An endemic of Morocco's Atlas Mountains, rarely collected.

Type: Morocco, Mt. Gourza, Goundafa, Humbert and Maire (lectotype: P; isolectotypes: BM, BR, C, G, K, MPU). Paratypes: Morocco, Mt. Aziouel, Seksaoua, Ibrahim s.n. (GE, K, LE, P); Mt. Ouensa, SE of Marrakech, Ibrahim s.n. (BM, BR, G, K, MPU, P); Mt. Taboughert, Ait Adouyouz, Ibrahim s.n. (BM, BR, P).

Heterotypic synonym: *Cicer maroccanum* M.G. Popov, Bull. Appl. Bot. Genet. Pl. Breed. 21-1:188.1928-29. Type: Morocco, Mt. Aziouel, Ibrahim s.n. (lectotype: P; isolectotypes: GE, K, LE, P).

Fls.: June-Aug.

Distrib.: Morocco, Atlas Mts (2700-2900 m).

Ecol.: Alpine vegetation on schistous rubble slopes.

5. *Cicer balcaricum* Galushko, Novit. Syst. Plant. Vasc. 6:174-176.1970; van der Maesen 37.1972; Czrepanov 230.1981.

A perennial, related to *C. anatolicum*, *C. flexuosum* and *C. songaricum*, but with cuneate leaflet base and leaf margin serrate to double-serrate with acute spiny teeth of ca 3 mm, tooth of midrib reflexed. Only known from the type, not seen by the present author. Type: USSR-Balkarskaya ASSR, Balcaria, Caucasus, source of Baksan river, nr Elbrus village Galushko and Kurdjashova 25-8-1964 (holotype: LE).

Fls.: July-Aug.

Distrib.: Caucasus (2000 m).

Ecol.: Southern exposed rubble slopes.

6. *Cicer baldshuanicum* (M.G. Popov) Linczevski, Not. Syst. Herb. Inst. Bot. Acad. Sci USSR 9:112(1948?)1949; Linczevski 395.1948; van der Maesen 38.1972.

A perennial from Sect. Polycicer with rounded-serrate leaflets, sparsely mainly eglandular pubescent, 30-40 cm tall.

Type: USSR: Tadzhik SSR, lower Darvaz Mts between Chovaling and Yakh-su rivers, from Zagara pass to Jakh-su river, Michelson 1428 (holotype: LE). Paratypes: USSR, Baldshuan, Regel s.n. (LE); Kulyab nr Czargi, Divnogorskaja 503 (LE); Shuro-abad nr Pushalak, Linczevski and Maslennikova 901 (LE); Tirjai Mts nr Pyandsh river, between Chirmanshou and Andshiroupojen villages N of Shuro-abad, Linczevski 477 (LE).

Basionym: *Cicer flexuosum* Lipsky subsp. *baldshuanicum* M.G. Popov, Bull. Appl. Bot. Genet. Pl. Breed. 21-1:211.1928-29.

Fls.: May-July

Distrib.: USSR-S Tadzhik SSR, Pamir-Alai (1600-2000 m).

Ecol.: Mountain slopes, near water.

7. *Cicer bijugum* K.H. Rechinger, Arkiv. Bot., Stockholm, andra ser. 1:510.1952; id. ibid. 5-1:257.1959; Davis, Fl. Turkey 3:272.1970; van der Maesen 41.1972; id. 4.1979.

A close relative of chickpea with 2 (or 3) pairs of leaflets. Can be hybridized with chickpea, but results are sterile or lethal. Not found again in its locus classicus near Azaz, north of Aleppo, but possibly more common than appears from the half dozen locations presently known.

Type: Syria, Azaz, Haradjian 4442 (holotype: G; isotypes: G, K, W, WU).

Fls.: (Apr.) May-June.

Distrib.: SE Turkey, N. Syria and N. Iraq (500-1300 m).

Ecol.: Weed in orchards, abandoned fields, grazing areas.

8. *Cicer canariense* Santos Guerra & G.P. Lewis Kew Bull. 40 (in print). 1985.

A vetchlike perennial, endemic to Tenerife and Palma (Canary Islands), with flowers larger than the annual *Cicer cuneatum* , with very narrow and long-linear leaflets (up to 30 pairs), pods quite similar, seeds also globular, but with a more pronounced beak. Otherwise so unlike any other *Cicer* that a separate subgenus has been proposed to accomodate it. First collected in 1960, the plant was first treated as an undescribed species of *Vicia*. Surprisingly overlooked on the well-explored islands, it survives on ledges above the goat-line, and is apparently extinct in more accessible areas. The vernacular *Garbancera* aptly expresses the relationship with garbanzo, the chickpea.

Synonym: *Vicia* sp. nov., Vegetacion y Flora de La Palma 207-208.1983.

Type: Canary Islands, La Palma, Caldera de Taburiente, alluvial soils in pine forest near Lomo de Las Chozas, 1200 m, Santos and Fernandez s.n. (holotype: ORT; isotype: K). Paratypes: ibid., Santos s.n. (1972) (K, ORT); Dos Aguas, wet sandy places at edge of ravine, 900 m, Santos s.n. (seed only); Caldera, 1300 m, Andrews R117 (K); Barranco de Las Grajas (Garafia), Santos s.n. (ORT); Tenerife: Tamadaya (Arico), bottom of narrow valleys, Santos s.n. (K, ORT).

Fls.: Aug-Sept.

Distrib.: Canary Islands, Tenerife and La Palma (900-1400 m).

Ecol.: Dry mesocanarian zone with canarian pine, close to streams.

9. *Cicer chorassanicum* (Bunge) M.G. Popov, Bull. Appl. Bot. Genet. Pl. Breed. 21-1:180.1928-29; Kitamura, Fl. Afghan. 223.1960; Podlech and Dieterle, Candollea 24-2:211-212.1969; van der Maesen 43.1972; id. 5.1979.

A trifoliolate annual, with little or much anthocyanin (stems and leaves purple-coloured), with very small purple-veined white flowers and small pods. Not uncommon in Afghanistan, apparently rare in Iran.

Basionym: *Ononis chorassanica* Bunge, in Boissier, Fl. Orient. 2:62.1872.

Type: Iran, Khorassan Mts near Ssabzewar, Bunge s.n. (holotype: G).

Heterotypic synonym: *Cicer trifoliolatum* Bornmuller, Bull. Herb. Boiss. ser. 2-5:849.1905. Type: Iran, Elburz Mts, Ferasad village on Shimran Mt, nr Teheran, Bornmüller 6636 (holotype: JE; isotype: WU).

Fls.: (Apr) May-July.

Distrib.: N and C Afghanistan, N and NE Iran (1400-3300 m).

Ecol.: Rocky and rubble slopes, calcareous or granitic, gneiss, dry valleys.

10. *Cicer cuneatum* Hochstetter ex Richard Tent. Fl. Abyss. 1:195.1847; Baker in Oliver, F. Trop. Afr.

2:172.1871; Cufodontis, Bull. Jard. Bot. Brux. 25-3 (suppl.): 306.1955; van der Maesen 46.1972; Collenette, Flowers of Saudi Arabia 1985.

The only annual with tendrils, of climbing habit, not unlike a vetch (*Vicia* spp.). The flowers are small, pinkish, and the elongate pods contain ca four small globular seeds without a conspicuous beak. Known in Ethiopia as *Ait shembra* (rat's chickpea, Amharic), *Ater guasot* (shepherd's pea), *Anchoa ater* (rat's chickpea, Tigrinia).

Type: Ethiopia, nr Gapdiam in Tigre, Schimper Sect. 2:810 (lectotype: P; isolectotypes: BR, K, L, M, P, OXP, W). Paratypes: Ethiopia, Maye Goua-Goua to Debre Sina, Quartin-Dillon and Petit s.n. (P, W); mountains near Axum, Schimper Sect 3:1545 (BM, G, K, L, M, MPU); fields nr Kepsaid, Schimper herb. complement. 799 (K, P).

Fls.: Oct-Nov (Ethiopia), Jan-Feb (Egypt).

Distrib.: Ethiopia, SE Egypt or NE Sudan: Jebel Elba Saudi Arabia (1000-2200 m).

Ecol.: Cultivated fields, open vegetation, sometimes a weed in sorghum.

11. *Cicer echinospermum* P.H. Davis, Notes Roy. Bot. Gdn Edinb. 29-3:312.1969; Davis, Fl. Turkey 3:272.1970; van der Maesen 49.1972; id. 4.1979.

An annual weed, closely related to the chickpea and only distinguishable by its truly spontaneous occurrence and echinate seeds. In early stages the branches are prostrate, then ascend to flower. The pods do not shatter early as in most wild species, and the seed size is considerable (ca 10 g/100 seeds).

Type: Turkey, Urfa, Tel Pinar, Sintenis 747 (holotype: K; isotypes: E, WU).

Homotypic synonym: *Cicer edessanum* Stapf ex Bornmüller (nomen), Beihefte Bot. Centrbl. 19-2:248.1906.

Fls.: May.

Distrib.: Turkey, E. Anatolia, N. Iraq: Jebel Sinjar (700-1100 m).

Ecol.: Rocky slopes, vineyards, fallow and cultivated fields, grass vegetation, *Quercus* scrub.

12. *Cicer fedtschenkoi* Linczevski, Not. Syst. Herb. Inst. Bot. Acad. Sci. USSR 9:108 (1948?)1949; id. Fl. USSR 13:399.1948; Kitamura and Joshi, Addit. Reports Kyoto Univ. 103.1966; van der Maesen 52.1972; id. 8.1979.

A copiously glandular pubescent perennial, hairs up to 2 mm; rachis ending in a tiny incised rounded leaflet. Not often collected.

Type: USSR-Tadzhik SSR, Schugnan, Badzhan-kutal, Fedtschenko 27-7-1904 (holotype: LE).

Synonym: *Cicer songaricum* var. *pamiricum* Lipsky ex Paulsen, Bot. Tidskr. 19:162.1909. Type: USSR-Tadzhik SSR, nr Lake Jashil-kul, Paulsen 1104 (holotype: C).

Cicer songaricum var. *schugnanicum* M.G. Popov 219.1928-29. Type: USSR-Tadzhik SSR, Schugnan, W Pamir-alai, Tuturin and Besedin s.n. (holotype: LE).

Fls.: (June) July-Aug.

Distrib.: USSR, S. Kirghiz SSR, Tadzhik SSR: Pamir, N and NE Afghanistan (2500-4200 m).

Ecol.: dry stony slopes or valleys, granite, S-exposed, also near lakes, streambeds. In Badakhshan near *Salix pseudolirida*.

13. *Cicer flexuosum* Lipsky, Acta Hort. Petrop. 23:102.1904; Popov 209.1928-29; Linczevski, Fl. USSR 13:392.1948; Kitamura, Fl. Afghan. 223.1960; van der Maesen 54.1972.

A glandular pubescent perennial with 2-flowered racemes ending in a sturdy arista, with flexuous stems.

Type: USSR-Kazakh SSR, Kuletschek, Karatau, Regel 200 (lectotype: LE; isolectotypes: E, K, P). Paratypes: Angren riv, Mussa s.n. (C, LE); Karagus, Regel s.n. (BM, C, LE); Baroldai, Sewerzov s.n. (LE, M); Karatau, Maev s.n. (LE); Tashkent, Maev s.n. (LE); Gosai, Regel s.n. (LE); Pskiem, Fedtschenko s.n. (LE).

Synonyms: *Cicer flexuosum* subsp. *tianschanicum* var. *robustum* M.G. Popov, Bull. Univ. As. Centr. 15 suppl. 14.1927. Type: USSR, Pamir-alai, Jakkabag nr Tschopuch, Lipsky 2003 (holotype: LE). Paratype: USSR, W Tian-Shan, Karatau Mts, source of Arys river, Tshirktshik (LE?).

Homotypic synonym: *Cicer flexuosum* subsp. *robustum* M.G. Popov: 210.1928-29.
Fls.: May-July.
Distrib.: USSR-S Kirgiz SSR, Tadzhik SSR: Tian-shan (500-2400 m).
Ecol.: Rocks, rubble slopes, nr riverbeds, tree and scrub vegetations.

14. *Cicer floribundum* Fenzl, Pugillus Plant. Nov. Syr. Taur. occ. 1:4.1842; Alefeld, Oest. Bot. Zeitschr. 9:356-1859; Boissier, Fl. Orient. 2:561.1872; Popov 199.1928-29; Davis, Fl. Turkey 3:268.1970.

A perennial from shady places with purple flowers. The leaves have end leaflets with a tendrillous tip, or rarely a simple tendril. The hairs are shorter than those of *Cicer graecum*, which is closely related. The other species of this series (Ser. Europaeo-Anatolica M.G. Pop.) are also close: *C. isauricum* P.H. Davis, *C. heterophyllum* Contandr. et al., and *C. montbretii* Jaub. & Sp. Endemic of the Toros dağlari, rarely collected.

Type: Turkey, Taurus Mts, Gülek, Kotschy 167 (holotype: W).
Fls.: June-July.
Distrib.: Turkey: S. Anatolia (800-1700 m).
Ecol.: Mountain slopes, forest of *Fagus orientalis* and *Quercus coccifera*.

15. *Cicer graecum* Orphanides, in Boiss., Diagn. Ser. 2-2: 43.1856; Boissier, Fl. Orient. 2:563.1872; Popov 202.1928-29; Fürnkranz, Oest. Bot. Zeitschr. 115:404.1968; van der Maesen 60.1972.

Densely glandular pubescent perennial, hairs long, up to 1.5 mm, with upper leaves ending in a simple or ramified tendril; flowers veined, reddish purple, of medium size. A peculiar endemic of the Peloponnesus, not of N Greece as erroneously mapped (van der Maesen 63.1972). Known as *revithi* (like *revithia*, cultivated chickpea). So far only known from the area near the locus classicus.

Type: Greece, above Trikkala, Mt. Kyllene, Orphanides 578 (holotype: P; isotypes: BR, K, W).
Fls.: Apr-July.
Distrib.: Greece, Peloponnesus (1200-1400 m).
Ecol.: Hedges, cornfields, pine forests, calcareous soils.

16. *Cicer grande* (M.G. Pop.) Korotkova, Bot. Mat. Herb. Inst. Bot. Acad. Sci. Uzbek. 10:18.1948; van der Maesen 63.1972.

A large perennial with rachis ending in a usually branched tendril, rather large leaflets, to 27 mm long, in 4-6 pairs, pods up to 3 cm. Collected only a few times.

Basionym: *Cicer flexuosum* Lipsky ssp. *grande* M.G. Popov, Bull. Univ. As. Centr. 15 suppl.: 15.1977; Popov 210.1928-29.

Type: USSR-Uzbek SSR, Pamir-alai, Kugitang, Popov & Vvedensky 494 (lectotype TAK). Paratype: ibid., id. 495 (TAK).
Fls. June.
Distrib.: USSR-Uzbek SSR, Nuratau (1000-2000 m).
Ecol.: Mountain slopes.

17. *Cicer heterophyllum* Contandriopoulos, Pamukçuoğlu et Quézél, Biologia Gallo-Hellenica 4-1:12-15.1972.

Peculiar species similar to *Cicer montbretii* and *C. isauricum*, but with lanceolate leaflets at lower leaves, and ovate-rounded leaflets in the upper flowering parts of the plant. The pubescence is long, as in *C. montbretii*, but even more dense. The flowers are uniformly pale yellow. Type: Turkey, Antalya Prov., forests of *Pinus brutia* and *Quercus cerris* between Manavgat and Akseki, 3 km S of Didere, N exposition, 1100 m, sample 6-J-3 (holotype: MARSSJ; isotype: WAG).
Fls.: July.
Distrib.: Turkey, Toros Daglari (1100 m).
Ecol.: Pine and oak forest.

18. *Cicer incanum* Korotkova, Not. Syst. Herb. Inst. Biol. Zool. Acad Sci. Uzbek. 10:17.1948; van der Maesen 64.1972.

A member of Sect. Acanthocicer, with spiny rachis, with 4-6 pairs of leaflets (not 6-9 as in *C. macracanthum*), the tooth of the midrib of the leaflets shorter than or equal to the lateral ones (not longer) and the stipules foliolate (not spiny).

Type: USSR-Tadzhik SSR, W Pamir-alai, Jakkabag-darja, Botshantshev and Butkov 720 (holotype: TAK).
Heterotypic synonym: *Cicer pungens* var. *horridum* M.G. Popov 224.1928-29; Borissova, Nov. Syst. Pl. Vasc. 6:172.1969.
Type: USSR-Tadzhik SSR, Pamir-alai, Jakkabag Mts. between Kaidar-bulak and Tashkurgan, Nevessky s.n. (holotype: LE).
Fls.: Aug.
Distrib.: USSR-S Tadzhik SSR, Pamir-alai (2000-3000 m).
Ecol.: Calcareous rocks.
19. *Cicer incisum* (Willdenow) K. Maly, in Ascherson and Graebner, Syn. Mittel-Europ. Fl. 6 Suppl. 16.1927; Boissier, Fl. Orient. 2:561.1872; Popov 183.1928-29; Rechinger, Fl. Aeg. 322.1943; Linczevski, Fl. USSR 13:390.1948; Fürnkranz, Oest. Bot. Zeitschr. 115:407.1968; Davis, Fl. Turkey 3:270.1970; van der Maesen 66.1972; id. 6.1979.

A small prostrate alpine perennial, densely glandular pubescent, with 3-5 (-7) leaflets and relatively large (9-12 mm), reddish or bluish purple flowers. Rather widely distributed, not recently collected for experimental purposes.

Basionym: *Anthyllis incisa* Willd., Spec. Pl. 3-2:1017.1802.
Type: Crete, herb. Willdenow (holotype: B).
Heterotypic synonyms: *Cicer pimpinellifolium* Jaubert et Spach: 228.1842. Type: Turkey, Taurus Mts, Kotschy 170 (hololectotype: P; isotypes: BM, G, K, OXF, W). Paratypes: Turkey, Mt Olympus or Keşisdağ (BM, G, K, MPU, OXF); Montbret 2417, Herb. Webb (K, P, W).

Cicer adonis Orphanides ex Nyman, Consp. Fl. Europ. 200-1878. Type: Greece, Mt. Parnassus nr. Longar (holotype: P; isotypes: BM, E, G, GZU, JE, K, L, M, MPU, OXF, P, W). Paratype: Greece, Heldreich 2962 (?).

Cicer ervoides (Sieber) Fenzl, Ill. Syr. Taur. in Russegger Reise 1:892. 1841 (basionym *Ononis ervoides* Sieb., Reise nach der Insel Kreta 1817 band 1:325.1823). Type: Greece, Crete, Mt. Ida (Psiloritis), Sieber 13181 (holotype: W; isotypes: L BM, M).

Cicer incisum Woronow, Trudi Tifflisk. Bot. Sada 12-2:69.1924 and Fl. Cauc. 2:356.1930. Type: USSR-Georgian SSR, Caucasus, Tana river valley nr Ateni-Karthalinia, Tiflis prov., Woronow and Schelkownikow Herb. Fl. Cauc. 130 (holotype: JE, isotype: G, LE). Homotypic synonym: *Cicer caucasicum* Bornmüller, Feddes Repert. 50:139.1941.

Cicer ervoides (Sieber) Fenzl var. *libanoticum* Boissier, Fl. Orient. 2:562.1872. Type: Lebanon, Jebel Makmel, Boissier (holotype: G; isotypes: K, P). Homotypic synonym: *Cicer incisum* var. *libanoticum* (Boissier) Bornmüller, Feddes Repert. 5:138.1941. Cited specimens: Turkey, Ala Dağ 2950 m, Bornmüller 381 (JE?); ibid., above Cemis-Deresi, 2800 m, id. 302 (JE?).

Cicer minutum Boissier et Hohenacker, Diagn. Sér. 1-9:130.1849; van der Maesen 66.1972. Type: Iran, Mt. Elburz, Loura valley, Kotschy 542 (holotype: P; isotypes: BM, G, K, M, OXF, W, WAG).
Fls.: Caucasus: May, Greece: June-July; Turkey and Lebanon: July-Aug (Sept).
Distrib.: Greece-Crete, Turkey, Iran, Lebanon, USSR-Armenian and Georgian SSR (1400-2700 m). Ecol.: (Sub)alpine vegetation, rubble slopes, calcareous and igneous soils.
20. *Cicer isauricum* P.H. Davis, Not. Roy. Bot. Gdn Edinb. 29-3:311.1969; Davis, Fl. Turkey 3:268.1970; van der Maesen 70.1972.

A sparsely glandular pubescent perennial, with flexuous stems and imparipinnate leaves. Flowers white, quite large, 20 mm. Endemic of a small area in the W Toros dağlari. As with many perennials, the rootstock can be considerable. The Turkish vernacular is *tuzllu nohut*, the saltish chickpea.

Type: Turkey, Antalya Prov., Akseki, Huber-Morath 17174 (holotype Hb. Huber-Morath). Paratypes: Durbanas, Davis 14396 (K); and Akseki, Sorger 65-37-8 (?).
Fls.: June-July (Aug).
Distrib.: Turkey, Antalya prov. (1000-1500 m).
Ecol.: Grey volcanic rocks, rubble slopes, *Abies cilicia* and *Pinus nigra* forests.
21. *Cicer judaicum* Boissier, Diagn. Sér. 2-9:130.1849; Boissier. Fl. Orient. 2:560.1872 Popov 176.1928-29;

Popova, Kult. Fl. USSR 4:66.1937; Bornmüller, Feddes Repert. 50:138.1941; Davis, Fl. Turkey 3:271.1970; van der Maesen 72.1972.

Annual weed, close to *Cicer pinnatifidum* Jaub. et Sp., but with doubly incised leaflets and triangular rather than elongate-triangular seeds. The leaf petiole is shorter, 1-1.5 times the length of the leaflets. Restricted to Palestine and S. Lebanon. Type: Palestine, Jerusalem, Boissier s.n. (holotype: G)
Homotypic synonym: *Cicer pinnatifidum* var. *judaicum* M.G. Popov 176.1928-29.
Fls.: Mar-May.
Distrib.: Palestine, Lebanon (0-500 m).
Ecol.: Rocky places and fallow fields, sometimes a weed in crops.

22. *Cicer kermanense* Bornmüller, Bull. Herb. Boiss. Ser 2-5:969.1905 (nomen in obs.); Bornmüller, Beihefte Bot. Centrbl. 578:288.1937; van der Maesen 76.1972; id. 8.1979.

A white to pink flowered perennial with paripinnate leaves, ending in a curly tendril, with cuneate-fanshaped leaflets, broader than long. Localised in the Kerman area of Iran, rarely collected.
Type: Iran, Kerman prov., Kuh-i-Dschupar, Bornmüller 3678 (lectotype: JE; isolectotypes: G, WU). Paratypes: ibid., Bornmüller 3676 (BM, BR, G, JE, OXF, P, W, WU); Kuh-i-Nasr, id. 3677 (JE); Kuh-i-Häsar, id. 3680 (JE); ibid. id. 3679 (E, G, JE, W).
Homotypic synonym: *Cicer spiroceras* subsp. *kermanense* (Bornm.) M.G. Popov 196.1928-29.
Fls.: May-June (July).
Distrib.: SE Iran.
Ecol.: Mountains, rocky places.

23. *Cicer korshinskyi* Linczevski, Not. Syst. Inst. Bot. Acad. Sci. USSR 9:110 (1948?)1949; Linczevski, Fl. USSR 13:396.1948.

A poorly known perennial of Section Polycicer with leaf rachis ending in a simple sturdy tendril, a foliolate curl or a leaflet (at lower leaves). Leaflets are obovate or broadly cuneate, margin toothed. Flowers and seeds are unknown, the immature pods measure up to 30 mm.
Type: USSR-Tadzhik SSR, Darvaz Mts, Imam-askara Mt, Linczevski 1179 (LE).
Fls.: Aug.
Distrib.: USSR-Tadzhik SSR, NW Pamir (2500 m).
Ecol.: Dry rocky slopes.

24. *Cicer laetum* Rassulova et Sharipova, description not traced, listed by Czrepanov 1981.
No further information is available for this species.

25. *Cicer macracanthum* M.G. Popov, Bull. Univ. As. Centr. 15, suppl.: 16.1927; Popov 226.1928-29; Kitamura, Fl. Afghan. 225.1960; id., plants of W Pakistan and Afghanistan 91.1964; Borissova, Novit. Syst. Plant Vasc. Leningrad 6:167.1970; van der Maesen 80.1972; id. 12.1979.

A spiny perennial, with long spiny stipules, up to 25 mm, often with a shorter secondary spine, rarely a third or fourth one. Quite closely resembling *C. acanthophyllum*.
Type: USSR-Tadzhik SSR, Pamir-alai, Guralash, Popov in Herb. As. Med. 205 (holotype: TAK; isotypes: BR, C, E, G, LE, W). Heterotypic synonyms: *Cicer songaricum* var. *spinosum* Aitch., J. Linn. Soc. Bot. 18.49.1881. Type: Afghanistan, Kurram Valley, Seratigah, 3500 m, Aitchison 819 (holotype: K).
Fls.: June-Aug.
Distrib.: Afghanistan, India, Pakistan, USSR: Tadzhik and Uzbek SSR (2200-3600 m).
Ecol.: dry streambeds, valleys, rubble slopes.

26. *Cicer microphyllum* Benth, in Royle, Ill. Bot. Himal. 200.1839; Baker in Hooker, Fl. Brit. India 2:176.1879; Popov 220.1928-29; Linczevski, Fl. USSR 13: 403.1948; van der Maesen 82.1972; id. 9.1979; Chandel, Int. Chickpea Newsletter 10:4.1984.

A widely collected, but difficult to maintain, perennial with tendrillous leaves, leaflets very small, up to 10(-17) mm long, remote to fairly close. Usually erroneously included in *C. songaricum* Steph. ex DC., which is a Central-Asian species with a different morphology. *Cicer microphyllum* is of rather wide distribution in the Himalayas. Vernaculars are *tizhu-jawane, banyarta, sarri* or *serri*.
Type: India, Himachal Pradesh, Shalkur (Hungarung), Royle s.n. (holotype: K).Heterotypic synonyms:

Cicer jacquemontii Jaubert et Spach, Ann. Sci. Nat. Ser. 2-18:231.1842; Boissier, Fl. Orient. 2:563.1872; Popov 220.1928-29; Linczevski, Fl. USSR 13:400.1948; Rechinger, Ann. Naturhist. Mus. Wien 65:32.1961. Type: India, Himalaya, Yurpo, Kanaor region, Jacquemont 1733 (lectotype: P). Paratype: id. 1734 (K, P); id. s.n. (K, L).

Fls.: June-Aug. (Sept).

Distrib.: E Afghanistan, China: W. Tibet, India: Himachal Pradesh, Kashmir, N. Uttar Pradesh, Pakistan: Chitral, Gilgit, Swat, USSR-Pamir (2000-5600 m).

Ecol.: Rubble slopes, in dry riverbeds, in pasture, open vegetation or near trees, subalpine forest of *Betula*, along streams.

27. *Cicer mogoltavicum* (M.G. Popov) A. Koroleva Fl. Tadzhik. 5:600.1937; Linczevski, Fl. USSR 13:397.1948; van der Maesen 87.1972.

Perennial, quite tall, to 70 cm, with rachis ending in a simple or ramified tendril. Leaflets remote, broadly cuneate, flabellate, almost half-circular with toothed top. Rarely collected. Sparsely eglandular and glandular pubescent.

Basionym: *Cicer flexuosum* Lipsky subsp. *tianschanicum* var. *mogoltavicum* M.G. Popov, Bull. Univ. As. Centr. 15, suppl. 15.1927. Type: USSR-Tadzhik SSR, Mogoltau Mts, Katar-Bulak, Popov and Vvedensky, Herb. As. Med. 264 (holotype: TAK; isotypes: BR, C, G, K, LE, MW, P, W). Homotypic synonym: *Cicer flexuosum* Lipsky subsp. *mogoltavicum* M.G. Popov, 211.1928-29.

Fls.: June (and later?).

Distrib.: USSR-Tadzhik SSR (1500 m?).

Ecol.: Mountains, presumably rubble slopes.

28. *Cicer montbretii* Jaubert et Spach, Ann. Sci. Nat. Sér. 2-17:229.1842; Popov 203.1928-29; Fürnkranz, Oest. Bot. Zeitschr. 115:406.1968; Davis, Fl. Turkey 3:268.1970; Quezel, Candollea 25-2:374.1970; van der Maesen 89.1972.

A beautiful tall perennial with large (20 mm) white or cream flowers, large imparipinnate leaves, leaflets up to 30 mm long. Glandular pubescent, hairs up to 2 mm. Seeds up to 5 mm, 3-7 per pod. Seed dormancy has been noticed, fruiting outside its habitat (e.g. Ankara) could not be induced.

Type: Turkey, Kaz Dag (Mt. Gargaro, Gassadagh), Aucher-Eloy 1146 (holotype: P; isotype: OXF). Paratype: ibid., Coquebert de Montbret s.n. (W).

Fls.: Mar-June (-Aug).

Distrib.: Albania, Bulgaria, Turkey: Thracia and W. Anatolia (0-1200 m).

Ecol.: Hill slopes, *Pinus nigra* or *Quercus* forest, loam and rocky places and near water.

29. *Cicer multijugum* Maesen, Meded. Landbouwhogeschool Wageningen 72-10:91.1972; van der Maesen 9.1979; Czrepanov 230.1981.

A perennial of low stature, 10-30 cm, with imparipinnate leaves of 9-18 pairs of leaflets, at lower nodes less pairs. Profusely glandular pubescent, related to *Cicer microphyllum*.

Fls.: July-Aug.

Distrib.: Afghanistan (3000-4000 m).

Ecol.: Rubble slopes, limestone hillsides.

30. *Cicer nuristanicum* Kitamura, Acta Phytotax. Geobot. Kyoto 16:136.1956; Kitamura, Fl. Afghan. 224-225.1960; van der Maesen 94.1972; id. 10.1979.

Thinly pubescent perennial, akin to *C. microphyllum*, but stipules very small. Vernaculars in Baskar (India) are *koksul* and *hommair*.

Type: Afghanistan, Nuristan, Voma-Chatrass, Kitamura s.n. (holotype: KY).

Fls.: June-July (Aug.).

Distrib.: Afghanistan, India-Kashmir, Pakistan-Chitral.

Ecol.: *Abies* forest, pastures, shady humid places, limestone rocks.

31. *Cicer oxyodon* Boissier et Hohenacker, Diagn. Ser. 1-9:129.1849; Alefeld, Oest. Bot. Zeitschr. 9:357.1859; Boissier, Fl. Orient. 2:563.1872; Popov 190. 1928-29; Kitamura, Fl. Afghan. 225.1960; van der Maesen 97.1972; id. 10.1979.

Perennial of Sect. Polycicer, glandular pubescent, leaflets in 4-5 pairs, rather remote, orbicular or broadly fanshaped. Tendril of rachis simple or ramified. Corolla veined lilac or white. A vernacular is *nohut kuhi* (mountain chickpea) in Farsi.
Type: Iran, Elburz Mt, Uston Bag nr Passgala, Kotschy 287 (holotype: P; isotypes: BM, G, K, L, M, OXF, WAG, WU).
Fls.: (May) June-July.
Distrib.: Iran, Afghanistan, N Iraq (1250-2500 m). Ecol.: Rubble and earth slopes, cultivated fields, *Rhus-Quercus* forests.
32. *Cicer paucijugum* Nevski, Acta Inst. Bot. Acad. Sci. USSR ser. 1-4:260. 1937; Linczevski, Fl. USSR 13:397.1948; van der Maesen 100.1972.

Perennial with just 2-4 pairs of leaflets per leaf, rachis ending in a leaflet or foliolate spine. Flowers are large, 24 mm long, bluish violet. Synonymy is confused.
Type: USSR - Servshan above Chodsha-i-fil village, Kugitang-tau, Nevski 485 (holotype: LE?)
Heterotypic Synonym: *Cicer songaricum* Steph. ex DC. var. *paucijugum* M.G. Popov 217.1928-29. Type: USSR- S Kazakh SSR, Revat, Komarov s.n. (holotype: LE).
Cicer popovii Nevski, Acta Inst. Bot. Acad. Sci. USSR sér. 1-4:261.1937. Type: as for var. *paucijugum* M.B. Pop.
Fls.: June-July
Distrib.: USSR-S Tadzhik SSR, E. Kazakh SSR? (2900 m).
Ecol.: Stony slopes, *Juniperus salina* vegetation.
33. *Cicer pinnatifidum* Jaubert et Spach, Ann. Sci. Nat. Ser. 2-18:227.1842; Boissier, Fl. Orient. 2:560.1872; Popov 173-177.1928-29; Popova, Kult. Fl. SSSR 4:67.1937; Davis, Fl. Turkey 3:271-272.1970; van der Maesen 102.1972; id. 5.1979.

Annual herb with semi-erect or prostrate stems, 2-4 (-5) pairs of simply incised leaflets and petiole relatively long, 10-17 mm, and small pinkish purple flowers. The seeds are elongate-angular, not triangular as in *Cicer judaicum* and larger than in that species. Two varieties can be distinguished: var. *anatolicum* M.G. Pop.: leaflets obovate-cuneate, thick, teeth triangular broad, stipules 2-3 toothed, teeth lanceolate up to 5 mm; var. *syriacum* M. Pop.; leaflets narrowly cuneate, thin, deeply incised, teeth narrow lanceolate, stipule teeth linear up to 7 mm, seeds strongly bilobular.
Type: Asia minor, Montbret s.n. cultiv. at Paris (P).
Synonym: *Cicer sintenisii* Bornmüller, Beih. Bot. Centralbl. 19-2:248.1906; id. Feddes Repert. 50:139.1941. Type: Turkey, Kharput, Sintenis 574 (holotype: P; isotypes: BR, JE, K, WU).
Fls.: Feb.-Mar. (Syria); Apr.-July (Turkey).
Distrib.: Cyprus, N. Iraq, Syria, Turkey-Anatolia, USSR-Armenia (250-1400 m).
Ecol.: Rocky or rubble places, vineyards, *Pinus brutia* and scrub vegetation.
34. *Cicer pungens* Boissier, Diagn. Sér. 2-2:44.1856; id. Fl. Orient. 2:565. 1872; Popov 223.1928-29; Linczevski, Fl. USSR 13:403.1948; Kitamura, Fl. Afghan. 225.1960; Borissova, Nov. Syst. Pl. Vasc. Leningrad 6:172.1970; van der Maesen 106.1972; id. 13.1979.

A very spiny perennial, but stipules incised-foliaceous. Calyx teeth also spiny, corolla blue violet, flag dorsally greyish or greenish, carina white at the base. Specimens can grow to large cushions 40 cm tall and 60-70 cm wide. Reasonably easy to find in Afghanistan. Even this species pays its toll to Lepidopteran borers and bruchids, and even camels (van der Maesen 1980). Vernacular in Bamyan province, Afghanistan, is *nachutak roman, the chickpea is nachut.*
Type: Afghanistan, Yomutt nr Kabul, Griffith 1608 (holotype: K; isotypes: C, G, K, L, M, W).
Heterotypic synonym: *Cicer spinosum* M.G. Popov, Bull. Univ. As. Centr. 15 suppl. 15.1927. Type: USSR-Turkestan, Pamir-alai, Popov? (holotype: LE).
Fls.: (May) June-July.
Distrib.: Afghanistan, USSR-Tadzhik SSR (1800-4200 m).
Ecol.: Stony and rubble slopes, volcanic ashes, limestone, alpine meadows.
35. *Cicer rassuloviae* Linczevski, description not traced, listed by Czrepanov, 1981. Homotypic synonym: *Cicer multijugum* Rassulova et Sharipova 1978, non van der Maesen.

36. *Cicer rechingeri* Podlech Mitt. Bot. Staatssamml. München 6:587.1967.

A spiny perennial of Sect. Acanthocicer with small leaflets in 5-10 pairs per leaf. Stipules triangular to lanceolate, foliolate, 1-3-toothed. Flowers 12-15 mm long, pale violet to violet. Vernaculars are *nachutak*, as for *C. pungens*, and *abobak* (C Afghanistan). This species has strongly acidic glandular exudation, and is apparently less grazed than others.

Type: Afghanistan, Baghlan, Middle Andarab Valley, NE of Deh-Salah in the Upper Kasan Valley, 2400 m, Podlech 11700 (holotype: M; isotypes: E,W).

Fls.: July-Aug.

Distrib.: Afghanistan (2400-3600 m).

Ecol.: Dry slopes, granitic rubble, moraine near gletscher.

37. *Cicer reticulatum* Ladizinsky, Not. Roy. Bot. Gdn Edinb. 34-2:201-202.1975; Moreno and Cubero, Euphytica 24: 465-485.1978; van der Maesen and Pundir, Plant Gen. Res. Newsl. 57:19-24.1984.

Annual, the progenitor of chickpea, also classified as *Cicer arietinum* var. *reticulatum* (Ladiz.) Cubero et Moreno (earlier quoted as subspecies, van der Maesen and Pundir 1984, but geographic distribution not separate from var. *arietinum*). Prostrate, stems later somewhat ascending, seeds reticulate. Hybridizes well with chickpea.

Type: Turkey, Mardin prov., nr. Dereici, ca 9 km E of Savur on gulley, edge of vineyard, Ladizinsky s.n. (holotype: HUJ).

Fls.: May-June.

Distrib.: E. Turkey (700-1000 m).

Ecol.: Limestone hills, oak scrub vegetation, weedy habitats.

38. *Cicer songaricum* Stephan ex de Candolle, Mem. Lég. 8:349.1825; DC., Prodr. 2:354.1825; Alefeld, Bonplandia 9:348.1861; Popov, Bull. Univ. As. Centr. 15, suppl. 15.1927; Popov 213.1928-29; Linczevski, Fl. USSR 13: 397.1948; van der Maesen 113.1972; id. 8.1979.

Perennial with rachis ending in a simple tendril or tendrillous leaflet, leaflets in 5-7 pairs, quite rounded, stipules rounded or ovate, larger than or as large as leaflets, toothed. Flowers purplish, large, to 30 mm long. Often confused with *Cicer anatolicum* from Turkey and *C. microphyllum* from Kashmir-Hindukush, but *C. songaricum* is confined to Central Asia.

Type: USSR-Songaria (Dzhungarskyi Alatau), Stephan ex Herb. Prescott (holotype: OXF; isotype: LE).

Heterotypic synonyms: *Cicer songaricum* var. *alaicum* (M.G. Pop.) Kuschakewicz ex O. & B. Fedtschenko, based on *C. alaicus* Kuschak. ex O. & B. Fedtsch., Consp. Fl. Turkest. 2:245.1909, nomen nudum. Type: USSR-Kirghiz SSR, Alai valley, Tian-shan Mts, Kuschakewicz s.n. (holotype: LE; isotypes: C, E, G, K).

Cicer songaricum var. *turkestanicum* Franchet, Ann. Sci. Nat. Ser. 6-15:267.1883. Type: Tadzhik SSR, Gorge de Tschoukalik, nr Urmetan, Capus 380 (holotype: P) (= var. *ecirrhosum* Lipsky p.p.).

Cicer songaricum var. *glutinosum* Franchet, ibid. Type: Tadzhik SSR, Ona Oulgane valley, Capus 381 (holotype: P).

Cicer songaricum var. *cirrhiferum* Lipsky, Acta Hort. Petrop. 23:97.1904. Type: Kazakh SSR, Tsheherak-Assu river, Khrebet Tarbagatay, Karelin & Kirilov 222 (lectotype: LE; isolectotypes: BM, BR, G, K, M, MW, WU). Paratypes: USSR-Dzhungarlya, Uldzhar, Shanin s.n. (LE); Khrebet Tarbagatay and Alatau, Schrenk s.n. (K, LE, W), Alatau, Karelin & Kirilov s.n. Chinese Turkestan: Ush. Talki, Regel s.n. (LE); Burchan-tau (Tekes), Fetisov s.n. (LE); Yulti-Aristau, Regel s.n. (LE); Kash, Regel s.n. (LE). Dzhungarya, Schrenk s.n. (LE); Altin-Emel, Kuyan-kuz, Regel s.n. (LE). *Cicer songaricum* var. *imparipinnatum* Herder, Bull. Soc. Imp. Naturalistes Moscou 39-2:31.1866.

Cicer songaricum var. *ecirrhosum* Lipsky, Acta Hort. Petrop. 23:97.1904.

Cicer songaricum var. *oxyodon* M.G. Pop., 1928-29. Type: Dzhungarskyi Alatau, Dsharkent distr., Chorgos river, Divnogorsky 21-6-1907 (holotype: LE) (= *ecirrhosum* Lipsky p.p.).

Fls.: (May) June-Aug.

Distrib.: USSR-Kazakh, Kirghiz and Tadzhik SSR (2300-4000 m).

Ecol.: Rubble slopes, near streams, but also dry places.

39. *Cicer spiroceras* Jaubert et Spach, Ann. Sci. Nat. Sér. 2-18:233.1842; Boissier, Fl. Orient. 2:564.1872; Popov 193.1928-29;van der Maesen 118.1972; id. 11.1979.

Tall perennials, thinly glandular pubescent, with 4-8 pairs of remote fan-shaped leaflets with 7-12 teeth, rachis ending in a curly tendril, flowers lavender, 15 mm long.
Type: Iran, Isfahan, Aucher-Eloy 1126 (holotype: P; isotypes: G, K, P). Paratype: Iran, no location, Aucher-Eloy 4357 (BM, G, K, OXF, P, WU).
Fls.: May-July (Aug).
Distrib.: Iran (2600 m).
Ecol.: Rubble slopes, oak forests.

40. *Cicer stapfianum* K.H. Rechinger, Engl. Bot. Jahrb. 75:339.1951; van der Maesen 120.1972; id. 14.1979.

Small subglabrous spiny perennial, rachis ending in a spine, most leaflets transformed into spines, basal 1-2 of the 3-5 pairs sometimes foliaceous, flowers to 18 mm long, probably purplish. Only found once, apparently a narrow endemic, perhaps a rare mutant, probably very drought resistant.
Type: Iran, Fars prov., Kuh-e-Bul NNE of Shiraz, Stapf 625 (holotype: W; isotype: K, W).
Fls.: Aug.
Distrib.: Iran (4000 m).
Ecol.: Mountains.

41. *Cicer subaphyllum* Boissier, Diagn. Sér. 1-6:44.1845; Alefeld, Oest. Bot. Zeitschr. 9-11:357.1849; Boissier, Fl. Orient. 2:564.1872; Popov 196.1928-29; van der Maesen 122.1972; id. 11.1979.

Glabrous sturdy bush, perennial, to 40 cm, only pedicel and pod glandular pubescent, the 2-6-(8) pairs of leaflets transformed into spines, rachis ending in a curl. Only found once, xerophytic endemic.
Type: Iran, Fars prov., Kuh-Ajub Mts, Mt. Jobi near Persepolis, Kotschy 403 (holotype: P; isotypes BM, C, G, JE, K, L, M, OXF, W, WAG).
Fls.: May.
Distrib.: Iran (2000 m).
Ecol.: Rubble slopes.

42. *Cicer tragacanthoides* Jaubert et Spach, Ann. Sci. Nat. Bot. Sér. 2-18: 234.1842; Alefeld, Oest. Bot. Zeitschr. 9-11:357.1859; Boissier, Fl. Orient. 2: 265.1872; Popov 230.1928-29; Linczevski, Fl. USSR 13:405.1948.

Sturdy branched perennial shrublet with tiny remote leaflets, 1-6 mm long, rachis ending in a spine, specimens of 15-20 cm belong to var. *tragacanthoides*, those of 25-35 cm with the largest leaflets of the range and somewhat recurved spiny rachis to var. *turcomanicum* M.G. Popov (230, 1928-29). Vernacular is *nochudi kuhi* (mountain chickpea, Farsi).
Type of var. *tragacanthoides*: Iran, Elamout Mts, Aucher-Eloy 4337 (holotype: P; isotypes: BM, G, OXF, P, W).
Heterotypic synonym: *Cicer straussii* Bornmüller, Beih. Bot. Centrbl. 27-2:344.1910. Type: Iran, Ostoronkuh, Strauss 8-1903 (holotype: JE).
Type of var. *turcomanicum* Bornm.: USSR-Turkmen SSR, Kopet-dagh Mts, Karanka gorge nr Ashkhabad, Litwinow 243 (lectotype: LE; isolectotypes: E, G, JE, P, WU).
Homotypic synonym: *Cicer kopetdaghense* Linczevski, Not. Syst. Herb. Bot. Acad. Sci. USSR 9:111.1949.
Fls.: July (Aug).
Distrib.: Iran, USSR-Turkmen SSR.
Ecol.: Mountain, alpine region, dry rocky rubble slopes.

43. *Cicer yamashitae* Kitamura, Acta Phytotax. Geobot. Kyoto 16:135.1956; Kitamura, Fl. Afgh. 225.1960; van der Maesen 128.1972; id. 5.1979.

Annual species with 2-3 pairs of leaflets and end leaflet, and long slender arista (5-20 mm). The first flowers and pods may develop between the stones. Peculiar endemic of the Sarobi area between Kabul and Jalalabad, perhaps also north of Sarobi. Vernacular: *wogi*.
Type: Afghanistan, between Sarobi and Kabul, Yamashita and Kitamura s. n. (holotype: KY).
Heterotypic synonym: *Cicer longearistatum* K.H. Rechinger, Biol. Skrift. Kong. Dansk. Selsk. 9-3:201.1957.
Type: Afghanistan, Sarobi, between Kabul and Jalalabad, Volk 1887 (holotype: W). Paratypes: ibid., Volk

1888 (W); Tisin on road Kabul to Jalalabad, Kerstan 583 (HAL).
Fls.: May-June.
Distrib.: Afghanistan: Kabul, Kapisa, Laghman prov. (900-2800 m).
Ecol.: Rocks (gneiss), rubble slopes.

6. Excluded Names

In old literature some species names are listed under *Cicer* but do not belong there:

C. ervoides Brign., Fasc. Pl. Forojul. 27.1810 = *Lens ervoides* (Brign.) Grande.
C. lens Willd., Spec. Pl. 3:1114.1808 = *Lens culinaris* Medikus.
C. nigrum hort. ex Steudel, Nom. Bot. ed. 2-1:361. 1840 = *Lens culinaris.*
C. nummulariaefolium Lam., Encycl. 2:2.1786 = *Crotalaria biflora* L.
C. punctatum hort. ex Steudel, Nom. Bot. e 2-1:361. 1840 = *Lens ervoides.*
C. punctulatum hort. ex Ser. in DC. Prodr. 2:366. 1825 = *Lens culinaris.*
C. soloniense Schranck ex Don, Gen. Syst. 2:312.1832 = *Lens ervoides.*

7. Note on Cytology

For a full account on the cytology of chickpea, see Chapter 5. The cytology of only a limited number of *Cicer* species has been studied, since living material was not available. The cultivated chickpea has been studied much more: usually 2n=16 chromosomes are counted, but counts of 2n=14 or n=7 have also been published (Fürnkranz 1968). Wild species possess 2n=14 or 16 chromosomes (see Table 2.2). The peculiar new vetch-like endemic of the Canary Islands, *Cicer canariense*, has 2n=24 chromosomes. (Santos Guerra and Lewis 1985).

Table 2.2. Chromosome numbers reported in the genus *Cicer* L.

Species	Chromosome number	Source(s)[a]
C. anatolicum Alef.	2n = 14, 16	van der Maesen 1972
C. arietinum L.	2n = 14, 16, 24, 32, 33	van der Maesen 1972
C. bijugum K.H.Rech.	2n = 16	van der Maesen 1972
C. canariense Santos Guerra & Lewis	2n = 24	Santos Guerra and Lewis 1985
C. chorassanicum (Bge)M.Pop.	2n = 16	Podlech & Dieterle 1969
C. cuneatum Hochst. ex Rich.	2n = 16	van der Maesen 1972
C. echinospermum P.H.Davis	2n = 16	Almad and Slinkard, pers. commun.
C. floribundum Fenzl.	2n = 14	Contandriopoulos et al. 1972
C. heterophyllum Contandr. et al.	2n = 16	Contandriopoulos et al. 1972
C. incisum (Willd.) K.Maly	2n = 16	van der Maesen 1972[c]
C. isauricum P.H.Davis	2n = 16	Contandriopoulos et al. 1972
C. judaicum Boiss.	2n = 16	van der Maesen 1972
C. microphyllum Benth[b]	2n = 14	Iyengar 1939
C. montbretii Jaub. & Sp.	2n = 16, 24	van der Maesen 1972
C. pinnatifidum Jaub. & Sp.	2n = 16	Avdulov 1937
C. pungens Boiss.	2n = 14	van der Maesen 1972
C. reticulatum Ladiz.	2n = 16	Almad and Slinkard, pers. commun.
C. yamashitae Kitam.	2n = 16	Almad and Slinkard, pers. commun.

[a]First reports, for these and other references, see van der Maesen 1972.
[b]As *C. songaricum* Steph. ex DC.
[c]Simultaneously published by Contandriopoulos et al. (1972).

V. CULTIVARS

Several infraspecific classifications have been proposed in chickpea. The oldest and simplest are based on a few characters, of which seed colour was, and has remained, the most important. Jaubert and Spach (1842) and Alefeld (see van der Maesen 1972) followed the old apothecaries and herbalists, but each in a different way. Alefeld's varieties are still occasionally encountered, but these are based on seed shape, size and colour only, which is rather simplistic.

The most detailed classification was made by Popova (1937); and Koinov (1968) added a few varieties. For a review see van der Maesen (1972). Popova (1937) subdivided *Cicer arietinum* into four subspecies, 13 geographical proles and 65 varieties, making use of several quantitative characters beside plant colour and seed colour. It is a workable classification, even if cumbersome, and little-used. Her varieties, however, are better considered as cultivars or cultivar groups, the 'proles' as subraces, and the 'subspecies' as races in the sense of Harlan and de Wet (1971).

The quantitative characters, as observed in Tashkent, rendered this classification unsatisfactory for universal application. The diversity observed has been seen, and was available, before 1937, and it is not known whether all taxa are distinguishable in today's world germplasm. Popova's (1937) classification, based on the collections of Vavilov and his collectors, does not (entirely) agree with the earlier ones made on the same collections, such as the Afghan cultivars (Prosorova 1929) and the Turkish chickpeas (Popova and Pavlova 1933). Many of the cultivars then described are no longer available in the Turkish germplasm.

Indian cultivars have been subdivided into 25 'types' (Howard et al. 1915), and later into 84 'types' (Shaw and Khan 1931). These 'Pusa types' have not all been maintained, but most are probably available even if their identity is uncertain. The users of chickpea germplasm, such as breeders and agronomists, are not concerned about a detailed classification, other than the two 'super cultivar groups' kabuli and desi. These groups more or less coincide with the two races proposed by Moreno and Cubero (1978): *macrosperma* and *microsperma*, names also used for lentil races.

Moreno (1985) rounded off her biometrical studies confirming for several characters a bimodal distribution, and the existence of the two mentioned large cultivar groups; admitting the occurrence of intermediate forms. There will always be cultivars which are not unambiguously classifiable into one or the other group. Newly produced cultivars receive more proper treatment such as well-written published descriptions, storage in seed base collections, and in a voucher herbarium. An account of released chickpea cultivars has been given by Smithson et al. (1985).

It would still be interesting to verify whether all infraspecific taxa described are still represented in cultivation or germplasm collections.

References

Allchin, F.R. 1969. Early cultivated plants in India and Pakistan. *In* The domestication of plants and animals (P.J. Ucko, and G.W. Dimbleby, eds.). Gerald Duckworth and Co., London, pp.323-329

Avdulov, N.P. 1937. [The karyotype of *Cicer arietinum* L.]. Uchenye Zapiski Sarotovskogo Gosudarstvennogo Imeni N.G. Cernysevkogo. Universiteta, Sertie Biologicekaja **1**: 30-36. (Abhandlungen Tschernyschewski Staatsuniversitaet Saratow), Biologische Serie 1: 30-36.

Boissier, E. 1872. Flora orientalis 2. Geneva-Basel: 560-565.

Chowdury, K.A., Saraswat, K.S., Hasam, S.N. and Gaur, R.G. 1971. 4.000-3.500 year-old barley, rice and pulses from Atranjikhera. Science and Culture **37**: 531-533.

Contandriopoulos, J., Pamukuoglu, A. and Quezel, P. 1972. A propos des Cicer vivaces du pourtour mediterranee oriental. Biologia Gallo-Hellenica **4-1**: 1-18.

Czrepanov, S.K. 1981. Plantae vasculares URSS. Nauka, Leningrad: 230.

Darby W.J., Ghaloungui, P. and Grivetti, L. 1977. Food: the gift of Osiris. Academic Press, London, New York, San Francisco: 685-687.

Davis, P.H. 1970. Flora of Turkey and the East Aegean Islands. Edinburgh University Press 3: 267-274.

de Candolle, A. 1883. Origine des Plantes Cultivees. Paris: 258-260.

Dixon, D.M. 1969. A note on cereals in ancient Egypt. *In* The Domestication of Plants and Animals (P.J. Ucko and G.W. Dimbleby, eds.). p.137 Gerald Duckworth and Co., London.

Dodonaeus, R. 1608. Cruydtboeck (4th ed.): 916-919.

Don, G. 1882. General history of dichlamydeous plants **2**: 311.

Duschak, M. 1871. Zur Botanik des Talmud. I. Neuer, Pest: 105-106.

Ellison, R., Renfrew, J., Brothwell, D. and Seeley, N. 1978. Some Food Offerings from Ur, excavated by Sir Leonard Woolley, and previously unpublished. Journal of Archeological Science. **5**: 167-177.

Fraas, C. 1870. Synopsis Plantarum Florae Classicae. S. Calvary and Co., Berlin: 55-56.

Fürnkranz, D. 1968. Beiträge zur Systematik und Karyologie der Gattung *Cicer* I. Die europäishen Arten. Oesterreichische Botanishe Zeitschrift. **115**: 400-410.

Gams, H. 1924. Leguminosae. *In* Illustrierte Flora von Mittel-Europa. München, J.F. Lehmanns Verlag **4-3**: 1498-1501.

Gelb, I.J., Jacobsen, T., Landsberger, B. and Oppenheim, A.L. (eds.). 1956. The Assyrian Dictionary. Oriental Institute, University of Chicago **6**: 47-48.

Harlan, J.R. and de Wet, J.M.J. 1971. Towards a rational classification of cultivated plants. Taxon **20**: 509-517.

Hehn, V. 1874. Kulturpflanzen und Hausthiere in ihrem Übergang aus Asien nach Griechenland und Italien sowie das übrige Europa. Berlin: 187-190.

Helbaek, H. 1959. Domestication of food plants in the Old World. Science **130**: 365-372.

Helbaek, H. 1970. The plant husbandry at Hacillar. *In* Excavation at Hacilar (J. Mellaart, ed.) pp. 189-244. Edinburgh University Press.

Hopf, M. 1969. Plant remains and early farming in Jericho. *In* The Domestication of Plants and Animals (P.J. Ucko and G.W. Dimbleby, eds.) pp. 355-359 Gerald Duckworth and Co., London.

Howard, A., Howard, G.L.C. and Khan, A.R. 1915. Some varieties of Indian gram. Memoire, Department of Agriculture, India. **7-6**: 213-235. (see page 56, line 6th last).

Iyengar, N.K. 1939. Cytological investigations on the genus *Cicer*. Annals of Botany, New Series **3**: 271-305.

Jaubert, H.F. and Spach, E. 1842. Monographia generis *Cicer* . Annales des Sciences Naturelles 2eme série Botanique **18**: 223-235.

Koinov, G.M. 1968. Nagut, *Cicer arietinum*. Sofia, 191 pp.

Kuhn, F., Hammer, K. and Hanelt, P. 1976. Botanische Ergebnisse einer Reise in die CSSR 1974 zur Sammlung autochthoner Landsorten von Kulturpflanzen. Kulturpflanze **24**: 317-318.

Kupicha, F.K. 1977. The delimitation of the tribe Vicieae and the relationships of *Cicer* L. Botanical Journal of the Linnean Society. **74**: 131-162.

Ladizinsky, G. 1975. A new *Cicer* from Turkey. Notes from the Royal Botanical Garden Edinburgh **34**: 201-202.

Ladizinsky, G. and Adler, A. 1975. The origin of chickpea as indicated by seed protein electrophoresis. Israel Journal of Botany **24**: 183-189.

Lenz, H.O. 1859. Botanik der alten Griechen und Römer. Gotha: 723 pp.

Linczevski, I.A. 1948. *Cicer* L.: Flora of the USSR. Moscow-Leningrad **13**: 384-406.

Low, I. 1924. Die Flora der Juden. Vienna and Leipzig **2**: 427-434.

Moreno, M.T. 1985. Variabilidad intraespecifica en *Cicer arietinum* L. Unpublished Tesis doctoral, Universidad de Cordoba, Spain.

Moreno, M.T. and Cubero, J.I. 1978. Variation in *Cicer arietinum* L. Euphytica **27**: 465-485.

Murr, J. 1890. Die Pflanzenwelt in der Griechischen Mythologie. Wagner'sche Universitäts-Buchhandlung, Innsbruck: 163-165.

Nozzolillo, C. 1985. Seedling morphology and anatomy of eight *Cicer* species and their taxonomic value. Canadian Journal of Botany **63**: 1-6.

Podlech, D. and Dieterla, A. 1969. Chormosomenstudien an Afghanischen Pflanzen [Chromosome study on Afghan plants]. Candollea **24**: 185-243.

Polhill, R.M. and van der Maesen, L.J.G. 1985. Taxonomy of Grain Legumes *In* Grain Legume Crops (R.J. Summerfield and E.H. Roberts eds.) pp. 3-36. Collins, London.

Popov, M.G. 1928-29. [The genus *Cicer* and its species]. Trudy Prikladnoi Botanike Genetike i Selekcii 21-1: 1-254. Also translated by INSDOC, New Delhi, 1976.

Popova, G.M. 1937. [*Cicer*]. *In* Flora of Cultivated Plants (of the USSR) pp.25-71. Moscow-Leningrad.

Popova, G.M. and Pavlova, A.M. 1933. [Turkish chickpeas]. *In* Agricultural Turkey (P.M. Zhukovski, ed.)pp. 340-347. Moscow-Leningrad.

Prosorova, K.G. 1929. *In* Agricultural Afghanistan (N.I. Vavilov and D.D. Bukinich, eds.) pp. 341-345. Supplement to Trudy Prikladnoi Botanike, Genetike i Selekcii 33. Leningrad.

Ramanujam, S. 1976. Chickpea. *In* Evolution of Crop Plants (N.W. Simmonds, ed.) pp.157-159 Longman, London and New York.

Rechinger, K.H. 1952. Arkiv for Botanik, Stockholm, Andra serie 1: 510.

Santos Guerra, A. and Lewis, G.P. 1985. A new species of *Cicer* (Leguminosae-Papilionoideae) from the Canary Islands, Kew Bulletin 40 (in press)

Savithri, R. 1976. Studies in Archaeobotany together with its bearing upon socio-economy and environment of Indian protohistoric cultures. Ph.D. Thesis, University of Lucknow, India.

Schwanitz, F. 1966. The origin of cultivated plants. Harvard University Press, Massachusetts. 175 pp.

Shaw, F.T.F. and Khan, A.R. 1931. Studies in Indian pulses (2). Some varieties of Indian gram (*Cicer arietinum* L.) Memoires, Department of Agriculture India. Botanical Series 1g: 27-47.

Smithson, J.B., Thompson, J.A. and Summerfield, R.J. 1985. Chickpeas. *In* Grain Legume Crops (R.J. Summerfield and E.H. Roberts, eds.)pp. 312-390. Collins, London.

van der Maesen, L.J.G. 1972. *Cicer* L., a monograph of the genus, with special reference to the chickpea (*Cicer arietinum* L.), its ecology and cultivation. Mededelingen Landbouwhogeschool (Communications Agricultural University) Wageningen **72-10**. 342 pp.

van der Maesen, L.J.G. 1979. *Cicer*. *In* Flora Iranica. Akademische Druck- und Verlagsanstalt, Graz **140**: 1-15, t. 1-22.

van der Maesen, L.J.G. 1980. Observations on pests and diseases of wild *Cicer* species. Indian Journal Plant Protection 7' (1979): 39-42.

van der Maesen, L.J.G. and Pundir, R.P.S. 1984. Availability and use of wild *Cicer* germplasm. Plant Genetic Resources Newsletter **57**: 19-24.

Vavilov, N.I. 1926. Studies on the origin of cultivated plants. Leningrad. pp. 129, 238.

Vavilov, N.I. 1949-50. The origin, variation, immunity and breeding of cultivated plants. Chronica Botanica, New York 13-1/6: 26-38, 75-78, 151.

Vishnu-Mittre, A. 1974. The beginnings of agriculture: Palaeobotanical evidence in India *In* Evolutionary studies in World Crops: diversity and change in the Indian sub-continent (Sir J.B. Hutchinson, ed.)pp. 23-24. Cambridge University Press.

von Fischer-Benzon, R. 1894. Altdeutsche Gartenflora. Lipsius and Tischer, Kiel and Leipzig: 101.

Woenig, F. 1897. Die Pflanzen im alten Aegypten. Verlag von Albert Heitz, Leipzig: 213.