A REASSESSMENT OF THE GENUS PSEUDOCAMELINA

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ABSTRACT. The genus *Pseudocamelina* (Cruciferae) is reviewed and shown to contain three species—seven having been recognised in the recent *Flora Iranica* account. The anomalous *P. campylopoda* is considered to merit independent generic status as the new monotypic *Camelinopsis* A. G. Miller; two subspecies are recognised within it. *Pseudocamelina szowitsii* is regarded as synonymous with *Peltariopsis planisiliqua*. The problems of the natural affinities of the three genera, *Pseudocamelina*, *Camelinopsis* and *Peltariopsis*, and their position within the family, are considered. The chromosome number $2n = 14$ is recorded for *Pseudocamelina glaucophylla*. All the species discussed are restricted to Iran and immediately adjacent regions.

INTRODUCTION

Since the publication ten years ago of the Cruciferae in *Flora Iranica* (Rechinger, 1968), a considerable quantity of additional material has been collected which, in some cases, necessitates a reassessment of the generic accounts. One such case is *Pseudocamelina* and it, together with its allies or putative allies, is the subject of this review. All the taxa under consideration are alike in their reduced form, consequently having a paucity of available characters. This, together with less than adequate material, resulted in the previous confusion in their taxonomy.

Originally, several of the plants dealt with here were included by Boissier (1867) in the genus *Cochlearia*. Since his time, a much narrower generic concept has been generally adopted within the family and all of the five sections he recognised—*Armoracia*, *Pseudosempervivum*, *Peltariopsis*, *Pseudocamelina* and *Kernera*—have since been accorded independent generic status. The two sections which concern us here, *Peltariopsis* and *Pseudocamelina*, were raised to generic rank by Busch in 1927 and 1928 respectively. *Peltariopsis* then included three species restricted to NW Iran, E Turkey and adjacent areas of the Armenian S.S.R., and *Pseudocamelina* contained six species endemic to Iran, to which a further species, *P. kleinii*, also from Iran, was added by Rechinger in 1973. The final species to be considered here, *Cochlearia campylopoda*, was described by Bornmueller & Gauba in 1934. It was assigned to sect. *Pseudocamelina* with the invalidly published name *Pseudocamelina campylopoda* appearing in the synonomy; Rechinger in *Flora Iranica* (1968) included it in the genus *Pseudocamelina* as an independent species.

All the species involved have a similar overall appearance. In the main, they are rather slender, annual or biennial, erect, glabrous herbs, with the leaves restricted to a basal rosette or with the cauline leaves reduced in form. The stems are thin and terete, bearing the fruits on elongated, often zig-zagging, branches.

In *Flora Iranica*, seven species of *Pseudocamelina* and two species of *Peltariopsis* were recognised. This, together with *Pseudocamelina kleinii*, covers all known species of *Pseudocamelina* but in *Peltariopsis* there is a further species endemic to Transcaucasia. As a result of the studies

summarised below, only three species are now accepted in *Pseudocamelina*; one species, *P. campylopoda*, is given independent generic status and another, *P. szowitsii*, is shown to be synonymous with a species of *Peltariopsis*.

Unless otherwise indicated, all the specimens cited have been seen. Within Iran, the specimens are cited in the sequence used in *Flora Iranica*, i.e. North (N), West (W), South (S), East (E), Central (C).

PSEUDOCAMELINA

For reasons discussed below, *Pseudocamelina campylopoda* and *P. szowitsii* are excluded from *Pseudocamelina* leaving five species, excluding *P. kleinii*, to be considered. The following key, modified from that in *Flora Iranica*, summarises the characters used to separate them.

1. Fruits ovate, seeds biseriately arranged; fruiting axis strongly flexuose . . . . . *P. camelinae*
\+ Fruits linear, seeds uniseriately arranged; fruiting axis straight or slightly flexuose 2
2. Dwarf plants up to 5 cm tall; replum evanescent . *P. aphragmodes*
\+ Plants erect, more than 20 cm tall; replum persistent . . 3
3. Fruiting branches flexuose; pedicels longer than the fruits . *P. glaucophylla*
\+ Fruiting branches straight; pedicels shorter than the fruits . . 4
4. Plants glabrous; basal leaves obovate-oblong, entire or crenate; flowers white, turning violet . . . . . *P. violacea*
\+ Plants shortly pubescent; basal leaves orbicular, repand; petals white . . . . . *P. campylocarpa*

Boissier, when he originally described *P. campylocarpa*, *P. aphragmodes*, *P. violacea* and *P. camelinae* must have had very little material to work with—probably less than ten gatherings of the entire genus. Consequently, with the amount of material now available (over seventy gatherings of *P. glaucophylla* alone), it is not altogether surprising that intermediates between the species occur and, furthermore, that most of the characters he used have proved to be extremely variable and have failed to correlate in the combinations in which they were linked. The following characters fall within this category: degree of flexuosity of the fruiting branches; the ratio of pedicel-length to fruit-length; leaf shape and form of margin; and the fruit shape and arrangement of seeds.

P. camelinae was distinguished from *P. glaucophylla* by the flexuosity of the fruiting branches, fruit shape and seed arrangement. Because of the variability of all these characters it is impossible to justify maintaining *P. camelinae* as a separate species and therefore I have included it in *P. glaucophylla*.

The case of *P. aphragmodes* is rather different; it differs from *P. glaucophylla* in its dwarf habit (up to 5 cm) and evanescent replum. The significance of the evanescent replum is difficult to assess as it is found only in the type (*Kotschy* 656a) and one other gathering (*Kotschy* 656), both from the same locality. *Kotschy* 656 is, however, intermediate in height between *P. aphragmodes* and *P. glaucophylla* being about 15 cm high. It was included by Boissier in *P. glaucophylla* but apart from its stature resembles the type of

FIG. 1. Distribution of ● *Pseudocamelina glaucophylla*, ▲ *P. campylocarpa*, ■ *P. aphragmodes*.

P. aphragmodes (*Kotschy* 656a) in all respects. Bearing in mind that the two gatherings were probably collected together, I have included *Kotschy* 656 in *P. aphragmodes*. This rather changes the circumscription of the species—that is, the only real difference between *P. aphragmodes* and *P. glaucophylla* appears to be the character of the replum. Further collecting will probably show *P. aphragmodes* to be merely a dwarf, high-alpine form of *P. glaucophylla*.

According to Boissier, *P. violacea* and *P. campylocarpa* differed from *P. glaucophylla* in their straight, not flexuose, fruiting branches and in pedicels which were relatively shorter, not longer, than the fruits. However, these characters are unreliable because of their extreme variability within *P. glaucophylla* and many intermediates between the three species are now known. *P. violacea* differs from *P. campylocarpa* in the absence of an indumentum and in having white flowers turning violet on wilting. In the past,

all short pedicelled plants because of their glabrosity were placed in *P. violacea*. In fact, the presence of an indumentum is apparently of sporadic occurrence and completely uncorrelated with any other character; for instance, *Aucher* 90 (originally named as *P. violacea*) is hairy but it resembles typical *P. glaucophylla* in all other ways. There does, however, seem to be a case for keeping *P. campylocarpa* as a distinct species to include plants with short pedicels and erect fruits.

P. kleinii Rech. fil. was recognised on account of its small stature (6–15 cm), violet flowers, strongly saccate sepals and the generally large size of the petals, sepals and fruit. However, even taking into account these apparently distinctive characters, I have been unable to recognise it as a distinct species but regard it merely as a high alpine form of *P. glaucophylla*.

Pseudocamelina (Boiss.) N. Busch in Journ. Soc. Bot. Russe 13:113 (1928).
Syn.: *Cochlearia* sect. *Pseudocamelina* Boiss., Fl. Or. 1:247 (1867).
Type species: *P. glaucophylla* (DC.) N. Busch

1. Plant less than 15 cm; replum absent at time of fruit dehiscence . . . . . 2. *P. aphragmodes*
\+ Plant usually more than 25 cm; replum persistent 2
2. Pedicels less than 2 mm; siliquae erect . . 3. *P. campylocarpa*
\+ Pedicel 2 mm or more; siliquae erect-spreading . 1. *P. glaucophylla*

1. P. glaucophylla (DC.) N. Busch in Journ. Soc. Bot. Russe 13:115 (1928). Fig. 1, 3e.
Syn.: *Nasturtium glaucophyllum* DC., Reg. Veg. Syst. Nat. 2:195 (1821).
Cochlearia glaucophylla (DC.) Boiss. in Ann. Sc. Nat. sér. 2, 17:170 (1842).
C. camelinae Boiss., *l.c.* 172.
C. violacea Boiss., *l.c.* 171.
Pseudocamelina camelinae (Boiss.) N. Busch in Journ. Soc. Bot. Russe 13:114 (1928).
P. violacea sensu Rechinger in Flora Iranica 222 (1968), *p.p.*
P. kleinii Rech. fil. in Anz. Österr. Akad. Wiss. Math.-Naturwiss. 109:171 (1973).
Icon.: Delessert, Icon. 2, tab. 14 (1823); Journ. Soc. Bot. Russe 13:114 (1928).
Type: Persia prope Teheran, *Olivier* (P—*n.v.*).

Biennial (or perennial?), erect herbs, 25–60 cm, branching pseudodichotomously throughout, glabrous (rarely shortly pubescent), often glaucous. Leaves most variable in shape and size: lower leaves orbicular to narrowly obovate-spathulate, long-petioled, often fleshy, (1·5–)4–8 × (0·5–)2 cm, margin entire or crenate to dentate; upper cauline leaves linear or absent. Sepals 3–4(–4·5) mm; inner subsaccate, narrowly ovate; outer narrowly oblong, slightly longer. Petals (2·5–)4–5 mm, obovate, cuneate, not distinctly clawed, longer than the sepals, white often pinkish-violet. Fruiting axis straight to strongly angular-flexuose. Fruiting pedicels 3–18 mm, longer or shorter than the fruit. Fruit linear to narrowly oblong ovate, 5–25 × 1–1·5 mm. Seeds uniseriately or biseriately arranged, pale brown, smooth, oblong-ovate,

1·5 × 0·75 mm. 2n = 14 (A new count based on *C.* 11051). Growing in a variety of habitats from mountain screes and rocky slopes to semi-desert, 1000–4100 m.

PERSIA. **N.** Persia borealis, *Kotschy* (W). Mazanderan: M. Elburs nr Derbend, *Kotschy* 259 (W, G); in valle fluvii Chalus, 2400 m, *Rechinger* 960 (W); 68 km Karaj to Chalus, 2250 m, *Babakhanlou & Amin*, 6428-E, (E); Elburs mts, N of Kandevan Pass, 3110 m, *Archibald* 2481(E); in declivibus borealibus jugi Kandevan, 2400 m, *Gauba* 151(W); in valle Haraz prope Panjab, 1000 m, *Wendelbo* 638(W,E); Kojur nr Elika, *Gauba* 135(W); in ditione Nur prope Elika, 2700 m, *Gauba* 152 (W); Lar valley, 2450 m, *Wendelbo & Assadi* 13415 (W,E). **W.** Azerbaijan: N of Tabriz, 1700 m, *Lamond* 5177(E); inter Tabriz et fluvium Talkheh, 1700 m, *Rechinger* 43548(W); Einal Zeinal prope Tabriz, 1350–1600 m, *Grossheim* (G, LE); 90 km ENE Mianeh v. Khalkhal, 1400 m, *Rech.* 43325(W); Mianeh, Ghaflankuk, Zanjan road, 1150 m; *Foroughi & Assadi* 13714(W); Kizil Uzum, 13–19 km SE Mianeh, 1200 m, *Rech.* 42234(W); 13 km below Mianeh on road to Zanjan, 1050 m, *Lamond* 4231(E). Tehran: 157 km from Hamadan on the road to Ghazvin, 1890 m, *Assadi & Amin* 13630(W,E); 130 km from Hamadan on the road to Ghazvin, 1850 m, *Assadi & Shirdelpur* 13228B(E,W); 19 km N Saveh, 1370 m, *Pabot* 7255(G); 31 km S Saveh, 1500 m, *Babakhanlou & Amin* 6379(E); E of Arak, 1645 m, *Archibald* 1735(E). Hamadan: Kuh-e-Khorzane prope Hamadan, *Sabeti* 136(W). Luristan: Durud, 2100 m, *Koelz* 17865(W,E); Oshtoran Kuh, *Renz* 48204 (W). Esfahan: Golpayegan, Kousar, Talestan on road to Talegtian, 1700 m, *Wendelbo & Foroughi* 11484(W); between Dameneh and Khunsar, Belehsuh-Kuh, 2770 m, *Archibald* 3083(E,W); Esfahan, *Aucher* 90(G); Bakhtiari, Tang-e-Sayad protected region, 2550 m, *Rechinger* 47239(E,W); Bakhtiari, Laieh Sabz, Zardeh Kuh, 4140 m, *Archibald* 3001(E); between Esfahan and Abadeh, 1500–2500 m, *Schmid* 5367(G), 5382(G), 5420(G); Qashqai, between Shahreza and Semirom, 2600 m, *Rechinger* 47361(W,E); Qashqai, Kuh-e Surmandeh, N of Semirom, 2700–3900 m, *Rechinger* 47500(W); Qashqai, Semirom, in faucibus Darreh Ahshar, 2450 m, *Rechinger* 47475(W). **S.** Fars: Abadeh, Bideh, Kuh-e-Dinar, 3100 m, *Termé & Izadyar* 20172E (E). Kerman: between Ashin Bala and Godar-e Tut, 25 km SSW of Esfandaqeh, *Assadi, Edmondson & Miller*, E. 1958(E). **C.** Tehran: 41 km N Tehran, Shemshak, 2000 m, *Amin* 6749(E); M. Elburs occid. supra Forasad, 1800 m, *J. & A. Bornmueller* 6182(E,G); jugi Elbursensis ad basin septentr. alpium Tuchal pr. Scheheristanak, 2200 m, *J. & A. Bornmueller* 6183(G); Tuchal mts above Passghaleh, 2200 m, *Alava* 10385(E); M. Tuchal, Hafthauz, 1500 m, *Aellen* 1079(W); M. Taleghan, 2000 m, *Termé* 20173E(E); Haranj-e Taleghan, 2000 m, *Amin & Bazargan* 19659E(E); Oushan, Kuh-e-Lavar, 2000–2100 m, *Termé & Matine* 31792E(E); M. Elburs occid, Azâd-Kouh, 3880 m, *Klein* 7900(W); Gochisar, NE Karaj, 2100 m, *Furse* 2636(W,E); 30 km N Karaj, by Neza, *Anderson & Peterson* 151(E,W); 6 km N Karaj, 2240 m, *Babakhanlou & Amin* 6461(E); Kalak prope Karaj, 1500 m, *Rechinger* 977(W); Karaj, Kalak, 1400 m, *Moussavi* 6556(E); Kuh Dashteh, *Rechinger* 372 (W);Vessieh, 1500 m, *Rechinger* 6851(E,W,G); between Qazvin and Rasht, 500–1200 m, *Schmid* 6586(E,W,G); 20 km SE Tehran, 1050 m, *Pabot* 7371(W,G); Abeali, 2040 m, *Pabot* 4290(G); between Fashan and Zadgan, *Termé & Matine* 31793E(E). Rostamabad, Salehabad, Firuzkuh, 2400 m, *Dini & Arazm* 6150 (E); Shah-Abass Karavanserai, *Iranshahr* 30573E(E); Bijin 44 km from

Tehran on road to Qom 1050 m, *Shirdelpur & Amin* 11613(W). Yazd: Deh Bala, Shir Kuh, 3700–4000 m, *Foroughi & Assadi* 17969 (E).
Persia: Persia Media, Hawuz i Sultan, *Haussknecht*; *Aucher* 91 (G—type of *P. violacea*), 4137(G,W), 4164 (G—type of *P. camelinae*), 6165(G).
Cult. specimen: grown from *Moussavi* 6556 (*C.* 11051—E).

Within this extremely polymorphic species I have been unable to accept or define any infraspecific taxa, despite the fact that some of the extremes of variation look rather distinct. Three apparently distinctive forms are: A, plants with long torulose fruits up to 22 mm from the central Elburs mountains—*Klein* 2262, *Archibald* 2481, *Wendelbo* 13414; B, generally slender plants with flowers much smaller (1·5 mm) than normal—*Foroughi & Assadi* 17969 (Shir Kuh, Yazd), *Assadi, Edmondson & Miller, E.* 1958 (Kerman); C, plants with an indumentum of simple hairs—*Aucher* 90. But even in these three cases there appears to be no clear discontinuities in the range of variation and no correlation with distribution.

2. P. aphragmodes (Boiss.) N. Busch in Journ. Soc. Bot. Russe 13:115 (1928). Fig. 1.
Syn.: *Cochlearia aphragmodes* Boiss., Diagn. Pl. Or. Nov. Ser. 1, 6:15 (1845).
Type: In glareosis regionis summae alpis Kuh-e Daena, *Kotschy* 656a (holo. G).
Differing from *P. glaucophylla* in its dwarf habit, up to 15 cm, and evanescent fruit replum.
PERSIA. S. Fars: Kuh-e Dinar, *Kotschy* 656 (G).

This species is endemic to the high alpine regions of Kuh-e Dinar and only known from two gatherings. In the original description, the type of *P. aphragmodes* was cited as *Kotschy* 656. However, in *Flora Orientalis*, *Kotschy* 656 was cited under *P. glaucophylla* and the type of *P. aphragmodes* was given as *Kotschy* 656a. The description clearly refers to *Kotschy* 656a and not to the taller *Kotschy* 656.

3. P. campylocarpa (Boiss.) N. Busch in Journ. Soc. Bot. Russe 13:115 (1928). Fig. 1.
Syn.: *Cochlearia campylocarpa* Boiss. in Ann. Sci. Nat. sér. 2, 17:171 (1842).
Pseudocamelina violacea sensu Rechinger in Flora Iranica, 1968, *p.p.*
Type: [Persia] Ispahan, *Aucher* 95 (holo. G; iso. BM).
Differing from *P. glaucophylla* in the short fruiting pedicels, up to 2 mm, and the erect, not spreading, fruits.
PERSIA. W. Luristan: Boroudjerd, Kuh-e-Garrow, 2000–2900 m, *Moussavi & Satei* 30581E(E). Kebara 2000 m, *Koelz* 18249(W), 18278a(W). S. Fars: Abadeh, Bavanat, Kuh-e-Khataban, 3100 m, *Termé & Izadyar* 20142E(E); Kuh-Ajub ad Persepolis, *Kotschy* 903(G), 935(W).

This species is characterised by its short fruiting pedicels—not, as originally described, by having an indumentum. As recognised here, *P. campylocarpa* includes part of *P. violacea* sensu *Flora Iranica*. It is clearly closely related to *P. glaucophylla* and, as is the case with *P. aphragmodes*, further collecting and

field observations might show that it does not merit independent specific status. An example of a specimen somewhat intermediate between *P. campylocarpa* and *P. glaucophylla* is *Dini & Arazm* 6150; it has the very short flowering pedicels of the former species but, because they lengthen in fruit to 4 mm, the specimen is included in *P. glaucophylla*.

Camelinopsis

When reviewing the species of *Pseudocamelina*, it became clear that *P. campylopoda* differed in many significant respects from the rest of the genus. Its position in *Pseudocamelina* is perhaps tenable within the broader generic concept accepted when *P. szowitsii* is included in the genus. However, when *P. szowitsii* is removed to *Peltariopsis* the position of *Pseudocamelina campylopoda* becomes completely anomalous and I have therefore given it separate generic status under the name *Camelinopsis*.

FIG. 2. Distribution of ▼ *Camelinopsis campylopoda* subsp. *campylopoda*, ▽ *C. campylopoda* subsp. *kurdica*, ● *Peltariopsis planisiliqua*, ▲ *P. grossheimii*.

The most important differences between *Camelinopsis* and *Pseudocamelina* are in the fruit morphology. In *Pseudocamelina*, the fruit is essentially a linear, often torulose, siliqua with six to many uniseriately or biseriately arranged seeds; occasionally the fruit is shorter and oblong to ovate. By contrast, in *Camelinopsis* the fruit is an obovate to orbicular biconvex, two- or four-seeded silicula. *Camelinopsis* differs from *Pseudocamelina* in several other important respects. In *Camelinopsis*, the flowers overtop the buds, the sepals are erect-spreading, the anthers triangular and the basal and lower cauline leaves are irregularly bi- to tri-pinnate. In *Pseudocamelina*, however, the inflorescence is elongate with the flowers opening well below the buds, the sepals are erect, the anthers oblong and the leaves are all entire or at most dentate.

The most characteristic feature of *Camelinopsis* is its overall fruiting facies. The fruiting branches are always markedly flexuose with the fruits held pendant on delicately recurved pedicels (fig. 3). In *Pseudocamelina*, though the fruiting branches are often flexuose, the pedicels are always held erect.

The possible relationship of *Camelinopsis* with *Peltariopsis* needs to be considered. Both share similar inflorescences and flowers. However, there are several important differences. In *Camelinopsis* the median nectary gland is absent, the leaves are bipinnate to tripinnate and the fruiting branches strongly flexuose. By contrast, in *Peltariopsis* the median nectary gland is developed, the leaves are entire or at most digitately lobed and the fruiting axis is straight with the fruits held erect. *Camelinopsis* also differs from *Peltariopsis* in details of fruit morphology: the fruit is obovate and biconvex in section whereas in *Peltariopsis* it is elliptic and compressed. Finally, *Peltariopsis* is characterised by the distinctive arrangement of the cells of the replum (fig. 3f).

The only other SW Asiatic genera in Cruciferae which have flexuose fruiting stems are *Camelina* Crantz and *Nasturtiicarpa* Gilli, and they, like *Pseudocamelina*, never have recurved fruiting pedicels and differ from *Camelinopsis* in several other characters.

Camelinopsis A. G. Miller, **gen. nov.** Cruciferae-Lunarieae.

Herbae annuae, glabrae tenues, foliis inferioribus irregulariter pinnatis. *Caules* erecti, infracto-flexuosi; pedicelli in statu fructifero recurvati. *Sepala* erecto-patula, non saccata, margine scariosa. *Petala* alba. *Glandulae nectariferae* medianae desunt. *Filamenta antherarum* edentata. *Silicula* latiseptata, dehiscens, obovata, biconvexa. *Semina* 2–4, humiditate interdum mucilaginea. *Radicula* accumbens. Genus monotypicum.

No close affinities; differing from *Pseudocamelina* in the obovate silicule, erect-spreading sepals and triangular anthers. From *Peltariopsis*, it differs in the lack of median nectary glands, presence of biconvex fruit and by the arrangement of the cells in the replum. From both it differs in the characteristic fruiting facies and irregularly pinnate leaves.

Within *C. campylopoda* I have recognised two subspecies separated by the differences set out in the key below: subsp. *kurdica* restricted to the mountains of NE Iraq and subsp. *campylopoda* to the central Elburs mountains of Iran, near Karaj. The difference between the two subspecies

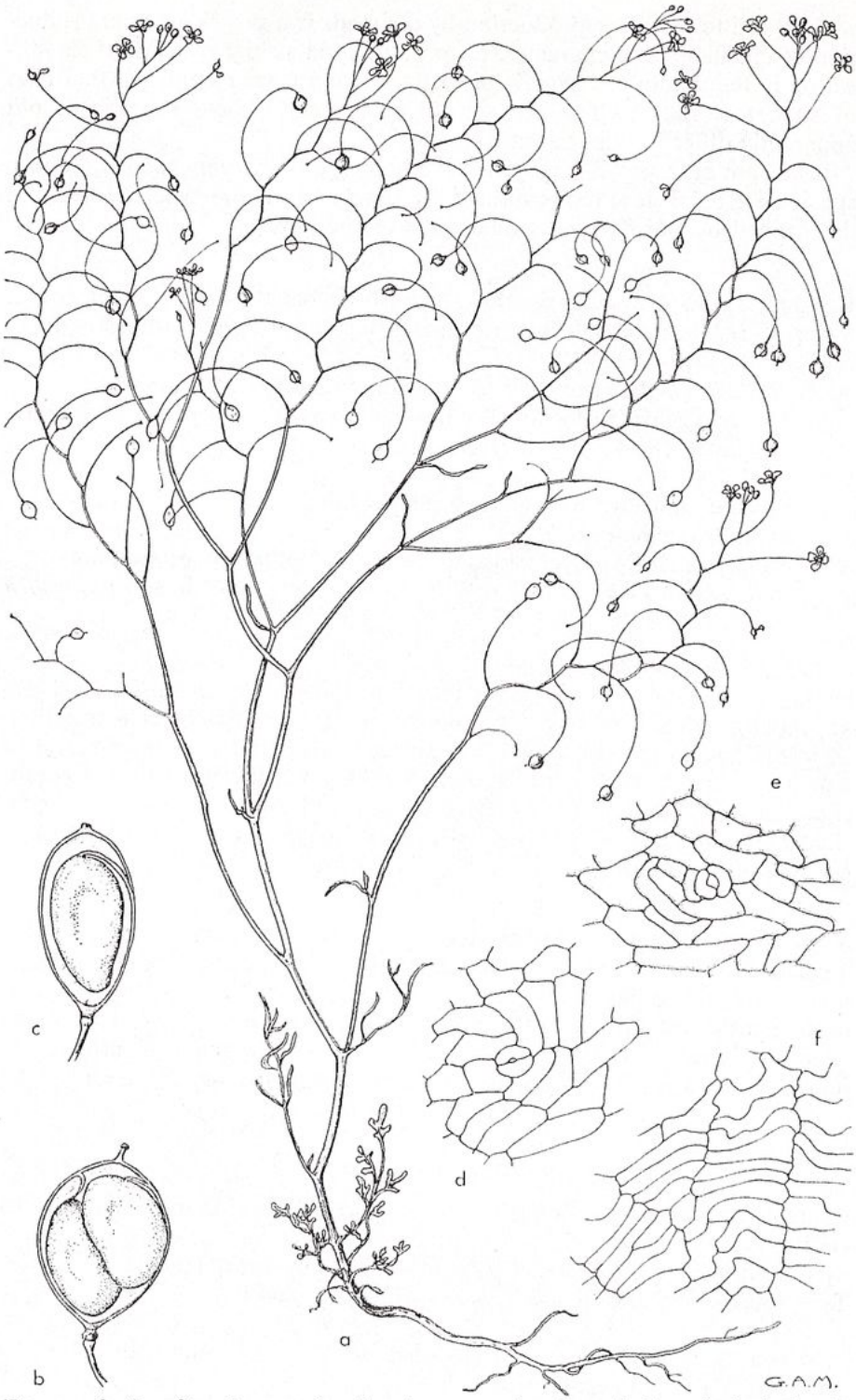

FIG. 3. a-b *Camelinopsis campylopoda* subsp. *campylopoda*: a, habit × $\frac{2}{3}$; b, fruit with valves removed × 11. c, *C. campylopoda* subsp. *kurdica*, fruit with valves removed × 11. d-f, cells of replum of: d, *C. campylopoda*; e, *Pseudocamelina glaucophylla*; f, *Peltariopsis planisiliqua*, all × 250.

with regard to mucilage production by the seeds is a surprising one. Production of mucilage, as a character, is normally used at higher levels of classification in the family, i.e. generic or sectional, and it seems unusual that taxa of such low rank, which are so obviously very closely related, should apparently differ in this respect.

It has not been possible to locate the holotype of *P. campylopoda*, but the specimen cited below (B), collected by Gauba from the type locality and determined by Bornmueller, could serve as the type.

C. campylopoda (Bornm. & Gauba) A. G. Miller, **comb. nov.** Fig. 2, 3 a, b & d.
Syn.: *Cochlearia campylopoda* Bornm. & Gauba in Feddes Repert. 36:339 (1934).
Pseudocamelina campylopoda Bornm. & Gauba, *l.c.—nomen.*
P. campylopoda [Bornm. & Gauba ex] Hadač & Chrtek in Acta Univ. Carol. (Biol.) 1971:261 (1973).

1. Silicule obovate, loculus 2-seeded, style 0.5 mm; seed mucilaginous on wetting . . . . . a. subsp. *campylopoda*
\+ Silicule narrow-obovate, loculus 1-seeded, stigma sessile; seed not mucilaginous on wetting . . . . . b. subsp. *kurdica*

a. subsp. **campylopoda**
PERSIA. **C.** Tehran: Karaj, Kuh-e-Dashteh, 1500–1900 m, *Matine & Termé* 31795E(E); Jahrub, Abeali, 1700 m, *Dini & Arazm* 6151(E); Nostratabad, 16 km N Karaj, 1800 m, *Amin & Bazargan* 19268(E); 12 km from Karaj to Chalus, 1560 m, *Babakhanlou & Amin* 6466(E); Vardavaard valley, 1650 m, *Wendelbo, Sanii & Assadi* 11769(E); Elburs, Karaj, Aahgi, 1500 m, 5 vii 1934, *Gauba* (B); in montosis supra Keredj sitis ad pagum Allangeh, 12 vii 1934, *Gauba* (holo.—*n.v.*).

b. subsp. **kurdica** A. G. Miller, **subsp. nov.** a subsp. *campylopoda* siliculis anguste obovatis, loculis 1-spermis, stigmatis sessilibus, seminibus humiditate non mucilaginis differt. Fig. 2, 3c.
IRAQ. Kurdistan: Pira Magrun, 1650 m, *Wheeler-Haines* 1865 (E), *Hadač* 2849 (PR—*n.v.*); Sulaimaniya, ditione pagi Penjwin, in glareosis serpentincis jugi Malakawa, 1400 m, *Rechinger* 10435 (holo. E; iso. G; W—*n.v.*).

PELTARIOPSIS

Peltariopsis (Boiss.) N. Busch in Monit. Jard. Bot. Tiflis nov. sér. 3–4:10 (1927).
Syn.: *Cochlearia* sect. *Peltariopsis* Boiss., Fl. Or. 1:247 (1867).
Type species: *Peltariopsis planisiliqua* (Boiss.) N. Busch

1. Plants up to 20 cm; fruits crowded; basal leaves often with two lateral lobes; lower stem leafy in fruit . . . 2. *P. grossheimii*
\+ Plants more than 30 cm; fruits distant; basal leaves entire; lower stem not leafy in fruit . . . . . 1. *P. planisiliqua*

1. P. planisiliqua (Boiss.) N. Busch in Monit. Jard. Bot. Tiflis, nov. sér. 3–4: 8 (1927). Figs. 2, 3f.

Syn.: *Cochlearia planisiliqua* Boiss. in Ann. Sc. Nat. sér. 2, 17:169 (1842).
C. drabaecarpa Boiss., *l.c.* 169.
C. szowitsii Boiss., Fl. Or. 1:248 (1867).
Peltariopsis drabaecarpa (Boiss.) N. Busch in Monit. Jard. Bot. Tiflis, nov. sér. 3–4:10 (1927).
Pseudocamelina szowitsii (Boiss.) N. Busch in Journ. Soc. Bot. Russe 13:114 (1928).

Type: [Persia] Seid-Khodji, *Aucher* 4169 (holo. G; iso. W).

U.S.S.R. Armenian S.S.R., Nakhichevan: Shakhbuz, *Grossheim et al.* (LE); Shakhbuz, prope pag. Kju-Kju, *Shevljakov* (LE); Shakhbuz, *Gabrielian* 75043 (ERE); Aznaberd, *Takhtajan et al.* 69138 (ERE); Aznaberd, *Mulkidjanian* 77780 (ERE); Yoznabyurla, *Takhtajan et al.* (ERE); Mikoyan, *Takhtajan* 63058 (ERE); Yekhegnadzor, *Takhtajan & Manakian* 80265 (ERE); Azizbiekov, *Gabrielian et al.* 64040 (ERE), 64041 (ERE); Daragalez, *Takhtajan* 27052 (ERE), 27053 (ERE); in valle Koschadara, *Szowits* 490 (LE).
TURKEY. Van: Gevas, Artos Dagh, SE corner of Lake Van, 2500–3000 m, *Rix et al.* 756 (E). Bitlis: N slope of crater on Nemrut Dagh, 2600 m, *McNeil* 582 (E). Hakkari: Cilo Dagh, Diz Deresi, 1800 m, *Davis* 23917 (E).
PERSIA. **W.** Azerbaijan: in monte Mischou Dagh prope Yam, 1800–2400 m, *Rechinger* 43911 (E); Mischou Dagh nr Yam, 2500 m, *Grossheim* 282 (G); Seid Khodji, *Aucher* 4152 (G—type of *P. drabaecarpa*).

I have included both *Pseudocamelina szowitsii* and *Peltariopsis drabaecarpa* here; *P. drabaecarpa*, known only from the type, is merely an immature form of *P. planisiliqua*, and *Pseudocamelina szowitsii* is identical with it in all respects.

P. planisiliqua grows on calcareous scree above 2000 m.

2. P. grossheimii N. Busch in Monit. Jard. Bot. Tiflis, nov. sér. 3–4:10 (1927). Fig. 2.

Type: [U.S.S.R. Armenian S.S.R.]. Distr. Nakhichevan, prope stationem viae ferrae Negram et Kyzyl-Wank, 15 v 1923, *Grossheim* 5100 (ERE).
U.S.S.R. Armenian S.S.R. Nakhichevan: inter Ordubad et Kartshevan, *Karjagin* (LE); inter Negram et Daresham, *Grossheim* 5101 (ERE); Megrinsk, *Gabrielian & Gambaryan* 87397 (ERE), 87398 (ERE), 87399 (ERE), *Gabrielian & Gambaryan s.n.* (E).

P. grossheimii is distinguished by its small stature, up to 20 cm, and its generally leafy facies in fruit. It grows at lower altitudes than *P. planisiliqua*, up to 1000 m, in fissures of calcareous rocks.

Affinites of the Genera

The three genera reviewed here share a rather similar facies in the vegetative state and to a lesser extent in fruit. As shown above, however, though superficially alike they differ in a number of important characters. What then are their natural affinities and how can they be fitted into the existing classification of the Cruciferae?

Schulz (1936) separated *Pseudocamelina* (including *Camelinopsis*) and *Peltariopsis* widely, placing them in the tribes *Matthioleae* and *Lunarieae* respectively. Janchen (1942), on the other hand, associated them together in the subtribe *Cochleariineae* of *Lepidieae*. The two genera with their dorsally compressed fruits and broad repla, however, are clearly out of place in the *Lepidieae*; perhaps their best position, but by no means the most natural, is near *Peltaria* in the *Lunarieae*.

Pseudocamelina is completely anomalous in the *Matthioleae* and because of its reduced form its affinities are difficult to assess. Its best position is probably an isolated one in subtribe *Cochleariinae* of the *Lepidieae*.

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