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A taxonomic revision of the genus *Pseudocamelina* (Brasssicaceae, tribe Thlaspideae)

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Abstract

Pseudocamelina comprises nine species, of which seven are endemic to Iran and one each to Pakistan and Kurdistan Iraq. The new species *P. bakhtiarica* and *P. kermanica* are described, illustrated, and their relationships to nearest relatives are discussed. The new combination *P. kurdica* is proposed, and the genus *Camelinopsis* is reduced to synonymy of *Pseudocamelina*. Second-step lectotypifications are designated for *P. camelinae* and *P. violacea.*

Keywords: *Camelinopsis,* Cruciferae, Iran, Iraq, Pakistan

Introduction

Pseudocamelina Boissier (1867: 247) N.Busch in Grossheim (1927: 214) was originally recognized by Boissier as a section of six species in a very broadly delimited *Cochlearia* Linnaeus (1753: 747). The sectional name was most likely proposed in reference to the superficial resemblance of its species to *Camelina laxa* Meyer (1831: 193), a species of Armenia, Azerbaijan, Georgia, Iran, and Turkey that has distinctly flexuous racemes. Such a strongly flexuous inflorescence evolved independently in several unrelated taxa of various Brassicaceae (Cruciferae) tribes. These include *C. laxa* and *Chrysochamela velutina* (Candolle 1821: 370) Boissier (1867: 313) [Syria, Turkey] of the tribe Camelineae, *Ammosperma cinereum* (Desfontaines 1798: 83) Hook.f. in Bentham & Hooker (1862: 82) [Libya] and *Cakile arabica* Velen. & Bornm. in Bornmüller (1911: 114) [Iran, Iraq, Jordan, Kuwait, and Saudi Arabia] of the Brassiceae, and *Machaerophorus matthioloides* Schlechtendal (1857: 469) [Peru] of the Thelypodieae.

The recognition herein of two new species of *Pseudocamelina* did not alter the generic boundaries, though they provided concrete evidence that *Camelinopsis* Miller (1978: 30) can no longer be maintained as distinct from *Pesudocamelina*. The morphological data strongly agree with molecular data (see below) in supporting the union of both genera. Miller (1978) segregated *Camelinopsis* from *Pseudocamelina* mainly on the basis of having obovoid to subglobose (vs. linear to narrowly oblong) fruit, flowers overtopping (vs. not overtopping) the flower buds, ascending (vs. erect) sepals, ovate (vs. oblong) anthers, and pinnatisect (vs. entire or dentate) basal leaves. However, these characters, whether alone or in a combination, clearly do not hold, especially upon the study of extensive material of the complex both in the field and in numerous herbaria. The description below of *P. kermanica*, as well as the addition of *P. conwayi* (Hemsley 1894: 4) Al-Shehbaz (2014: 144), left *Camelinopsis* indistinguishable from *Pseudocamelina* in every aspect of morphology.

The molecular phylogenetic studies (Esmailbegi *et al.*, in prep.) consistently demonstrated that *Camelinopsis* forms with *Pseudocamelina* a single monophyletic clade in both nuclear ITS and chloroplast *trn*L-F. It is, however, unclear why the ITS studies of Khosravi *et al.* (2009) showed *Camelinopsis campylopoda* (Bornm. & Gauba in Bornmüller 1934: 339) Miller (1978: 32) sister to *Didymophysa aucheri* Boissier (1841: 379) instead of *P. glaucophylla* (Candolle 1821: 195) Busch (1928: 115). Indeed, their voucher of *C. campylopoda* from Fars province is very likely misidentified

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because the species does not grow there. Instead, *P. glaucophylla* is common in that province. If the Fars sample is definitely a *Pseudocamelina,* then why it did not fall in the same clade as *P. glaucophylla*? The most likely possibilities are either the Fars sample was a contamination with *D. aucheri* or a misidentification.

Although Al-Shehbaz (2012) listed *Camelinopsis* as a genus unassigned to any tribe, Beilstein *et al.* (2006) included its generic type, *C. campylopoda* (as *Pseudocamelina*), in their *ndh*F studies, and it fell into a well-supported clade that was later recognized by Al-Shehbaz *et al.* (2006) as the tribe Thlaspideae, an assignment that was confirmed by Couvreur *et al.* (2010).

The placement by Schulz (1936) of *Pseudocamelina* in the invalidly published Matthioleae [lacking Latin diagnosis] was not supported by any feature characteristic of that tribe. The genus and two North American genera, *Iodanthus* (Torrey & Gray 1838: 72) Steudel (1840: 812) and *Hesperidanthus* (Robinson 1895: 174) Rydberg (1907: 433), are anomalous in that tribe because they lack the branched trichomes, strongly 2-lobed stigmas, and multicellular glands that most of the remaining 14 genera in Schulz's Matthioleae have. Similarly, the assignment of *Pseudocamelina* by Janchen (1942) and Miller (1978) to the Hesperideae and Lepidieae, respectively, disagrees morphologically and molecularly with the current circumscription of these tribes. The Hesperideae is characterized by the strongly decurrent stigma lobes and uniseriate, multicellular glands, whereas the Lepidieae often has strongly angustiseptate silicles, one apical ovule per locule, copiously mucilaginous seeds, and usually two or four stamens. *Pseudocamelina* has none of these features of both tribes, though it has six stamens just as almost the rest of the family, including some *Lepidium* Linnaeus (1753: 643).

As delimited here, *Pseudocamelina* is readily distinguished from the other genera of the tribe Thlaspideae by having a combination of flexuous racemes often grouped in loose panicles, minute cauline leaves much smaller than basal ones, often dichotomously branched stems, and filiform or slender fruiting pedicels. The dwarf and high-alpine plants of *P. kleinii* Rechinger (1973: 171) are the exception for not having strongly flexuous racemes.

Materials and Methods

The first author conducted extensive fieldwork in Iran, and plants of most species were studied in their native habitats and in the greenhouses in Brno. Herbarium studies were done by the first and/or last author in AAU, B, BM, E, FMUH, G, K, KW, LE, M, MICH, MIR, MO, P, PR, PRC, TUH, and W. The herbaria in Isfahan University and the Research Center of Agriculture and Natural Resources, Kurdistan Province (Sanandaj city) have no acronyms and, therefore, their cities are listed instead. Images on the E (http://data.rbge.org. uk/herb) and JSTOR Global Plants project database (https://plants.jstor.org) were consulted.

Results

The following taxonomic revision of *Pseudocamelina* treats nine species centered in Iran (7 spp., all endemic), with one species each endemic to NE Iraq and to Karakoram Mts. in Pakistan.

Taxonomy

Pseudocamelina (Boiss.) N.Busch in Grossheim (1927: 214). ≡ *Cochlearia* sect. *Pseudocamelina* Boissier (1867: 247). Lectotype species designated by Busch in Grossheim (1927: 214): *P. glaucophylla* (DC.) N.Busch.
Camelinopsis Miller (1978: 30). *Syn. nov.* Type species: *C. campylopoda* (Bornm. & Gauba) A.G.Mill.

Description:—Herbs annual, biennial, or perennial with caudex, often glaucous. Trichomes simple or absent. Stems erect to ascending, often dichotomously branched basally and/or apically, flexuous, leafy. Basal leaves petiolate, rosulate or not, simple, entire, repand, dentate, sinuate-flabellate, or trisect to 1−3-pinnatisect into linear lobes; cauline leaves short petiolate or sessile, not auriculate at base, uppermost entire. Racemes few to many flowered, ebracteate, lax, elongated considerably in fruit, often forming open panicles; rachis strongly flexuous or rarely straight; fruiting pedicels ascending to divaricate, filiform, straight or recurved, persistent. Sepals ovate to oblong, free, deciduous,

erect or ascending, equal, base of lateral pair not saccate or rarely saccate; petals white, pink, or violet, ascending to spreading, longer than sepals; blade obovate, oblong to oblanceolate, apex obtuse; claw not or slightly differentiated from blade, shorter than sepals, glabrous, unappendaged, entire; stamens 6, slightly exserted, erect, slightly tetradynamous; filaments wingless, unappendaged, glabrous, free; anthers ovate, oblong or linear, not apiculate; nectar glands confluent, subtending bases of all filaments, or glands 2, lateral, and median glands lacking; ovules 2−28 per ovary; placentation parietal. Fruit dehiscent, capsular siliques or silicles, linear, narrowly ellipsoid, oblong, obovoid, or subglobose, terete, not inflated, unsegmented; valves papery, obscurely veined, glabrous, not keeled, smooth or torulose, wingless, unappendaged; gynophore obsolete or to 0.3 mm; replum rounded, visible; septum complete, fenestrate, or absent; style obsolete or to 0.5 mm, persistent; stigma capitate, entire, unappendaged. Seeds uniseriate or rarely biseriate, wingless, oblong, plump; seed coat not mucilaginous when wetted; cotyledons accumbent.

Nine species: seven endemic to Iran and one each to Kurdistan Iraq and Karakoram mountains, Pakistan.

Key to the species

1. Fruiting pedicles arcuate recurved; fruit subglobose or obovoid to broadly so; ovules 2 or 4 per ovary; basal and lowermost cauline leaves 1−3-pinnatisect 2
- Fruiting pedicles straight, divaricate to suberect; fruit linear to oblong or narrowly ellipsoid; ovules (4−)6−28 per ovary; basal and lowermost cauline leaves entire, dentate, or rarely trisect 3
2. Fruit subglobose to broadly obovoid; petals 2.5−3.5 mm long; ovules 4 per ovary; style 0.2−0.5 mm long; Iran ..... *Pseudocamelina campylopoda*
- Fruit narrowly obovoid; petals 1.2−1.5 mm long; ovule 2 per ovary; style less than 0.1 mm long; Iraq ..... *Pseudocamelina kurdica*
3. Raceme 2−5-flowered; rachis and fruiting pedicles densely puberulent; basal leaves trisect into linear lobes; Pakistan ..... *Pseudocamelina conwayi*
- Raceme many flowered; rachis and fruiting pedicles glabrous; basal leaves entire or dentate; Iran 4
4. Plants surculose perennial; stems 5−15 cm tall; flowers violet 5
- Plants annual or biennial, rarely perennial with very short caudex; stems (12−)25−70 cm tall; flowers white, rarely purplish 6
5. Petals 3−3.5 mm long septum perforate or absent; fruit 6−14 mm long; ovules 6−8 per ovary ..... *Pseudocamelina aphragmodes*
- Petals 5.2−6 mm long; septum complete; fruit 20−25 mm long; ovules 18−28 per ovary ..... *Pseudocamelina kleinii*
6. Fruiting pedicles 1−2 mm long, erect, subappressed to straight rachis ..... *Pseudocamelina campylocarpa*
- Fruiting pedicles 7−19 mm long, divaricate, not appressed to flexuous rachis 7
7. Plants biennial; fruit (3−)5−26 mm long; petals 4−5 mm long; ovules 10−20 per ovary ..... *Pseudocamelina glaucophylla*
- Plants annual or perennial; fruit 1.8−3.5 mm long; petals 1.5−3 mm long ovules 4 or 8 per ovary 8
8. Plants perennial; ovules 4 per ovary; septum fenestrate; basal leaves oblanceolate, entire ..... *Pseudocamelina bakhtiarica*
- Plants annual; ovules 8 per ovary; septum complete; basal leaves flabellate to suborbicular, dentate ..... *Pseudocamelina kermanica*

Pseudocamelina aphragmodes (Boiss.) N.Busch (1928: 115). ≡ *Cochlearia aphragmodes* Boissier (1846: 15). Described from: "Hab. in glareosis regionis summae alpis *Kuh-Daëna* Persiae australis Kotschy No. 656." Type:—IRAN (as Persia), "Hab. in glareosis regionis summae alpis Kuh-Daëna, 15 July 1842, *C. G. T. Kotschy 656[a]* (Lectotype first step designated by Rechinger (1968: 222) and second step designated here: G-BOISS-00332269!; isolectotypes, BM-000582869!, G-00389749!, K-000484397!, KW!, P-02272501!, P-02272502!, P-02272503!). Most likely isolectotypes: BM-001254039!, G-000371890!, P-05348478!, P-05348481!, P-04627220!, P-05413210!, and W-0051434!).

Description:—Herbs perennial, glabrous throughout; caudex surculose, with petiole remains of previous seasons. Stems 5−10(−15) cm tall, dichotomously branched from base, ascending, glabrous, slender, strongly flexuous. Basal leaves rosulate, petioles 10−18 mm long; blade somewhat fleshy, oblong-lanceolate to oblong-spatulate, 6−12 × 3−8 mm, apex obtuse, margin entire, base cuneate; uppermost leaves oblanceolate to linear-oblanceolate, much smaller. Racemes 7−14-flowered, lax, strongly flexuous; fruiting pedicels filiform, straight, divaricate, 5−15 mm long. Sepals ca. 2 mm long, erect; petals obovate, violet, 3−3.5 mm long, obscurely differentiated into blade and claw; filaments ca. 1.5 mm long; ovules 6−8 per ovary. Fruit linear, 6−14 × 1−1.2 mm, terete, torulose; septum absent. Seeds uniseriate, oblong, pale brown, 1.5−2 × 0.8−1 mm.

Distribution:—endemic to Iran and known thus far only from a few collections about the type locality.

Representative specimens:—IRAN. Without locality or province, 1837, *Aucher-Eloy s.n.* (P). **Fars**: Dena Mt., Kuh-e Gol road, 19 July 2000, *M. Mirtadzadini 1836b* (MIR); Kuh-e Dena (Kuh-I Dinar), supra vicum Sisakht, 2400−3400 m, 14 June 1973, *J. Sojak 6250* (PR); Abadeh-Barcanat, Kuh-e Khataban, 3100 m, 23 June 1969, *F. Termé & Izadyar 20142e* (E). **Kohgiluye & Boyer-Ahmad**: SW of Iran, between Sisakht and Padena, SE of Bizhan pass, 3235 m, 9 July 2015, *M. Mirtadzadini 1787* (MIR). **Kurdistan**: Marivan to Pave Gardane-Tate between Dezli and Hanigarmale, 1800−2600 m, 9 July 1995, *A. Ghahreman & V. Mozaffarian 18336* (TUH).

Notes:—Although Rechinger (l.c.) indicated that the lectotype (as "Type G!") is at G, he did not specify nor annotate any of the three sheets there, and a second-step lectotypification is needed. Boissier (1846) cited the unicate in his herbarium as 656, though that specimen has 656a, a collection number that he changed later (Boissier, 1867). The seven sheets listed above as likely isotypes (BM-001254039, G-000371890, P-05348478, P-05348481, P-04627220, P-05413210, and W-0051434) have the collection number as 656 instead of 656a, but these duplicates were apparently collected from the exact same locality and at the same date and, therefore, they should perhaps be treated as isolectotypes. The only problem with those seven sheets is that their plants are coarser in size and may have been collected at lower altitudes. Miller (1978) indicated that plants of 656 have complete septa and those of 656a have perforated or no septa. However, that difference does not hold because perforated vs. complete septa can be found within the same sample or the same plant. Indeed, G-000371890 has fruits with complete, perforated, and no septa on the same plant. Furthermore *P. glaucophylla* is biennial, whereas *P. aphragmodes* is surculose perennial just as its close relative *P. kleinii.*

Boissier annotated both *Kotschy 656* (P-05413210) and *Aucher-Eloy 90* from Isfahan (P-05348479) as *Cochlearia violacea*, but these sheets clearly belong to *Pseudocamelina aphragmodes*, a species not known to grow there. Furthermore, there are two other *Aucher-Eloy 90* sheets, P-05413219 and P-5413216, from Isfahan, and these unquestionably belong to *P. glaucophylla,* a species quite common in that province. It is quite likely that the *Aucher-Eloy 90* (P-05348479) duplicate had a mixed label and that the plant was collected from the adjacent Fars Province in which *P. aphragmodes* grows. Therefore, the last collection was not cited above in the material examined.

Pseudocamelina bakhtiarica Esmailbegi, Mirtadzadini & Al-Shehbaz, *sp. nov.*

Diagnosis:—*Pseudocamelina bakhtiarica* is readily distinguished from the remaining eight species of the genus by a combination of perennial habit with short caudex, 4 ovules per ovary, oblong fruit, and entire, oblanceolate basal leaves.

Type:—IRAN. **Chaharmahal Bakhtiari**: Bakhtiari, SW of Samsami village, Mt. Mili, near the point N32 8.195′, E50 12.589′, 3 July 2010, *Mansour Mirtadzadini 1786* (holotype, MIR!; isotype, MO-6737247!). Fig. 1.

Description:—Herbs perennial, glabrous throughout; caudex woody, with stem remains of previous seasons. Stems 12–35 cm tall, slender, erect to ascending, flexuous from lowermost branching, profoundly flexuous in the inflorescence. Basal and lowermost cauline leaves with petiole 1–2 cm long; blade fleshy oblanceolate to narrowly so, 4–7 × 1–4 mm, base attenuate, margin entire, apex subacute; middle and upper cauline leaves similar to basal ones, short petiolate to sessile, gradually reduced in size upwards. Racemes rather lax, grouped in open panicles, 4–16-flowered; rachis strongly flexuous, segments between adjacent flowers distinctly shorter than fruiting pedicles; fruiting pedicles 7–25 mm long, filiform, straight, divaricate ascending at 40–60º angle. Sepals narrowly oblong, purplish, with white margin, 1.2–1.5 mm long; petals narrowly oblanceolate 1.5–2.2 × ca. 0.5 mm; anthers yellow, ca. 0.4 mm long; ovules 4 per ovary. Fruit oblong, 2.2–3 × 0.5–1 mm, terete; valves smooth, not veined, papery, obtuse at both ends; gynophore 0.1–0.3 mm long; septum fenestrate, membranous; style slender 0.3–0.5 mm long. Seeds oblong, plump, 1.1–1.3 × 0.5–0.6 mm.

Eponymy:—the species epithet is named after Bakhtiari region of Iran.

Conservation status:—*Pseudocamelina bakhtiarica* is known only from the type collection. Therefore, it is given the assessment of Data Deficient (DD) according to the IUCN (2001) criteria.

Notes:—*Pseudocamelina bakhtiarica* resembles *P. conwayi* in having woody caudex, strongly flexuous racemes, and filiform fruiting pedicels. However, it differs by having undivided (vs. trisect) basal leaves, 4–16-flowered (vs. 2–5-flowered) racemes grouped (vs. ungrouped) in open panicles, glabrous (vs. puberulent) stems and leaves, and oblong (vs. linear) fruits.

Pseudocamelina campylocarpa (Boiss.) N.Busch (1928: 115). ≡ *Cochlearia campylocarpa* Boissier (1842: 171). Type:—IRAN (as Persia). Isfahan, *P. M. R. Aucher-Eloy 95* (Holotype: G-BOIS-00332268!; isotypes: BM-001254038!,G-00389746!, K 000484396!, P 02272512!).

Description:—Herbs biennial, glabrous throughout or pilose along lower stems. Stems 37−60 cm tall, single to several from base, flexuous throughout, branched below and above, ascending. Basal leaves rosulate; petiole 0.5–2.5 cm long; blade fleshy, 5−14 × 4−8 mm, suborbicular to broadly obovate, base cuneate, margin dentate to subentire, apex obtuse, repand, cuneate at base; cauline leaves narrowly oblanceolate, long petiolate, uppermost linear, sessile. Racemes many flowered, lax, elongated considerably in fruit; rachis straight; fruiting pedicels erect to erect-ascending, slightly stout, 1−2 mm long, subappressed to rachis, glabrous. Sepals oblong, 2.2−2.5 mm long, erect, glabrous; petals white, 4−5 × ca. 1.2 mm, obscurely differentiated into blade and claw; stamens 0.7−0.8 mm long; ovules 10−14 per ovary. Fruit linear-oblong, 5−7 × ca. 1 mm; style ca. 0.7 mm long. Immature seeds pale brown, smooth, uniseriate.

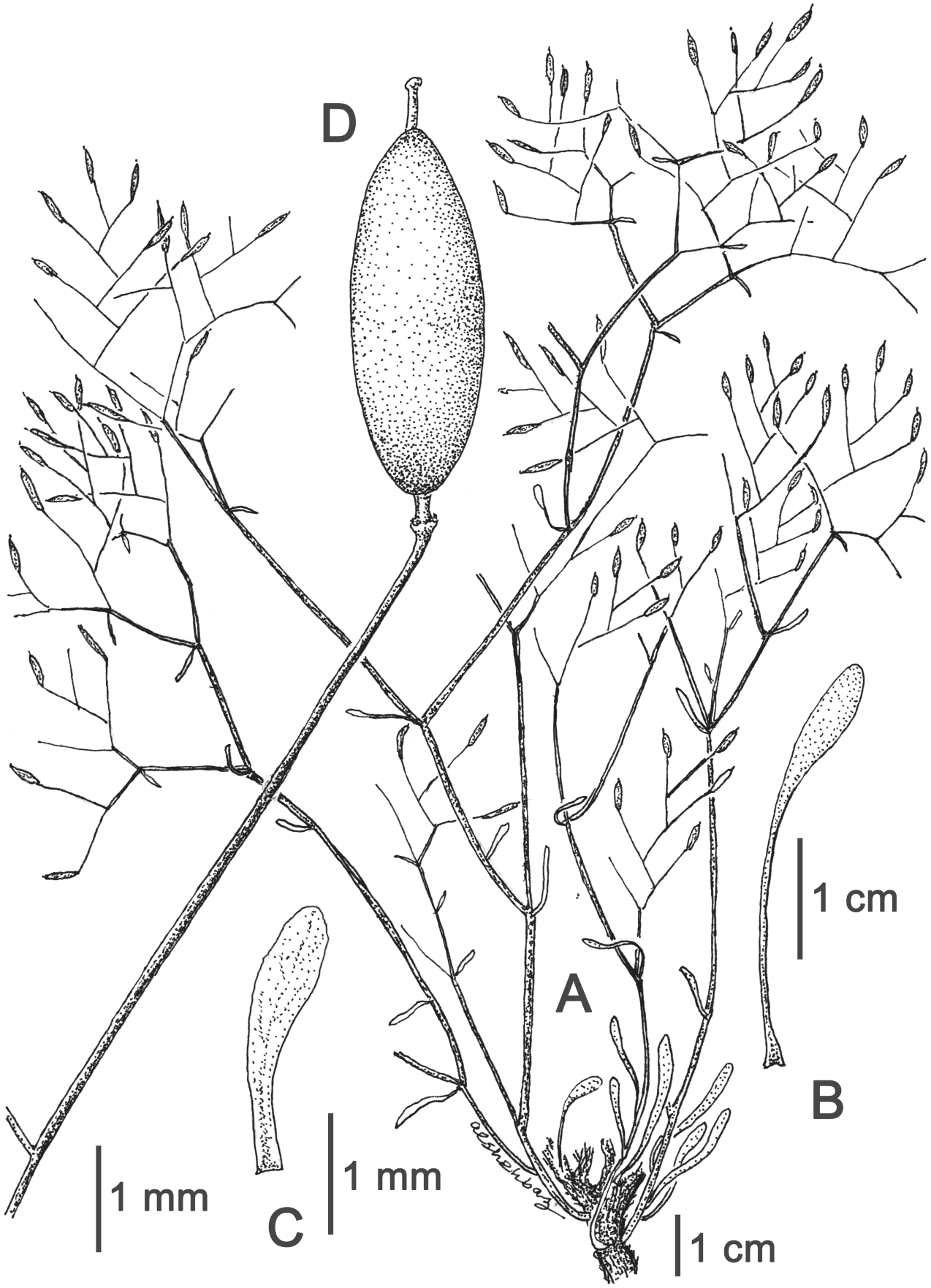

FIGURE 1. *Pseudocamelina bakhtiarica.* **A**. Plant. **B**. Basal leaf. **C**. Petal. **D**. Fruit and fruiting pedicel. Drawn by Al-Shehbaz from the isotype (MO-6737247).

Distribution:—endemic to S and W Iran.

Representative specimens:—IRAN: **Chaharmahal Bakhtiari**: Bakhtiari, 40 km S Dorahun, 1920 m, 8 July 1959, *H. Pabot 2272* (G). **Luristan**: Kebara, 2000 m, June 1941, *W. N. Koelz 18249* (MICH, W), *W. N. Koelz 18278a* (MICH, W). **Fars**: Kuh-Ajub near Persepolis, April 1842, *T. Kotschy 903* (BM, G, P), *T. Kotschy 935* (W). **Kerman**: Kerman, Godar-e Khane Sorkh, *M. Mirtadzadini 1754d* (MIR); Kerman, N of Baft, 5 km SE of Kiskan toward Bezenjan, 2517 m, 15 June 2012, *M. Mirtadzadini 1755b* (MIR); Kerman, SW of Bardsir, 10 km W of Deh-e Rastegar, near Khane-Sorkh village, 2453 m, 3 May 2013, *M. Mirtadzadini 1781a* (MIR). **Tehran**: Hawz-i Sultan, 1868, *C. Haussknecht s.n.* (P).

Notes:—Boissier based the species description solely on the specimen in his herbarium. Furthermore, the G-00389746 sheet was added to the Geneva herbaria from the Moricand herbarium that was donated to the G combined herbaria in 1908 and which Boissier did not examine. Therefore, the specimen in G-BOIS is the holotype.

Pseudocamelina campylocarpa is easily distinguished from the other congeners by having stout suberrect fruiting pedicles to 2 mm long. By contrast, the other species have slender, often divaricate or recurved fruiting pedicles distinctly longer than 2 mm.

Pseudocamelina campylopoda (Bornm. & Gauba) Hadač & Chtrek (1973: 261). ≡ *Cochlearia campylopoda* Bornm. & Gauba in Bornmüller (1934: 339). Described from: "Persia borealis: Elburs [for Alborz], in montosis supra Keredj [for Karadj] sitis ad pagum Allangch (12. VII. 1934: leg. Dr. Gauba)." Type:—IRAN. **Tehran**: in montosis supra Karadj sitis as pagum Allangeh, 12 July 1934, *Gauba 140* (holotype, W-1958-0006835!).

Syn.:—*Camelinopsis camplylopoda* (Bornm. & Gauba) Miller (1978: 32).

Description:—Herbs annual, glabrous throughout. Stems 10–30 cm tall, slender, flexuous throughout. Basal and lowermost cauline leaves 1–3-pinnatisect, soon withered; petiole 0.7–1.5 cm long, slender; lateral leaf lobes petiolulate, dentate or pinnatisect, ultimate segments obovate to oblong, 1–4 mm long; cauline leaves similar, ultimate segments linear, 0.5–1.5 × ca. 0.5 mm; uppermost leaves narrowly linear, entire. Racemes many flowered, strongly flexuous, 5–10 cm long; fruiting pedicels filiform, divaricate, strongly arcuate, lowermost 1.5–3.5 cm long. Sepals purplish. with white margin and apex, 1.2–1.5 mm long; petals narrowly obovate to oblong, 2.5–3.5 × 1.2–1.8 mm; median filaments 1–1.3 mm long, lateral filaments 0.7–0.9 mm long; anthers ca. 0.5 mm long; ovules 4 per ovary. Fruit subglobose to broadly obovoid, slightly flattened, 2.2–3 × 1.8–2.6 mm; style 0.2–0.5 mm long. Seeds uniseriate, 1.8–2 × 1–1.3 mm. $2n$=14.

Distribution:—endemic to Iran.

Representative specimens:—IRAN. **Qazvin**: Pic-Kuh, Karaj*, Gauba 141* (W). **Tehran**: Nosratabad, Km 16 N Karaj, *Amin-Bazargan 10268* (E); Jajrud Tehran Abali, *Dini & Arazm 6151* (E), *6165* (TUH); Km 12 on Karaj road of Chalus, 1560 m, 3 June 1973, *Babakhanlou & Amin 6466* (E); Vardavard Valley, 1650 m, 27 May 1974, *P. Wendelbo et al. 11769* (E); Tehran-Karaj, Garm Darreh, 1500 m, 7 May 1978, *M. Assadi 27515* (E); Alborz Mt., Pic-Kuh, Karaj, 7 June 1937, *K. H. Rechinger 757* (W); Karaj*,* 2 April 1937, *K. H. Rechinger 340* (BM, W); Karaj, 1 June 1944, *W. N. Koelz 33441* (W); Jajroud, 1700 m, 6 June 1972, *Dini & Arazm 6151* (TUH); Yonjehzar Farahzad, N Tehran, *Amin & Bazargan 6229* (TUH); Simien Dasht, km 87, Firuzkuh, *Amin & Bazargan 6233* (TUH); Sorkhe-Hessar, *Anonymous12436* (TUH); Djadjrud, *Ganj Alizadeh 12437* (TUH); Sorkhe-Hessar, April 1959, *12438* (TUH); Karaj-Tal, *A. Parsa 12439* (TUH); Nosratabad, km 16 N of Karaj, 1800 m, 25 June 1974, *Amin & Bazargan 19268* (TUH); Damavand, Ghareh Ghaj, Sefid Kamar, *V. Mozaffarian 53964* (TUH).

Notes:—Bornmüller and Gauba (in Bornmüller, 1934) described the species in *Cochlearia* and listed *Pseudocamelina campylopoda* as its synonym. However, the latter is a nomen nudum that was erroneously recognized by Rechinger (1968) as a validly published name. The name remained invalid for 39 years until the work of Hadač & Chrtek (1973).

Pseudocamelina conwayi (Hemsl.) Al-Shehbaz (2014: 144). ≡ *Cochlearia conwayi* Hemsley (1894: 4). Type:—[PAKISTAN]. Expedition to the Karakoram Glaciers 1892, Doyen to Raínghát, *W. M. Conway 305* (holotype, K-000247181!).

Description:—Herbs perennial, minutely puberulent throughout with straight, simple papillate trichomes to 0.05 mm long; caudex woody, few-branched, with leaf and stem remains of previous seasons. Stems ca. 7 cm tall, branched from caudex and above, ascending, puberulent, dichotomously branched, strongly flexuous. Basal leaves subrosulate, trisect, 1–2 cm long, puberulent, nonfleshy; lobes linear, entire; middle cauline leaves trisect, petiolate, not auriculate

at base; petiole 3–6 mm long; lobes linear to filiform, 3–10 × 0.2–1 mm, entire; uppermost leaves undivided, linear. Racemes 2–5-flowered, lax, strongly flexuous, puberulent, ebracteate; flowering pedicels divaricate, filiform, straight, puberulent, 5–15 mm long. Sepals oblong, 2.5–3 mm long, erect, puberulent, subsaccate at base; petals oblanceolate, white, 5–7 × 0.5–1 mm, undifferentiated into blade and claw; filaments erect, 2–3 mm long, tetradynamous; anthers oblong, ca. 1 mm long, not apiculate; nectar glands confluent, subtending bases of median stamens, surrounding those of lateral stamens; ovary linear; style ca. 0.5 mm long; stigma entire. Ovule number and mature fruits and seeds unknown.

Distribution:—Endemic to Karakoram Mts. (Pakistan).

Conservation status:—*Pseudocamelina conwayi* is known only from the type collection. Therefore, it is given the assessment of Data Deficient (DD) according to the IUCN (2001) criteria.

Notes:—The species was assigned to *Pseudocamelina* by Al-Shehbaz (2014) on the basis of having strongly flexuous racemes, divided leaves, filiform fruiting pedicels, linear ovaries, and perennial habit. These features combined are not found in any Asian genus and, therefore, such placement is maintained here. However, the species is disjunct from the nearest distribution center of the genus in Kerman by well over 1500 kilometers. Additional collections are needed before its generic placement is resolved.

Pseudocamelina glaucophylla (DC.) N.Busch in Grossheim (1927: 214). ≡ *Nasturtium glaucophyllum* de Candolle (1821: 195). ≡ *Cochlearia glaucophylla* (DC.) Boissier (1842: 170). Type:—IRAN (as Persia). **Tehran**: Tehran, *Olivier* (holotype, P-02272504!).

Cochlearia camelinae Boissier (1842: 172), *nom. illeg.*, non *Cochlearia camelinae* (Fischer & Meyer 1835: 34) Ledebour (1841: 160), in nota. ≡ *Pseudocamelina camelinae* N.Busch (1928: 113). Described from: "[P. M. R. Aucher-Eloy] N. 331 et 4164, Persia." Type:—IRAN. Without locality data, *P. M. R. Aucher-Eloy 4164* (lectotype first-step designation by Rechinger (1968: 221) and second step by Miller (1978: 28): G-BOIS-00332266!; isolectotypes, BM-000582866, E-00381433!, G-00389747!, G-00389748!, K-000484395!, P-02272509!, P-02272510!, P-02272511!). Syntype: [Iran], Persia, 1835, *Aucher-Eloy 331* (P-05413238!).

Cochlearia violacea Boissier (1842: 171). ≡ *Pseudocamelina violacea* (Boiss.) N.Busch (1928: 115). Described from: [P. M. R. Aucher-Eloy] N. 91, Persia." Type:—[IRAN]. "Persia. Aucher-Eloy-Herbier d'Orient 91." (lectotype first-step designation by Rechinger (1968: 222) and second-step by Miller (1978: 28): G-BOIS-00332267!; isolectotypes, G-00371872! [de Candolle herbarium], G-00371889!, P-02272519!, P-02272520!).

Description:—Herbs biennial, glabrous throughout or rarely pilose, glaucous. Stems simple or rarely few branched at base, (25−)30−70 cm tall, somewhat dichotomously branched above base, ascending, flexuous. Basal leaves rosulate, petiole 0.5−2.5(−3) cm long; blade fleshy, orbicular to obovate or oblong to spatulate, (2−)4−8.4 × 0.4−2.1 cm, entire or dentate; uppermost leaves linear to oblanceolate, entire. Racemes many flowered, lax, elongated considerably in fruit, flexuous; fruiting pedicels divaricate, filiform, straight, 4−19 mm long. Sepals oblong, 2.5−4(−4.5) mm long, erect, lateral pair not saccate at base; petals spatulate, white, sometimes becoming purplish when dry, 3.5−4.5 × 1−1.8 mm, obscurely differentiated into blade and claw; filaments erect, 2−3.2 mm long, tetradynamous; anthers oblong, ca. 1 mm long; ovules 10−20 per ovary Fruit linear or oblong, (3−)5−18(−25) × 1−1.5 mm; style 0.4−1 mm long. Seeds uniseriate to biseriate, pale brown, smooth, oblong, 1−1.5 × 0.6−0.8 mm. 2*n*=14.

Distribution:—endemic to Iran at 500−3900 m.

Representative specimens:—IRAN. Without exact locality *P. M. R. Aucher-Eloy 90* (BM, P), *4137* (BM, P).

Azarbaijan: 13 km below Mianeh on road to Zanjan, 1050 m, 22 June 1971, *J. Lamond 4231* (E); Qezel Owzan (Kizil Uzun), 1200 m, 22 June 1971, *K. H. Rechinger 42234* (G, W); Einal Zeinal, between Tabriz and Talkheh Rud (Atschi Tschai), 1700 m, 20 July 1971, *K. H. Rechinger 43548* (G, K, W); N of Tabriz, 1700 m, 20 July 1971, *J. Lamond 5177* (E); Mianeh, Ghaflankuh, Zanjan road, 1150 m, 21 July 1974, *H. Foroughi & M. Assadi 13714* (W); Kivi, 90 km ENE Mianeh versus khalkhal, 1400 m, 15 July 1971, *K. H. Rechinger 43325* (W); SE of Ardabil, east of Hir, Darband region, 1921 m, 17 June 2015, *M. Mirtadzadini et al. 1806* (MIR); Takab, 2.5 km W of Takht-e Solaiman temple, 2156 m, 19 June 2015, *M. Mirtadzadini et al. 1812* (MIR); Hashtjin to Khalkhal, W of Aq-Dagh Mt., after Sousahab village, near Mir-e Jin village, 2027 m, 7 August 2012, *M. Mirtadzadini 1813* (MIR). **Chaharmahal Bakhtiari**: Bakhtiari, 40 km S. Gandoman, *H. Pabot 2272* (G); Bakhtiari (Tang-e-Sayad protected region), Marghak, 2550 m, 3 June 1974, *K. H. Rechinger 47239* (G, K, W); 21 km from Gandoman to Lordegan, 2210 m, 22 June 2015, *M. Mirtadzadini 1756* (MIR); Shahr-e Kord to Farsan, 2 July 2004, *M. Mirtadzadini 1800* (MIR). **Fars**: Abadeh, Shahrmian Kushk-e Zar, Dareh-e Gol, 2550−3000 m, 4 June 1975, *P. Wendelbo & H. Foroughi 17859* (E). **Hamadan:** Hamadan, Kuh-e Khorzane, *Sabeti 136* (W). **Isfahan**: S of Isfahan, Semirom waterfall, 1 Jul 2006, *M. Mirtadzadini s.n.* (MIR); between Isfahan and Tehran, May 1859, *A. G. Bunge s.n.* (P); between Yezd and Isfahan, May 1859, *A. G.*

Bunge 13 (P); Belehsuh-Kuh, between Dameneh and Khunsar, 2770 m, 10 August 1966, *J. C. Archibald 3083* (E, W); Qashqai, between Shahreza and Semirom, 2600 m, 5 June 1974, *K. H. Rechinger 47361* (E, W); Qashqai, Darreh Abshar, Semirom, 6 June 1974, *K. H. Rechinger 47475* (G, W); Ostan 10, between Isfahan and Abadeh, 1500−2500 m, 27 April 1956, *F. Schmid 5420, 5382* (G); Isfahan, Balehsun-Kuh, between Damaneh and Khunsar, *J. C. Archibald 3083* (W); Qashqai, Kuh-e Surmandeh (Kuh-e Alijuq) N of Semirom, 2700−3900 m, 7 June 1974, *K. H. Rechinger 47500* (W); W mountain of Baq-Bahadoran, 7 June 2001, *M. Mirtadzadini 1798* (MIR); between Tiran and Damane, S of Kord-e Olia, 2450−2600 m, 26 May 2010, *M. Mirtadzadini 1799* (MIR); Varian, near Ardestan, 2000 m, 25 June 1975, *H. Foroughi & M. Assadi 18052* (E); Semirom, Vanak, Dalan Kuh, 1900 m, 5 June 2001, *M. R. Parishani 14163* (Isfahan); Isfahan, 1837, *Aucher-Eloy 90* (G). **Kashan**: Niasar to Delijan, Barzok village to Mt. Karkas, 23 May 2010, *M. Mirtadzadini 1805* (MIR). **Kermanshah**: 19 km N of Paveh, *H. Pabot 1255* (G). **Kurdistan**: Bijar to Zanjan, 5 km up to Bianlo village, 1650 m, 7 October 2002, *H. Maroofi & S. Naseri 5574* (Sanandaj). **Luristan**: Durud, 2133 m, 28 May 1941, *W. N. Koelz 17865* (E, MICH, W); Oshtoran Kuh, 16−17 June 1974, *J. Renz 48204* (W); 33 km from Shul-Abad to Aligoodarz, 2760 m, 30 July 1999, *M. Mirtadzadini 1803* (MIR); 12 km from Aligodarz to Khomein Mt, 2600−2850 m, 3 July 1977, *Runemark & Lazari 26557* (E). **Markazi**: 4 km W Arak, 1950 m, 7 June 1959, *H. Pabot 1152* (G); E of Arak, 1645 m, 3 May 1966, *J. C. Archibald 1735* (E, K); 19 km N of Saveh, 1370 m, 22 May 1961, *H. Pabot 7255* (G); Sefid Khani Mt., 10 July 1966, *Anonymous 12441* (TUH). **Mazandaran**: Lar Valley, 2450 m, 3 July 1974, *P. Wendelbo & M. Assadi 13415* (E, W); Haraz valley, above Panjab in dry slope, 1000 m, 11 May 1959, *P. Wendelbo 638* (E, W); Alborz, near Elika, 2700 m, *Gauba 152* (W); Alborz, Gochisar, NE Karaj, 2133 m, 18 June 1962, *P. Furse 2636* (E, W); Kudjur, near Elika, *Gauba 135* (W); Callus Valley, 2400 m, 9 June 1937, *K. H. Rechinger 960* (BM, W); Nasan to Youssh, 22 July 2015, *M. Mirtadzadini 1791* (MIR); between Yush and Nasan, 21 Hune 2011, *M. Mirtadzadini 1792a* (MIR); Heraz road, near Ab-Askar (near Sad Lake), 12 August 2008, *M. Mirtadzadini 1793* (MIR); Karaj-Chalus road, Pol-e Zanguleh Kalavanga, Dunassi, 2900 m, 8 July 1999, *H. Nazarian 33243* (TUH); Gochisar, NE of Karaj, *Furse 3636* (E, W); Kendovan, Gachsar, 2980 m, 17 July 1972, *S. C. Klein 3734, 3712* (E, G); Kendovan, Gachsar, a proximite de l'ancienne route du col, 2980 m, 17 July 1972, *S. C. Klein 3726* (G); N of Kandovan Pass, 3110 m, 25 June 1966, *J. C. Archibald 2481* (E, W); Kandovan, 22 June 1966, *Anonymous 12556* (TUH); N of Karaj, S of Kandovan tunnel, 2691 m, 2 August 2012, *M. Mirtadzadini 1790b* (MIR); Chalus road, W of Kandovan tunnel, 2887 m, 25 June 2015, *M. Mirtadzadini 1807* (MIR); Alborz mountain chain, Chalus road, after Karaj dam, Mowrud village, 2340 m, 21 July 2010, *M. Mirtadzadini 1808* (MIR); Karaj to Chalus, N of Nesa village, 2229 m, 13 June 2015, *M. Mirtadzadini 1825* (MIR); Karaj to Chalus, S of Gatshsar, W of Talaqan crossroad, 2251 m, 13 June 2015, *M. Mirtadzadini 1826* (MIR); Nesa in Chalus road, 7 May 1984, *A. Ghahreman & Sheikhaleslami 12444* (TUH); Tochal Mt., 2200 m, 7 June 1972, *R. Alava 10385* (E). **Qazvin**: Vessieh, 1500 m, 1 September 1948, *K. H. Rechinger 6851* (E, G, MO, W); between Qazvin and Rasht, 500−1200 m, 5−6 September 1956, *F. Schmid 6586* (E, G, W). **Semnan**: Kavir, Siah Kuh, 5−35 km a Karavan−Sari Shah Abbas, 24 May 1974, *K. H. Rechinger 46293* (E, G, MO, W). **Tehran**: Mt. Alborz near Derbend, 8 June 1843, *T. Kotschy 259* (BM, E, G, MO, P, W); Hawuz-e Sultan, 1868, *C. Haussknecht s.n.* (BM, P, W); 1 km N of Abeali, 2040 m, 11 July 1960, *H. Pabot 1290* (G); Tochal, Ferasad, 1800 m, 28 May 1902, *J. F. N. & A. Bornmüller 6182* (E, P); Tehran, *P. M. R. Aucher-Eloy 4163* (BM, P); Tochal, Scheheristanek, 2200 m, 6 June 1902, *J. F. N. Bornmüller 6274* (P); between Tudischk and Ku-pahi, 11 May 1889, *A. G. Bunge s.n.* (P); Dih-korghon, 1856, *Seidlitz s.n.,* (P); Mt. Tochal, Hafthauz, 1300−1500 m, 4 July 1948, *P. Aellen 1079* (G, MO, W); 20 km SE of Tehran, 1050 m, 13 June 1962, *H. Pabot 7371* (G, W); Au N-O du village de Kelvan, S of Naz (Mishenou), 2860 m, 21 June 1971, *S. C. Klein 1204, 1215, 1043, 1066, 1075* (G); Tochal, 2990 m, 16 June 1973, *S. C. Klein 4613* (G); Imam Zadeh Hashem, Polour, 2500 m, 30 June 1974, *S. C. Klein 7637* (G); 20 km SE of Tehran, *H. Pabot 7371* (G); Tochal, near Scheheristanek, 2200 m, 7 June 1902, *J. F. N. Bornmüller 6183* (BM, G, P, W); between Shemshak and Dizin, 2900 m, 25 June 1977, *K. H. Rechinger 57215* (E, K, G, W); Vashan, Kuh-e Lazar, *F. Termé & Matine 31792e* (E); Bijin, about 44 km from Tehran on road to Qom, 1050 m, 20 May 1974, *A. Shirdelpur & H. Amini 11613* (W); 157 km from Hamadan on road to Ghazvin, 1890 m, 19 July 1974, *M. Assadi & H. Amini 13630* (E, W); Road of Qom, 900 m, 2 May 1977, *H. Amin & Rejamand 32867* (W); 30 km N of Karaj (K. 32 km W of Tehran), 2 July 1969, *J. S. Anderson & I. C. Petersen 151* (E, K, W); Karaj, Kuh-e Dasht, 7 May 1937, *K. H. Rechinger 372, 766, 977* (W); Alborz, Tochal, 2600 m, 30 May 1902, *J. F. N. Bornmüller 6184* (PRC); Tehran, Darake, 16 June 2000, *M. Mirtadzadini 1794* (MIR); Tochal, 2000 m, 19 June 2015, *S. Esmailbegi 1795, 1796, 1979* (MIR); Darband, 1971 m, 18 June 2015, *S. Esmailbegi 1802, 1804* (MIR); N of Karaj dam, 1803 m, 26 June 2015, *M. Mirtadzadini 1814, 1815* (MIR); 30 km E of Demavand, on the pass SE of Taar lake, 3046 m, 12 July 2015, *M. Mirtadzadini 1816* (MIR); Emamzadeh Davoud Mt., 2750 m, 25 June 2015, *M. Mirtadzadini 1817, 1818* (MIR); N of Dizin Pass, 3349 m, 12 June 2015, *M. Mirtadzadini 1820* (MIR); 17 km NE of Karaj, W of Arangeh village, 1915 m, 24 June 2015, *M. Mirtadzadini 1821* (MIR); 15 km NE of Karaj near Arangeh, 1696 m, 24 June 2015, *M. Mirtadzadini 1822* (MIR);

Dizin, W of Gajereh, 3592 m, 3 August 2012, *M. Mirtadzadini 1823* (MIR); Dizin Pass, near ski run, 3130 m, 3 August 2012, *M. Mirtadzadini 1824* (MIR); road of Qom 50 km from Tehran, Abdol-Abad, 19 June 1967, *S. Mobayen 12442* (TUH); N of Tehran, Tochal Mt., 2000 m, 19 June 2015, *S. Esmailbegi 1810, 1811* (MIR); Damavand, *Anonymous 12443* (TUH); Taleghan, Mehran, 2050 m, 6 June 1991, *Sanei & A. A. R. Maasoumi 100392* (TUH); above Darband and Mt. Kuhha-ye Tochal, 2000−3800 m, 29 June 1973, *J. Sojak 7278, 7265* (PR). **Yazd**: Yazd, Deh-Bala, Shirkuh mountain, 3700−4000 m, 21 June 1975, *H. Foroughi & M. Assadi 17969* (E, G). **Zanjan**: 4 km from Mahneshan to Aqkand, 1792 m, 19 June 2015, *M. Mirtadzadini et al. 1809* (MIR).

Notes:—*Pseudocamelina glaucophylla* is by far the most widespread and variable species of the genus, a conclusion reached earlier by Miller (1978). The variation is evident in every morphological feature, including plant height, size, shape, and margin of basal leaves, branching of the inflorescence, length of fruiting pedicles, flower size, ovule number, fruit size and shape, and seed arrangement. The longest fruit in the species (2−3 cm × ca. 1 mm) were observed in plants of Alborz Mountain, especially in Province Mazandaran. By contrast, the shortest and widest fruit (3−8 × 1.4−1.8 mm) are scattered throughout the species range and typically biseriate seeds were found in *Rechinger 46293* (K, W) that was collected from central Iran, Kavir protected region, Siah-Kuh.

Forms of *Pseudocamelina glaucophylla* with straight rachis and pedicels shorter than fruit were recognized by Boissier (1867) as *Cochlearia violacea* (petals purple) and *C. camelinae* (petals white). However, the examination of a wealth of material of this "three-species" complex, both in the field and in many herbaria, revealed that fruit shape, pedicel length, presence or absence of indumentum, flower color when dry, length ratio of fruiting pedicel to fruit are definitely unreliable, and Miller's (1978) treatment of the three taxa as a single polymorphic species is fully justified. Indeed, these characters are not inherited in a single, consistent pattern to justify the recognition of additional taxa.

Rechinger (1968) did not specify which of the three duplicates in the Geneva herbaria is the lectotype of *Pseudocamelina violacea*. Boissier annotated P-02272519 and another sheet that he did not cite (P-55348479), but the collection number and year of collection of the latter sheet are 90 and 1835, respectively.

Pseudocamelina kermanica Esmailbegi, Mirtadzadini & Al-Shehbaz, *sp. nov.*

Diagnosis:—*Pseudocamelina kermanica* is easily distinguished from the other annual species of the genus by having straight fruiting pedicels, 8 ovules per ovary, and strongly dentate, flabellate to suborbicular-cordate or broadly obovate basal leaves.

Type:—IRAN. SW **Kerman**: Qale-Askar, 3 km SW of Madun village, N29 32.231, E56 34.008, 3530 m, 15 June 2012, *Mansour Mirtadzadini 1782b* (holotype, MIR!; isotype, MO-6737248!). Fig. 2.

Description:—Herbs annual, Stems 40–45 cm tall, slightly flexuous from lowermost branching, profoundly flexuous in the inflorescence. Basal and lowermost cauline leaves with petiole 0.8–2.5 cm long; blade somewhat fleshy, flabellate to broadly obovate or suborbicular-cordate, 0.7–2.2 × 1–3 cm, with 10–20 obtuse deep teeth, base truncate to cordate or cuneate; cauline leaves reduced in size and fewer toothed upwards; uppermost leaves linear to linear-oblanceolate, entire. Racemes rather lax, 7–15-flowered, grouped in open panicles; rachis strongly flexuous, segments between flowers distinctly shorter than fruiting pedicles; fruiting pedicles 7–14 mm long, filiform, straight, divaricate-ascending at 40–60º angle. Sepals narrowly oblong, purplish, 1.5–2 mm long, spreading; petals purplish with white margin, spreading, narrowly oblanceolate 2.5–3 × 0.7–1 mm; stamen spreading; anthers yellow, ca. 0.5 mm long; ovules 8 per ovary. Fruit oblong to oblong-ovate, 1.8–3.5 × 1–1.5 mm, terete; valves smooth, not veined, papery, obtuse at both ends; gynophore 0.1–0.3 mm long; septum complete; style slender 0.8–1 mm long. Seeds oblong, plump, 1–1.2 × 0.5–0.7 mm.

Eponymy: The species epithet is derived from Kerman province of Iran.

Additional specimens examined (Paratypes):—IRAN. **Kerman**: Sardu, Bagh-Rahi village, 15, May, 2014, *M. Payandeh 1783b* (MIR); Kerman, Baft, Sendiqu, Gugher, 4 June 1996, *M. Mirtadzadini 1967* (TUH); Shahrebabak, Meimand, 3 September 1997, *M. Mirtadzadini 1784* (MIR); Harmu, 3 June 1996, *M. Mirtadzadini 1785* (MIR).

Notes:—In the annual habit, strongly flexuous racemes in open panicles, silicle fruits, filiform pedicels longer than rachis segments between pedicels, undivided upper leaves, and lack of indumentum, *Pseudocamelina kermanica* resembles both *P. campylopoda* and *P. kurdica*, or *Camelinopsis* sensu Miller (1978) and Al-Shehbaz (2012). Such strong similarities support the reduction herein of the latter genus to synonymy *Pseudocamelina*. However, *P. kermanica* differs from both species in having 8 (vs. 4 or 2) ovules per ovary, undissected (vs. 1–3-pinnatisect) basal leaves, and straight (vs. strongly recurved) fruiting pedicels.

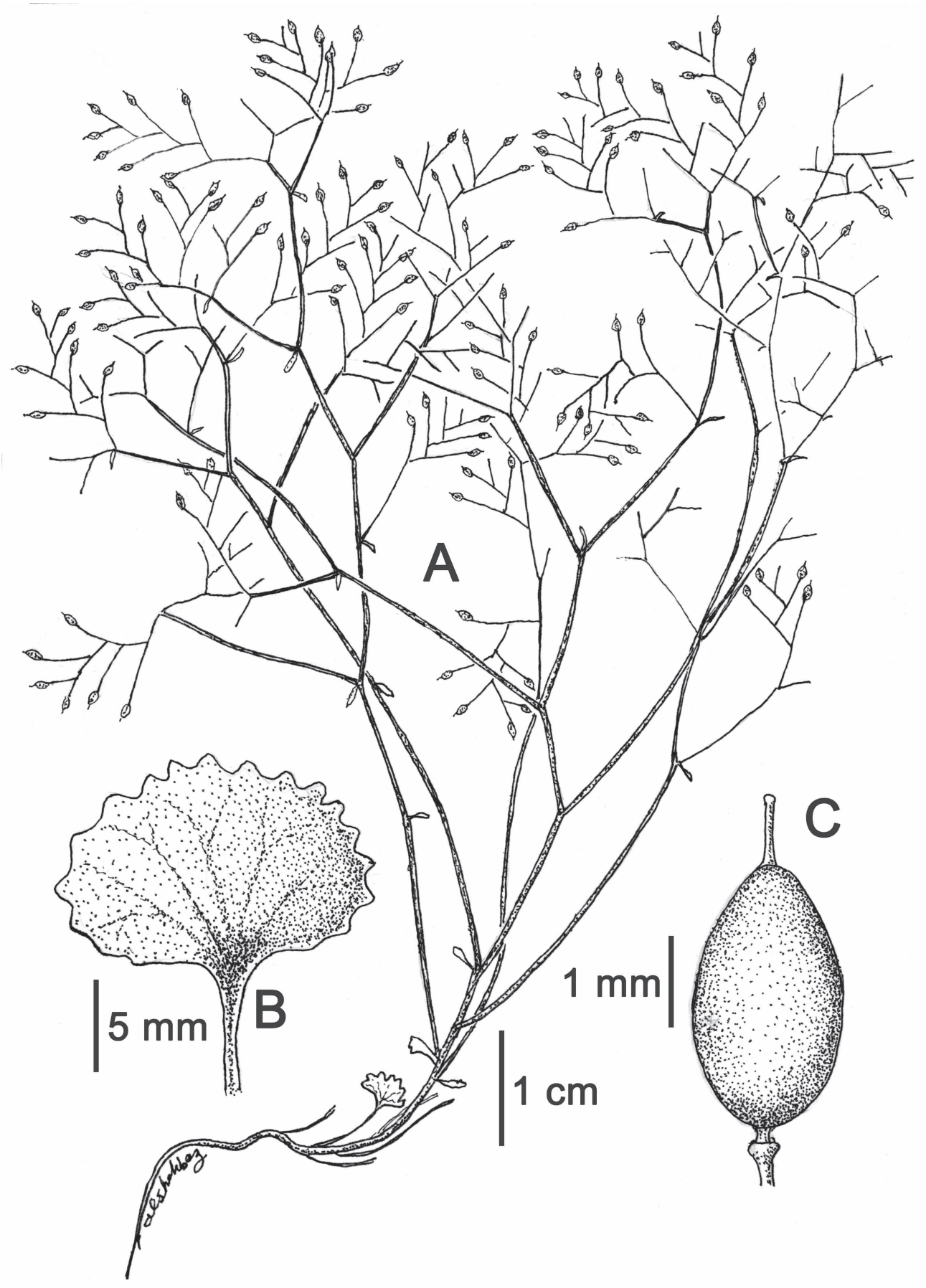

FIGURE 2. *Pseudocamelina kermanica*. **A**. Plant. **B**. Basal leaf from greenhouse rosette grown fom a seed of isotype. **C**. Fruit. Drawn by Al-Shehbaz from the isotype (MO-6737248).

Pseudocamelina kleinii Rechinger (1973: 171). Described from " Persia: N: Montes Elburs occidentales, Takht-e Sulaiman, in glareosis mobilibus regionis Hazartschal, 3500 m, VII. 1971, *S. C. Klein s. n.,* holotypus, W". Type:—IRAN. Mt. Alborz, Asad-Kouh, 26 July 1971, 3850 m, *S. C. Klein 2262* (holotype, W-1980-0005237!; isotype, K-000693450!).

Description:—Herbs perennial, with slender, surculose, rhizome-like subterraneam caudex, glabrous or with a few simple trichomes, subglaucus. Stems (5−)7−15 cm tall, dichotomously branched from base and above, ascending, flexuous. Basal leaves rosulate, fleshy, petiole 1−2.5 cm long; blade obovate, (5−)6−14 × 2.2−8 mm, entire, cuneate at base, obtuse at apex; cauline leaves linear-oblanceolate, short petiolate, reduced in size upward. Racemes several flowered, lax, flexuous; fruiting pedicels divaricate, straight, 4−10 mm long. Sepals oblong, purple, 3.8−4 mm long, ascending, lateral pair saccate at base; petals oblong, obtuse, violet, 5.2− 6 × 1.5−2 mm, undifferentiated into blade and claw, obtuse at apex; median filaments 3.9–4.1 mm long, lateral filaments, 2.8–3 mm long; anthers oblong, ca. 1 mm long, not apiculate; ovules 18−28 per ovary. Fruit linear, 20−25 × 1−1.3 mm, slightly torulose, midvein obscure; style 0.2−0.5 mm long. Seeds oblong, uniseriate, smooth, oblong, 1.2 −1.7 × 0.8−0.9 mm.

Distribution:—endemic to Iran.

Representative specimens:—IRAN. **Mazandaran**: N of Iran, Alam-Kuh, Khersan glacier, 4119 m, 3 August 2015, *K. Kavousi 1788* (MIR); N of Iran, Alam-Kuh, Khersan glacier, 4109 m, 27 July 2014, *K. Kavousi 1789* (MIR); W Mt. Alborz, Azad-Kuh, 3880 m, 12 August 1974, *S. C. Klein 7900* (G, K); Gardaneh-ie Lasargoun (Azad-Kuh), 3520 m, 2 July 1978, *S. C. Klein 9112* (G); Chalan (massif de l'Alam-Kuh), 3850 m, 26, July 1971, *S. C. Klein 2275 & 2262* (G).

Notes:—Rechinger (1973) compared *Pseudocamelina kleinii* with *P. violacea*, both of which species were reduced by Miller (1978) to synonymy of the highly variable *P. glaucophylla*. However, Miller annotated the type specimen of *P. kleinii* as "Rather long, torulose fruited form with large fls". In fact, *P. kleinii* differs substantially from *P. glaucophylla* by being a much smaller plant (5−)7−15 vs. (25−)30−70 cm tall with saccate (vs. non-saccate) lateral sepals, violet (vs. white) petals 5.2−6 (vs. 3.5−4.5) mm long, 18−28 (vs. 10−20) ovules/seeds per ovary/fruit, and fruits 20−25 [vs. (3−)5−18(−25)] mm long. In our opinion these substantial differences strongly justify the recognition of *P. kleinii* as an independent species. Furthermore, *P. kleinii* is a surculose perennial (vs. biennial).

Pseudocamelina kurdica (A.G.Mill.) Esmailbegi & Al-Shehbaz, *comb. nov.* ≡ *Camelinopsis campylopoda* subsp. *kurdica* Miller (1978: 32). ≡ *Camelinopsis kurdica* (A.G.Mill.) Al-Shehbaz & A.G.Mill. in Al-Shehbaz (2012: 947). TYPE:—IRAQ (Kurdistan). **Sulaimaniya**: in ditione pagi Penjwin, in glareosis serpentinicis jugi Malakawa, 1400 m, 19–20 May 1957, *K. H. Rechinger 10435* (holotype, E!; isotypes, G!, K!, US-00324483!, W-1960-0003526!).

Description:—Herbs annual, glabrous throughout. Stems 13–45 cm tall, slender, flexuous throughout. Basal and lowermost cauline leaves 1–3-pinnatisect, soon withered; petiole 0.7–1.5 cm long, slender; lateral leaf lobes petiolulate, dentate or pinnatisect, ultimate segments obovate to oblong, 1–4 mm long; cauline leaves similar to basal ones, ultimate segments linear, 0.5–1.5 × ca. 0.5 mm, entire; uppermost leaves narrowly linear, entire. Racemes many flowered, strongly flexuous, 5–15 cm long; fruiting pedicels filiform, divaricate, strongly arcuate, lowermost 1.7–3.5 cm long. Sepals purplish with white margin and apex, ca. 0.8 mm long; petals narrowly obovate to oblong, 1.2–1.5 × ca. 0.5 mm; median filaments 0.8–0.9 mm long, lateral filaments, 0.5–0.6 mm long; anthers ca. 0.2 mm long; ovules 2 per ovary. Fruit narrowly obovoid, slightly flattened, 2.5–3 × 1.1–1.5 mm; style to 0.1 mm long. Seeds aseriate, 1.8–2.1 × 0.9–1.1 mm.

Distribution:—endemic to NE Iraq.

Representative specimens:—IRAQ (Kurdistan). **Sulaimani**: Pira Magroun, scree slopes, 1676 m, 22 Oct 1966, *Haines et al. 1865* (E, K); Penjwin, Malakawa, 1400 m, 19–20 June 1957, *K. H. Rechinger 10435* (E, G, K, MO, W); Sachra Chau, above Zawiya, 22 October 1960, *E. Hadač 2849* (PR).

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