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Artikel: Typification of Edmond Boissier's Cruciferae (Brassicaceae) names enumerated in Flora Orientalis
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Notes. – The holotype is a collection folder of three sheets only one of which is unlabelled.

This is the most unique species in the genus for having linear to narrowly oblong siliques instead of obovate, obpyriform, or subglobose silicles characteristic of the remaining species.

Chrysochamela (Fenzl) Boiss., Fl. Orient. 1: 313. 1867.

Tribe: *Camelineae* DC.

Note. – The genus includes three species restricted to Turkey, with the range of one extends into Syria.

Nasturtium flexicaule Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 58. 1842.

Type: “*Cochlearia velutina* DC. in Deless. Ic. Select. t. 49. [Aucher-Eloy] N. 316, Alep”.

Holotypus: SYRIA: “Alep”, s.d., *Aucher-Eloy* 316 (G-BOIS [G00332480]; iso-: BM [BM001254059, BM001254060], G [G00446230, G00446231, G00446232], P [P00580379, P02272500, P05348484]).

= ***Chrysochamela velutina*** (DC.) Boiss., Fl. Orient. 1: 313. 1867.

Note. – Boissier in *Flora Orientalis* reduced the name to synonymy of *Chrysochamela velutina*.

Chrysochamela elliptica (Boiss.) Boiss., Fl. Orient. 1: 314. 1867.

= *Nasturtium ellipticum* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 59. 1842.

Type: “[Aucher-Eloy] N. 4057, Beybazar”.

Holotypus: TURKEY: “Beybasar”, s.d., *Aucher-Eloy* 4057 (G-BOIS [G00332481]; iso-: BM [BM001254057, BM001254058], G [G00389764, G00389765, G00389766], K [K000725095], LE, P [P002272500, P05348487]).

Notes. – Boissier based the species description solely on the G-BOIS duplicate.

DOROFYEV (2003: 55) cited an isosyntype that was not examined in this study. He followed HEDGE (1965: 494) in believing that BOISSIER (1842a) cited two collections in the original description of the species when in fact he cited only *Aucher-Eloy* 4057. Boissier in *Flora Orientalis* added another collection, *Balansa* s.n. from Bereketly, that Hedge and Dorofeyev erroneously took as a syntype.

Chrysochamela noeana (Boiss.) Boiss., Fl. Orient. 1: 314. 1867 (Fig. 23, p. 115).

= *Nasturtium noeana* Boiss., Diagn. Pl. Orient. ser. 2, 1: 21. 1854.

Type: “Hab. in alpibus *Armeniae* ad *Bakker Madem* ubi Maio 1852 legit clar. Noë”.

Holotypus: TURKEY: “Bakker Madem”, V.1852, *Noë* 828 (G-BOIS [G00332482]; iso-: G [G00389763], KW [KW000127994], P [P00747281, P02272530]) (Fig. 24, p. 116).

Note. – Boissier based his species description solely on the unicate in his herbarium (Fig. 24, p. 116).

Diceratella Boiss., Diagn. Pl. Orient. 5: 80. 1844.

= *Diceratium* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 61. 1842 [nom. illeg.] [non Lag.].

Tribe: *Anastaticheae* DC.

Notes. – *Diceratella* is a substitute name for Boissier's illegitimate *Diceratium*.

The genus includes nine species in Africa, Saudi Arabia, Iran, and Pakistan.

Diceratella floccosa (Boiss.) Boiss., Fl. Orient. 1: 315. 1867.

= *Diceratium floccosum* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 61. 1842.

Type: “[Aucher-Eloy] N. 4075, absque loco natali”.

Lectotypus (designated here): IRAN: *sine loco*, s.d., *Aucher-Eloy* 4075 (G-BOIS [G00332483]; isoelecto-: FI [FI005657], G [G00441265], K [K000693469], P [P00747560, P00747561]).

Notes. – Lectotypification of the species name is justified because Boissier annotated P00747561 as *Diceratium floccosum* and, therefore, he examined more than one duplicate to generate the species description.

Although there are two duplicates of the type collection in the Geneva herbaria, Boissier did not examine G00441265 because it was part of the general herbarium.

Diceratella canescens (Boiss.) Boiss., Fl. Orient. 1: 315. 1867.

= *Diceratium canescens* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 62. 1842.

Type: “[Aucher-Eloy] N. 4077, In deserto Laristan”.

Lectotypus (designated here): **IRAN**: “in desert Laristan”, s.d., *Aucher-Eloy* 4077 (G-BOIS [G00332484]; isolecto-: BM [BM001254064, BM001254102], FI [FI005656, FI010108], G [G00446233], K [K000693470], P [P00747562, P00747563, P00747564, P00747565, P06616557]).

Note. – Boissier annotated P00747562 as *Diceratium canescens*, and this indicates that he based the species description on that specimen and the unicate in his herbarium. Therefore, lectotypification of the name is justified.

Tetracme Bunge, Del. Sem. Hort. Dorpat. 1836: 7. 1836.

Tribe: *Euclidieae* DC.

Note. – *Tetracme* consists of nine species in SW Asia and adjacent Russia eastward into western China and Mongolia.

Tetracme secunda Boiss., Diagn. Pl. Orient. ser. 2, 1: 29. 1854.

Type: “Hab. in regno *Cabulico* (Griffith sub N° 1508)”.

Holotypus: **AFGHANISTAN**: *sine loco*, s.d., *Griffith* 1508 (G-BOIS [G00332485]; iso-: K [K000693451, K000693453, K000693454]).

Notes. – Boissier based the species description solely on the unicate in his herbarium and did not examine any of the K duplicates above.

Two specimens, K000693451 and K000693454, have the same collection number as the holotype but differs in being collected from Dai Hag.

Tetracme stocksii Boiss., Fl. Orient. 1: 317. 1867.

Type: “Hab. in Belutschîâ ad Gurghina (Stocks exs. 974!)”.

Holotypus: **PAKISTAN**: “Gurghina”, 1851, *Stocks* 974 (G-BOIS [G00332487]; iso-: K [K000693462, K000693463]).

Note. – The species is narrowly endemic in Pakistan and known thus far only from a handful collections.

Tetracme contorta Boiss., Fl. Orient. 1: 317. 1867.

Type: “Hab. in Affghaniâ ad Choky (Griff!), Belutschîâ ad Gurghina (Stocks exs. 953!)”.

Lectotypus (first step designated by RECHINGER, 1968: 226; second step designated here): **AFGHANISTAN**: *sine*

loco, 1838, *Griffith* 1370 (G-BOIS [G00332486]; isolecto-: B [B100277030], G-BOIS [G00332488], K [K000693466], LE [LE00013941], P [P05414105, P05414122], W [W0055935]). **Syntypus**: **PAKISTAN**: “Gurghina”, s.d., *Stocks* 953 (G-BOIS [G00332489], K [K000693467, K000693468]).

Notes. – A second-step typification is needed to correct the herbarium of the lectotype from W to G-BOIS because the species was based only on the duplicates of the latter herbarium, and the duplicate at W was never examined or annotated by Boissier.

Label of G00332486 has the collection number *Griffith* 1370 but no locality data, whereas G00332488 has the locality “Choky” but no collection number and Griffith’s journal no. 492. However the other isolectotypes have both the locality and collection number.

Didymophysa Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 379. 1841.

Tribe: *Thlaspidiae* DC.

Note. – A genus of three species distributed in Afghanistan, Armenia, Azerbaijan, Iran, Iraq, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Uzbekistan (see also *Petrocallis* above).

Didymophysa aucheri Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 179. 1842.

Type: “[Aucher-Eloy] N. 247, mons Elwind; [Aucher-Eloy] 4079, Demavend; [Aucher-Eloy] 4080, Elamont”.

Lectotypus (first step designated by DOROFYEV, 2003: 69; second step designated here): **IRAN**: “Elamont”, s.d., *Aucher-Eloy* 4080 (G-BOIS [G00332490]; isolecto-: BM [BM000582572, BM000582573], G [G00441264], K [K000642948], KW [KW000127981], LE [LE00012861, LE00012862], P [P01817512, P01817516], W [W0003832]). **Syntypi**: **IRAN**: “in Mte Elwind”, s.d., *Aucher-Eloy* 247 (G-BOIS [G00332491], K [K000642947], P [P01817518]); “Demavend”, s.d., *Aucher-Eloy* 4079 (BM [BM000582567], G [G00441263, G00441681], G-BOIS [G00332492], K [K000642949], P [P01817513, P01817517]).

Note. – DOROFYEV (2003) erroneously lectotypified the species name based on duplicate at LE that was never studied by Boissier. Therefore, a second step is needed to designate the G-BOIS duplicate as the lectotype. The label of G00441681 reflects a mix-up of both localities cited in the protologue.

Physalidium Fenzl in Tchich., *Asie Min.*, Bot. 1: 327. 1860.

Tribe: *Thlaspidaceae* DC.

Note. – *Physalidium* was first reduced to synonymy of *Graellsia* by POULTER (1958) and, as presently recognized, this genus currently includes nine species (see *Graellsia*).

Physalidium stylosum (Boiss. & Hohen.) Fenzl in Tchich., *Asie Min.*, Bot. 1: 327. 1860.

= *Sobolewsia stylosa* Boiss. & Hohen. in Boiss., *Diagn. Pl. Orient.* 8: 41. 1849.

= *Graellsia stylosa* (Boiss. & Hohen.) Poulter in *Notes Roy. Bot. Gard. Edinburgh* 22: 92. 1956 (Fig. 26A, p. 118).

Type: “Hab. in declivibus septentrionalibus montis *Elbrus* propè *Derbend* Kotschy No 85”.

Holotypus: IRAN: “In m. Elbrus pr. *Derbend*”, 4000' [1220 m], 5.V.1843, *Kotschy 85* (G-BOIS [G00332493]; iso-: B [B100241750], BM [BM000582807, BM000582808], G [G00446234, G00446235], GH [GH00062503], K [K000342190, K000697688], KW [KW000127958], LE [LE00012882, LE00012883], P [P02141415, P02141416, P02141417], W [W0050814]) (Fig. 25, p. 117).

Notes. – The holotype is a collection folder of two sheets one of which has the species name in Boissier's handwriting and the locality as above printed. The collection number, day, month, and altitude were handwritten (Fig. 25, p. 117). The other sheet has fully printed label as in all the isotypes.

The printed labels of the isotypes lack the altitude and have the phrase “In declivibus septentrionem versus spectantibus” inserted before the locality data.

There was no need to lectotypify the name, as done in ESMAILBEGI et al. (2017a), because the species was based solely on the unicate in G-BOIS.

Heldreichia Boiss. in *Ann. Sci. Nat., Bot. ser.* 2, 16: 381. 1841.

Tribe: *Biscutelleae* Dumort.

Notes. – Although HEDGE (1965) recognized three species in *Heldreichia*, PAROLLY et al. (2010) clearly demonstrated that the genus is monospecific, the type species of which, *H. bupleurifolia*, is highly polymorphic.

The latter authors divided the species into five taxa all except subsp. *bupleurifolia*, which also grows in Lebanon, are endemic to Turkey.

Heldreichia longifolia Boiss. in *Ann. Sci. Nat., Bot. ser.* 2, 17: 187. 1842.

= *Lepidium longifolium* (Boiss.) Al-Shehbaz in *Novon* 12: 8. 2002.

Type: “[Aucher-Eloy] N. 320 in monte *Zerdkou*”.

Lectotypus (designated here): IRAN: “in Mte. *Zerde*”, s.d., *Aucher-Eloy 320* (G-BOIS [G00150398]; isolecto-: BM [BM001254105], G [G00096409], K [K000484134], MPU [MPU023096], P [P01817522, P01817523, P06648212]).

Notes. – The species name needed lectotypification because Boissier based the description on the duplicates in G-BOIS and P06648212 which he annotated.

The listing by AL-SHEHBAZ et al. (2002: 8) of the holotype at G is incorrect and resulted from overlooking BOISSIER (1841a).

Heldreichia bupleurifolia Boiss. in *Ann. Sci. Nat., Bot. ser.* 2, 17: 186. 1842.

Type: “[Aucher-Eloy] N. 292, *Akdag*”.

Holotypus: TURKEY: “*Mak Dag*”, s.d., *Aucher-Eloy 292* (G-BOIS [G00150392]; iso-: BM [BM000582585, BM000582586], G [G00096399], K [K000484315], P [P01817519, P01817520, P01817521]).

Note. – There is no need for any lectotypification of the name because BOISSIER (1841a, 1842b) based the species description on the unicate in his herbarium and because there is no duplicate in the Candolle's herbarium and he did not annotate any of the three sheets at P.

Heldreichia bupleurifolia var. *subtriloba* Boiss., *Fl. Orient.* 1: 319. 1867.

Type: “Hab. inter lapides in monte *Davros* *Pisidia* supra *Isbarta* (Heldr!), inter lapides montis *Berytdagh* *Cataoniae* alt. 9000' (Hausk!) in summis *Libani* (Ky exs. 692!)”.

Lectotypus (first step designated by PAROLLY et al., 2010: 197; second step designated here): TURKEY: “débri des rochers entre les pierres sur les pentes les plus rapides du sommet du Mt. *Davros* près d'*Isbarta*”, 6000'–7000' [1830–2130 m], 10.VIII.1845, *Heldreich 1180* (G-BOIS [G00332495]; isolecto-: B [B100673435], BM [BM001254103], G [G00446236, G00446237], K [K000484138]). **Syntypi:** LEBANON: “in summis glareosis *Libani* *Dsihome Arasya*”, 9000' [2740 m], 24.VII.1855, *Kotschy 692* (G-BOIS [G00332497], P [P06648032]).

TURKEY: “Taurus Cataonicus. Lapidés Berytdagh.”, 9000' [2740 m], 10.VIII.1865, *Haussknecht s.n.* (B [B100673436], BM [BM001254194], G-BOIS [G00332496], JE [JE00019281, JE00019282], K [K000484137], P [P06648030, P06648031, P06648033], W [W0075593, W18890055570]).

= *Heldreichia bupleurifolia* Boiss. subsp. *bupleurifolia* in Ann. Sci. Nat., Bot. ser. 2, 17: 186. 1842.

Notes. – The designation by PAROLLY et al. (2010) of the lectotype is corrected herein as a second-step typification from B to G-BOIS because Boissier did not examine any material additional to that of his herbarium.

Heldreich handwritten label in French [G00332495 and B100673435] as above was translated to Latin and distributed in mimeographed, handwritten printed labels by Boissier as “In mte Davros suprâ Isparta interlapides. Aug 1845” but without elevation or day of the month. Such labels are found on the isolectotypes at G and K.

Heldreichia bourgaei Boiss., Fl. Orient. 1: 320. 1867.

= *Heldreichia bupleurifolia* subsp. *bourgaei* (Boiss.) Parolly et al. in Taxon 59: 198. 2010.

Type: “Hab. in glareosis alpinis montis Akdagh Lyciae (Bourg. exs. sub *H. bupleurifolia*)”.

Holotypus: **TURKEY:** “In glareosis regionis alpinae montis Ak-Dagh”, 3.VII.1860, *Bourgeau 19* (G-BOIS [G00150391]; iso-: B [B100673498, B100673499], E [E0373125, E00373126], G [G00096398, G00096400, G00446238], GOET [GOET002606], K [K000484139], LE [LE00012865], P [P06648028, P06648034, P06648037, P06648039], W [W0075594, W18890072809, W18890152678]).

Notes. – The holotype, and the G00096400 and G00446238 isotypes are collection folders each of which consists of a labeled, barcoded sheet and another unlabeled sheet.

The collection date, collector, and locality on LE isotype is exactly the same as the holo- and isotypes, but the collection number was erroneously given as *Bourgeau 34* instead of *19*.

Heldreichia rotundifolia Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 185. 1842.

= *Heldreichia bupleurifolia* subsp. *rotundifolia* (Boiss.) Parolly et al. in Taxon 59: 198. 2010.

Type: “[Aucher-Eloy] N. 293, Olympus Armeniae”.

Lectotypus (designated here): **TURKEY:** “in Olympo Armenia”, s.d., *Aucher-Eloy 293* (G-BOIS [G00150313]; isolecto-: BM [BM000582603], G [G00096292], K [K000484143], MO [MO1617689], P [P01817524, P01817525, P01817526]).

Note. – The name needed lectotypification because Boissier based the species description on the unicate in his herbarium and on P01817524 that he annotated.

Heldreichia kotschyi Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 186. 1842.

Type: “cl. Kotschy è monte Tauro sub numero 115”.

Holotypus: **TURKEY:** “In monte Tauro”, summer 1836, *Kotschy 45* (G-BOIS [G00150399]; iso-: BM [BM00125410], G [G00096434, G00096435], K [K000484144, K000484145, K000484146, K000484147], KW [KW000127992], P [P05434838, P05434839], W [W0075592]).

= *Heldreichia bupleurifolia* subsp. *rotundifolia* (Boiss.) Parolly et al. in Taxon 59: 198. 2010.

Notes. – PAROLLY et al. (2010) erroneously designated Balansa's collection as the lectotype, and that collection was cited in BOISSIER (1867a) but not in the original publication (BOISSIER, 1842b).

However, *Kotschy 45*, which is the only collection of the species in G-BOIS and annotated by Boissier, was misprinted in the original protologue as *115*, where the handwritten *4* was definitely misread by Boissier as *11*. *Kotschy 45* was collected in 1836, whereas the two images of *Kotschy 115* at B imaged as types [http://herbarium.bgbm.org/object/B100673495] were collected in 1853 or 13 years after the publication of the species.

Thlaspi L., Sp. Pl.: 645. 1753.

Tribe: *Thlaspidaceae* DC.

Notes. – A genus of three Eurasian species, and the generic type, *Thlaspi arvense* L., is a cosmopolitan weed and cultivated plant.

As recognized by CANDOLLE (1821a, 1821b), BOISSIER (1867a), and subsequent authors prior to 1973, *Thlaspi* was so broadly delimited to include over 100 species. MEYER (1973, 1979) retained only six species in the genus and transferred the remaining taxa into a dozen segregates based primarily on seed-coat anatomy.

However, subsequent authors (e.g., GREUTER et al., 1986; APPEL & AL-SHEHBAB, 2003) retained the genus in the broad sense, whereas others (e.g., AL-SHEHBAB, 2012, 2014) relied on

the available molecular data and placed all except six species in *Noccaea* of the tribe *Coluteocarpeae*. The latter genus also currently encompasses almost all taxa described in *Iberidella* by BOISSIER (1841b).

As recently delimited, ESMAILBEGI et al. (2018) recognized only four species in *Thlaspi*, of which *T. kochianum* F.K. Mey. was subsequently reduced by GERMAN (2018) to the following species.

Thlaspi huetii Boiss., Diagn. Pl. Orient. ser. 2, 5: 39. 1856.

Type: “Hab. circâ *Tortoum* cl. Huet. du Pavillon Fl. Fr. que Junio”.

Holotypus: TURKEY: “circa *Tortoum*”, VI.1853, *Huet du Pavillon s.n.* (G-BOIS [G00332498]; iso-: G [G00371929, G00371966, G00446270], GOET [GOET002659], JE [JE00000226, JE00000227, JE00000228, JE00000229], K [K000484287, K000484288], KW [KW000127983], LE, P [P01817546], W [W18890010575], WAG [WAG0004281], ZT [ZT00008149]).

Note. – The holotype is a collection folder of two sheets, and MEYER (2001a: 21) correctly indicated that the holotype is the G-BOIS specimen.

Thlaspi kotschyianum Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. 8: 39. 1849.

Type: “Hab. in monte *Elbrus* suprâ pagum *Passgala* Kotschy”.

Holotypus: IRAN: “In m. *Elbrus* supra pagum *Passgala*”, 6.V.1843, *Kotschy 102* (G-BOIS [G00330469]; iso-: B [B100249989], BM [BM000582802], FI [FI005701], GOET [GOET002660], H, JE [JE00000217], K [K000484289], KW [KW000127985], L [L1844733], LE [LE00012863], P [P01817548, P01817549, P01817550, P01817551], W [W0029522], WAG [WAG0004280], WU [WU0101803], ZT [ZT00008150]).

= *Noccaea platycarpa* (Fisch. & C.A. Mey.) Al-Shehbaz in Harvard Pap. Bot. 19: 44. 2014.

Notes. – MEYER (2001b: 49), followed by GERMAN & CHEN (2009: 208) and AL-SHEHBAB (2014: 44), indicated that the holotype is in G-BOIS.

The species was maintained by HEDGE (1968: 114) and ARTELARI (2002: 255) in *Thlaspi*, reduced by MEYER (2001b) to synonymy of *Neurotropis platycarpa* (Fisch. & C.A. Mey.) F.K. Mey., and reduced by AL-SHEHBAB (2014) to synonymy of *Noccaea platycarpa*.

Thlaspi szowitsianum Boiss., Fl. Orient. 1: 324. 1867.

= *Noccaea szowitsiana* (Boiss.) Al-Shehbaz in Harvard Pap. Bot. 19: 46. 2014.

Type: “Hab. in humidis montis Karagiol prov. Karabagh (Szow!)”.

Holotypus: ARMENIA: “In m. Karagiol humidis”, 1.VI.1829, *Szovits 295* (G-BOIS [G00332500]; iso-: H [H1052111], LE [photo at E]).

Note. – MEYER (2001b: 48) correctly indicated that the holotype is in G-BOIS, but DOROFYEV (2003: 213) stated that the lectotype is at LE. No lectotypification is needed because Boissier drafted the species description only on the unicate in his herbarium.

Thlaspi brevicaulis Boiss. & Kotschy in Boiss., Diagn. Pl. Orient. ser. 2, 5: 40. 1856.

Type: “Hab. in subalpinis *Bludan* suprâ *Zebdani* Antilibani cl. Kotschy qui fructiferum legit Junio 1855”.

Lectotypus (designated here): SYRIA: “Crescit in alpinis supra *Bludan* Antilib”, 6000' [1830 m], 6.VI.1855, *Kotschy 47* (G-BOIS [G00332501 plants on the top left and lower right]; isolecto-: B [B100277008], BM [BM001254108], G [G00446239], GZU [GZU000043738], JE [JE00000216], K [K000484290], KW [KW000127984], P [P01817533, P01817534, P01817535], S [S0712424], W, ZT [ZT00008140]).

= *Noccaea platycarpa* (Fisch. & C.A. Mey.) Al-Shehbaz in Harvard Pap. Bot. 19: 44. 2014.

Note. – The lectotype sheet includes four groups of plants, of which the group on the top right was collected by Kotschy from Lebanon, and this is not part of the type collection. The one on the lower left has a label with only number 47, and it is considered as part of type gathering. Finally, two labels on the specimen, a handwritten one with the above locality but without the day and a printed one with: “Circa *Zebdaine* prope *Damascus*. Ad rivulos in sabusosis supra *Bludan* alt. 6000 ped. Die 6. Jun.”.

Thlaspi microstylum Boiss., Diagn. Pl. Orient. 8: 38. 1849.

= *Noccaea microstyla* (Boiss.) F.K. Mey. in Feddes Repert. 84: 466. 1973.

Type: “[Boissier] Hab. in regione montanâ sylvaticâ *Cassii* in *Syriâ* boreali undè specimen unicum fructiferum retuli”.

Holotypus: TURKEY: “*Cassius* regio media”, V–VII.1846, *Boissier s.n.* (G-BOIS [G00332511]).

Note. – No duplicates of the type collection were encountered in all of the herbaria consulted, and MEYER (2006c: 187) is followed in recognizing the G-BOIS sheet as the holotype.

Thlaspi perfoliatum var. *microcarpum* Boiss., *Fl. Orient.* 1: 325. 1867.

Type: “Hab. in agris schistosis prope Beylan Syr. bor. (Haussk!)”.

Holotypus: SYRIA: “Syria borealis. in schistos. p. Beilan”, 27.II.1865, *Haussknecht s.n.* (G-BOIS [G00332505]; iso-: G [G00446271], JE [JE00000224]).

= *Noccaea perfoliata* (L.) Al-Shehbaz in Harvard Pap. Bot. 19: 44. 2014.

Note. – The variety is based on a minor difference in the fruit size of a widespread and highly variable Eurasian species.

Thlaspi perfoliatum var. *rotundatum* Boiss., *Fl. Orient.* 1: 326. 1867.

= *Noccaea perfoliata* (L.) Al-Shehbaz in Harvard Pap. Bot. 19: 44. 2014.

Note. – This is a renaming at the varietal rank of the following entry.

Thlaspi micranthum Boiss. & C.I. Blanche in Boiss., *Diagn. Pl. Orient.* ser. 2, 5: 41. 1856 [nom. inval.].

Type: “pl. Syr. exs. speciminibus numerosioribus a cl. Blanche et Gaillardot acceptis a *Th. perfoliato* floribus subminoribus siliculisque paulò latius alatis non sat differt”.

= *Noccaea perfoliata* (L.) Al-Shehbaz in Harvard Pap. Bot. 19: 44. 2014.

Notes. – *Thlaspi micranthum* was mentioned by BOISSIER (1856) as a note under *T. lilacinum* but not accepted by him.

It was listed by Boissier in *Flora Orientalis* as a synonym of *T. perfoliatum* var. *rotundatum*, and both names by MEYER (2003a) as synonyms of *Microthlaspi perfoliatum*.

Noccaea perfoliata and a handful of other species form a complex of very closely related and morphologically rather similar taxa. The complex has recently been split by ALI et al. (2016) into three genera (*Microthlaspi* F.K. Mey., *Friedrichkarlmeyeria* T. Ali & Thines, and *Ihsanalshehbazia* T. Ali & Thines) indistinguishable morphologically and better be maintained in *Noccaea*

as broadly delimited by AL-SHEHBAB (2014) and most recently recognized by ÖZÜDOĞRU et al. (2019).

Thlaspi natolicum Boiss. in *Ann. Sci. Nat., Bot. ser.* 2, 17: 180. 1842.

= *Noccaea natolica* (Boiss.) Al-Shehbaz in Harvard Pap. Bot. 19: 42. 2014.

Type: “[Aucher-Eloy] N. 306, Syria, 4151, Asia Minor; 4152, sylvae Asiae Minoris”.

Lectotypus (designated by MEYER, 2003a: 7): **TURKEY:** “As. Min.”, s.d., *Aucher-Eloy 4151* (G-BOIS [G00332502]; isolecto-: BM [BM001254107, BM001254110], G [G00446240], K [K000484319], KW [KW000127986], P [P01817558], W [W0050744, W18890077526]). **Syntypi:** SYRIA: *sine loco*, s.d., *Aucher-Eloy 306* (G [G00442641, G00446242], G-BOIS [G00332503], K [K000484292], P [P01817556, P05408423]). **TURKEY:** “Asia Minor”, s.d., *Aucher-Eloy 4152* (P [P01817557, P01817560]).

Note. – None of the Geneva herbaria has *Aucher-Eloy 4152*, and Boissier cited that number based on P01817557 and P01817560 that he annotated.

Thlaspi bulbosum Spruner ex Boiss., *Diagn. Pl. Orient.* 1: 74. 1843.

= *Noccaea bulbosa* (Spruner ex Boiss.) Al-Shehbaz in Harvard Pap. Bot. 19: 35. 2014.

Type: “Hab. in umbrosis regionis montanae, mons *Parnes Atticae* (Sprunn. Boiss.), mons *Citheron Baeotiae* (Boiss.). Fl. Maio”.

Lectotypus (designated by MEYER, 2006b: 197): **GREECE:** “von Gipfel der Parnessi”, 4000' [1220 m], 1840, *Spruner s.n.* (G-BOIS [G00332512]; isolecto-: B [B100277009], JE [JE00004200], W [W0075591]). **Syntypi:** **GREECE:** “Cithéron Beotia”, V.1842, *Boissier s.n.* (G-BOIS [G00332513]); “Parnes Attica”, IV or V.1842, *Boissier s.n.* (B [B100277009], G-BOIS [G00332514], JE [JE00004021], K [K000484259]).

Note. – The isolectotype and syntype at B were mounted on the same sheet with a single barcode.

Thlaspi ochroleucum Boiss. & Heldr. in Boiss., Diagn. Pl. Orient. 8: 39. 1849.

= *Noccaea ochroleuca* (Boiss. & Heldr.) F.K. Mey. in Feddes Repert. 84: 461. 1973.

Type: “Hab. ad nives in regione superiori montis *Davros dagh* alt. 5–6000' in *Pisidiâ* (Heldreich), in *Macedoniae* alpibus si specimen a cl. Friwaldsky mihi sub *Th. alpini* nomine missum hùc rectè refero”.

Lectotypus (designated by FRANZÉN, 1986: 324): **TURKEY**: “Région supérieure du Davros-Dagh”, 5000'–6000' [1520–1830 m], 28.V.1845, *Heldreich* 740 (G-BOIS [G00332515]; isolecto-: B, BM [BM000582804], G [G00383953, G00383958], G-BOIS [G00332516], JE [JE00004182], K [K000484268], P [P01817561], W [W0050740, W18890010578]). **Syntypus**: **SINE PATRIA**: “Macedonia”, s.d., *Friwaldsky s.n.* (G-BOIS [G00797085]).

Notes. – MEYER (2006c: 95), followed by AL-SHEHBAZ (2014: 43), erroneously attributed the lectotypification of the name to HEDGE (1965: 335) who only copied the locality data but did not designate any herbarium.

The isolectotypes are without a collection number.

Thlaspi taygeteum Boiss., Diagn. Pl. Orient. 8: 40. 1849.

Type: “Hab. in regione sylvaticâ inferiori *Taygeti* supra *Mistra* ubi legi [Boissier] florif. Aprili 1842”.

Holotypus: **GREECE**: “Taygeti pars inferior. Supra *Mistra*”, IV.1842, *Boissier s.n.* (G-BOIS [G00332517]; iso-: JE, W [W0050738]).

= *Noccaea graeca* (Jord.) F.K. Mey. in Feddes Repert. 84: 463. 1973.

Note. – Boissier in *Flora Orientalis* reduced the species name to synonymy of *Thlaspi graecum*, and subsequent authors followed that.

Thlaspi microphyllum Boiss. & Orph. in Boiss., Diagn. Pl. Orient. ser. 2, 6: 19. 1859.

= *Noccaea microphylla* (Boiss. & Orph.) F.K. Mey. in Feddes Repert. 84: 460. 1973.

Type: “Hab. ad *Carcaria* montis *Parnassi* cl Prof. Orphanidès Junio 1854, ad nives in cacumine montis *Veluchi* cl. Samaritani et Guicciardi fine Julii 1857”.

Lectotypus (designated by FRANZÉN, 1986: 323): **GREECE**: “Legi in monte *Parnasso* prope *Carcaria*”, 4000' [1220 m], 28.VI–10.VII.1854, *Orphanides* 2744 (G-BOIS [G00332518];

isolecto-: JE). **Syntypus**: **GREECE**: “Ad nives in cacumine m. *Veluchi*”, 30.VII.1857, *Samaritani* & *Guicciardi* 3353 (B [B100249986], G [G00371982], G-BOIS [G00332519], K [K000484248]).

Note. – MEYER (2006c: 65) overlooked the earlier lectotypification by FRANZÉN (1986), though both designated the same specimen as the lectotype.

Thlaspi densiflorum Boiss. & Kotschy in Boiss., Fl. Orient. 1: 328. 1867.

= *Noccaea densiflora* (Boiss. & Kotschy) F.K. Mey. in Feddes Repert. 84: 465. 1973.

Type: “Hab. in montibus *Kassan Oglu Ciliciae* *Kurdicae* (Ky exs. 62!), in *Amano Syriae* bor. (Ky!), in monte *Troodos Cypri* alt. 5000' (Ky!)”.

Lectotypus (designated here): **TURKEY**: “Plantae in montibus *Kassan Oghlu* ad pagum *Gorumse*”, 5600' [1705 m], 13.V.1859, *Kotschy* 62 (G-BOIS [G00332520]; isolecto-: B [B100277001, B100277002], BM [BM000582798, BM000582799], G [G00371979], JE [JE00004177], P [P01817542, P01817543, P01817544, P01817545], S [S0945758], W [W0032952, W18890058140], ZT [ZT00159919]). **Syntypi**: **CYPRUS**: “Troodo ad fontes *Ta Maschinari*”, 5000' [1520 m], 15.V.1862, *Kotschy* 717 (G [G00446273], G-BOIS [G00332522]). **SYRIA**: “*Amanus* pr. *Beylan*”, 1862, *Kotschy s.n.* (G-BOIS [G00332521]).

Notes. – Hedge annotated the G00371979 sheet in December 1965 though he did not indicate its type status and did not annotate the G-BOIS sheet.

As shown by MEYER (2006c: 189–190), *Kotschy* 717 is an isotype of *Thlaspi cyprium* Bornm. (= *Noccaea cypria* (Bornm.) F.K. Mey.) and, therefore, that collection should not be taken as part of the *Noccaea densiflora* material.

Thlaspi griffithianum (Boiss.) Boiss., Fl. Orient. 1: 329. 1867.

= *Carpoceras griffithianum* Boiss., Diagn. Pl. Orient. ser. 2, 1: 40. 1854.

= *Noccaea griffithiana* (Boiss.) F.K. Mey. in Haussknechtia Beih. 12: 170. 2006.

Type: “Hab. in *Bharowul* regni *Cabulici* (cl. Griffith pl. exs. N° 1473)”.

Holotypus: **AFGHANISTAN**: “*Bharowul*”, s.d., *Griffith* 1473 (G-BOIS [G00330468]; iso-: K [K000484297]) (Fig. 27B, p. 119).

Notes. – Two sheets at K [K000484296, K000484298] have the collector and country but not the locality or collection number, and they may or may not be part of the type collection.

The isotype sheet at K has the collection number 1493 (Fig. 27B, p. 119), whereas that in G-BOIS is 1473. However, labels of both sheets have Griffith's journal no. 111. Based on our experience with Griffith's gatherings, different collection numbers were given for one area and often all have the same journal number. BOISSIER (1867a, 1888) never listed Griffith 1473.

Thlaspi elegans Boiss., Diagn. Pl. Orient. 5: 82. 1844.

= *Noccaea elegans* (Boiss.) Al-Shehbaz in Harvard Pap. Bot. 19: 37. 2014 (Fig. 26B, p. 118).

Type: "Hab. in Cariâ ubi 1843 detexit Chr. Pinard".

Holotypus: TURKEY: "Caria", 1842, Pinard s.n. (G-BOIS [G00332507]; iso-: B [B100277003], G [G00371943, G00371944], GOET [GOET002657], JE [JE00004203], K [K000484300, K000484301, K000484302], P [P01817562, P01817563], W [W0032953], Z [Z000004435]).

Note. – Both MEYER (2003b: 89) and AL-SHEHBAZ (2014: 37) indicated that the specimen in G-BOIS is the holotype. It is a collection folder of two sheets one of which is labeled "Caria 1842".

Thlaspi rosulare Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 5: 39. 1856.

= *Noccaea rosularis* (Boiss. & Balansa) Al-Shehbaz in Harvard Pap. Bot. 19: 45. 2014.

Type: "Hab. in regione montanâ superiori jugi Masmeneudagh, cl. Balansa legit fructiferum Augusto 1855".

Holotypus: TURKEY: "Région montagneuse supérieure du Masmeneu-Dagh, à 25 lieues SSO de Césarée", 8.VIII.1855, Balansa 178 (G-BOIS [G00332523]; iso-: G [G00383939], GH [GH00062505], K [K000484304], P [P01817568, P01817569], US [US01117981]).

Note. – The species was described on the unicate in G-BOIS, a specimen correctly recognized by AL-SHEHBAZ (2014: 45) as the holotype.

Thlaspi lilacinum Boiss. & A. Huet in Boiss., Diagn. Pl. Orient. ser. 2, 5: 41. 1856.

= *Noccaea lilacina* (Boiss. & A. Huet) Al-Shehbaz in Harvard Pap. Bot. 19: 41. 2014.

Type: "Hab. in Armeniâ boreali in viâ inter Gumuchchané et Zazalarchané cl. Huet. du Pavillon qui legit floriferum Maio 1853".

Holotypus: TURKEY: "Inter Gumuchané et Zazalarchané", V.1853, Huet du Pavillon s.n. (G-BOIS [G00332510]; iso-: FI [FI005702], G [G00371991, G00371992], GH [GH00062504], GOET [GOET002661], K [K000484305], P [P01817552, P01817553]).

Notes. – MEYER (1973) designated this species as the generic type for *Callothlaspi* F.K. Mey. He (MEYER, 2006a: 177) considered the G-BOIS sheet as the holotype, and it is the only material examined by Boissier.

The G-BOIS holotype is a collection folder of two sheets the label of one of which indicates "Armenia. May 1843", but this appears to be an error for 1853, as correctly shown in the K duplicate.

Thlaspi papillosum Boiss., Fl. Orient. 1: 330. 1867.

= *Noccaea papillosa* (Boiss.) F.K. Mey. in Feddes Repert. 84: 460. 1973.

Type: "Hab in Cariae monte Cadmo supra Khonas ad nives (Boiss!), in monte Akdagh Lyciae (Bourg. exs. sub *Th. ochroleuco*)".

Lectotypus (designated by MEYER, 2006c: 71): TURKEY: "Cadmus, ad or. Denisleh ad nives", VI.1842, Boissier s.n. (G-BOIS [G00332524]; isolecto-: JE [JE00004180]). **Syntypus:** TURKEY: "Plantae Lyciae. Mt. Ak-Dagh", 5.VII.1860, Bourgeau s.n. (K [K000484294], P [P05411314]).

Note. – The species was recently placed by DOROFYEV (2013) in *Apterigia* Galushko, but it is maintained here in *Noccaea*.

Thlaspi haussknechtii Boiss., Fl. Orient. 1: 330. 1867.

= *Noccaea haussknechtii* (Boiss.) F.K. Mey. in Feddes Repert. 84: 460. 1973.

Type: "Hab. ad nives montis Berytdagh Cataoniae alt. 9000'–10000' (Haussk!)".

Lectotypus (designated here): TURKEY: "Taurus Cataonicus. Berytdagh", 9000'–10000' [2740–3050 m], 10.VIII.1865, Haussknecht 1102 (G-BOIS [G00332525]; isolecto-: JE [JE00004166]).

Notes. – Boissier examined the sheet in his herbarium and that at JE, which he annotated. Therefore, the name needs lectotypification.

MEYER (2006c: 70) treated the material at JE as the holotype and the G-BOIS specimen as the isotype.

Carpoceras Link, Handb. 2: 289. 1831.

Tribe: *Thlaspidaceae* DC.

Note. – The type species of *Carpoceras*, *C. sibiricum* Link is a synonym of the earlier published *Thlaspi ceratocarpum* (Pall.) Murray, which is a perfectly good species of *Thlaspi*, and therefore the former genus is a synonym of *Thlaspi* (see AL-SHEHBAB, 2012).

Carpoceras stenocarpum Boiss., Diagn. Pl. Orient. 8: 37. 1849.

= *Noccaea stenocarpa* (Boiss.) Al-Shehbaz in Harvard Pap. Bot. 19: 46. 2014.

Type: “Hab. propè nives in monte Totschal propè Teheran Kotschy No 165”.

Lectotypus (designated here): **IRAN**: “Prope nives m. Totschal pr. Teheran”, 17.V.1843, *Kotschy 165* (G-BOIS [G00332509]; isolecto-: B [B100249757], BM [BM001254109], FI [FI005703], G [G00446243, G00446244, G00446245], GOET [GOET002666], JE [JE00004196], K [K000484308], KW [KW000127988], P [P01817570, P01817572, P01817573, P01817575], S [S032260], W [W0050743], ZT [ZT00008152]).

Notes. – Printed labels of the duplicates of the type collection have the name “*Thlaspi stenocarpum* Boiss. et Hohenack n. sp.”, including the sheet in Bunge’s herbarium, P01817572, which was annotated by Boissier.

The name was never published in *Thlaspi* until its transfer by HEDGE (1968).

Carpoceras cilicicum Schott & Kotschy ex Boiss., Fl. Orient. 1: 332. 1867.

= *Noccaea cilicica* (Schott & Kotschy ex Boiss.) Al-Shehbaz in Harvard Pap. Bot. 19: 36. 2014.

Type: “Hab. in graminosis alpinis Tauri Cilicici supra Gülek alt. 7000' (Ky exs. 70!)”.

Holotypus: **TURKEY**: “Locis graminosis ad plumbi fodinas territorii Gülek”, 7000' [2130 m], 8.VII.1853, *Kotschy 70a* (G-BOIS [G00332508]; iso-: K [K000484311],

KW [KW000127987], P [P01817540, P01817541], S [S-G-9858], W [W0075783], WAG [WAG0004282]).

Note. – Geneva herbarium has just the above single sheet of the type collection, and both MEYER (2003c: 126) and AL-SHEHBAB (2014: 36) indicated that it is the holotype.

Carpoceras sibiricum Boiss., Diagn. Pl. Orient. 8: 37. 1849 [nom. illeg.].

= *Thlaspi ceratocarpum* (Pall.) Murray in Novi. Comment. Soc. Regiae Sci. Gott. 5: 26. 1775.

Notes. – *Carpoceras sibiricum* Boiss. is illegitimate because BOISSIER (1849) listed the earlier published *Thlaspi ceratocarpum* in synonymy. Boissier also neglected LINK (1831) who made the same error.

Both superfluous names of *Carpoceras sibiricum* are based on the same type collection, and MEYER (2001a) correctly placed them in the synonymy of the accepted name above in *Thlaspi*.

No material of Boissier’s name was located in the Geneva herbaria.

The name *T. ceratocarpum* was lectotypified by GERMAN (2011: 52).

Carpoceras oxyceras Boiss., Diagn. Pl. Orient. 8: 37. 1849.

= *Noccaea oxyceras* (Boiss.) Al-Shehbaz in Harvard Pap. Bot. 19: 43. 2014.

Type: “[Boissier] Hab. in nemorosis regionis inferioris jugi Cassii inter Cassab et Suadieh”.

Holotypus: **SYRIA**: “Chaîne du Cassius chemin de Suadieh”, III.1846, *Boissier s.n.* (G-BOIS [G00332506]; iso-: G [G00383941, G00383944], GOET [GOET002664], K [K000484314, K000484316], KW [KW000127982], P [P01817565, P01817566, P01817567, P04656710], PH [PH00029990], W, ZT [ZT00008151]).

Notes. – The holotype is a collection folder of four sheets three of which lack the locality data. The isotypes have a printed, handwritten, abbreviated label by Boissier distributed as “Syria, Cassius, jun. 1846. E. Boissier”.

Both MEYER (2003b: 75) and AL-SHEHBAB (2014: 43) listed the holotype in G-BOIS. The duplicate at W was listed by MEYER (2003b), though a search for it was unsuccessful.

Labels of the G, GOET, K, and P duplicates have the species name as *Thlaspi oxyceras* Boiss., but that combination was published by HEDGE (1965).

Carpoceras cappadocicum Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 6: 19. 1859.

= *Noccaea cappadocica* (Boiss. & Balansa) Al-Shehbaz in Harvard Pap. Bot. 19: 36. 2014.

Type: “Hab. in regione montanâ superiori montis *Dedê dagh Antitauri* ad orientem *Caesareae* cl. Balansa”.

Holotypus: TURKEY: “Région montagneuse supérieure du Dédé-Dagh (l’un des pics de l’anti-Taurus), à 12 lieues à l’ESE du mont-Argée”, 6.VIII.1856, *Balansa* 438 (G-BOIS [G00330550]; iso-: G [G00371948, G00371952], GOET [GOET002663], JE [JE00004204], K [K000484318], P [P01817536, P01817537, P01817538, P01817539], W [W18890069384]).

Notes. – The isotypes have a printed handwritten label by Balansa with indications as above but with the exsiccatae number 1004.

MEYER (2003b: 82, 83) and AL-SHEHBAZ (2014: 36) recognized the sheet in G-BOIS as the holotype and did not recognize *Balansa* 1004 as part of the same collection apparently because the field vs exsiccatae number (see above) was cited.

Balansa’s duplicates of all collections carry his field numbers on the specimens sent to Boissier, but his exsiccatae numbers are always different. Meyer annotated G00371948 and W18890069384, which have the exsiccatae number *Balansa* 1004, as isotypes but apparently he later changed his mind.

Iberis L., Sp. Pl.: 648. 1753.

Tribe: *Iberideae* Webb & Berthel.

Note. – A genus of 27 species distributed primarily in C and S Europe, with fewer species in N Africa and SW Asia.

Iberis sempervirens var. *rosea* Boiss., Fl. Orient. 1: 333. 1867.

Type: “Hab. in monte Cadmo Cariae supra Khonas (Boiss!), Tauro Cilicico (Ky! Bal!), ditione Kassan Oglu (Ky!)”.

Lectotypus (designated here): TURKEY: “Cadmus ad or. Denisleh. Caria”, VI.1842, *Boissier s.n.* (G-BOIS [G00332526]). **Syntypi:** TURKEY: “Taurus”, 20.VII.1855, *Balansa s.n.* (G [G00446248], G-BOIS [G00332529], P [P05415699]); “Kassan Oglu”, 18.V.1859, *Kotschy* 89 (G-BOIS [G00332527], P [P01817590], W [W0075589]); “Iter Cilicicum in Tauri alpes ‘Bulgar Dagh.’ Ad plumbi fodinas”, 6000' [1830 m], VII.1853, *Kotschy* 115 223 74 34 (G [G00446249], G-BOIS [G00332528], K [K000484120], P [P01817591, P01817592, P01817593], W [W0075588]).

= *Iberis sempervirens* L., Sp. Pl.: 648. 1753.

Notes. – The lectotype and syntypes are based on fruiting and flowering material, respectively.

Caution should be made in dealing with Kotschy’s multiple collection numbers because he used to send handwritten labels to Boissier, and after receiving the determinations, he distributed his collections with printed labels sometimes different from the originals he sent to Boissier. More on this is discussed under the entries of *Brossardia papyracea* var. *kotschyi* and *Crenularia eunomioides*.

Iberis olympica Boiss., Diagn. Pl. Orient. ser. 2, 1: 37. 1854.

Type: “Hab. in summis jugis *Olympi Bithyni* (Boiss! Noë! Clementi!)”.

Lectotypus (designated here): TURKEY: “Olympus Bithynis”, VIII.1842, *Boissier s.n.* (G-BOIS [G00332530]). **Syntypi:** TURKEY: “In cacumis jugis Olympi bith.”, VIII.1850, *Clement s.n.* (G [G00371777], G-BOIS [G00332531], K [K000484125, K000484126]); “Olympus Bithynia”, 1847, *Noë s.n.* (G-BOIS [G00332532]).

= *Iberis carnosa* Willd., Sp. Pl. 3: 455. 1800.

Note. – HEDGE (1965) treated the species as a synonym of *I. spruneri* Jord., but both species should be synonymized with *I. carnosa*, as done by TAN (2002).

Iberis jordanii Boiss., Diagn. Pl. Orient. ser. 2, 1: 38. 1854 [nom. illeg.].

= *Iberis attica* Jord., Observ. Pl. Nouv. 6: 42. 1847.

= *Iberis carnosa* Willd., Sp. Pl. 3: 455. 1800.

Note. – *Iberis jordanii* Boiss. is illegitimate because BOISSIER (1854) listed the earlier published *I. attica* Jord. in synonymy.

Brossardia Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 380. 1841.

Tribe: *Coluteocarpeae* V.I. Dorof.

Note. – This monospecific genus was reduced by KHOSRAVI et al. (2008b) to synonymy of *Noccaea*.

Brossardia papyracea Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 380. 1841.

= *Noccaea papyracea* (Boiss.) Khosravi et al. in Feddes Rept. 119: 21. 2008 (Fig. 26E, p. 118; 27A, p. 119).

Type: “[Aucher-Eloy] N. 4127 Ispahan”.

Lectotypus (designated here): **IRAN**: “Ispahan”, s.d., *Aucher-Eloy 4127* (G-BOIS [G00332538]; isolecto-: G [G00446250, G00446251], K [K000484219], P [P01817530, P01817531], W [W0055933]).

Notes. – KHOSRAVI et al. (2008b) indicated that the above G-BOIS specimen is the holotype.

However, the name needed lectotypification because Boissier based the species description on the unicate in his herbarium and on P01817530 that he annotated.

Brossardia papyracea var. *kotschy* Boiss., Diagn. Pl. Orient. 8: 41. 1849.

Type: “Hab. in declivibus septentrionalibus montis *Kuh Barfi* et *Kuh Delu* Persiae australis Kotschy No 523 et 327”.

Lectotypus (first step designated by AL-SHEHBAB, 2014: 43; second step designated here, plants with mature fruits): **IRAN**: “In declivibus in sept. spectantibus alpis Kuh-Delu”, 15.VI.1842, *Kotschy 523* (G-BOIS [G00332539]; isolecto-: B [B100241026 plant on top left, B100241027 two plants in middle], E [E00373121 plant in middle], G [G00446252, G00446253], KW [KW000127989], P [P06648118, P06648119, P06648121], S [S1216130 four plants except upper middle two], US [US00324433 upper left plant], W [W four plants except top center, W0070598 two plants on top right and top left, fragment on lower center, W18890029664 two plants on top right]). **Syntypus** [plants in flower]: **IRAN**: “In m. Kuh-Barfi in n. Schiras”, 3.V.1842, *Kotschy 327* (B [B100241026 five plants without fruit, B100241027 plants on left and right], E [E00373121 plants on left and right], G [G00446254], K [K000484221], KW [KW000127990], P [P04022668, P04022672, P04022673, P06648121 plant on left], S [S1216130 upper middle two], US [US00324433 plants in middle and right], W [W remaining plants on the isolectotype above, W18890029616]).

= *Noccaea papyracea* (Boiss.) Khosravi et al. in Feddes Rept. 119: 21. 2008.

Notes. – The lectotype sheet (G-BOIS) has three labels, of which one (handwritten) gives the locality (Kuh-Barfi), flowering date (May 3), and the collection number (327); the other (also handwritten) gives the locality (Kuh-Delu), fruiting date (June 15), and collection number (523); and the third is printed

and has the locality as Kuh-Delu, both flowering and fruiting dates above, and both collection numbers. It is the printed label that has been distributed often with both flowering and fruiting material. Because the fruit gives the most distinctive and distinguishing characters, the fruiting specimens are designated here as the lectotype collection. Plants in the flowering stage represent syntypes either distributed alone or mixed with the fruiting material.

The lectotype has eight plants, of which only two (bottom right and left) are in fruit, and the remaining six are syntypes. Therefore, the initial lectotypification by AL-SHEHBAB (2014) was incomplete because neither flowering nor fruiting material was selected.

Brossardia retusa Boiss., Fl. Orient. 1: 336. 1867.

= *Brossardia papyracea* var. *kotschy* Boiss., Diagn. Pl. Orient. 8: 41. 1849.

= *Noccaea papyracea* (Boiss.) Khosravi et al. in Feddes Rept. 119: 21. 2008.

Note. – This is a renaming at the species rank of the previous entry.

Crenularia Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 380. 1841.

Tribe: *Aethionemeae* Al-Shehbaz et al.

Note. – All of the following species of *Crenularia* have been transferred to or synonymized with those of *Aethionema*.

Crenularia glaucescens (Boiss.) Boiss., Fl. Orient. 1: 337. 1867.

= *Iberis glaucescens* Boiss. in Ann. Sci. Nat., Bot. ser. 4, 2: 243. 1854.

Type: “Hab. prope Kizildagh, ad radices montis *Akdagh* declivitatem borealem montis *Bulghurdagh* Ciliciae constituentis ubi legit cl. P. a Tchihatcheff”.

Holotypus: **TURKEY**: “Propé Kizildagh. Asie Minoris”, 1854, *Tchihatcheff s.n.* (G-BOIS [G00154064]).

= *Aethionema balansae* Boiss., Diagn. Pl. Orient. ser. 2, 6: 20. 1859.

Notes. – Upon the transfer of *Iberis glaucescens* to *Aethionema*, BORNMÜLLER (1911) created an illegitimate later homonym of the Greek *A. glaucescens* Halácsy (in Verh. K. K. Zool.-Bot. Ges. Wien 38: 748. 1888). However, there is no need to create a new name for the central Turkish *Iberis glaucescens* in *Aethionema*, such as *A. glaucinum* Greuter et al. (Willdenowia 13: 85. 1983),

because of the availability of *A. balansae*, a name reduced by Boissier in *Flora Orientalis* to synonymy of *Crenularia glaucescens*.

The species was treated by HEDGE (1965) as *Aethionema glaucescens*.

Aethionema balansae Boiss., Diagn. Pl. Orient. ser. 2, 6: 20. 1859.

Type: “Hab. in *Tauro*. Colui in Hort. Valeyres e seminibus a cl. Balansa lectis”.

Holotypus: TURKEY: “Taurus, Jardin de Valleyres”, VI.1857, Boissier s.n. (G-BOIS [G00332540]).

Note. – There is a single sheet in G-BOIS with the species name, and its plants were cultivated in Boissier's garden and were collected in May, June and July.

Crenularia orbiculata Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 181. 1842.

= *Aethionema orbiculatum* (Boiss.) Hayek in Repert. Spec. Nov. Regni Veg. Beih. 30(1): 472. 1925.

Type: “[Aucher-Eloy] n. 336, Mons Athos”.

Lectotypus (designated by FRANZÉN, 1986: 327): GREECE: “in Mte. Athos”, s.d., *Aucher-Eloy* 336 (G-BOIS [G00332541]; isolecto-: G [G00002100, G00002101], K [K000484166], P [P00835113, P00835114]).

Notes. – The name needed lectotypification because Boissier based the species description on the G-BOIS and G00002100 sheets.

FRANZÉN (1986) indicated that the original collection is in G-BOIS, and that comment is taken as an effective lectotypification because of the existence of an unicate in this herbarium.

Crenularia eunomioides Boiss., Diagn. Pl. Orient. ser. 2, 5: 41. 1856.

= *Aethionema eunomioides* (Boiss.) Bornm. in Beih. Bot. Centralbl., Abt. 2, 28: 535. 1911.

Type: “Hab. in schistosis meridionalibus vallis *Gusguta* Tauri Cilicici alt. 7000' cl. Kotschy. Fl. Jun. Fruct. Jul.”.

Lectotypus (designated here): TURKEY: “Iter Cilicicum in Tauri alpes ‘Bulgar Dagħ.’ In schistosis austro oppositis vallis *Gusguta* et *Dasch Olugh*”, 7000' [2130 m], 26.VI.1853 and 2.VII.1853, *Kotschy* 32 201 23d (G-BOIS [G00154063]; isolecto-: G [G00002436], GOET [GOET002669], K [K000075759],

P [P00835107, P00835108, P00835109, P00835110], S [S1216214], W [W0005563], WAG [WAG0004255]).
Syntypus: TURKEY: “Iter Cilicicum in Tauri alpes ‘Bulgar Dagħ.’ In schistosis austro oppositis vallis *Gusguta* et *Dasch Olugh*”, 7000' [2130 m], 26.VI.1853 and 2.VII.1853, *Kotschy* 32 201 23d (G [G00002436], G-BOIS [G00154063], GOET [GOET002669], K [K000075759], P [P00835107, P00835108, P00835109, P00835110], S [S1216214], W [W0005563], WAG [WAG0004255]).

Notes. – Lectotypification of this species name involves several factors that contribute to its complexity.

First, many of the *Brassicaceae* material collected by Kotschy and sent to Boissier for determination were accompanied by Kotschy's handwritten labels, after which Kotschy distributed the exsiccatae with printed labels (for a good example, see the above-mentioned typification of *Brossardia papyracea* var. *kotschyi*). For this species, two rather vague labels saying “Plantae Tauri Cilicici. Th. Kotschy 1853”, accompanied with the printed, complex, exsiccatae label, were sent to Boissier.

Second, that complex label gives two collection dates (June 26 and July 2), two localities (*Gusguta* et *Dasch Olugh*), three of Kotschy's collection numbers (23d, 32, and 201), and identification as *Lipophragma eunomioides*, a *nomen nudum* listed by BOISSIER (1856) but not elsewhere.

Third, it is impossible to know which plant was collected from where, at what date, and what collection number was assigned.

Fourth, *Crenularia eunomioides* is a perfectly good species not yet typified despite its original description over 110 years ago.

Fifth, both flowering and fruiting material are on the sheets, and it is impossible to tell which was collected when because the difference in the collection dates are only six days apart, and without knowing the altitude and locality of each plant material, the situation becomes rather complex.

Finally, in order to lectotypify the name, an arbitrary decision is made here to select the best fruiting material as lecto- and isolectotypes regardless to place and date of collection and collection number in order to avoid the situation where such a well-known species name ought to be discarded as an ambiguous name.

Crenularia umbellata (Boiss.) Boiss., Fl. Orient. 1: 338. 1867.

= *Moriera umbellata* Boiss., Diagn. Pl. Orient. 6: 16. 1846.

= *Aethionema umbellatum* (Boiss.) Bornm. in Beih. Bot. Centralbl., Abt. 2, 28: 535. 1911.

Type: “Hab. in glareosis regionum summarum alpis *Kuh-Daëna* Kotschy No. 780”.

Holotypus: IRAN: “In glareosis reg. sumarum alpis Kuh-Daëna”, 2.VIII.1842, *Kotschy 780* (G-BOIS [G00154010]; iso-: B [B100241892], BM [BM001254112], E [E00061169, E00061170], FI [FI005705], G [G00002123, G00002124], K [K000075747], KW [KW000127991], LE [LE00012860], MO [MO2001061, MO2001062], P [P00835122, P00835123, P00835124, P00835126, P00835127], W [W0005554, W18890020458], WAG [WAG0003966]).

Note. – Boissier in *Flora Orientalis* based the species description only on the unicate in G-BOIS, and therefore there was no need to lectotypify the name by Al-Shehbaz (in MOAZZENI et al., 2018: 261).

Moriera Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 380. 1841.

Tribe: *Aethionemeae* Al-Shehbaz et al.

Note. – Although HEDGE (1968) and AL-SHEHBAZ et al. (2006) recognized *Moriera* as distinct from *Aethionema*, the two genera were later united (AL-SHEHBAZ, 2012), and the main difference between them is the spiny habit. It is interesting to note that the spiny habit had evolved at least four times independently within *Aethionema*, including *A. erinaceum* (see under *Lepidium*) and *Aethionema spinosum* recognized here (see MOHAMMADIN et al., 2017).

Moriera spinosa Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 182. 1842.

= *Aethionema spinosum* (Boiss.) Prantl in Engl. & Prantl, Nat. Pflanzenfam. 3(2): 165. 1891 (Fig. 26C–D, p. 118).

Type: “[Aucher-Eloy] N. 347, Persia”.

Holotypus: IRAN: *sine loco*, s.d., *Aucher-Eloy 347* (G-BOIS [G00330708]; iso-: BM [BM001254111], G [G00371901, G00371902], K [K000484161, K000484162], LE, P [P00835118, P00835119, P00835120, P00835121]).

Note. – BOISSIER (1842b) based the species description on the unicate in G-BOIS. He did not annotate any of the duplicates cited above.

Lepidium intricatum Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 26. 1860.

Type: “Im Gebirge bei Ssou (im N. von Isfahan), [Buhse] 21 May 1849 (florens)”.

Holotypus: IRAN: “in montib. pr. Ispahan”, 1847, *Buhse 1444* (G-BOIS [G00332559]; iso-: LE [LE00012820, LE00012821]).

= *Aethionema spinosum* (Boiss.) Prantl in Engl. & Prantl, Nat. Pflanzenfam. 3(2): 165. 1891.

Notes. – Label of the holotype was handwritten by Boissier on a Buhse 1847 blank printed label. Both duplicates at LE have the same information of the protologue, but their collection number is 1441.

Boissier in *Flora Orientalis* reduced *L. intricatum* to synonymy of *Moriera spinosa*.

Moriera cabulica Boiss., Diagn. Pl. Orient. ser. 2, 1: 41. 1854.

Type: “Hab. in monte Erak regni Cabulici alt. 11000' (cl. Griffith Journal N° 1151)”.

Holotypus: AFGHANISTAN: “Erak”, 11000' [3350 m], s.d., *Griffith 1151* (G-BOIS [G00332542]; iso-: K [K000618647, K000618648]).

= *Aethionema spinosum* (Boiss.) Prantl in Engl. & Prantl, Nat. Pflanzenfam. 3(2): 165. 1891.

Note. – BOISSIER (1854) based the species description only on the unicate in G-BOIS.

Aethionema W.T. Aiton, Hort. Kew. ed. 2, 4: 80. 1812.

= *Crenularia* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 380. 1841.

= *Campyloptera* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 381. 1841.

= *Moriera* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 380. 1841.

Tribe: *Aethionemeae* Al-Shehbaz et al.

Notes. – *Aethionema* includes 56 species centered primarily in Turkey, with fewer species in Iran and the Balkan Peninsula, and the range of some reach Morocco and Spain and that of another species into Pakistan.

Based strictly on morphology, YILDRIMILI & KILIÇ (2016) divided *Aethionema* into nine subgenera, four sections, two subsections, and three new series, but such division does not seem to be practical, and it is incompatible with the subsequently published and most recent molecular phylogenetic study on the genus (MOHAMMADIN et al., 2017). In addition to their over splitting the genus, they described 11 new species and recognized only 51 species in the entire genus.

The genus is much in need of a thorough monograph that critically evaluates morphology in light of molecular, genomic, and cytological data.

BOISSIER (1841b) described four smaller genera allied to *Aethionema*, of which he maintained in *Flora Orientalis* both *Crenularia* and *Moriera* as distinct and reduced *Campyloptera* and *Iberidella* to synonymy of *Aethionema*. However, almost all species that he described originally in *Iberidella* are currently assigned to *Noccaea*.

All *Brassicaceae*-wide molecular phylogenetic studies have consistently showed that *Aethionema* is sister to the rest of the family, and the interested reader should consult MOHAMMADIN et al. (2017). Therefore, the genus occupies a significant position for understanding trait evolution and other studies on the rest of the family.

Aethionema trinervium var. *ovalifolium* (Boiss.) Boiss., Fl. Orient. 1: 342. 1867.

= *Iberidella ovalifolia* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 189. 1842.

Type: “[Aucher-Eloy] N. 4125, Armenia”.

Holotypus: TURKEY: “Armenia”, s.d., *Aucher-Eloy* 4125 (G-BOIS [G00332543]; iso-: G [G00446255, G00446256], K [K000484170], P [P00700958, P05415776]).

= *Noccaea trinervia* (DC.) Steud., Nomencl. Bot. ed. 2, 2: 197. 1841.

Notes. – Boissier did not examine or annotate any of the duplicates at G or P, and, therefore, the G-BOIS sheet should be recognized as the holotype (see BOISSIER, 1841a).

The systematic position of the species has fluctuated a great deal, but based on molecular phylogenetic studies, it was placed by KHOSRAVI et al. (2009b) in *Vania* F.K. Mey., and more recently (AL-SHEHBAZ, 2014) in *Noccaea* of the remotely related tribe *Coluteocarpeae*.

Aethionema sagittatum (Boiss.) Boiss., Fl. Orient. 1: 342. 1867.

= *Iberidella sagittata* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 188. 1842.

Type: “[Aucher-Eloy] N. 4126, Ispahan”.

Holotypus: IRAN: “Ispahan”, s.d., *Aucher-Eloy* 4126 (G-BOIS [G00154009]; iso-: BM [BM000883327, BM000883560], G [G00002121, G00002122], K [K000484179], KW [KW000127945], LE [LE00012845], P [P01817603, P01817604, P01817605, P01817606, P02428210, P02428210], W [W0005555, W18890077582]).

= *Noccaea trinervia* (DC.) Steud., Nomencl. Bot. ed. 2, 2: 197. 1841.

Notes. – Lectotypification of the species by DOROFYEV (2012: 463) based on *Kotschy* 476 at LE is erroneous because BOISSIER (1842b) did not cite that collection number under *Iberidella sagittata*. It is when Boissier in *Flora Orientalis* transferred it to *Aethionema* that he cited the additional collection *Kotschy* 476.

There are no duplicates of *Aucher-Eloy* 4126 in the Candolle's herbarium, and none of the six duplicates at P was annotated by Boissier. Therefore, the specimen in G-BOIS should be recognized as the holotype.

Aethionema tenue (Boiss. & Buhse) Boiss., Fl. Orient. 1: 343. 1867.

= *Iberidella tenuis* Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 25. 1860.

= *Noccaea tenuis* (Boiss. & Buhse) F.K. Mey. in Feddes Repert. 84: 459. 1973.

Type: “Grasiger Abhang am Damirdagh (Ssahendgebirge) etwa 10000 Fuss hoch, 21 Juni 1847 (florens et deflorata). [Buhse] No 589/2”.

Holotypus: IRAN: “Damirdagh jugi Ssahen”, 1847, *Buhse* s.n. (G-BOIS [G00332544]; iso-: K [K000484323], LE [LE00012855, LE00012856]).

Note. – MEYER (2006c: 50), who apparently neither annotated nor examined that unicate, recognized thin G-BOIS sheet as the holotype.

Noccaea trinervia (DC.) Steud., Nomencl. Bot. ed. 2, 2: 197. 1841.

= *Iberidella heterophylla* Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 25. 1860.

= *Aethionema heterophyllum* (Boiss. & Buhse) Boiss., Fl. Orient. 1: 343. 1867, **syn. nov.**

Type: “Am Gipfel des Kuh Mulum in Talyschgebirge, [Buhse] 26 April 1847 (specimen unicum florens)”.

Holotypus: IRAN: *sine loco*, 1847, *Buhse* s.n. (G-BOIS [G00332545]; iso-: LE [n.v.]).

Note. – HEDGE (1965: 329, 1968: 110) allied *Aethionema heterophyllum* to *A. caespitosum*, but it is definitely a synonym of the *Noccaea trinervia* complex, which is easily distinguished by the auriculate, prominently 3-veined cauline leaves.

Aethionema caespitosum (Boiss.) Boiss., Fl. Orient. 1: 343. 1867.

= *Iberidella caespitosa* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 190. 1842.

= *Noccaea caespitosa* (Boiss.) Al-Shehbaz & Menke in Taxon 61: 949. 2012 (Fig. 27C, p. 119).

Type: “[Aucher-Eloy] N. 155, Armenia”.

Holotypus: TURKEY: “Armenia”, s.d., *Aucher-Eloy 155* (G-BOIS [G00330707]; iso-: BM [BM000582604], G [G00002080, G00002081, G00002082], K [K000484180], P [P01817600, P01817601]).

Notes. – DOROFYEV (2013) transferred the species to *Apterigia* solely based on slight morphological similarities.

However, the recognition of the species as *Noccaea* (AL-SHEHBAZ, 2012) was based on molecular phylogenetic studies that clearly supports its exclusion from *Aethionema* and its placement in *Noccaea*, where it was subsequently maintained (AL-SHEHBAZ, 2014).

Aethionema rubescens Boiss., Fl. Orient. 1: 343. 1867.

= *Noccaea rubescens* (Boiss.) F.K. Mey. in Feddes Repert. 84: 459. 1973.

Type: “Hab. in summo jugo Metdesis Tauri Cilicici alt. 11800' (Ky exs. 160!), in summo monte Masmeneudagh Cappadociae (Bal)”.

Lectotypus (designated here): TURKEY: “Iter Cilicicum in Tauri alpes ‘Bulgar Dagħ.’ In summo Metdesis. glareaosa ornat.”, 11800' [3595 m], 3.VII.1853, *Kotschy 160* (G-BOIS [G00330706]; isolecto-: E [E00374334], G [G00002099], K [K000484183], P [P00432274, P01817625, P01817626], W [W0005557]). **Syntypus:** TURKEY: “Masmeneu dagħ in cacumine”, 6.IX.1855, *Balansa s.n.* (G-BOIS [G00332546]).

Notes. – MEYER (2006c: 51), followed by AL-SHEHBAZ (2014: 45), overlooked the fact that two syntypes were cited in the original publication of *Aethionema rubescens*. They recognized the *Kotschy 160* in G-BOIS as the holotype.

By contrast, HEDGE (1965: 323) reduced the species to synonymy of *A. oppositifolia*, both of which species are currently recognized in *Noccaea* (AL-SHEHBAZ, 2014).

Although the publication of *Eunomia rubescens* was attributed to TCHIHATCHEFF (1860), the name was a *nomen nudum* and, therefore, its publication ought to be attributed to Boissier in *Flora Orientalis*.

Aethionema bourgaei Boiss., Fl. Orient. 1: 344. 1867.

Type: “Hab. in lapidosis regionis alpinae superioris montis Akdagħ Syriae (Bourg!)”.

Holotypus: TURKEY: “Ag-D'hag, région alpine”, 5.VII.1860, *Bourgeau 45* (G-BOIS [G00332547]; iso-: P [P00428103, P01817608]).

= *Noccaea bourgaei* (Boiss.) D.A. German in Turczaninowia 21: 181. 2018.

Notes. – Boissier did not examine any other material for the description of the species and, therefore, the specimen in G-BOIS is the holotype.

The holotype sheet has two labels, an original handwritten label carrying the field number 45, and a second label, unnumbered, and with printed “Plantae Lyciae 1860” and handwritten “Mt. Ak-Dagħ, région alpine supérieure dans les pierrailles” as in the isotypes at P.

GERMAN (2018) has clearly shown that the proper placement of *Aethionema bourgaei* is to recognize it as an independent species of *Noccaea* instead of reducing it to synonymy of others as done by MEYER (2006c) and AL-SHEHBAZ (2012, 2014).

Aethionema elongatum Boiss., Diagn. Pl. Orient. 6: 17. 1846.

Type: “Hab. sparsim in rupestribus alpis Kuh-Daëna Kotschy No. 583”.

Holotypus: IRAN: “In rupestribus alpis Kuh-Daëna sparsim”, 8.VII.1842, *Kotschy 583* (G-BOIS [G00154019]; iso-: B [B100157906], E [E00048974], FI [FI005696, FI010161], G [G00002127, G00002128], H [H1349928], HAL [HAL0081456], JE [JE00024752], K [K000075778], KW [KW000127952], L [L1823691], LE [LE00012841], MO [MO2001054], P [P00428151, P01817611, P01817612, P01817613, P01817614], S [S0711030], W [W0005564, W0005565, W18890029626, W18890154980], WAG [WAG0000787], WU [WU0044247]).

= *Aethionema virgatum* (Boiss.) Hedge in Rech. f., Fl. Iran. 57: 354. 1968.

Note. – No lectotypification is needed because Boissier based its description on the unicate in G-BOIS.

Aethionema elongatum var. *minus* Boiss., Fl. Orient. 1: 345. 1867.

= *Moriera virgata* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 183. 1842.

= *Aethionema virgatum* (Boiss.) Hedge in Rech. f., Fl. Iran. 57: 354. 1968.

Note. – This is a renaming of the following entry at the varietal rank.

Moriera virgata Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 183. 1842.

= *Aethionema virgatum* (Boiss.) Hedge in Rech. f., Fl. Iran. 57: 354. 1968.

Type: “[Aucher-Eloy] N. 4165, Ispahan”.

Lectotypus (designated by Al-Shehbaz in MOAZZENI et al., 2018: 262): **IRAN**: “Ispahan”, s.d., *Aucher-Eloy* 4165 (G-BOIS [G00154011]; isolecto-: BM [BM000883376, BM001254113], G [G00002125, G00002126], K [K000075779], P [P00428152]).

Notes. – The species name needs lectotypification because Boissier annotated P00428152 perhaps in 1840 as “*Texiera virgata*”, a name that was never published and almost certainly replaced by *Moriera* published in 1841. *Texiera* Jaub. & Spach was published in March 1842.

The basionym *Moriera virgata* was not indexed in *Flora Orientalis* though listed in the synonymy of the previous entry.

Aethionema szowitsii Boiss., Fl. Orient. 1: 345. 1867.

Type: “Hab. in lapidosis montium prov. Aderbidjan Persiae ad Badalan (Szow!). [...] Formam siliculâ apice truncatâ nec retusâ cum typo legit Szowits exs. 535”.

Holotypus: **IRAN**: “In lapidosis montium ad Badalan. Distr. Khoi. Prov. Aderbeidzan”, 5.VI.1828, *Szowits* 335 (G-BOIS [G00332548]).

= *Aethionema virgatum* (Boiss.) Hedge in Rech. f., Fl. Iran. 57: 354. 1968.

Notes. – Szowitz exs. 535 in the protologue was a misprint of 335.

Specimens from Armenia: B100157988, K000484184 and LE00012853 are possible isotypes.

Although LE00012852 and LE00012854 were annotated by Dorofeyev on 10/11/2010 as the type, their collection date and number are different from that in G-BOIS and, therefore, they cannot be recognized as part of the type collection.

Aethionema stenopterum Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 192. 1842.

Type: “[Aucher-Eloy] N. 341, Akdagh; 4129, Persia”.

Lectotypus (first step designated by Al-Shehbaz in MOAZZENI et al., 2018: 258; second step designated here): **IRAN**: “Ispahan”, s.d., *Aucher-Eloy* 4129 (P [P00432260]; isolecto-: G [G00002108], G-BOIS [G00154001], P [P01817632]). **Syntypus**: **TURKEY**: “Ak Dagh”, s.d., *Aucher-Eloy* 341 (G [G00002107], K [K000618646], P [P00428093, P01817633]).

Notes. – Label of the G-BOIS isolectotype was handwritten by Boissier, and its fragmentary flowering branch taken from P00432260 that Boissier annotated.

The species epithet is named after the fruiting material on the P specimen above. Al-Shehbaz (in MOAZZENI et al., 2018) selected *Aucher-Eloy* 4129 as the lectotype collection, but he designated the G-BOIS rather than the P fruiting specimen as the lectotype. That erroneous handling is corrected here by a second-step lectotypification.

As noted by HEDGE (1968: 106), the syntype (*Aucher-Eloy* 341) was cited by BOISSIER (1867a: 346), under *A. thesiifolium* instead of *A. stenopterum*.

HEDGE (1968: 103, 106) separated *Aethionema stenopterum* from *A. virgatum* solely by having style exerted vs included or subequalling the apical fruit sinus, but that difference alone is tenuous at best, and further morphological studies are needed to separate these two species which are clearly unrelated based on molecular phylogenetic studies by MOHAMMADIN et al. (2017).

Aethionema thesiifolium Boiss. & Heldr. in Boiss., Diagn. Pl. Orient. 8: 44. 1849.

Type: “Hab. in saxosis montis *Olklatschi* propè *Egirdir* in *Pisidiâ*. (Heldr.)”.

Holotypus: **TURKEY**: “Rocailles du Mt. Olklatschi près de la ville d’Egirdir au bord du lac”, 1.VI.1845, *Heldreich* 782 (G-BOIS [G00154007]; iso-: BM [BM000883384], E [E00048962], G [G00002119, G00002120], K [K000075774, K000075775], KW [KW000127951], P [P05434378], W [W0005556, W18890026321]).

Notes. – The G-BOIS holotype is a collection folder of two sheets, of which sheet 1 has a barcode and the original label handwritten in French by Heldreich and carrying the field number 782, whereas sheet 2 is not barcoded, unnumbered, and has a printed, handwritten label in Latin by Boissier (“in saxosis montis Olklatschi suprâ Egirdir, Jun. 1845”) and distributed as in the other isotypes.

Furthermore, label of the W0005556 isotype was mimeographed by Boissier, whereas that of W18890026321 was written by Heldreich, but none of these duplicates was examined by Boissier.

Aethionema grandiflorum Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. 8: 42. 1849 (Fig. 26F, p. 118).

Type: “Hab. in fauce *Schirdere* montis *Elbrus* Kotschy No 181”.

Holotypus: IRAN: “In fauce Schir Dere in m. Elbrus pr. Derbend”, 21.V.1843, *Kotschy 181* (G-BOIS [G00330700]; iso-: B [B100157890], BM [BM000582594], FI [FI005697], G [G00002093, G00002094], GOET [GOET002671], H [H1349929], K [K000075768, K000484185], KW [KW000127948], LE [LE00012842], MICH [MICH1199201], P [P00432497, P00432500, P01817618, P01817619], W [W0005558, W0005559], WAG [WAG0000788], WU [WU0044250]).

Notes. – The holotype is a collection folder of two sheets, of which the barcoded one has the locality, date, and collection number handwritten, and the other has a printed label.

It was the only material studied by Boissier and, therefore, there was no need to lectotypify the name as done by Al-Shehbaz in MOAZZENI et al. (2018: 253).

Aethionema grandiflorum var. *parviflorum* Boiss., Diagn. Pl. Orient. 8: 43. 1849.

Type: “Hab. in *Persia* Aucher No 342 et 4129A, in monte *Elbrus* propè *Asadbar* Kotschy No 455”.

Lectotypus (designated here): IRAN: *sine loco*, s.d., *Aucher-Eloy 342* (G-BOIS [G00332549]; isolecto-: K [K000618644], P [P00432313, P05434431]). **Syntypi:** IRAN: *sine loco*, s.d., *Aucher-Eloy 4129A* (G [G00446257], G-BOIS [G00332550], K [K000618645], P [P00432312, P0534429]); “Prope pagum *Asadbar* in partibus occidentalibus m. *Elbrus*”, 8.VII.1842, *Kotschy 455* (G-BOIS [G00332551], LE [LE00012843]).

= *Aethionema grandiflorum* Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. 8: 42. 1849.

Note. – BOISSIER (1867a: 346) reduced this variety to synonymy of *Aethionema pulchellum*, under which he listed all three syntypes above.

Aethionema pulchellum Boiss. & A. Huet in Boiss., Diagn. Pl. Orient. ser. 2, 5: 43. 1856.

Type: “Hab. in incultis propè *Erzeroum* secùs viam quae ad *Persiam* ducit”.

Lectotypus (designated by Al-Shehbaz in MOAZZENI et al., 2018: 254): TURKEY: “In incultis vice *Persicae* 2 h. *Erzeroum*”, VI.1853, *Huet du Pavillon s.n.* (G-BOIS [G00332552]; isolecto-: JE [JE00007934]). **Syntypus:** TURKEY: “Circà *Erzeroum*”, 6000'–6500' [1830–1980 m], VII.1853, *Huet du Pavillon s.n.* (FI [FI005698], K [K000075773, K000075783], LE [LE00012844], P [P00432289, P00580381, P05434432], W [W18890026319]).

= *Aethionema grandiflorum* Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. 8: 42. 1849.

Notes. – The lectotype is a collection folder of two sheets one of which was labeled “Armenia. Huet.”. No other duplicates of the type collection were found among the Huet du Pavillon herbarium that was incorporated in the Geneva herbaria.

All of the above syntypes were most likely collected near the type locality but in July rather than June of the same year.

Aethionema armenum Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 191. 1842 (Fig. 29A, p. 121).

Type: “[Aucher-Eloy] N. 344, montes *Armeniae*”.

Holotypus: TURKEY: “In Mte. *Armenia*”, s.d., *Aucher-Eloy 344* (G-BOIS [G00154002]; iso-: BM [BM000582601], FI [FI010158], G [G0002076, G00002077], K [K000075786], MO [MO1619007], P [P00428094, P01817607]).

Note. – Boissier based his species description on the G-BOIS unicate alone.

Aethionema schistosum Boiss. & Kotschy in Boiss., Diagn. Pl. Orient. ser. 2, 5: 42. 1856.

Type: “Hab. in schistosis *Tauri Cilicici* cl. Kotschy”.

Neotypus (designated here): TURKEY: “Partie inférieure de la vallée de *Kar-Boghas*, entre *Gulet-Boghas* et la partie la plus élevée du *Taurus oriental*”, 28.VII.1855, *Balansa 189* (G-BOIS [G00797343]; isoneo-: G [G00414303], P [P00432272, P05434356]) (Fig. 28, p. 120).

Notes. – Not a single Kotschy specimen of the very distinctive *A. schistosum* was found in the Geneva herbaria. Such specimen, if existed, may have been misplaced, lost, or seen elsewhere.

The species folder in G-BOIS has two specimens, of which one was collected by Haussknecht in 1865, nine years after the publication of the species. The second was collected by Balansa in Taurus Cilicici on 28 July 1855, at least 13–14 months before the publication date of *A. schistosum*. It is rather puzzling why BOISSIER (1856) did not cite Balansa's collection, though he cited it in *Flora Orientalis* along with the collections of Haussknecht and Kotschy. It would be an important find if Kotschy's specimen is discovered. However, in its absence, the best way to preserve the correct interpretation of the species limits is to designate a neotype. In our opinion, the best choice is Balansa's collection, which was examined by Boissier, and it is represented by four duplicates one each at G and G-BOIS and a pair in P.

Balansa's duplicate P05434356 is a mixed collection with Haussknecht's 1865 gathering annotated by Boissier and initially part of Bunge's herbarium.

Locality of the P duplicates is "Région sous-alpine du Taurus, au nord du défilé des Portes Ciliciennes". Except for the neotype, which has the collection number *Balansa 189*, the isoneotypes have *Balansa s.n.*

Aethionema capitatum Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 5: 43. 1856.

Type: "Hab. ad rupes quibus insidet castellum dirutum *Pylarum Ciliciarum*. Fructiferum fine Junii legit cl. Balansa".

Holotypus: TURKEY: "Rochers de la montagne où est situé le chateau en ruine dominant le défilé des Portes Ciliciennes, à 10 lieues au nord de Tarsous", 27.VI.1855, *Balansa 190* (G-BOIS [G00156033]; iso-: BM [BM000582605], E [E00201001], FI [FI005691], G [G00002083], GOET [GOET002668], JE [JE00010991], K [K000075764, K000075765, K000075766], KW [KW000127949], P [P00428110, P01817609, P01817610], W [W0005568, W18890076131], WAG [WAG0004256, WAG0004257]).

Notes. – The name needs no lectotypification because Boissier based the species description solely on the material in G-BOIS.

All the isotypes have printed labels with slightly modified text from the original: "Rochers du château en ruine dominant le défilé des Portes Ciliciennes, à 10 lieues au N. de Tarsous. 27 juin. 1855. Balansa 440".

The locality given in the protologue differs from that of the holotype or isotypes sheets. However, HEDGE (1965) gave a "hybrid" label information half of it "Ad rupes quibus insidet castellum dirutum *Pylarum Ciliciarum*" was taken from the original protologue, and the other half "27 vi 1855, *Balansa 440*" was copied from the isotype printed label.

The G00002083 isotype is a collection folder of two sheets one of which is unlabeled.

Aethionema lignosum Boiss. & Hausskn. in Boiss., Fl. Orient. 1: 348. 1867.

Type: "Hab. in summo monte Berytdagh Cataoniae in rupestribus alt. 8000'–9000' (Hausskn!)"

Lectotypus (designated here): TURKEY: "In rup. Berytdagh. Taurus Cataonicus", 9000' [2740 m], 10.VIII.1865, *Haussknecht s.n.* (G-BOIS [G00330701]; isolecto-: B [B100157876], BM [BM000883517], G [G00002085], JE [JE00010965], P [P00432314], W [W0005569, W18890312712]).

= *Aethionema capitatum* Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 5: 43. 1856.

Note. – In addition to the duplicate in his herbarium, Boissier examined and annotated JE00010965 and, therefore, the name needs lectotypification.

Aethionema speciosum Boiss. & A. Huet in Boiss., Diagn. Pl. Orient. ser. 2, 5: 44. 1856.

Type: "Hab. in Armeniâ inter *Gumuchhané* et *Zazalarhané* et propè *Erzeroum* cl. Huet du Pavillon. Fl. Maio. Fr. Jun."

Lectotypus (designated here): TURKEY: "Inter *Gumuchané* et *Zazalarhanée*", V.1853, *Huet du Pavillon s.n.* (G-BOIS [G00154003]; isolecto-: G [G00002109, G00002110], JE [JE00010977, JE00010979], K [K000484191, K000484193], P [P00432267, P01817622]). **Syntypus:** TURKEY: "Circa *Erzeroum*", 6000'–6200' [1830–1890 m], VI.1853, *Huet du Pavillon s.n.* (FI [FI005692], G [G00002111, G00002112], G-BOIS [G00154004], K [K000484195, K000484196], P [P00432265, P00432277]).

Notes. – By missing "et" before "circa *Erzeroum*" in citing the exact protologue, HEDGE (1965: 322) was likely left with the impression that a single collection of May 1853 was involved. The Geneva herbaria have three duplicates of each syntype collection, and none of these six duplicates was annotated by Hedge.

The labels of the isolectotypes have: "Prope *Zazalarhané*. Inter *Baibut* et *Erzeroum*, 5–6000', Mai 1853, A. Huet du Pavillon" indicated.

The original handwritten labels by Huet in the G-BOIS herbarium are somewhat different from the partially printed type labels for material distributed as exsiccatae, as well as those in Huet herbarium G00002109 and G00002111.

Aethionema subulatum (Boiss. & Heldr.) Boiss., Fl. Orient. 1: 349. 1867.

= *Eunomia subulata* Boiss. & Heldr. in Boiss., Diagn. Pl. Orient. 8: 42. 1849.

Type: “Hab. in parte occidentali montis *Gheidagh* Tauri Isaurici alt. 6000' (Heldreich). Fl. Julio”.

Holotypus: TURKEY: “Taurus: Mt. Ghei-Dagh partie occident.”, 6000' [1830 m], 9.VII.1845, *Heldreich 1047* (G-BOIS [G00332554]; iso-: B [B100157989]).

Note. – Only the above two specimens were found in the major herbaria consulted, Boissier did not examine the duplicate at B.

Aethionema lacerum Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 5: 45. 1856.

Type: “Hab. in rupestribus partis superioris *Pylarum Cilicium* Tauri cl. Balansa, fl. et fr. ineunte Julio”.

Holotypus: TURKEY: “Rochers de la partie supérieure du défilé des Portes Ciliciennes, au nord de Tarsous”, 1.VII.1855, *Balansa 187* (G-BOIS [G00154005]; iso-: BM [BM000883343], E [E00061097, E00061098], G [G00002115, G00002116], K [K000484198, K000484199], MPU [MPU013480], P [P00432315, P01817621]).

= *Aethionema stylosum* DC., Syst. Nat. 2: 562. 1821.

Note. – The isotypes have a printed, handwritten label: “Défilé des portes Ciliciennes. 1er Juillet 1855. B. Balansa”.

Aethionema fimbriatum Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 193. 1842 (Fig. 29B, p. 121).

Type: “[Aucher-Eloy] N. 4128, Aderbidjan”.

Lectotypus (designated by Al-Shehbaz in MOAZZENI et al., 2018: 253): IRAN: “Aderbidjan”, s.d., *Aucher-Eloy 4128* (G-BOIS [G00330699]; isolecto-: BM [BM000582597], E [E00201073], G [G00002089, G00002090], K [K000075763], KW [KW000127950], LE [LE01039436], MO [MO1619144], P [P00428153, P01817615, P01817616], W [W0005562, W18890077583]).

Note. – Boissier annotated P00428153, and this means that he based the species description on that specimen and duplicate in his herbarium. Therefore, lectotypification of the name is needed.

Aethionema schizopterum Boiss. & Hausskn. in Boiss., Fl. Orient. Suppl.: 60. 1888.

Type: “Hab. in rupestribus calcareis montium Avroman et Schahu Kurdistaniae Persicae (Hausskn.!)”.

Holotypus: IRAN: “In rupestr. calc. m. Avroman & Schahu”, VII.1867, *Haussknecht 107* (G-BOIS [G00330702]; iso-: JE [JE00007936, JE00007937, JE00007938], K [K000484200, K000484201]).

= *Aethionema fimbriatum* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 193. 1842.

Notes. – The holotype is a collection folder of three sheets: sheet 1 of 3 is barcoded and has a handwritten label by Haussknecht as given above in the quotation phrase, plus a printed label indicating “Haussknecht It. Orient. Montes Avroman et Schahu. Jul.-1867”. Sheet 2 of 3 has a label with printed information as in sheet 1. Sheet 3 of 3 has a packet with the collection number 107 and Boissier's handwriting that reads “Avroman et Schahu”.

The K duplicates do not have the collection number, but their printed label is the same as that of the holotype.

Aethionema cardiophyllum Boiss. & Heldr. in Boiss., Diagn. Pl. Orient. 8: 43. 1849.

Type: “Hab. in montibus tophaceis suprâ urbem *Bouldour* Pisidia rarum (Heldreich)”.

Holotypus: TURKEY: “Bouldour. Montagnes de tuffe blanche à 1 lieue au dessus de la ville”, 24.V.1845, *Heldreich 707* (G-BOIS [G00330694]; iso-: BM [BM000883357], E [E00374320], G [G00002087, G00002088, G00446266], K [K000075762], KW [KW000127946], LE [LE00012840], P [P5434756]).

= *Aethionema cordatum* (Desf.) Boiss., Fl. Orient. 1: 350. 1867.

Notes. – The isotypes have printed, handwritten labels by Boissier and read “In montibus tophaceis ad Bouldour”, and lack the day and collection number.

Because Boissier examined only the unicate in his herbarium in drafting the species description, that specimen is the holotype. There was no need to lectotypify the name as done by DOROFYEV (2012: 463) who recognized *A. cardiophyllum* as a distinct species and designated its lectotype based on the LE duplicate that was neither examined nor annotated by Boissier.

Aethionema cardiophyllum var. *edentulatum* Boiss. & A. Huet in Boiss., *Diagn. Pl. Orient. ser. 2*, 5: 45. 1856.

Type: “Hab. propè Tortoum Armeniae cl. Huet du Pavillon”.

Holotypus: TURKEY: “Prope Tortoum”, VI.1853, *Huet du Pavillon s.n.* (G-BOIS [G00332555]; iso-: BM [BM000883356], K [K000075785]).

= *Aethionema cordatum* (Desf.) Boiss., *Fl. Orient. 1*: 350. 1867.

Note. – This varietal name was not mentioned in BOISSIER (1867a, 1888).

Aethionema cordatum var. *pichleri* Boiss., *Fl. Orient. Suppl.*: 61. 1888.

Type: “Hab. in summis Olympi Bithyni ad latus meridionale (Pichler!)”.

Lectotypus (designated here): TURKEY: “Bythinien. Auf den südliche Abhänge des Mte. Olymp, bei Brussa”, VI.1874, *Pichler s.n.* (G-BOIS [G00330696]). **Syntypi:** TURKEY: “Auf steinigten Abhängen des Südseite am Mte. Olymp.”, VI.1874, *Pichler s.n.* (G-BOIS [G00330695]); “Auf den höchsten Jöchern des Mte Olymp bei Brussa”, VII.1873, *Pichler 232* (G-BOIS [G00330697]).

= *Aethionema cordatum* (Desf.) Boiss., *Fl. Orient. 1*: 350. 1867.

Note. – All three G-BOIS specimens have handwritten labels by Pichler in German, and although they differ in their exact locality data from the protologue, they were the only material studied by Boissier in his description of the variety, and a lectotype is designated from one of them.

Aethionema salmasium Boiss., *Fl. Orient. 1*: 350. 1867.

Type: “Hab. in saxosis ad pagum Temer ditionis Salmas prov. Aderbidjan Persiae (Szow!)”.

Holotypus: IRAN: “In elatis saxonum ad pagum Temer Distr. Salmas Prov. Aderbeidzan”, 23.IV.1828, *Szovits 120* (G-BOIS [G00332556]; iso-: LE [LE00012850, LE00012851]).

= *Noccaea trinervia* (DC.) Steud., *Nomencl. Bot. ed. 2*, 2: 197. 1841.

Notes. – The designation of LE00012851 by DOROFYEV (2012: 462) as the lectotype is rejected because Boissier based the species description solely on the G-BOIS specimen.

Labels of B100157855, CM0660, GH00018396, and K000484177 have the locality as Armenia plus the collector name. As in type collections of other species by Szovits from Azerbaijan, such brief labels are common, and the above four duplicates may also belong to the type collection of *Aethionema salmasium*.

Aethionema moricandianum (Boiss.) Boiss., *Fl. Orient. 1*: 351. 1867.

= *Eunomia moricandiana* Boiss., *Diagn. Pl. Orient. 5*: 83. 1844.

Type: “Hab. in Cariae montibus ubi aestate 1843 detexit Ch. Pinard”.

Holotypus: TURKEY: “Caria”, 1843, *Pinard s.n.* (G-BOIS [G00330705]; iso-: BM [BM000883360], G [G00002091, G00002092, G00446267], K [K000484203, K000484204]).

= *Aethionema cordatum* (Desf.) Boiss., *Fl. Orient. 1*: 350. 1867.

Note. – Boissier based the species description solely on G00330705 and did not examine the other duplicates at G or K. Therefore, the designation by Al-Shehbaz in MOAZZENI et al. (2018: 250) of the G-BOIS duplicate as a lectotype was unnecessary.

Aethionema iberideum (Boiss.) Boiss., *Fl. Orient. 1*: 351. 1867.

= *Eunomia iberidea* Boiss. in *Ann. Sci. Nat., Bot. ser. 2*, 17: 191. 1842 (Fig. 29C, p. 121).

Type: “[Aucher-Eloy] N. 345, Olympus Bithynus”.

Holotypus: TURKEY: “Olympus Bithynia”, s.d., *Aucher-Eloy 345* (G-BOIS [G00330704]; iso-: E [E00199978], G [G00002095, G00002096], K [K000075761], P [P00432483, P01817620]).

Note. – Boissier based his species description on the unicate in his herbarium and did not annotate any of the duplicates at G.

Aethionema creticum Boiss. & Heldr. in Boiss., *Fl. Orient. Suppl.*: 61. 1888.

= *Aethionema saxatile* subsp. *creticum* (Boiss. & Heldr.) Andersson et al. in *Willdenowia* 13: 18. 1983.

Type: “Hab. in rupestribus montium Sphacioticorum Cretae supra Askyphous 3–4000' (Heldr.!) et in montibus

Lakous (Reverch.!), in Anatoliâ (Auch. 343!), in monte Kalolamni insulae Karpathos (Pichl.!).”

Lectotypus (designated by ANDERSSON et al., 1983: 18): **GREECE**: “in rupestribus montium Sphaciocorum supra Askyphous”, 3000'–4000' [910–1220 m], 3.IV.1846, *Heldreich 1371* (G-BOIS [G00332557]; isolecto-: E [E00199891], G [G00002102, G00002103], K [K000484172, K000484173], W [W0005566, W0005567], WU [WU0044162]). **Syntypus**: **GREECE**: “Plantes de Crête. Montagnes de Lakous”, 1.VI.1883, *Reverchon s.n.* (G-BOIS [G00797221]); “in insula Karpatos. Monte Kalolimni”, 18.V.1883, *Pichler 59* (G-BOIS [G00797222]). **TURKEY**: *sine loco*, s.d., *Aucher-Eloy 343* (G-BOIS [G00797220], K [K000618649]).

Note. – The lectotype has a handwritten label by Heldreich. The isolectotypes have printed handwritten label by Boissier “*Aethionema saxatile* var. *ovalifolium* DC. Creta in rupestribus Sphaciot. supra Askyphous 4000'. Apr. 1846. De Heldreich” without collection number.

Aethionema graecum Boiss. & Spruner in Boiss., *Diagn. Pl. Orient.* 6: 16. 1846.

= *Aethionema saxatile* subsp. *graecum* (Boiss. & Spruner) Hayek in *Repert. Spec. Nov. Regni Veg. Beih.* 30(1): 472. 1925.

Type: “Hab. in collibus calcareis *Graeciae*, *Pentelici* et *Hymetti* prope *Athenas*, montis *Parnes Atticae Argolidis*. Spruner”.

Lectotypus (designated by ANDERSSON et al., 1983: 17): **GREECE**: “Pentelicon”, 1841, *Spruner s.n.* (G-BOIS [G00332558]; isolecto-: G [G00002104], W [W0005560, W0005561]). **Syntypus**: **GREECE**: “Parnes”, s.d., *Spruner s.n.* (BM [BM000556337], K [K000484174]).

Note. – This and the preceding entry belong to the highly variable and most widespread perennial *A. saxatile*. Critical, population-based molecular and morphological studies are needed to entangle the complexity of the species.

Aethionema campylopterum Boiss., *Fl. Orient.* 1: 353. 1867 [nom. illeg.].

= *Campyloptera syriaca* Boiss. in *Ann. Sci. Nat., Bot. ser.* 2, 17: 194. 1842.

= *Aethionema syriacum* (Boiss.) Bornm. in *Beih. Bot. Centralbl.*, Abt. 2, 28: 120. 1911 (Fig. 29D, p. 121).

Type: “Hab. in agris Syriae (Auch. exs. 339!), ad Aleppo et Aintab (Haussk!)”.

Holotypus: **SYRIA**: *sine loco*, s.d., *Aucher-Eloy 339* (G-BOIS [G00154006]; iso-: BM [BM000582590], G [G00002117], K [K000075760], MO [MO1619145], P [P00428104]).

Notes. – *Aethionema campylopterum* is illegitimate because Boissier in *Flora Orientalis* listed the earlier published *Campyloptera syriaca* Boiss. as a synonym.

Boissier based the species description solely on the unicate in his herbarium, and he did not examine or annotate the duplicates in G or P (see BOISSIER, 1841a).

Lepidium L., *Sp. Pl.*: 643. 1753.

Tribe: *Lepidieae* DC.

Notes. – *Lepidium* is third largest genus in the *Brassicaceae* after *Draba* and *Erysimum*, with 259 species represented by native taxa on all continents except Antarctica.

Based on extensive developmental and molecular phylogenetic studies (e.g., BOWMAN et al., 1999; MUMMENHOFF et al., 2001, 2004, 2009), *Lepidium* was expanded by AL-SHEHBAZ et al. (2002), AL-SHEHBAZ (2003), and AL-SHEHBAZ & MUMMENHOFF (2010) to include *Cardaria* Desv., *Coronopus* Zinn, *Hymenophysa* C.A. Mey., *Stroganowia* Kar. & Kir., *Stubendorffia* Schrenk ex Fish., and *Winklera* Regel.

Lepidium aucheri Boiss. in *Ann. Sci. Nat., Bot. ser.* 2, 17: 195. 1842.

Type: “[Aucher-Eloy] N. 319, Bagdad; 4142, Persia australis”.

Lectotypus (first step designated by DOROFYEV, 2012: 467; second step designated here): **IRAQ**: “Bagdad”, s.d., *Aucher-Eloy 319* (G-BOIS [G00150393]; isolecto-: BM [BM000946193], G [G00096401, G00096402, G00096403], K [K000654400], LE, P [P53356151, P053356153]). **Syntypus**: **IRAN**: “ad Oras Pers. austr.”, s.d., *Aucher-Eloy 4142* (BM [BM000593539, BM000593540], G [G00096404, G00096405], G-BOIS [G00150394], K [K000653999], KW [KW000128000], MO [MO1617334], P [P053356150, P53356155], W [W0075837]).

Note. – DOROFYEV (2012: 467) selected *Aucher-Eloy 319* from the two original syntypes in the protologue, but he designated the LE duplicate as the lectotype. However, Boissier based the species description solely on the two duplicate syntypes in his herbarium and did not examine or annotate the LE specimen. Therefore, a second-step designation is proposed here to correct the lectotypification from LE to G-BOIS.

Lepidium nebrodense var. *microstylum* (Boiss. & Heldr.) Boiss., Fl. Orient. Suppl.: 62. 1888.

= *Lepidium microstylum* Boiss. & Heldr. in Boiss., Diagn. Pl. Orient. ser. 2, 6: 21. 1859.

Type: “Hab. in regione superiori *Sympetherico* montis *Veluchi Aetoliae* cl. Samaritani et Guicciardi”.

Holotypus: GREECE: “m. Veluchi – in reg. super. (*Sympetterico*)”, 3.VIII.1857, *Samaritani* & *Guicciardi* 3352 (G-BOIS [G00332560]).

= *Lepidium hirtum* subsp. *nebrodense* (Raf.) Thell. in Vierteljahrsschr. Naturf. Ges. Zürich 51: 154. 1906.

Notes. – Boissier based the species description solely on the unicate in G-BOIS.

No duplicates of the type collection have been found in any of the major herbaria consulted.

Lepidium propinquum var. *auriculatum* Boiss., Fl. Orient. 1: 357. 1867.

Type: “Hab. in lapidosis humidis Armeniae ad Koschadara (Szow!)”.

Holotypus: AZERBAIJAN: “In lapidosis secus rivulos Kotschadara”, 18.VII.1829, *Szovits* 537 (G-BOIS [G00330475]; iso-: LE, P [P05444762]).

= *Lepidium chalepense* L., Cent. Pl. 2: 23. 1756.

Notes. – The holotype is a collection folder of two sheets, of which one is unlabeled but with the same collection number. The P duplicate has the collector as *Szovits s.n.*

THELLUNG (1906b: 89) recognized one of the holotype sheets as *Lepidium draba* var. *auriculatum* (Boiss.) Thell., and he annotated the other as var. *propinquum*. By contrast, MULLIGAN & FRANKTON (1962: 1425) transferred var. *auriculatum* to *Cardaria propinqua* (Fisch. & Mey.) N. Busch, though they did not typify it.

Except for the presence of minute auricles on the cauline leaves, in nearly all other aspects, the plant is more at home in *Lepidium propinquum*, though the latter species has no auricles at all. Perhaps the taxon should be maintained infraspecific taxon of this species, as originally described by Boissier in *Flora Orientalis*, but the lack of sufficient material for this study prevented accepting such assignments.

Lepidium erinaceum Boiss., Diagn. Pl. Orient. 6: 17. 1846.

= *Aethionema erinaceum* (Boiss.) Khosravi & Mumm. in Nordic J. Bot. 26: 29. 2008.

Type: “Hab. in alpe *Kuh-Daëna* Persiae australis Kotschy No. 701”.

Holotypus: IRAN: “In alpe Kuh-Daëna”, 20.VII.1842, *Kotschy* 701 (G-BOIS [G00154026]; iso-: B [B100241671], BM [BM001172147], CAS [CAS00123206], E [E00077261], FI [FI005689], K [K000642707], KW [KW000127997], LE, MO [MO1926529], P [P05330964, P05330965, P05330966], PR [PR375027], PRC [PRC455628], W [W18890020395], WAG [WAG0004278], WU [WU0059756, WU0101802], Z [Z00078596]).

Notes. – The isotypes have printed label with same information as in the holotype but with phrase “Habitu siliculisque lineari-oblongis distinct species”.

THELLUNG (1906a) placed *Lepidium erinaceum* in a monospecific *Acanthocardium* Thell., where it remained accepted by all subsequent works, including HEDGE (1968), APPEL & AL-SHEHBAZ (2003), and AL-SHEHBAZ et al. (2006). However, KHOSRAVI et al. (2008a) have established beyond a doubt that the species is perfectly nested within *Aethionema*. Their listing of the holotype in G-BOIS is correct because Boissier based the species description on that specimen alone.

Lepidium crassifolium var. *ramosissimum* Boiss., Fl. Orient. 1: 358. 1867.

Type: “Hab. in inundatis salsis Anatoliae prope Koniah (Heldr!)”.

Lectotypus (designated here): TURKEY: “In salsis hieme inundatis planitie Koniah”, VII.1845, *Heldreich s.n.* (G-BOIS [G00332561]; isolecto-: G [G00446258, G00446259, G00446611], K [K000642708], LE, W).

Syntypus: TURKEY: “Plaine de Koniah, entre Koniah et le Karadagh, lieux salés et inondés en hiver”, 18.VI.1845, *Heldreich* 907 (G-BOIS [G00332332]).

= *Lepidium cartilagineum* (J. Mayer) Thell. in Vierteljahrsschr. Naturf. Ges. Zürich 51:173. 1906.

Notes. – Boissier in *Flora Orientalis* did not specify the collection date, though labels of all isolectotypes above give July. Therefore, the unicate collected in June is recognized here as a syntype.

The status of this and following two entries are discussed under *L. pumilum*.

Lepidium crassifolium var. *dentatum* Boiss., Diagn. Pl. Orient. ser. 2, 6: 22. 1859.

Type: “Hab. in pratis salsis ad occidentem urbis *Caesareae* sitis cl. Balansa, in pascuis salsis circà *Van Armeniae* cl. Noë”.

Lectotypus (designated here): **TURKEY**: “Van in pascuis”, IV.1849, *Noë 176* (G-BOIS [G00332562]). **Syntypi**: **TURKEY**: “Van. Auf sandigen Triften”, V.1849, *Noë 219* (G-BOIS [G00332563]); “Bords des marais salés. Marais situés à l’ouest de Césarée”, 1107 m, VII.1856, *Balansa 447* (G-BOIS [G00332564]).

= *Lepidium cartilagineum* (J. Mayer) Thell. in Vierteljahrsschr. Naturf. Ges. Zürich 51:173. 1906.

Note. – See discussion under *L. pumilum*.

Lepidium cartilagineum subsp. *crenatifolium* (Boiss. & Balansa) Al-Shehbaz, **comb. et stat. nov.**

= *Lepidium crenatifolium* Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 6: 22. 1859.

Type: “Hab. ad marginem paludum salsarum *Cappadociae* circà *Kara-hissar* alt. 1200 metr. Floret aestate”.

Holotypus: **TURKEY**: “Plaine de Kara-Hissar (Cappadoce)”, c. 1200 m, 18.VI.1856, *Balansa s.n.* (G-BOIS [G00332565]).

Notes. – This taxon is by far one of the most distinctive variants of the *L. cartilagineum* complex, and its unique feature is the coarsely crenate leaves.

THELLUNG (1906b: 155) recognized this taxon as a variety, just as he did for the preceding and following entries, though it merits the subspecific rank.

Lepidium pumilum Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 6: 21. 1859.

Type: “Hab. in salsis ad margines paludum ad occidentem *Caesareae* sitarum alt. 1000 metr. cl. Balansa qui legit fructiferam Sept. 1856”.

Holotypus: **TURKEY**: “Terrains salés. – Bords des marais situés à l’ouest de Césarée (Cappadoce)”, c. 1107 m, 23.VII.1856, *Balansa 448* (G-BOIS [G00150395]; iso.: BM [BM001172145], FI [FI005690], G [G00446260, G00446261], JE [JE00005905], K [K000642709, K000642710], P [P05444741, P05444743, P05444744], W [W18890019374, W18890069354], ZT [ZT00078598, ZT00078599]) (Fig. 30, p. 122).

Notes. – The holotype has a handwritten label by Balansa with the field number 448. The labels of the isotypes have printed, handwritten label by Balansa “Prés salés situés au NO de Césarée (Cappadoce), à 1100 mètr. d’alt.” with the exsiccatae number 999.

This and the previous three entries belong to the *Lepidium cartilagineum* complex in which a total of 20 species and infraspecific taxa have been described by various authors. No single treatment has been satisfactory, and thorough molecular phylogenetic studies, coupled with a critical re-evaluation of morphology in light of molecular data, are needed to determine the status of every specific and infraspecific taxon recognized in this complex. THELLUNG (1906b) provided the latest and most comprehensive treatment of the complex, and he divided *L. cartilagineum* into two subspecies, of which only subsp. *cartilagineum* was further divided into five varieties and four forms.

Lepidium cartilagineum subsp. *caespitosum* (Desv.) Thell. is by far the most distinctive, and it differs from subsp. *cartilagineum* by having caudex branches densely covered with leaf remains of previous seasons (vs naked caudices), narrowly linear to filiform (vs suborbicular, broadly ovate, elliptic, or lanceolate) basal leaves, non-auriculate, linear (vs frequently auriculate, variously shaped) cauline leaves, sepals 2.5–3 (vs 1–1.5) mm long, and fruit 4–5 (vs 2–3.5) mm long. In our opinion, these are well-defined taxa, and *L. caespitosum* Desv. ought to be maintained as a distinct species.

The rest of the complex was treated by THELLUNG (1906b) as *Lepidium cartilagineum* subsp. *crassifolium* (Waldst. & Kit.) Thell., and it included the type of *L. cartilagineum*. Therefore, it should be recognized it as subsp. *cartilagineum*, just as more recently done by HEDGE (1968: 67), but not as HEDGE (1965: 283), where he followed Thellung.

In addition to the variation in basal- and cauline-leaf morphology and development of auricles on uppermost cauline leaves, plants of this complex can be quite variable in height and the degree of branching, and only three taxa are consistently recognizable here. The subsp. *cartilagineum* is the most widespread (Asian Turkey, Caucasus, W Russia, Iran, Afghanistan, Pakistan), and the bulk of its range falls within the *Flora Orientalis* area. It consists of robust plants often (15–)18–35 cm tall, entire, or rarely obscurely dentate and basally cuneate basal leaves, and sagittate to amplexicaul or cordate upper cauline leaves.

By contrast, subsp. *crenatifolium* (endemic to central Turkey) has orbicular to broadly ovate basal leaves with truncate base and prominently crenate margin, and rather small cauline leaves with poorly developed auricles. Boissier in *Flora Orientalis* maintained this taxon as a distinct species, THELLUNG (1906b) reduced it to a variety of *L. cartilagineum*, and it is maintained here as a subspecies of the latter species. Finally, *L. pumilum* (Crimea, central Turkey, Iran) is a small plant 6–12(–15) cm tall,

with lanceolate, entire, and basally cuneate to attenuate basal leaves, and narrowly lanceolate to linear and exauriculate or very rarely minutely auriculate uppermost cauline leaves. It can easily be distinguished from the other members of the *L. cartilagineum* complex, and Boissier in *Flora Orientalis* is followed in recognizing it as a distinct species.

By contrast, THELLUNG (1906b) treated *L. pumilum* as a variety of *L. cartilagineum* subsp. *crassifolium* (Waldst. & Kit.) Thell., HEDGE (1965) reduced it to synonymy of subsp. *cartilagineum*, and then HEDGE (1968) and BRASSIBASE (2019) accepted it as *L. cartilagineum* subsp. *pumilum* (Boiss. & Balansa) Hedge.

Lepidium affghanum Boiss., Fl. Orient. 1: 358. 1867.

Type: “Hab. ad Keratkuh inter Herat et Tebes ubi specimen unicum legit cl. Bunge”.

Holotypus: IRAN: “inter Herat et Tebes. Kerat-Kuh”, X–XI.1858, *Bunge* 36 (P [P05356212]) (Fig. 31, p. 123).

Notes. – No specimens were located in the Geneva herbaria, and the unicate P05356212 was annotated by Boissier. It has to be taken as the holotype because no duplicates were seen elsewhere in any of the major herbaria consulted. If such exist, then it is still highly unlikely that Boissier examined them.

HEDGE (1968: 121), who treated the species as *Strogonowia affghana* (Boiss.) Pavlov, indicated that the type is at G even though it did not exist in the first place.

Lepidium coronopifolium* var. *aucherianum Boiss., Fl. Orient. 1: 360. 1867.

Type: “Hab. in prov. Aderbidjan Persiae (Auch. exs. 4169 M!)”.

Holotypus: IRAN: “Aderbidjan”, s.d., *Aucher-Eloy* 4169M (G-BOIS [G00332566]; iso-: BM [BM001172146]).

= ***Lepidium persicum*** Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 196. 1842.

Note. – Although described from Azerbaijan in Iran, this taxon was not accounted for in *Flora Iranica* (HEDGE, 1968). However, THELLUNG (1906b: 168) reduced it to synonymy of the highly heterogeneous *L. lyratum* L. in which he included the very distinctive *L. persicum*.

Lepidium persicum Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 196. 1842.

Type: “[Aucher-Eloy] N. 321 et 4141, montes ad Ispahan”.

Lectotypus (first step designated by DOROFYEV, 2008: 1966; second step designated here): IRAN: “Ispahan”, s.d., *Aucher-Eloy* 4141 (G-BOIS [G00150396]; isolecto-: G [G00096406, G00096407], K [K000642711], KW [KW000127998], LE, P [P05444613, P05444614, P05444616, P05444644, P05444645, P05444646], W [W0024182]). **Syntypus:** IRAN: “in Mte. ad Ispahan”, s.d., *Aucher-Eloy* 321 (G [G00096408, G00446262], G-BOIS [G00150397], K [K000642712], P [P05444618, P05444647]).

Notes. – DOROFYEV's (2008: 1966) lectotypification based on the LE duplicate is considered partial and corrected here by designating the G-BOIS as the lectotype because Boissier based the species description solely on the two specimens in his herbarium and did not examine or annotate any of the other duplicates cited above.

HEDGE (1968: 70) listed two collections, Buhse's from N Iran and Griffith's from Afghanistan, as syntypes, but these were listed in BOISSIER (1867a), not in the original publication (BOISSIER, 1842b).

Lepidium pichleri Boiss., Fl. Orient. Suppl.: 63. 1888.

Type: “Hab. in Persiâ loco non notato, unde semina attulit cl. Pichler!”.

Holotypus: IRAN: “Cult Valeyres”, 1883, *Pichler* s.n. (G-BOIS [G00332567]).

= ***Lepidium vesicarium*** L., Sp. Pl.: 643. 1753.

Notes. – The holotype is a collection folder of two sheets of which one is unlabeled.

We agree with THELLUNG (1906b: 149) that *L. pichleri* is a cultivated form of *L. vesicarium* in which the stems failed to inflate at the inflorescence nodes to produce the characteristic aspect of the species. In every other feature of the plant the former is indistinguishable from the latter.

Lepidium setosum Boiss., Diagn. Pl. Orient. ser. 2, 1: 45. 1854.

Type: “Hab. in regno *Cabulico* propè *Hydozyl*. (cl. Griffith pl. exs. N° 1483)”.

Note. – The species was not mentioned in BOISSIER (1867a, 1888) and was not mentioned in treatment of *Lepidium* for Pakistan (JAFRI, 1973), *Flora Iranica* (HEDGE, 1968), or BRASSIBASE (2019). However, it was treated by THELLUNG (1906b: 318) as a synonym of *Sisymbrium griffithianum* Boiss., though no such material of the species was found in any of the Geneva or other major herbaria consulted. Therefore, the identity of *Lepidium setosum* remains unresolved.

Hymenophysa C.A. Mey. ex Ledeb., Icon. Pl. Nov. 2: 20. 1830.

Tribe: *Lepidieae* DC.

Note. – As indicated in the preceding generic entry of *Lepidium*, the genus is currently defined to include *Hymenophysa*.

Hymenophysa fenestrata Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 197. 1842.

Type: “[Aucher-Eloy] N. 4095, Perezend”.

Holotypus: IRAN: “Pire Zend”, s.d., *Aucher-Eloy* 4095 (P [P02141403]; iso-: G-BOIS [G00330474], K [K000642717], P [P02141402]).

= *Lepidium chalepense* L., Cent. Pl. 2: 23. 1756.

Note. – The above G-BOIS duplicate consists of three fragmentary pieces taken by Boissier from P02141403 that he annotated.

Cakile Mill., Gard. Dict. ed. 4. 1754.

Tribe: *Brassicaceae* DC.

Note. – A genus of seven species six of which are native to the coasts of the Mediterranean sea, N Atlantic of Europe and North America, Caribbean Islands, and Gulf of Mexico. Two species are naturalized in the coasts of other continents. One species, *C. arabica* Vel., is an inland desert species in Kuwait, Iraq, Jordan, and Saudi Arabia (RODMAN, 1974).

Cakile maritima var. *integrifolia* Boiss., Fl. Orient. 1: 365. 1867.

Type: “Hab. in Aegypto ad Alexandriam (Samar!), in Euxino ad Moeotidem (Stev!)”.

Lectotypus (designated here): EGYPT: “Inter Alexandriam et Ramole”, 26.VIII.1855, *Samaritani* 3054 (G-BOIS [G00332568]). **Syntypus:** TURKEY: “Taur. Littor.”, 1820, *Steven* s.n. (G-DC [G00202895]).

= *Cakile maritima* Scop., Fl. Carniol. ed. 2, 2: 35. 1772.

Notes. – RODMAN (1974) did not examine the two syntypes above and did not lectotypify the taxon.

The only specimen of this species in the G herbaria that was collected by Steven is the one listed above. Its locality is different from that in the protologue, and it is not known if there is another specimen that has been misplaced or there is

some error in the original listing of the locality. Therefore the problem of this syntype remains unresolved.

The G-BOIS specimen is more complete and designated as the lectotype.

Erucaria Gaertn., Fruct. Sem. Pl. 2: 298. 1791.

Tribe: *Brassicaceae* DC.

Note. – A genus of ten species restricted to SW Asia and North Africa.

Erucaria aleppica var. *puberula* Boiss., Fl. Orient. 1: 365. 1867.

Type: “Hab. in Palaestina inter Hierosolymam et Jericho (Boiss!)”.

Holotypus: PALESTINE: “Palaestina. Descente à Jéricho”, IV–V.1846, *Boissier* s.n. (G-BOIS [G00332569]; iso-: G [G00446320], P [P05415289, P05415306]).

= *Erucaria hispanica* (L.) Druce in Rep. Bot. Exch. Club Soc. Brit. Isles 3: 418. 1914.

Note. – The holotype is a collection folder with three labelled sheets, of which one was annotated by Otto Eugene Schulz, and of the other two labeled sheets, one is barcoded.

Erucaria aleppica var. *polysperma* Boiss., Fl. Orient. 1: 366. 1867.

Type: “Hab. inter segetes ad Mersina Ciliciae (Bal!), in Assyriâ ad Tigridem (Noë!)”.

Lectotypus (designated here): TURKEY: “Mersina, dans les moissons”, 20.IV.1855, *Balansa* 235 (G-BOIS [G00332572]).

Syntypi: SYRIA: “Kass. ad Tigrid: in pratis et ruderalis”, 1851, *Noë* 8 (G-BOIS [G00332570]); “Kass. ad Tigridem”, V.1851, *Noë* 1128 (G-BOIS [G00332571]).

= *Erucaria hispanica* (L.) Druce in Rep. Bot. Exch. Club Soc. Brit. Isles 3: 418. 1914.

Note. – The lectotype consists of two labelled sheets in a collection folder.

Erucaria grandiflora Boiss., Diagn. Pl. Orient. 6: 13. 1846.

Type: “Hab. in declivibus apricis prope *Dalechi* et *Gere* [in Fl. Or: inter Abuchir et Schiraz] Persiae australis Kotschy No. 74”.

Holotypus: IRAN: “In declivibus apricis pr. Gere inter Abuschir et Schiras”, 22.III.1842, *Kotschy 74* (G-BOIS [G00332573]; iso-: BM [BM001254139, BM001254140, BM001254141], FI [FI005713], G [G00371682, G00371694, G00371696], GOET [GOET002574], H [H1260168], JE [JE00001704], K [K000653927], KW [KW000127937], LE [LE00012900], MO [MO1930353], P [P00741648, P00741649, P00741650, P00741651, P00741652, P04743340], US [US00099975], W [W0075587, W18890154986, W18890029608, W18890029625], WU [WU0101806]).

= *Erucaria hispanica* (L.) Druce in Rep. Bot. Exch. Club Soc. Brit. Isles 3: 418. 1914.

Notes. – Label of the holotype sheet was handwritten by Kotschy, while those of the isotypes were subsequently printed and distributed.

The holotype is a collection folder of two sheets, the label of one of which gives “Schiraz”, and on the packet has the collection number 74.

Erucaria lineariloba Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 390. 1842.

Type: “[Aucher-Eloy] N, 4140, Bouchir in Persiâ australi”.

Holotypus: IRAN: “Bider Bouchir”, s.d., *Aucher-Eloy 4140* (G-BOIS [G00332574]; iso-: BM [BM001254142, BM001254143], G [G00371653, G00371692], K [K000653926], LE [LE00012901], P [P00741653, P00741655, P00741656], W [W18890077521]).

= *Erucaria hispanica* (L.) Druce in Rep. Bot. Exch. Club Soc. Brit. Isles 3: 418. 1914.

Note. – Boissier based the species description on the unicate in his herbarium and did not examine any duplicates elsewhere.

Erucaria microcarpa Boiss., Diagn. Pl. Orient. 8: 47. 1849.

Type: “Hab. in deserto *Arabiae petraeae* contermino et in vallibus calidis inter *St.-Saba* et *mare Mortuum* (Boiss.)”.

Lectotypus (designated here): ISRAEL: “Arabia petraea, frontière de Palestine”, III.1846, *Boissier s.n.* (G-BOIS [G00332576]; isolecto-: G [G00371691, G00371701, G00371704, G00446319], GOET [GOET002646], K [K00065377, K000653878], KW [KW000127938], P [P00741657, P00741658], PH [PH00012908]). **Syntypus:** ISRAEL: “Palestine, Mar Morte”, IV–V.1846, *Boissier s.n.* (G-BOIS [G00332575]).

Note. – The lectotype is a collection folder of three sheets, of which two have only the collection month and year. The barcoded sheet has two labels one of which with the species name in red ink in Boissier’s handwriting.

Hussonia Boiss., Diagn. Pl. Orient. 8: 46. 1849.

Tribe: *Brassicaceae* DC.

Note. – The genus was reduced to synonymy of *Erucaria* by SCHULZ (1923), and with the exception of JAFRI (1977), all subsequent authors to the present have not recognized *Hussonia*.

Hussonia uncata Boiss., Diagn. Pl. Orient. 8: 47. 1849.

Type: “Hab. in *Wadi Feiran* Arabiae petraeae Schimper No 453, frequens in toto deserto Arabiae petraeae Palaestinae contermino inter *Nuckl* et *Gaza* [Boissier] in arenosis ad umbram suffruticum inter quos caules scandunt, in *Palaestinae* desertis (Pinard). Fl. Aprili”.

Lectotypus (designated here): ISRAEL: “Arabia petraea, inter Nuckl et Gaza”, III.1846, *Boissier s.n.* (G-BOIS [G00332577]; isolecto-: G [G00371611, G00371613, G00371614], K [K000653928, K000653929], KW [KW000127960], P [P00741642, P00741643, P00741660, P00741661], PH [PH00015037]). **Syntypi:** SINE PATRIA: “Arabia petraea”, 1846, *Pinard s.n.* (G [G00371610, G00371612], K [K000230250], KW [KW000127959], P [P00741662]). EGYPT: “Arabia petraea, Wadi Ferran”, 18.V.1835, *Schimper 453* (MO [MO3831305], P [P00741646, P00741647], TUB [TUB000588, TUB000589]).

= *Erucaria pinnata* (Viv.) Täckh. & Boulos in Publ. Cairo Univ. Herb. 5: 37. 1974.

Notes. – The lectotype is a collection folder of five sheets, of which one has Boissier’s handwriting of *Erucaria* in black ink with species epithet in red and “inter Nuckl et Gaza” on a printed label that reads “Arabia petraea, Mart. 1846. E. Boissier”. Another sheet is unlabeled, two carry the month and year of collection, and the fifth has only the above-mentioned printed label.

No duplicates of Pinard’s collection were found in G-BOIS, but the above sheets at G, K, KW, and P have printed labels handwritten by Boissier with the name “*Erucaria uncata* Boiss.” However, this name is a *nomen nudum* listed as synonym in the original publication of *Hussonia uncata*.

The two TUB duplicates have the collection number as *Schimper 457* instead of 453, but all the data are the same in both numbers, and both specimens are considered as most likely syntypes.

Greuter and Burdet (GREUTER & RAUS, 1983: 88) and GREUTER et al. (1986: 105) treated *Hussonia uncata* as a subspecies of *Erucaria pinnata*, but the differences between them are minor, and it is better to recognize a single, slightly polymorphic species as did BOULOS (1999).

ZOHARY (1966) followed SCHULZ (1923) in treating the species as *Erucaria uncata* (Boiss.) Asch. & Schweinf., but Boissier's plant is indistinguishable from the earlier published *Raphanus pinnatus* Viv. (Fl. Libyc. Spec.: 37. 1824), and both plants have non-torulose fruit with a long, curved beak. SCHULZ (1919) misinterpreted the limits of the species and transferred the latter name as *Reboudia pinnata* (Viv.) O.E. Schulz, which is indistinguishable from Boissier's *Erucaria microcarpa*, a species with torulose, beakless fruit.

Pyramidium Boiss., Diagn. Pl. Orient. ser. 2, 1: 46. 1854 [nom. illeg.] [non Brid.].

Tribe: *Anchonieae* DC.

Note. – This monospecific genus, which is now known as *Veselskya* Opiz, is endemic to Afghanistan.

Pyramidium griffithianum Boiss., Diagn. Pl. Orient. ser. 2, 1: 47. 1854.

= *Veselskya griffithiana* (Boiss.) Opiz in Lotos 6: 257. 1856.

Type: “Hab. in regno *Cabulico* circà *Dair Haj*, (W. Griffith. Coll. N° 1549 et 553 Journal)”.

Holotypus: AFGHANISTAN: “553 Journal. half way to *Dair Haj*”, s.d., *Griffith 1549* (K [K000693474]; iso-: G-BOIS [G00332578], K [K000693473]).

Notes. – The specimen of K with the journal and collection numbers on the label is the holotype.

The G-BOIS isotype is fragmentary and was taken from the holotype. The label of the holotype also has “Herb. Lemann, 1852” indicated whereas the G-BOIS isotype has “Mr. Lemann 1851”.

In addition to *Griffith 1549*, the isotype K000693473 has the number 1409 followed by “distr. cat.”.

Octoceras Bunge in Arbeiten Naturf. Vereins Riga 1: 172. 1847.

Tribe: *Euclidieae* DC.

Note. – A monospecific genus distributed from Iran into Afghanistan, Pakistan, Turkmenistan, Uzbekistan, and Kazakhstan.

Octoceras lehmannianum var. *stocksianum* Boiss., Fl. Orient. 1: 370. 1867.

Type: “Hab. in Belutschîâ prope Nichara (Stocks!), in Affghaniâ prope Quettah (Giff!)”.

Lectotypus (designated here): PAKISTAN: “Nichara”, 1851, *Stocks 805* (G-BOIS [G00332579]; isolecto-: K [K000484421, K000484422, K000618651]). **Syntypi:** AFGHANISTAN: *sine loco*, s.d., *Griffith 1407* (P [P00741615]); “near Quettah”, s.d., *Griffith 1506* (K [K000618650]).

= *Octoceras lehmannianum* Bunge in Arbeiten Naturf. Vereins Riga 1: 172. 1847.

Notes. – The collection *Griffith 1506* corresponds to number 427 in Griffith's journal as indicated on K000618650.

The variety is said to have straight fruit spines as long as or longer than the fruit width, but these aspects of the spine are quite variable and not useful taxonomically.

Boreava Jaub. & Spach in Ann. Sci. Nat., Bot. ser. 2, 16: 341. 1841.

Tribe: *Isatideae* DC.

Note. – As previously recognized, the genus included two species, but based on molecular studies, it has recently been united with the larger *Isatis* L. (see AL-SHEHBAB, 2012).

Boreava aptera Boiss. & Heldr. in Boiss., Diagn. Pl. Orient. 8: 49. 1849.

= *Isatis aptera* (Boiss. & Heldr.) Al-Shehbaz et al. in Taxon 61: 948. 2012.

Type: “Hab. propè *Bouldour* Pisidia (Heldreich)”.

Holotypus: TURKEY: “Bouldour”, 24.V.1845, *Heldreich 1086* (G-BOIS [G00332580]).

Note. – The holotype is a collection folder of three sheets, of which one has the handwritten label by Heldreich, with a collection number and day of collection. The two other sheets have a printed, handwritten label by Boissier: “Propè Bouldour Pisidia”, but do not have the collection date or number.

Glastaria Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 382. 1841.

Tribe: *Isatideae* DC.

Note. – A genus of one species distributed in Iraq, Israel, Jordan, Lebanon, Syria, and Turkey.

Glastaria deflexa Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 382. 1841 [nom. illeg.].

= *Glastaria glastifolia* (DC.) Kuntze, Revis. Gen. Pl. 1: 30. 1891.

Notes. – *Glastaria deflexa* is illegitimate because its protologue listed the earlier published *Peltaria glastifolia* DC. (Syst. Nat. 2: 330. 1821) as a synonym.

Boissier in *Flora Orientalis* adopted the generic name *Texiera* Jaub. & Spach and combination *T. glastifolia* (DC.) Jaub. & Spach (Ill. Pl. Orient. 1(1): 1, t. 1. 1842), under which he placed *Glastaria deflexa* in synonymy, without realizing that *Glastaria* (BOISSIER, 1841b) has priority over *Texiera*.

Pachypterygium Bunge, Del. Sem. Hort. Dorpat. 1843: 8. 1843.

Tribe: *Isatideae* DC.

Note. – The genus was reduced by JAFRI (1973) to synonymy of *Isatis* L., and that merger was supported by AL-SHEHBAZ (2012) based on molecular phylogenetic data by MOAZZENI et al. (2010).

Pachypterygium densiflorum Bunge ex Boiss., Fl. Orient. 1: 373. 1867.

= *Isatis densiflora* (Bunge ex Boiss.) German in Turczaninowia 19(4): 130. 2016.

Type: “Hab. in montosis Persiae australis inter Khabbise et Kerman (Bunge!)”.

Holotypus: IRAN: “in montosis inter Chabbis et Kerman”, IV.1859, *Bunge s.n.* (G-BOIS [G00332583]; iso-: B [B100272077], K [K000642924], LE [LE00012933, LE00012934], P [P00741529]).

Notes. – Boissier did not examine any material other than the duplicate in his herbarium.

GERMAN (2016) is followed in recognizing this species as distinct instead of JAFRI's (1973) position in reducing it to synonymy of *I. multicaulis* (Kar. & Kir.) Jafri.

Pachypterygium brevipes var. *persica* Boiss., Fl. Orient. 1: 374. 1867.

= *Isatis brevipes* (Bunge) Jafri in Nasir & Ali, Fl. W. Pakistan 55: 72. 1973.

Type: “Hab. in Persiâ bor.-orientali ad Schahrud (Bunge!)”.

Holotypus: IRAN: “prope Schahrud”, V.1858, *Bunge s.n.* (G-BOIS [G00332584]; iso-: K [K000642922], LE [LE00012929, LE00012930], P [P00741524]).

Note. – The variety was raised by PARSA (1951: 846) to a species, but its minor variation from the plants of *I. brevipes* does not merit its recognition at any rank.

Sameraria Desv. in J. Bot. Agric. 3: 161. 1815.

Tribe: *Isatideae* DC.

Note. – *Sameraria* included nine species of southwestern Asian, but some of its species were transferred by HADAČ & CHRTEK (1973) to the earlier published *Isatis*. Subsequent molecular phylogenetic studies (MOAZZENI et al., 2010) supported that transfer, and the remaining species were later moved to *Isatis* by AL-SHEHBAZ (2012).

Sameraria elegans Boiss., Fl. Orient. 1: 375. 1867.

= *Isatis elegans* (Boiss.) Hadač & Chrtek in Acta Univ. Carol., Biol. 1971: 251. 1973.

Type: “Hab. in Persiâ orientali inter Kerman et Yezd (Bunge!)”.

Holotypus: IRAN: “Inter Kerman et Jesd, inter Booriderum & Gerdekuh”, IV.1859, *Bunge* 78 (G-BOIS [G00332585]; iso-: B [B100241703], G [G00446316], K [K000642927], LE [LE00012904, LE00012908], P [P00741433, P00741434, P00741435, P00741437], US [US000324435], W [W0050791]).

Note. – All isotypes have the printed locality “inter Kerman et Jesd. Apr. 1859” and lack the additional details “inter Booriderum & Gerdekuh” and the collection number 78, though label of the isotype P00741433 has that collection number.

Sameraria leiocarpa Boiss., Fl. Orient. 1: 375. 1867.

Type: “Hab. in Persiâ austro-orientali inter Kerman et Yezd (Bunge!)”.

Holotypus: IRAN: “Inter Kerman et Jesd, inter Booriderum & Gerdekuh”, IV.1859, *Bunge* 79 (G-BOIS [G00332586]; iso-: P [P00741436]).

= *Isatis elegans* (Boiss.) Hadač & Chrtek in Acta Univ. Carol., Biol. 1971: 251. 1973.

Note. – The P duplicate was neither studied nor annotated by Boissier who based the species only on the material in G-BOIS.

Sameraria macrocarpa Boiss. & Hausskn. in Boiss., Fl. Orient. Suppl.: 64. 1888.

Type: “Hab. in jugo Pir Omar Gudrun Kurdistaniae Persicae (Hausskn.)”.

Holotypus: IRAQ: “Pir Omar Gudrun”, VI.1867, *Haussknecht* 126 (G-BOIS [G00332587]; iso-: JE [JE00002856]).

= *Isatis stylophora* (Jaub. & Spach) Hadač & Chrtek in Acta Univ. Carol., Biol. 1971: 251. 1973.

Note. – The JE duplicate was not seen by Boissier.

Isatis L., Sp. Pl.: 670. 1753.

Tribe: *Isatideae* DC.

Notes. – *Isatis* is Eurasian genus of some 94 species centered primarily in SW Asia. As indicated by DAVIS (1964, 1965b), the genus is taxonomically rather difficult due to the high morphological variability and overlap among related taxa. Indeed, without mature fruit, identification of species becomes tentative at best.

Extensive molecular, morphological, and cytological studies are needed to understand the sources of taxonomic complexity and evolutionary history of the genus.

Isatis violascens var. *longipes* Boiss., Fl. Orient. 1: 376. 1867.

Type: “Hab. in deserto ad Ssertschah Persiae mediae orientalis (Bunge!)”.

Holotypus: IRAN: “pr. Sser-tschah Persiae mediae orientalis. pr. desertum m. Otesch-Kerde”, III.1859, *Bunge* 74 (G-BOIS [G00332588]; iso-: P [P00741509, P00741510]).

= *Isatis emarginata* Kar. & Kir. in Bull. Soc. Naturalistes Moscow 15: 158. 1842.

Note. – Only the holotype was examined by Boissier.

Isatis stocksii Boiss., Fl. Orient. 1: 376. 1867.

Type: “Hab. in Belutschîâ prope Döubund (Stocks!)”.

Holotypus: PAKISTAN: “Beloutchistan. Döubund”, 1851, *Stocks* 964 (G-BOIS [G00332589]; iso-: K [K000642850, K000642851]).

Note. – A distinctive species treated by HEDGE (1968) as *Pachypterygium*, but molecular phylogenetic studies by MOAZZENI et al. (2010) supported its initial assignment in *Isatis* by Boissier in *Flora Orientalis*.

Isatis candolleana Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 199. 1842.

Type: “[Aucher-Eloy] N. 215, Taurus”.

Lectotypus (designated here): TURKEY: “Taurus”, 1837, *Aucher-Eloy* 215 (G [G00371798 plant on left with glabrous fruit]; isolecto-: G-BOIS [G00332591 fragment on left with glabrous fruit], P [P00741461]) (Fig. 32, p. 124).

Notes. – The specimen in G-BOIS is a mixed collection of fragments both of which were almost certainly taken from the more complete lectotype specimen that was studied by Boissier and consists of two complete plants also representing two taxa. Therefore, the name needs lectotypification.

BOISSIER (1842b) noticed that one plant had glabrous fruit and the other has densely velutinous ones, and he recognized them as var. α and β , respectively. He questioned if the glabrous plant (var. α) might be the same as *I. leiocarpa* DC., but this is a different taxon that belongs to *I. cappadocica* subsp. *subradiata* (Rupr.) P.H. Davis.

DAVIS (1965b: 297) described the fruit of *I. candolleana* as either velutinous or glabrous, thus agreeing with Boissier's original concept of the species and overlooking the fact that two species are involved.

BOISSIER (1856) described *I. velutina* and cited a single collection (*Huet du Pavillon s.n.*, see below), but he (*Fl. Orient.* 1: 377) added to the confusion by reducing *I. candolleana* to synonymy of the Caucasian *I. latisiliqua* Steven and cited its type collection, *Aucher-Eloy* 215 (*Fl. Orient.* 1: 378), as one of the three collections of *I. velutina*.

As lectotypified above, the plant with glabrous, smaller, purple fruit (var. α) is *I. candolleana*, whereas the plant with densely velutinous, larger, and yellowish fruit (var. β) should be attributed to *I. velutina*.

DAVIS (1965b: 296) overlooked the mixed type collections above and reduced *I. velutina* to synonymy of the earlier published *I. candolleana*, thus accepting a much broader species circumscription with drastically different fruit morphology.

There are other duplicates of *Aucher-Eloy* 215 (e.g., P00741508) that consist of only *I. velutina*.

Isatis latisiliqua var. *apiculata* (Boiss.) Boiss., Fl. Orient. 1: 377. 1867.

= *Isatis apiculata* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 199. 1842.

Type: “[Aucher-Eloy] N. 4139, Ispahan”.

Holotypus: IRAN: “Ispahan”, s.d., *Aucher-Eloy* 4139 (P [P00741485]; iso-: G [G004462750], G-BOIS [G00332590], P [P00741463]).

= *Isatis cappadocica* Desv. in J. Bot. Agric. 3: 174. 1815.

Notes. – The G-BOIS specimen is fragmentary and consists of a basal leaf and leafless flowering and fruiting branches, and unlike the other duplicates above with printed labels, that of G-BOIS was handwritten by Boissier.

The fragments were certainly taken from the complete P00741485 specimen that was annotated in Boissier's handwriting as “*Isatis apiculata*! Boiss.”.

This taxon most likely belongs to the *I. cappadocica* complex, but because of the immature fruit, it is almost impossible to confidently assign the type collection to any of the several subspecies of *I. cappadocica*.

Isatis latisiliqua var. *gudrunensis* Boiss., Fl. Orient. Suppl.: 64. 1888.

Type: “Hab. in rupestribus calcareis montis Pir Omar Gudrun Kurdistaniae 3–7000' (Haussk.!)”.

Holotypus: IRAQ: “Pir Omar Gudrun”, 3000'–6000' [910–1830 m], VI.1867, *Haussknecht* s.n. (G-BOIS [G00332592]; iso-: BM [BM001254136], K [K000642855], JE [JE00001296], P [P05384183]).

= *Isatis cappadocica* subsp. *subradiata* (Rupr.) Davis in Notes Roy. Bot. Gard. Edinburgh 26: 18. 1965.

Notes. – The above duplicates at K and P were collected at an elevation of 4–7000 ft, instead of 3–6000 ft as in the other duplicates, and may well belong here.

This taxon was treated by DAVIS (1964, 1965b) as *I. cappadocica* subsp. *subradiata* var. *gudrunensis* (Boiss.) Davis and by HEDGE (1968: 81–82) as a synonym of *I. cappadocica* subsp. *stenophylla* (Bornm. & Gauba) Hedge & Lamond. The differences between these two subspecies are tenuous at best and rest exclusively on the length/width ratio of the fruit.

Plants of the type collection of var. *gudrunensis* do not have mature fruit, and they are only reluctantly assigned here to the earlier published subsp. *subradiata*.

Isatis cordigera Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 198. 1842.

Type: “[Aucher-Eloy] E Persiâ probabiliter sed nec locus nec numerus in Schedulâ indicantur”.

Holotypus: IRAN: *sine loco*, s.d., *Aucher-Eloy* s.n. (P [P00741483]; iso-: G-BOIS [G00332594]).

= *Isatis cappadocica* subsp. *besseri* (Trautv.) Hedge & Lamond in Rech. f., Fl. Iran. 57: 82. 1968.

Notes. – The G-BOIS sheet consists of a handwritten label by Boissier and an envelope with only two fruits taken from the unicate P00741483 that was annotated in Boissier's handwriting as “*Isatis cordigera*! Boiss.”. Therefore, this P specimen is the holotype.

Isatis cordigera was not listed in HEDGE (1968) in the synonymy of *I. cappadocica* subsp. *besseri*.

Isatis undulata Aucher ex Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 200. 1842.

Type: “[Aucher-Eloy] N. 212, Cappadocia ad Euphratem”.

Holotypus: TURKEY: “Cappad. ad Euphratem”, s.d., *Aucher-Eloy* 212 (G-BOIS [G00332593]; iso-: E [E00386034], G [G00371663], K [K000642857], P [P00741502, P00741503, P00741504], W [W18890171321]).

Note. – The evidence supporting DAVIS (1965b: 297) recognition of the G-BOIS duplicate as the holotype is that none of the isotypes was annotated by Boissier.

Isatis velutina Boiss. & A. Huet in Boiss., Diagn. Pl. Orient. ser. 2, 5: 45. 1856.

Type: “Hab. in valle Kassuklu Armeniae borealis cl. Huet du Pavillon”.

Holotypus: TURKEY: “In valle Kassuklu”, V.1853, *Huet du Pavillon* s.n. (G-BOIS [G00332595]; iso-: BM [BM001254135], G [G00371803], K [K000642859]).

Notes. – The isotype sheet at G has a label with the handwritten part “In ruderatis vallis Kassuklu 4–5000 p.s.m.” and a printed part “Inter Baibout et Erzeroum. Armenia”. The sheet was erroneously annotated by Davis as holotype.

As discussed under *I. candolleana*, the fate of *I. velutina* depends on whether the mixed type collection of the lectotype of the former is treated as one or two species. It is concluded here that two species are involved, though DAVIS (1965b: 296), followed by GREUTER et al. (1986: 129), reduced *I. velutina* to synonymy of *I. candolleana* and accepted the latter as a polymorphic species with two fruit types.

Davis annotated the holotype sheet of *I. velutina* in 1960 (Fig. 32, p. 124) as a synonym of the later-published *I. conringiifolia* Bornm., but he (DAVIS, 1964: 21, 1965b: 296) treated both as synonyms of *I. candolleana*. He also annotated

the isotype G00371803 as holotype of *I. velutina* and “probably best treated as a var. of *I. candolleana*, or possibly a hybrid between the latter & sp. aff. *I. atropatana* Grossh.”.

Isatis alyssifolia Boiss., Fl. Orient. 1: 378. 1867.

= *Isatis cappadocica* subsp. *alyssifolia* (Boiss.) P.H. Davis in Notes Roy. Bot. Gard. Edinburgh 26: 18. 1964.

Type: “Hab. in rupestribus montis Ballouklardan Lyciae (Bourg!)”.

Holotypus: TURKEY: “Mt de Baluclardan prov. de Elmali”, 28.V.1860, *Bourgeau* 56 (G-BOIS [G00332596]; iso-: B [B100249796, B100249797], E [E00386032], G [G00371786], K [K000642854], P [P00741408, P00741409, P00741410], W [W18890067000]).

Note. – The holotype is a collection folder of two sheets one with a handwritten label and the other with a printed label, as in isotypes: “In rupestribus montis Ballouklardan *Bourgeau s.n.*”.

Isatis iconia Boiss. & Heldr. in Boiss., Diagn. Pl. Orient. 8: 48. 1849.

= *Isatis glauca* subsp. *iconia* (Boiss. & Heldr.) P.H. Davis in Notes Roy. Bot. Gard. Edinburgh 26: 22. 1964.

Type: “Hab. in agris propè *Koniah* (Heldreich)”.

Holotypus: TURKEY: “in campis *Koniah*”, 16.VI.1845, *Heldreich* 827 (G-BOIS [G00332598]).

Notes. – No duplicates of the type collection were seen in any of the major herbaria consulted, and it is not known if Heldreich collected more than the type specimen above.

The holotype is a collection folder of two sheets, of which the labeled, barcoded one consists of the lower part of the plant, and the other sheet is unlabeled and consists of an infructescence. Without either of the two sheets, it is impossible to know the identity of the species. It is also unknown if the two sheets belong to the same species.

No complete fruiting collections of the species were examined for this study, and a designation of such material as an epitype is highly desirable.

Isatis kotschyana Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. 8: 48. 1849.

Type: “Hab. ad radices montis *Demawend* in provinciâ *Lar*. Kotschy No 333”.

Lectotypus (designated here): IRAN: “Ad radices m. Demawend pr. p. Lar.”, 19.VI.1843, *Kotschy* 333 (G-BOIS [G00332600]; isolecto-: BM [BM000582563], E [E00386030, E00386031], FI [FI005706], G [G00371783, G00371784], GOET [GOET002619], K [K000642860], KW [KW000127956], LE [LE00012915, LE00012916], MO [MO1930850], P [P00580385, P00741455, P00741456, P00741457, P00741458, P004745146, P05384224], W [W0050808, W0075582], WAG [WAG0000827]).

Notes. – The sheet in Bunge’s herbarium P00741456 was annotated on a small piece of paper by Boissier as “*Isatis kotschy* B.”, and that annotation justifies lectotypifying the name.

Label of one duplicate [P05384224] has exactly the same information as that of the type except for a collection number as *Kotschy* 333a instead of 333, and it is recognized here as an isolectotype.

Isatis glauca Aucher ex Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 201. 1842.

Type: “[Aucher-Eloy] N. 214, Cappadocia ad Euphratem”.

Holotypus: TURKEY: “Capp. ad Euphratem”, s.d., *Aucher-Eloy* 214 (P [P00741452; iso-: G-BOIS [G00332601], P [P00741453]).

Notes. – The G-BOIS specimen has a label in Boissier’s handwriting, and it consists of a basal leaf and two lateral branches of developing infructescence taken from P00741452 that was annotated by Boissier as “*Isatis glauca!* Auch”.

The species was divided by DAVIS (1965b) into three subspecies.

Isatis glauca var. *collina* Boiss., Fl. Orient. 1: 379. 1867.

Type: “Hab. in collibus Lyciae et Armeniae (Bourg!), Cappadociae (Bal)”.

Lectotypus (designated here): TURKEY: “Collines situées au nord des Marais de Césarée (Cappadoce)”, c. 1200 m, 23.VII.1856, *Balansa* 454 (G-BOIS [G00332602]).

Syntypus: TURKEY: “Mt. de Ballouklardan”, 17.VI.1860, *Bourgeau* 58 (E [E00386029], G [G00446276, G00446277], G-BOIS [G00332603], K [K000642862], W [W18890066999]).

= *Isatis glauca* Aucher ex Boiss. subsp. *glauca* in Ann. Sci. Nat., Bot. ser. 2, 17: 201. 1842.

Notes. – The lectotype sheet was annotated as such by Davis in 1960, and his typification is accepted here.

The syntypes have *Bourgeau* 58 on the G-BOIS sheet or *Bourgeau s.n.* in exsiccatae distributed as *Isatis aucheri* var. *glabrescens*.

Isatis callifera Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 5: 46. 1856.

Type: “Hab. in fauce fluvii *Guzel Déré* suprâ *Sedichig* in *Ciliciâ* littorali cl. Balansa Fl. et Fr. Aprili”.

Holotypus: **TURKEY:** “Berges du *Guzel Déré*, en amont de *Sedi-chig* (Environs de *Mersina*)”, 14.IV.1855, *Balansa* 203 (G-BOIS [G00332604]; iso-: P [P00741421]).

Notes. – The label indicates that the specimen is “unique”, though there is the duplicate above at P that was not annotated by Boissier. It was collected by Balansa and its label carries the exact information as that of the holotype but without the collection number and with the year indicated.

Isatis frigida Boiss. & Kotschy in Boiss., Diagn. Pl. Orient. ser. 2, 5: 47. 1856.

Type: “Hab. in declivibus cacuminis *Metdesis* Tauri *Cilicici* suprâ fodinas plumbeas *Gülek* alt. 9000' cl. Kotschy”.

Holotypus: **TURKEY:** “in Tauri alpes ‘Bulgar-Dagh.’ Ad devexa summi cacuminis *Metdesis* supra plumbi fodinas pagi *Gülle*”, 9000' [2740 m], 30.VII.1853, *Kotschy* 156 112 222 (G-BOIS [G00332605]; iso-: E [E00257786], G [G00446278], GOET [GOET002620], K [K000642864, K000642865], KW [KW000127955], P [P00741443, P00741444, P00741445, P00741446, P00741447, P00741448, P00741449], S [S0912386, S0912398], W [W0075583, W0075584, W0075585], WAG [WAG0004253, WAG0004254]).

Notes. – Labels of the type collection have one to three collection numbers, but all the other data are identical, and it appears that different collection numbers were given by Kotschy with the thought that they represent different things. However, all labels carry the name *I. suffrutescens* Boiss., a *nomen nudum* listed in the synonymy in the original publication and in *Flora Orientalis*.

The label of P00741446 in Cosson's herbarium is handwritten, and it reads “*Isatis suffrutescens*, Boiss. Kotschy, iter cilic. no. 156”. However, plants with the numbers 156, 112, and 222 were mounted on a single sheet with barcodes P00741443, P00741444, and P00741445, respectively, though carrying the same information as that of the holotype. Therefore, such collection numbers have no value for this species.

The holotype is a collection folder of two sheets, the printed label of one of which indicate “*Plantae Tauri Cilicici*. Th. Kotschy. 1853”.

Isatis athoa Boiss., Fl. Orient. Suppl.: 64. 1888.

≡ *Isatis tinctoria* subsp. *athoa* (Boiss.) Papan. in Strid, Mount. Fl. Greece 1: 238. 1986.

Type: “Hab. in monte Atho unde semina ex quibus hanc plantam colui retulit cl. Pichler”.

Lectotypus (designated here): **GREECE:** “Mt Athos”, cult. 1875, *Pichler s.n.* (G-BOIS [G00332612 fruiting plant]).

Syntypus: **GREECE:** “Mt Athos”, cult. 1875, *Pichler s.n.* (G-BOIS [G00332612 flowering plant]).

Notes. – The plant was grown in Boissier's private garden at Valeyres from fruit collected by Pichler in 1873, and the voucher was collected by Boissier in 1875.

It is not known if Pichler made a voucher specimen of the fruits he sent to Boissier, but there is no such material in the Geneva herbaria.

The lectotype is a collection folder of two sheets, the plants of each were collected by Boissier at different times of the year because each sheet has plants in early flower and others with mature fruit. However, no collection dates were given. The flowers in *Isatis* hardly have any taxonomic value, but the fruits are essential. Therefore, the fruiting material is designated as the lectotype and the flowering branches as a syntype.

Isatis leuconeura Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 28. 1860.

Type: “Im Joluthal des Albursgebirges, [Buhse] 18 Juni 1848 (specimen unicum)”.

Holotypus: **IRAN:** “Elburs”, s.d., *Buhse* 1024 (G-BOIS [G00332607]; iso-: LE [LE00012917]).

Notes. – The LE specimen is a more complete unicate than the somewhat fragmentary material in G-BOIS.

As indicated in the protologue, the LE sheet has well-developed oblong auricles on the sagittate-amplexicaul cauline leaves the measurements of which were given in the original description.

The G-BOIS sheet has only reduced, non-auriculate leaves at the inflorescence branches. However, there are some problems with the label information on the G-BOIS sheet. It has a pre-printed 1847 label, just as most other Persian collection of Buhse that he collected post 1847 and sent to Boissier, and the locality as “Persia. Elburs” [Johu Valley] and collection number 1024, compared to the LE sheet without a collection number. Finally, the G-BOIS duplicate has better developed fruits than the LE duplicate, and the latter was not annotated

by Boissier. For these reasons, the G-BOIS specimen is recognized as the holotype.

HEDGE (1968: 84) indicated that *Isatis leuconeura* may be conspecific with *I. glauca*, though further studies on mature fruiting material is needed to elucidate that.

Isatis biscutellifolia Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 28. 1860.

Type: “Gebirge bei Jesd, Deh ballo, 24 Aprii 1849 (florens et fructifera). Zwischen Isfahan und Kaschan im Gebirge bei Ssoffi, 21 Mai 1849 (fructu immaturo). [Buhse] No 1367 et 1430. Provinz Aderbidschan: Pl. exs. Aucherianae No 4138, A”.

Lectotypus (designated here): **IRAN**: *sine loco*, s.d., *Buhse 1430* (G-BOIS [G00332608]; isolecto-: LE [LE00012910], P [P00741420]). **Syntypi**: **IRAN**: “Aderbidjan”, s.d., *Aucher-Eloy 4138A* (BM [BM001254138], G-BOIS [G00332609]); *sine loco*, 1849, *Buhse 1367* (P [P00741418]).

Notes. – The G-BOIS herbarium has one of the two syntypes of Buhse, and that number is designated here as the lectotype. The label of the isolectotypes have “Deh Ballo bei Jesd” at P without any Buhse number indicated and “1430. Gebirge bei Jesd, 24. April 1849” at LE.

Despite being immature, the fruit are rather bizarre for being contorted siliques. As for the Aucher-Eloy syntype, it is in the early flowering stage and almost impossible to assess its identity, though it has longer and denser indumentum than the lectotype which it resembles in leaf shape and size.

The Aucher-Eloy collection is tentatively taken as a syntype. Both duplicates at P are part of the Bunge herbarium.

Isatis aucheri Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 202. 1842.

Type: “[Aucher-Eloy] N. 213, Besnie”.

Lectotypus (designated here): **TURKEY**: “Besni”, s.d., *Aucher-Eloy 213* (G [G00371802]; isolecto-: G [G00371782], G-BOIS [G00332610], P [P00580386, P00741411, P00741412, P00741413, P04742615], W).

Note. – Although BOISSIER (1841a) was followed in determining whether the above specimen is a holotype or a lectotype, lectotypifying the name is preferred because Boissier examined G00371802 and because of the uncertainty whether the fragmentary specimen in G-BOIS, which consists of two small infructescence branches, was taken from the above duplicate or sent to him from P.

Isatis aucheri var. *vellerifera* (Boiss. & Noë) Boiss., Fl. Orient. 1: 380. 1867.

= *Isatis vellerifera* Boiss. & Noë in Boiss., Diagn. Pl. Orient. ser. 2, 1: 46. 1854.

Type: “Hab. in *Armeniâ* meridionali ad *Bakker Maaden* ubi Junio 1852 detexit cl. Noë”.

Holotypus: **TURKEY**: “Bakker Madem”, V–VI.1852, *Noë 827* (G-BOIS [G00332611]; iso-: KW [KW000127953]).

= *Isatis aucheri* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 202. 1842.

Note. – Boissier did not examine the duplicate at KW, and he based the description on the unicate in his herbarium.

Isatis cochlearis Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 202. 1842.

Type: “[Aucher-Eloy] N. 211, Besnie”.

Holotypus: **TURKEY**: “Besnie”, 1834, *Aucher-Eloy 211* (P [P00741423]; iso-: G-BOIS [G00332613], K [K000642881], W [W0050809]).

Note. – The sole material in the Geneva herbaria is the rather fragmentary specimen in G-BOIS that consists of two, small infructescence branches doubtless taken from the far more complete P00741423 by Boissier. Then the Paris sheet ought to be recognized as the holotype.

Isatis tinctoria var. *stenocarpa* Boiss., Fl. Orient. 1: 381. 1867.

= *Isatis tinctoria* subsp. *tomentella* (Boiss. & Balansa) P.H. Davis in Notes Roy. Bot. Gard. Edinburgh 26: 22. 1964.

Note. – Boissier in *Flora Orientalis* renamed the following entry at the varietal rank.

Isatis tomentella Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 5: 46. 1856.

= *Isatis tinctoria* subsp. *tomentella* (Boiss. & Balansa) P.H. Davis in Notes Roy. Bot. Gard. Edinburgh 26: 22. 1964.

Type: “Hab. in regione mediâ montis *Sipyli* suprâ *Magnesiam* cl. Balansa”.

Holotypus: **TURKEY**: “Partie moyenne du *Mont Sipyile*, au-dessus *Magnésie*”, 10.VI.1854, *Balansa 85* (G-BOIS [G00332614]; iso-: BM [BM000582564], E [E00386106, E00386108], FI [FI005708], G [G00371657,

G00371785], GOET [GOET002624], JE [JE00001299], K [K000642882], KW [KW000127957], LE [LE00012928], P [P00741495, P00741498], US [US00099984], W [W0050162, W0050163, W1889158145], WAG [WAG0004252]).

Notes. – As indicated above, Boissier in *Flora Orientalis* reduced the species to synonymy of *I. tinctoria* var. *stenocarpa*.

This taxon, the preceding, and following entries clearly belong to the highly variable *I. tinctoria* complex, which is the most widespread naturalized species in the genus and the only one cultivated extensively in the past for the blue dye woad (LEGGETT, 1944). It is still cultivated in SW Asia, through the central Asian republics of the former Soviet Union, into western and central China.

The lines separating its component infraspecific taxa can be tenuous and, therefore, DAVIS (1964) is followed in treating the extremes at the subspecific rather than the specific rank. In addition to Turkey, subsp. *tomentella* grows in Greece. However, in recognizing this entity at the species rank, TAN (2002: 127) erred in placing in its synonymy the earlier published *I. corymbosa*. Perhaps the ideal solution for the Greek representatives of this complex is to follow DAVIS (1964) in recognizing them at the subspecific rank.

Isatis corymbosa Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 200. 1842.

= *Isatis tinctoria* subsp. *corymbosa* (Boiss.) P.H. Davis in Notes Roy. Bot. Gard. Edinburgh 26: 22. 1964.

Type: “[Aucher-Eloy] N. 210, è Schedulâ collectionis meae in monte *Tauro*, ex eâ Musaei Parisiensis in *Thessaliâ*, circa *Larissam*”.

Lectotypus (designated here): **TURKEY**: “in Mte. *Tauro*”, s.d., *Aucher-Eloy 210* (G-BOIS [G00332615]; isolecto-: K [K000642883]). **Syntypi**: **GREECE**: “Inter Jugets Thessaliae. circa *Larystam*”, 1836, *Aucher-Eloy s.n.* (P [P00741424]); “Thessalia”, s.d., *Aucher-Eloy s.n.* (P [P00741425]).

Notes. – BOISSIER (1842b) based the species description on the unicate in his herbarium and on P00741424 that he annotated. Therefore, lectotypification is justified.

The label data in P00741426 is “Graecia, Cilicia, 1834–1936, *Aucher-Eloy 210*”, and although the collection number is the same as that of the lectotype, the collection date and locality are quite different. To our knowledge, Cilicia is in southern Turkey, not Greece, and therefore, this specimen is not considered as part of the type collection.

The subspecies is distributed in the southwestern portions of Turkey, south central and western Greece, and Crimea. It was recognized by TAN (2002) as a synonym of *Isatis tomentella* (see previous entry), but it is more practical to treat it as

independent taxon, as recognized here, by DAVIS (1965b), and BRASSIBASE (2019).

Isatis lockmanniana Kotschy ex Boiss., Fl. Orient. 1: 381. 1867.

Type: “Hab. in fissuris rupium montis Gebel Nur Ciliciae Kurdicae (Ky exs. 11!)”.

Holotypus: **TURKEY**: “Plantae in monte Lokmanni ‘Dschebbel Nur’ lectae. In fissuris rupestribus occidentem versus spectantibus”, 2100' [640 m], 24.IV.1859, *Kotschy 11* (G-BOIS [G00332616]; iso-: E [E00386145, E00441857], G [G00446279], JE [JE00001835], K [K000642884], LE [LE00012918, LE00012919], P [P00741472, P00741473, P00741474], S [S0912342], W [W0077482]).

Note. – The holotype is a collection folder of two sheets, the label of the barcoded one is printed, as in all isotypes, whereas label of the other sheet has “Th. KOTSCHY. Iter Orientale 1859”.

Isatis microcarpa J. Gay ex Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 201. 1842.

Type: “[Aucher-Eloy] N. 209, Sinai”.

Holotypus: **EGYPT**: “Sinai”, s.d., *Aucher-Eloy 209* (G-BOIS [G00332617]; iso-: G [G00446280, G00446281], K [K000642888], P [P00741407, P00741478, P00741479]).

Note. – The P00741407 and P00741478 duplicates were annotated by Gay as “*Isatis microcarpa* Gay in pl. un. itin Boiss. pl. Aucher”, and except for the G-BOIS, all other duplicates were distributed with the species name. The original holotype label still lacks the species name, and none of the above duplicates was annotated by Boissier.

Isatis aleppica var. *pamphylica* Boiss., Fl. Orient. 1: 383. 1867.

Type: “in cultis et ruderalis ad Adalia Pamphylicae (Heldr, Pestw Bourg!)”.

Lectotypus (designated here): **TURKEY**: “sur plusieurs cimetières turcs autour de la ville d’Adalia”, III.1845, *Heldreich 472* (G-BOIS [G00332620]; isolecto-: E [E00386102, E00386103], G [G00446283, G00446284, G00446314], GOET [GOET002621], K [K000642889, K000642891]). **Syntypi**: **TURKEY**: “Adalia, in arvis”, 19.IV.1860, *Bourgeau 23* (E [E00386100, E00386101], G [G00446282], G-BOIS [G00332619], K [K000642890]); “Adalia”, 1846, *Pestalozza s.n.* (G-BOIS [G00332618]).

= *Isatis lusitanica* L., Sp. Pl.: 670. 1753.

Notes. – The lectotype is a collection folder of three sheets, of which one has the barcode and original label in French, another has the printed, handwritten label by Boissier, and the third is unlabeled.

The isoelectotypes have printed label handwritten by Boissier: “circa Adalia. Mart 1845. Heldreich”.

Isatis songarica var. *persica* Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 27. 1860.

Type: “Wüste Ebene bei Dschendak, [Buhse] 6 April 1849 (deflorata). Gebirge bei Jesd, [Buhse] 24 April 1849 (fructu immaturo)”.

Lectotypus (designated here): **IRAN:** “Planitium ad Djendack”, 1847, *Buhse s.n.* (G-BOIS [G00332622]; isolecto-: LE).

= *Isatis minima* Bunge, Del. Sem. Hort. Dorpat. 1843: 7. 1843.

Notes. – Label of the lectotype has “Persia. Dr. Buhse. 1847” pre-printed prior to collecting the material in 1849. It carries the species name handwritten perhaps by Buhse, but the locality in Boissier’s handwriting.

The syntype from Yezd was not found in G-BOIS and is most likely housed at LE.

This varietal name was not mentioned in *Flora Orientalis*, though *I. songarica* was listed in the synonymy of *I. minima* Bunge. Furthermore, it was not mentioned under the treatment of the latter species in *Flora Iranica* (HEDGE, 1968: 87).

Isatis campylocarpa Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 203. 1842.

Type: “[Aucher-Eloy] N. 204, Persia”.

Holotypus: **IRAN:** *sine loco*, s.d., *Aucher-Eloy* 204 (P [P00741422]; iso-: G-BOIS [G00332621], W [W0050810]).

Notes. – The only material of the species in the Geneva herbaria is a fragment consisting of a tiny branch with two fruits and empty packet. Boissier annotated P00741422, as “*Isatis campylocarpa*! Boiss.”, from which he took that tiny branch.

The Paris material is the only unicate that BOISSIER (1842b) used in his full description of the species, including details on the plant habit, basal leaves, flowers, and infructescence, all of which characters not found on the G-BOIS material. Therefore, the P unicate is recognized as the holotype.

Isatis raphanifolia Boiss., Diagn. Pl. Orient. 6: 19. 1846 (Fig. 36, p. 128).

Type: “Hab. in umbrosis prope Gere inter Abuschir et Schiraz et ad fontes petrolei prope Dalechi Kotschy No. 67”.

Lectotypus (designated here): **IRAN:** “In umbrosis promontorii prope Gere inter Abuschir et Schiras”, 19.III.1842, *Kotschy* 67 (G-BOIS [G00332624]; isolecto-: B [B100249767, B100249768], BM [BM001254137], E [E00386099], FI [FI005707], G [G00371779, G00371797, G00371781], GOET [GOET002622], HAL [HAL0081726], JE [JE00001301, JE00001302], K [K000642292], KW [KW000127954], L [L1837775], LE [LE00012924, LE00012925], P [P00580387, P00741486, P00741487, P00741488, P007414869], S [S0912354], US [US00324438], W [W0055930, W1889002398], WAG [WAG0003967], WU [WU0101804]). **Syntypus:** **IRAN:** “Ad fontes petroleum fundentes ad Dalechi”, III.1842, *Kotschy* 67a (G-BOIS [G00332623]).

Note. – The only specimens examined by Boissier are the two collections in his herbarium, and the one with duplicates is designated as the lectotype.

Isatis rugulosa Bunge ex Boiss., Fl. Orient. 1: 384. 1867.

Type: “Hab. in Persiâ inter Kerman et Yezd et inter Yezd et Isphahan (Bunge!)”.

Lectotypus (designated here): **IRAN:** “in desertis inter Kerman Jesd & Isfahan”, IV.1859, *Bunge s.n.* (G-BOIS [G00332625]; isolecto-: G [G00446315], LE, P [P00741490, P00741491], W [W0050807]). **Syntypus:** **IRAN:** “inter Kerman et Jesd”, IV.1859, *Bunge s.n.* (B [B100249765], G [G00371794], K [K000642895], LE [LE00018183, LE00018186], NY [NY00185421], P [P00580388, P00741492, P00741493, P00741494], US [US000324437]).

Note. – The G-BOIS lectotype is a collection folder of two sheets, of which only one is labelled and barcoded.

Schimpera Hochst. & Steud. in Schimper, Pl. Arab. Exsicc. n° 244. 1835 [in sched.].

Tribe: *Isatideae* DC.

Note. – A monospecific genus, the type species of which is distributed in the deserts of Iran, Iraq, Israel, Jordan, Kuwait, Qatar, Saudi Arabia, Syria, and the United Arab Emirates.

Schimpera arabica var. *lasiocarpa* Boiss., Fl. Orient. 1: 384. 1867.

Type: “Hab. in deserto inter Nuckl et Gaza (Boiss!)”.

Holotypus: ISRAEL: “Intra Nuckl et Gaza. Arabia petraea”, III.1846, *Boissier s.n.* (G-BOIS [G00332626]).

= *Schimpera arabica* Hochst. & Steud. in Schimper, Pl. Arab. Exsicc. no. 244. 1835 [in sched.].

Note. – No duplicates of the type collection were found. Boissier based the description of this variety solely on the unicate in his herbarium.

Schimpera persica Boiss., Diagn. Pl. Orient. 6: 18. 1846.

Type: “Hab in insulâ *Karek* sinus *Persici* Kotschy No. 7 florifera, prope *Dalechi Persiae australis* ad fontes petrolei No. 1009 fructifera”.

Lectotypus (designated here): IRAN: “Auf Sandboden im Schatten der Dattelbaume. Karrak”, 30.XII.1841, *Kotschy 7* (G-BOIS [G00332628]; isolecto-: E [E00043019], G [G00446285, G00446286, G00446287], HAL [HAL0118322], JE [JE00004217], K [K000484436, K000484437], M [M9198940], MO [MO1930729], P [P00741588, P00741589, P00741590, P00741591, P00741592, P00741593], S [S1216129], W [W0075581]).
Syntypus: IRAN: “Ad fontes petroleum fundentes prope *Dalechi*”, III.1842, *Kotschy 1009* (G-BOIS [G00332627], P [P00741595]) (Fig. 33, p. 125).

= *Schimpera arabica* Hochst. & Steud. in Schimper, Pl. Arab. Exsicc. n° 244. 1835 [in sched.].

Note. – The isolectotypes have an exsiccatae printed label with “In palmetis ins. *Karek* in Sinu Persico. D. 30. Dec. 1841. Th. Kotschy 7” indicated.

Moricandia DC. in Mém. Mus. Hist. Nat. 7: 243. 1821.

Tribe: *Brassicaceae* DC.

Note. – A genus of eight species distributed in North Africa and SW Asia eastward into western Pakistan.

Moricandia sinaica (Boiss.) Boiss., Fl. Orient. 1: 386. 1867.

= *Brassica sinaica* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 85. 1842.

Type: “[Aucher-Eloy] N. 167, Sinai”.

Holotypus: EGYPT: “in Mte Sinai”, 1830, *Aucher-Eloy 167* (P [P02141433]; iso-: K [K000230234], W [W1889172258]).

Notes. – The type collection is apparently represented only by the three sheets above, and the holotype was annotated by Boissier. It is that sheet that Boissier studied and from which he drafted the species description, and no duplicates are found in any of the Geneva herbaria.

The type collection (*Aucher-Eloy 167*) was not cited by BOISSIER (1867a, 1888).

Moricandia dumosa Boiss., Diagn. Pl. Orient. 8: 25. 1849.

Type: “Hab. in omni Arabiâ petraea septentrionali copiosè a jugo *Tih* ad limites Palaestinae. Legi [Boissier] Aprili 1846”.

Holotypus: EGYPT: “Arabia petraea. Chaîne du *Tih*”, III.1846, *Boissier s.n.* (G-BOIS [G00332629]; iso-: G [G00446288, G00446289, G00446312], K [K000653954, K000653955], KW [KW000127942], PH [PH00018408]).

= *Moricandia nitens* (Viv.) Durrand & Barratte, Prodr. Fl. Lib.: 15. 1910.

Notes. – The holotype is a collection folder of two sheets, of which one has a printed label with Boissier’s handwriting of the locality and genus name in black ink and the species epithet and his name abbreviation in red ink. The other sheet has only the locality on two small labels holding the two plants.

The protologue erroneously indicates that Boissier collected the material in April instead of March, as evidenced from all the material examined, including the holotype.

Pinard collected material of the species in the same year, but his collections are not considered as part of the type gathering because Boissier always listed him whenever Pinard was the collector.

Moricandia clavata Boiss. & Reut. in Boiss., Diagn. Pl. Orient. ser. 2, 5: 25. 1856.

= *Pseuderucaria clavata* (Boiss. & Reut.) O.E. Schulz in Beibl. Bot. Jahrb. Syst. 54(3): 54. 1916.

Type: “*Moricandia teretifolia* Schimp. Pl. exs. Arab. Petr. N° 205 non DC. Hab. in *Arabiâ petraea* Schimper! Boissier!”.

Lectotypus (designated here): EGYPT: “Ad rivulum salsum exsiccatum in WadiAtal. Arab. petr.”, 17.III.1835, *Schimper 205* (G-BOIS [G00332631]; isolecto-: BM [BM001172159, BM001254050], E [E00372198, E00372199, E00372200, E00372202], FI [FI005688], G [G00446290, G00446291,

G00446292, G00446293], HBG [HBG506126, HBG506127, HBG506128], K [K000230443, K000230444], P [P02141431, P02141436, P02141437]). **Syntypus:** EGYPT: “Arabia petraea. Desert du Tih”, III.1846, *Boissier s.n.* (G-BOIS [G00332632]).

Note. – Boissier placed the species in unranked, presumably section, *Pseuderucaria* of *Moricandia* that was raised by SCHULZ (1916) to the generic rank.

Diplotaxis DC. in Mém. Mus. Hist. Nat. 7: 243. 1821.

Tribe: *Brassicaceae* DC.

Note. – *Diplotaxis* includes 33 species that grow primarily in the Mediterranean region, with the center of diversity in NW Africa and SW Europe and fewer species in C Europe and SW Asia eastward into Pakistan and Nepal.

Diplotaxis tenuifolia var. *integrifolia* Boiss., Fl. Orient. 1: 387. 1867.

Type: “Hab. in Cariâ (Pinard!)”.

Holotypus: TURKEY: “Caria”, 1843, *Pinard s.n.* (G-BOIS [G00332633]).

= *Diplotaxis tenuifolia* (L.) DC., Syst. Nat. 2: 632. 1821.

Notes. – The holotype is a collection folder of two labelled sheets, of which one has the varietal name.

No duplicates of the type collection were found in all of the major herbaria consulted for this research, but if they exist, it is highly unlikely that Boissier examined them. For this reason, the G-BOIS folder is recognized as the holotype.

Diplotaxis viminea var. *integrifolia* Boiss., Fl. Orient. 1: 388. 1867.

Type: “Hab. in Syriâ ad Berythum et Tripolim (Bl!), Hierosolymam (Auch. exs. 197! Boiss!)”.

Lectotypus (designated here): ISRAEL: “Jerusalem”, s.d., *Aucher-Eloy* 197 (G-BOIS [G00332636]; isolecto-: G [G00446294, G00446295], P [P05382206]). **Syntypi:** ISRAEL: “Palaestina. Jerusalem”, IV–V.1846, *Boissier s.n.* (G-BOIS [G00332634]). LEBANON: “Beyrouth A. C.”, III.1850, *Blanche* 1005 (G-BOIS [G00332635]).

= *Diplotaxis viminea* (L.) DC., Syst. Nat. 2: 635. 1821.

Note. – The isolectotype G00446295 was annotated by Boissier as *Brassica prolongii*.

Erucastrum C. Presl, Fl. Sicula: 92. 1826 [nom. cons.].

Tribe: *Brassicaceae* DC.

Note. – A genus of about 25 species centered in the Iberian Peninsula and NW Africa, with fewer species into N Europe and others in SW Asia and eastern and South Africa.

Erucastrum arabicum Fisch. & C.A. Mey., Index Sem. Hort. Petrop. 5: 35. 1839.

= *Brassica schimperi* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 86. 1842 [nom. illeg.].

Note. – *Brassica schimperi* is illegitimate because BOISSIER (1842a) listed the earlier published *Erucastrum arabicum* as a synonym. Later Boissier in *Flora Orientalis* reversed the assignment and placed the former species in the synonymy of the latter.

Brassica L., Sp. Pl.: 666. 1753.

Tribe: *Brassicaceae* DC.

Notes. – The tribe *Brassicaceae* is notoriously complex, and none of the current molecular phylogenetic studies provided satisfactory data that agree with the current generic delimitation based solely on morphology (see WARWICK & SAUDER, 2005; WARWICK & HALL, 2009; ARIAS & PIRES, 2012; ARIAS et al., 2014).

Indeed, *Brassica*, which currently includes 44 species centered in the Mediterranean region and SW Asia, is polyphyletic and needs substantial nomenclatural adjustments to make it monophyletic. When that is done, the genus would be substantially smaller and may well end up including *B. oleracea* ($n=9$), *B. rapa* ($n=10$), and some of their wild relatives with such chromosome numbers (see SNOGERUP et al., 1990).

Therefore, with the exclusion of *B. cretica*, the other species retained here in *Brassica* are only tentatively assigned to the genus, and detailed molecular, morphological, cytogenetic, and genomic studies would most likely assign them to other genera.

Brassica nivea Boiss. & Spruner in Boiss., Diagn. Pl. Orient. 1: 72. 1843.

= *Brassica cretica* subsp. *nivea* (Boiss. & Spruner) M.A. Gust. & Snogerup in Bot. Chron. (Patras) 3: 8. 1983.

Type: “[Boissier] Hab. in fissuris rupium verticalium *Acrocorinthi* ubi Aprili ineunte montem totum elegantissimis ornat racemis”.

Holotypus: GREECE: “Rupes Acrocorinthis”, IV.1842, *Boissier s.n.* (G-BOIS [G00332640]; iso-: BM [BM000750337], G [G00389480, G00389481], K [K000653810, K000653811, K000653812], KW [KW000127944], P [P05333502, P05333504, P05441735], UPS).

Notes. – The above combination was also superfluously published by Greuter & Burdet (GREUTER & RAUS, 1985: 64).

Label of the holotype, which was handwritten by Boissier, shows April as the month of collection, as in the protologue. However, labels of all isotypes, which are printed mimeographs in Boissier's handwriting, indicate March as the collection month. Because the plants of both holotype and isotypes are at the same developmental stage, and because there is only a single specimen of the species in G-BOIS, it is very likely that Boissier made a mistake in the month of collection. If it is shown otherwise, then the isotypes should be treated as syntypes.

Brassica nivalis Boiss. & Heldr. in Boiss., *Diagn. Pl. Orient.* ser. 2, 1: 32. 1854.

Type: “Hab. in rupibus ad nives *Olympi Thessali* rara (Heldr. Julio 1851)”.

Holotypus: GREECE: “In rupibus ad nives Olympi Thessaliae”, 24.VII.1851, *Heldreich 2559* (G-BOIS [G00332641]; iso-: WU [WU0076059]).

Notes. – The systematic position of *Brassica nivalis* is controversial, and it has been assigned to at least five genera of the tribe *Brassicaceae*. Although some authors placed the species in *Coincya* Rouy (Greuter & Burdet in GREUTER & RAUS, 1983; GREUTER et al., 1986; TAN, 2002) or in *Guenthera* Andr. (GÓMEZ-CAMPO, 2003, see comments under *Brassica persica*), it is tentatively retained in *Brassica*, as done by LEADLAY & HEYWOOD (1990), JALAS et al. (1996), and WARWICK & AL-SHEHBAB (2006).

The species does not fit in *Coincya* because it drastically differs in floral morphology, geography, and chromosome numbers.

Brassica leptocarpa Boiss., *Fl. Orient.* 1: 392. 1867.

Type: “Hab. in Persiâ ad Hour-i-Sultan inter Ispahan et Teheran (Bunge!)”.

Holotypus: IRAN: “Hour-i-Sultan. Inter Isfahan et Teheran”, V.1859, *Bunge 92* (G-BOIS [G00332642]; iso-: GOET [GOET002721], P [P05383350]).

= ***Brassica deflexa*** Boiss. in *Ann. Sci. Nat., Bot. ser. 2*, 17: 87. 1842.

Notes. – The G-BOIS specimen is the sole material studied by Boissier to describe the species, and it should be recognized as the holotype.

HEDGE (1968) recognized *B. leptocarpa* as a subspecies of *B. deflexa* and distinguished it by having fruit 3–4.5 (vs to 6) cm long and horizontal or deflexed (vs deflexed) fruiting pedicels 4–9 (vs 10–18) mm long. In fact these continuous characters are not inherited in that combination, and there are divaricate fruits on pedicels to 22 mm long or reflexed fruits on pedicels to 5 mm long. For these reasons, and without detailed, population-based studies, no infraspecific taxa are recognized in *B. deflexa*.

Brassica deflexa Boiss. in *Ann. Sci. Nat., Bot. ser. 2*, 17: 87. 1842.

Type: “[Aucher-Eloy] N. 229. Propè Aleppum”.

Holotypus: SYRIA: “Alep”, s.d., *Aucher-Eloy 229* (G-BOIS [G00332643]; iso-: BM [BM000552447, BM000593490], G [G00446298, G00446299], K [K000653839, K000653840], P [P05325385, P05325392, P05325393]).

Note. – None of isotypes was annotated by Boissier.

Brassica deflexa* var. *tigridis (Boiss.) Boiss., *Fl. Orient.* 1: 393. 1867.

= ***Brassica tigridis*** Boiss. in *Ann. Sci. Nat., Bot. ser. 2*, 17: 87. 1842.

Type: “[Aucher-Eloy] N. 227, Mesopotamia ad Tigrim”.

Holotypus: SINE PATRIA: “ad Tigrim”, s.d., *Aucher-Eloy 227* (G-BOIS [G00332644]; iso-: G [G00446300], K [K000653842, K000653843]).

= ***Brassica deflexa*** Boiss. in *Ann. Sci. Nat., Bot. ser. 2*, 17: 87. 1842.

Notes. – The holotype is a collection folder of four sheets all carrying the collection number, and one has the original Aucher-Eloy label and another the varietal name in Boissier's handwriting.

It is not possible to determine whether the type locality of this taxon falls in Turkey or Iraq in what is known as Kurdistan region of both countries.

Brassica lasiocalycina (Boiss. & Hausskn.) Boiss., *Fl. Orient. Suppl.* 66. 1888.

= ***Erucastrum lasiocalycinum*** Boiss. & Hausskn. in Boiss., *Fl. Orient.* 1: 389. 1867.

Type: “Hab. in hortis graminosis Aleppi (Haussk!)”.

Holotypus: SYRIA: “In hort. gram. Aleppo”, 12.III.1865, *Haussknecht s.n.* (G-BOIS [G00332638]; iso-: B [B100241049], JE [JE00002582], W [W0075580, W18890055605]).

= *Brassica deflexa* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 87. 1842.

Note. – The description of this species under *Brassica* and *Erucastrum* clearly reflects the blurry lines separating these two genera, a problem that persists to the present because both genera are polyphyletic and the characters separating them evolved independently several times in the tribe *Brassicaceae* to which they belong (see below).

Brassica elongata var. *integrifolia* Boiss., Fl. Orient. 1: 394. 1867.

Type: “Hab. in Cappadociâ (Bal!), Armeniâ Turcicâ (Ky! Bourg!), Mesopotamiâ (Auch. exs. 253!), Persiâ boreali (Auch. exs. 219! Ky! Bunge!)”.

Lectotypus (designated here): TURKEY: “Moissons.-Plaine de Césarée (Cappadoce)”, 1107 m, VI.1856, *Balansa 443* (G-BOIS [G00332645]; isolecto-: G [G00446301], P [P05325375, P05325376], W [W18890069385]). **Syntypi:** IRAN: *sine loco*, s.d., *Aucher-Eloy 219* (BM [BM000587780], G [G00446302], G-BOIS [G00332649], K [K000618652], P [P05325380, P05325381, P05325382]); “Champs incultes à Perguis à pies Baibout”, 10.VII.1862, *Bourgeau 127* (G-BOIS [G00332648], P [P05325364, P05325365]); “Inter Teheran et Tabris pr. Tinkmedasch”, VI.1859, *Bunge 87* (G-BOIS [G00332646]); “Chorassan, pr. Nischapur”, VI.1859, *Bunge 93* (G-BOIS [G00332647], P [P05325360]); “Crescit ad Zylzyle Chan versus Erzerum”, 4500' [1370 m], 28.VII.1859, *Kotschy 753* (G-BOIS [G00332650]).

= *Brassica elongata* Ehrh., Beitr. Naturk. 7: 159. 1792.

Notes. – The handwritten label of the lectotype has the elevation as 1107 m and the collection number as *Balansa 443*, whereas the mimeographed printed labels of the isolectotypes have 1200 m and *Balansa 1003*, respectively. Similar discrepancies are found in collections of other taxa and, therefore, it is believed that a single collection is meant here.

The syntype *Aucher-Eloy 253* was not located.

Boissier in *Flora Orientalis* recognized the plants he formerly (BOISSIER, 1842a) identified as *B. elongata* and later (BOISSIER, 1849) listed under *B. persica*, as the new var. *integrifolia* and cited additional collections besides the pair of Aucher-Eloy numbers (219 and 253) that he listed in his two earlier publications above.

The above duplicate P05325360 of *Bunge 93* is a “possible syntype” because it was collected in 1858.

Brassica persica Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. 8: 26. 1849.

Type: “*Br. elongata* Boiss. Ann. Sc. Nat. 1842 non Ehrh. Hab. in *Mesopotamiâ* Aucher l. cit.! [n. 253] Persiâ Aucher loc. cit.! [n. 219] inter segetes ad *Teheran* Kotschy N° 32”.

Lectotypus (designated here): IRAN: “Inter segetes prope urbem Teheran”, 17.IV.1843, *Kotschy 32* (G-BOIS [G00332651]; isolecto-: BM [BM000593489, BM001254154, BM001254155], G [G00446303, G00446304, G00446305], G-BOIS [G00332653], H [H1511099], K [K000653836, K000653837], KW [KW000127943], MO [MO3729750], P [P00580389, P04687356, P05325349, P05325351, P05325354]). **Syntypus:** IRAN: *sine loco*, s.d., *Aucher-Eloy 219* (BM [BM000587780], G [G00446302], G-BOIS [G00332649], K [K000618652], P [P05325380, P05325381, P05325382]).

= *Brassica elongata* Ehrh., Beitr. Naturk. 7: 159. 1792.

Notes. – No specimens of *Aucher-Eloy 253* were found in the Geneva and Paris herbaria, though BOISSIER (1867a: 268, 394) listed that collection number under both *Alyssum alpestre* var. *suffrutescens* and *Brassica elongata* var. *integrifolia*.

Both P05325380 and P05325382 were annotated by Boissier as “*Brassica elongata* W.K.”.

The species was reduced by BOISSIER (1867a: 394) to synonymy of the previous entry.

Brassica persica has recently been transferred by GERMAN (2015) to *Guenthera*, a genus resurrected by GÓMEZ-CAMPO (2003) to include nine species that he separated from *Brassica* on the basis of morphological characters and chromosome numbers.

As shown by WARWICK & SAUDER (2005) and WARWICK & HALL (2009) nuclear and chloroplast markers did not provide support for the monophyly of *Guenthera* sensu Gómez-Campo, though the chloroplast data by ARIAS & PIRES (2012) showed that the four *Guenthera* species they examined formed a well-supported monophyletic clade. While *Guenthera* might be the ultimate generic home for these species, they are temporarily retained in *Brassica*, with the hope of seeing a more comprehensive, genus-wide taxonomic adjustments for all species currently assigned to the latter genus.

Brassica willdenovii Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 88. 1842.

– *Sinapis integrifolia* sensu Willd., Hort. Berol. 1: tab. 14. 1804 [non H. West].

Type: “*Sinapis integrifolia* Willd. [Aucher-Eloy] Mascate absque numero”.

Holotypus: OMAN: “Muscat”, s.d., *Aucher-Eloy* 1078 (P [P05383513]).

= *Brassica juncea* (L.) Czern., *Conspect. Pl. Charc.*: 8. 1859.

Notes. – Boissier in *Flora Orientalis* placed *Brassica willdenowii* and *Sinapis integrifolia* in the synonymy of *S. juncea* L., a species currently recognized as *Brassica juncea*.

No material of the species was located in the Geneva herbaria, and the holotype sheet was annotated by Boissier as “*Brassica willdenowii*! Boiss. *Sinapis integrifolia* Willd.”. *Brassica willdenowii* remained in ambiguity for over 175 years until the above discovery of the holotype.

Eruca Mill., *Gard. Dict. Abr. ed.* 4. 1754.

Tribe: *Brassicaceae* DC.

Note. – A genus of four species native to NW Africa and SW Europe, with one subspecies as a crop and cosmopolitan weed (see below).

Eruca cappadocica Reut. ex Boiss., *Diagn. Pl. Orient. ser.* 2, 6: 13. 1859.

Type: “Hab. in planitie *Koniah Asiae minoris* cl. de Heldr. pl. exs. 1845, N° 1289 sub. *Er. sativâ*, inter segetes *Cappadociae* propè *Enehil* alt. 1460 metr. cl. Balansa N° 445”.

Lectotypus (designated here): TURKEY: “Jardins Moissous.– Village d’Enéhil (Cappadoce)”, 1460 m, IX.1856, *Balansa* 445 (G-BOIS [G00332655]). **Syntypus:** TURKEY: “Plaine de Koniah près de Soulimanhatzi au pied du Karadagh”, 19.VI.1845, *Heldreich* 1289 (G-BOIS [G00332656]).

= *Eruca vesicaria* subsp. *sativa* (Mill.) Thell. in Hegi, *Ill. Fl. Mitt.-Eur.* 4: 201. 1918.

Notes. – *Eruca vesicaria* is one of the most variable species in the tribe *Brassicaceae* due to its weediness and successful escape from cultivation as the salad crop arugula (English) or roquette (French) or as a source of industrial oil.

There is tremendous diversity in floral and leaf morphology, coupled with a greater variability in fruit length, width, seed size and number, and length of the apical segment “beak” relative to that of the proximal valvular segment.

All attempts in the past to accord species, subspecies, or varietal ranks to some of the variants led to further confusion, and the taxonomy of this complex is best served by the recognition of one species with two subspecies. The subsp. *vesicaria* has persistent calyx and is endemic to Spain, including the

Balearic Islands, whereas subsp. *sativa* has readily deciduous calyx and is the cosmopolitan weed and cultivated crop.

Eruca cappadocica var. *eriocarpa* Boiss., *Fl. Orient.* 1: 396. 1867.

Type: “Hab. in insulâ Cypro (ex Sibth.)”.

Holotypus: CYPRUS: “In insula Cypro”, s.d., *Sibthorp s.n.* (OXF).

= *Eruca vesicaria* subsp. *sativa* (Mill.) Thell. in Hegi, *Ill. Fl. Mitt.-Eur.* 4: 201. 1918.

Note. – We have not examined the type collection, and MEIKLE (1977: 105) maintained it as a variety of *Eruca sativa* Mill.

Eruca lativalvis (Boiss.) Boiss., *Fl. Orient.* 1: 396. 1867.

= *Brassica lativalvis* Boiss., *Diagn. Pl. Orient.* 6: 12. 1846.

Type: “Hab. ad sinum *Persicum* Aucher No. 4169. D., in *Persiâ australi* Kotschy No. 896”.

Lectotypus (designated here): IRAN: “ad Sinum Persicum”, s.d., *Aucher-Eloy* 4169D (G-BOIS [G00332653]; isolecto-: BM [BM001254145, BM001254146], FI [FI010153], G [G00371680, G00371695], K [K000653894]). **Syntypus:** IRAN: “In m. Kuh-Ajub. Prope ruinas Persepolis.”, IV.1842, *Kotschy* 896 (BM [BM001254144], G [G00371693], G-BOIS [G00332654]).

= *Eruca vesicaria* subsp. *sativa* (Mill.) Thell. in Hegi, *Ill. Fl. Mitt.-Eur.* 4: 201. 1918.

Note. – *Kotschy* 896 has well-developed broad fruits that reflect the name “*lativalvis*”. However, *Aucher-Eloy*’s collection is designated as the lectotype because it is more complete and represented by more duplicates.

Savignya DC. in *Mém. Mus. Hist. Nat.* 7: 231. 1821.

Tribe: *Brassicaceae* DC.

Note. – A monospecific genus of desert annuals distributed throughout North Africa eastward into southern SW Asia to Afghanistan and Pakistan.

Savignya aegyptiaca var. *oblonga* Boiss., *Diagn. Pl. Orient.* 8: 31. 1849.

Type: “Hab. inter frutices in arenosis vallis *Wadi Mokatteb* jugi *Sinaitici* ubi legi [Boissier] Mart. 1846”.

Holotypus: EGYPT: “Arabia petraea. Wadi Mokatteb”, III.1846, Boissier s.n. (G-BOIS [G00332657]; iso-: G [G00446313], K [K000230245]).

= *Savignya parviflora* (Delile) Webb in Giorn. Bot. Ital. 2(2): 215. 1849.

Note. – The holotype is a collection folder of three sheets, of which labels of two have the locality as “Wadi Mokatteb” and the collection date. The third sheet has the varietal name in Boissier’s handwriting, and its plants have only the collection date.

Enarthrocarpus Labill., Icon. Pl. Syr. 5: 4. 1812.

Tribe: *Brassicaceae* DC.

Note. – A genus of five species distributed in North Africa and the eastern Mediterranean from the Balkan Peninsula eastward into Pakistan.

Enarthrocarpus strangulatus Boiss., Diagn. Pl. Orient. 8: 44. 1849.

Type: “Hab. in *Aegypto* (Aucher! Husson!), in *Arabia petraea* versus *Palaestinam* copiosè. (Boiss.)”.

Lectotypus (designated here): ISRAEL: “Arabia petraea versus *Palaestinam*”, IV.1846, Boissier s.n. (G-BOIS [G00332660]; isolecto-: G [G00446306, G00446307], K [K000230266, K000230267], KW [KW000127940], P [P00741640], PH [PH00012115]). **Syntypi:** EGYPT: *sine loco*, s.d., *Aucher-Eloy 188* (G-BOIS [G00332659]); “Mabaroh”, s.d., Husson s.n. (G-BOIS [G00332658]). ISRAEL: “Arabia petraea versus *Palaestinam*”, III.1846, Boissier s.n. (G [G00446318], G-BOIS [G00332661]) (Fig. 34, p. 126).

Notes. – There is a single collection folder in G-BOIS with four sheets. One sheet, which is barcoded, was collected by Boissier in April 1846 and has a label with the locality in Boissier’s handwriting (Fig. 34, p. 126). The remaining three sheets are unlabeled, and their fruit maturity is much more similar to the lectotype rather than to the syntype G00332661.

Another specimen was also collected by Boissier in March 1846, but with a printed label annotated by Boissier, it is listed above as a syntype.

Enarthrocarpus tragicus Boiss. & Hausskn. in Boiss., Fl. Orient. Suppl.: 67. 1888.

Type: “Hab. in *graminosis Persiae australis* inter Kumaredj et Dalechi (Haussk!)”.

Holotypus: IRAN: “In *gramin.* inter Kumaredj et Dalaki”, 1000'–3000' [300–910 m], IV.1868, Haussknecht s.n. (G-BOIS [G00332663]; iso-: JE [JE00000249], W [W0044940]).

= *Brassica aucheri* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 88. 1842.

Notes. – The holotype is a collection folder of two sheets with identical labels and one in flower and the other in fruit. The first author erroneously annotated the sheet with fruiting plants in 1984 as holotype and the flowering one as isotype. However, they both represent one gathering that was too large to mount on one sheet.

The systematic position of this taxon has been controversial, and it is tentatively placed here in *Brassica*, though that generic assignment is tenuous at best. A summary of the taxonomic confusion is presented under *Raphanus aucheri* (see below).

Raphanus L., Sp. Pl.: 669. 1753.

Tribe: *Brassicaceae* DC.

Note. – A genus of three species centered in the Mediterranean region, with one weedy species, another (radish or radis) cultivated and naturalized, and a third endemic to Israel and Jordan.

Raphanus pugioniformis Boiss., Diagn. Pl. Orient. 8: 46. 1849.

Type: “[Boissier] Hab. in totâ *Galilaea* septentrionali a monte *Ithabure* ad *Banias* in pinguibus herbis frequens”.

Holotypus: ISRAEL: “Galilea. *Palaestina*”, IV–V.1846, Boissier s.n. (G-BOIS [G00302007]; iso-: G [G00223997, G00223998, G00446321], GOET [GOET008304], K [K000653896, K000653897], KW [KW000127939], P [P00741703, P00741704, P00741705], ZT [ZT00013962]) (Fig. 35, p. 127).

Notes. – The holotype is a collection folder of four sheets.

Status of this taxon had fluctuated a great deal from being accepted as a distinct species (Post, 1896: 17, 1932: 127), as variety of *R. rostratus* DC. (Schulz, 1919: 202; Zohary, 1966: 326; Mouterde, 1970: 117), or a synonym of *R. raphanistrum* subsp. *rostratus* (DC.) Thell. (Greuter et al., 1986: 150).

The molecular phylogenetic study by Ziffer-Berger et al. (2014) provides a strong support for the recognition of this taxon as a distinct species with a characteristically long, seedless beak to 9 cm long.

Raphanus raphanistrum var. *brevistylus* Boiss., Fl. Orient. 1: 401. 1867.

Type: “Hab. in littora Euxini circa Trapezuntem (Huet!)”.

Holotypus: TURKEY: “Bord de la mer noire à 1 h. de Trebusonde”, s.d., *Huet du Pavillon s.n.* (G-BOIS [G00332667]).

= *Raphanus raphanistrum* L., Sp. Pl.: 669. 1753.

Note. – No duplicate of this collection was found in the other Geneva herbaria, and it is best to treat the unicate as the holotype for now.

Raphanus aucheri (Boiss.) Boiss., Diagn. Pl. Orient. 8: 45. 1849.

= *Brassica aucheri* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 88. 1842.

Type: “[Aucher-Eloy] N. 203. Mossul”.

Lectotypus (designated here): IRAQ: “Mosul”, s.d., *Aucher-Eloy 203* (G-BOIS [G00332666]; isolecto-: P [P00741698]).

Notes. – Boissier annotated P00741698, and that means he based the species description on the two duplicates above and the lectotypification is then justified.

In treating *B. aucheri* as *Raphanus*, BOISSIER (1849: 45, 1867a: 401) confused two unrelated species that superficially resemble each other in flower color and reflexed fruit.

SCHULZ (1919) recognized that problem and treated (p. 209) the eastern Mediterranean species (N Israel, Lebanon and W Syria) as *R. aucheri*, and assigned (p. 135) the plants from Iran and Iraq to *Sinapis aucheri* (Boiss.) O.E. Schulz. However, the name *Raphanus aucheri* was a combination based on the same type of *Brassica aucheri* and, therefore, Schulz added to the confusion.

Both AL-SHEHBAZ (1985) and BAILLARGEON (1985) discussed the history and distribution of both species, and the name *Raphanus boissieri* Al-Shehbaz, which was proposed for the eastern Mediterranean species, was illegitimate to the earlier published *Quidproquo confusum* Greuter & Burdet (GREUTER & RAUS, 1983). Although the status of the last name was accepted by some (e.g., BAILLARGEON, 1985; GREUTER et al., 1986: 149) and rejected by others (e.g., AL-SHEHBAZ, 2012), recent molecular studies by ZIFFER-BERGER et al. (2014) have firmly established *Quidproquo* Greuter & Burdet as a distinct genus.

Fortuynia Shuttlew. ex Boiss. in Ann. Sci. Nat., Bot. ser. 2, 16: 379. 1841.

Tribe: *Brassicaceae* DC.

Note. – A monospecific genus distributed in Afghanistan, Iran, and Pakistan.

Fortuynia aucheri Shuttlew. ex Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 178. 1842.

Type: “[Aucher-Eloy] N. 4145, Bender Abbassy, Persiâ australia.”

Holotypus: IRAN: “Bender Abbassy”, s.d., *Aucher-Eloy 4145* (G-BOIS [G00796798]; iso-: G [G00371687, G00371689], K [K000653944], P [P00741663, P00741664, P00741665]).

= *Fortuynia garcinii* (Burm.) Shuttlew. ex Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 178. 1842.

Note. – None of the above six duplicates at G, K, or P was annotated by Boissier and, therefore, the unicate in G-BOIS is the holotype.

Fortuynia bungei Boiss., Fl. Orient. 1: 402. 1867.

Type: “Hab. ubique in Persiâ australi trans desertum magnum et inter Yezd et Ispahan (Bunge!). in deserto circa Djendack (Buhse!), in Affghaniâ occid. ad Anarderch (Bunge!)”.

Lectotypus (designated here): IRAN: “inter Jesd et Isfahan”, V.1859, *Bunge s.n.* (G-BOIS [G00332669]; isolecto-: P [P00741667, P00741668]). **Syntypus:** IRAN: “Persia”, 1847, *Buhse 1259* (G-BOIS [G00332668], LE).

= *Fortuynia garcinii* (Burm.) Shuttlew. ex Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 178. 1842.

Notes. – The lectotype is a collection folder of two sheets, the label of one is handwritten by Bunge and the other has a printed label and the species name in Boissier's handwriting.

No material of Bunge from Afghanistan was found in the Geneva herbaria, and it is likely that such material is at LE. Of the six sheets collected by Bunge and deposited at P, only the above two probably qualify for isolectotypes, though the printed label indicate April instead of May 1859, and the locality data was written in pencil that almost completely faded away.

Although HEDGE (1968: 52–53) and JAFRI (1973: 43) recognized two species in *Fortuynia*, the former author correctly observed that there is a continuous variation in fruit morphology from being typically emarginate and as long as wide (*F. bungei*) to the acute or slightly emarginate and longer than broad (*F. garcini*) and that such variation can be found within the same population. Therefore, the genus is recognized here as monospecific instead of dispecific (AL-SHEHBAZ, 2012).

Physorhynchus Hook. in Icon. Pl. 5: tab. 821, 822. 1851.

Tribe: *Brassicaceae* DC.

Note. – A genus of two species distributed in Afghanistan, Iran, Oman, Pakistan, and United Arab Emirates.

Zilla schouwvioides Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 382. 1842.

Type: “[Aucher-Eloy] N. 4146, Persia australis”.

Holotypus: IRAN: “Pers. australis”, s.d., *Aucher-Eloy* 4146 (G-BOIS [G00332671]; iso-: BM [BM001254147, BM001254148], G [G00446308, G00446309], K [K000653941], KW [KW000127941], P [P00741672, P00741673], W [W0075579]).

= *Physorhynchus chamaerapistrum* (Boiss.) Boiss., Fl. Orient. 1: 403. 1867.

Note. – The specimen in G-BOIS is the holotype because BOISSIER (1842c) based the species description solely on it.

Physorhynchus chamaerapistrum (Boiss.) Boiss., Fl. Orient. 1: 403. 1867.

= *Zilla chamaerapistrum* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 381. 1842.

Type: “[Aucher-Eloy] N. 4169 A, Persia australis”.

Lectotypus (designated here): IRAN: *sine loco*, s.d., *Aucher-Eloy* 4169A (G-BOIS [G00332670]; isolecto-: BM [BM001254149, BM001254159], G [G00371873], K [K000653942], P [P00580390, P00741675, P00741676, P00741677]).

Note. – Because BOISSIER (1842c) based his species description on the unicate sheet in his herbarium and on P00580390 that he annotated, the lectotypification is justified. The above other sheet at G was not examined by Boissier.

Didesmus Desv. in J. Bot. Agric. 3: 160. 1815.

Tribe: *Brassicaceae* DC.

Note. – A genus of two species distributed in the eastern Mediterranean. However, the following species does not belong to this genus as assigned by Boissier in *Flora Orientalis*.

Didesmus rostratus Boiss., Fl. Orient. 1: 405. 1867.

Type: “Hab. in Palaestina (Roth!)”.

Holotypus: ISRAEL: “Palestina”, s.d., *Roth* 994 (G-BOIS [G00332673]).

= *Erucaria rostrata* (Boiss.) A.W. Hill ex Greuter & Burdet in Willdenowia 15: 419. 1986.

Note. – This is the last of most of the entries above in the tribe *Brassicaceae* where Boissier describes a novelty in a genus and subsequently either him or others place it in another. The situation reflects the need to draw the generic lines in the tribe on more solid grounds.

Crambe L., Sp. Pl.: 671. 1753.

Tribe: *Brassicaceae* DC.

Note. – A well-defined genus of 37 species distributed in Macaronesia, Eurasia to western China, and from Tanzania northward into Scandinavia (PRINA, 2009; PRINA & MARTÍNEZ-LABORDE, 2008).

Crambe kotschyana Boiss., Diagn. Pl. Orient. 6: 19. 1846.

Type: “Hab. ad latera occidentalia montis *Sabst Buschom* prope Schiraz. Kotschy No. 380”.

Lectotypus (designated here): IRAN: “Ad latera occid. spectantia m. *Sabst-Buschom* pr. u. Schiras”, 14.V.1842, *Kotschy* 380 (G-BOIS [G00330471]; isolecto-: BM [BM000521176, BM000522982], E [E00042585], FI [FI005712], G [G00389494, G00389495, G00389496], H [H1350881], HAL [HAL0080982], JE [JE00006108], K [K000653909], L [L1834828], LE [LE00012944, LE00012945], MO [MO830199, MO3830200], MPU [MPU013479], P [P00741683, P00741684, P00741687, P00741688, P00741689], US [US00099990], W [W0051060, W18890029619], WAG [WAG0000793, WAG0000794, WAG0000795, WAG0000796], WU [WU0101805]).

Notes. – The name needs lectotypification because Boissier examined and annotated the duplicate at FI and based the species description on it and the duplicate in G-BOIS.

Although HEDGE (1968: 46) indicated that the type is at W, none of the two W duplicates of *Kotschy* 380 is acceptable because they were not examined or annotated by Boissier. Furthermore, W0051060 has the year of collection as 1841 instead of 1842 and lacks the locality data.

The lectotype in G-BOIS is a collection folder of three sheets all carrying the collection number but missing the date of gathering and two of which carrying locality data. The three isolectotypes at G each consists of two sheets in a collection folder.

Crambe quadricostata Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 388. 1842.

Type: “[Aucher-Eloy] N. 179, Mesopotamia”.

Holotypus: SINE PATRIA: “Mesopotamia”, s.d., *Aucher-Eloy 179* (G-BOIS [G00330472]; iso-: G [G00446310, G00446311], K [K000653911], P [P05408797, P05408804]).

= *Crambe orientalis* L., Sp. Pl.: 671. 1753.

Notes. – It is not possible to determine the country of origin of the type collection, and it could be Iraq, Syria, or Turkey.

Boissier in *Flora Orientalis* reduced the species to synonymy of *C. orientalis*.

Crambe orientalis var. *aucheri* (Boiss.) Boiss., Fl. Orient. 1: 407. 1867.

= *Crambe aucheri* Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 388. 1842.

Type: “[Aucher-Eloy] N. 180, Syria”.

Lectotypus (designated here): SYRIA: *sine loco*, s.d., *Aucher-Eloy 180* (G-BOIS [G00330473]; isolecto-: G [G00441286, G00441553], K [K000653916, K000653917], P [P00741691, P00741692, P00741693]).

= *Crambe orientalis* L., Sp. Pl.: 671. 1753.

Note. – Boissier examined both G00441286 and the G-BOIS specimens, but none of the other duplicates, in drafting the species description and therefore the name needed lectotypification. The specimen in G-BOIS is a fruiting material without leaves, and the original description provides a good description of leaves that was most likely taken from the former duplicate.

Crambe persica Boiss. in Ann. Sci. Nat., Bot. ser. 2, 17: 389. 1842.

Type: “[Aucher-Eloy] N. 4131, Demavend”.

Lectotypus (designated here): IRAN: “Demavend”, s.d., *Aucher-Eloy 4131* (G-BOIS [G00332129]; isolecto-: G [G00441285], K [K000653918], P [P00741694, P00741695]).

= *Crambe orientalis* L., Sp. Pl.: 671. 1753.

Note. – BOISSIER (1842c) based the species description on the material in his herbarium and on P00741695 that he annotated.

Bunias L., Sp. Pl.: 669. 1753.

Tribe: *Buniadeae* DC.

Note. – *Bunias* includes only two Eurasian species.

Bunias erucago var. *echinata* Boiss., Fl. Orient. 1: 409. 1867.

Type: “Hab. in Syriâ circa Elmalu”.

Holotypus: TURKEY: “Elmali Champs”, 14.VI.1860, *Bourgeau s.n.* (G-BOIS [G00332674]).

= *Bunias erucago* L., Sp. Pl.: 670. 1753.

Note. – No duplicate was found in any of the herbaria consulted and therefore the G-BOIS unicate is recognized as the holotype.