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Taxonomic notes on miscellaneous Cruciferae

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Summary. Taxonomy of miscellaneous taxa of Cruciferae (Brassicaceae) is updated. Six new combinations (*Erophila macrosperma*, *Isatis densiflora*, *Mostacillastrum volckmannii*, *Noccaea boissieri*, *Odontarrhena caliacrae*, and *Rorippa tsaratananae*) are validated. Four names are newly reduced to synonymy of what follows them in parentheses: *Barbamine procumbens* (*Barbarea ketzkhovellii*), *Cochlearia microcarpa* (*Rorippa austriaca*), *Torularia karatavica* (*Strigosella scorpioides*), and *Tetracme leptopoda* (*T. recurvata*). One name (*Cochlearia microcarpa*) is lectotypified. *Barbarea ketzkhovellii* is recorded for the first time from Turkey. Brief nomenclatural comments are provided for all entries.

Таксономические заметки о различных крестоцветных (Cruciferae)

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Аннотация. Работа посвящена уточнению систематики ряда представителей семейства крестоцветных (Cruciferae, или Brassicaceae). Обнародовано шесть новых комбинаций (*Erophila macrosperma*, *Isatis densiflora*, *Mostacillastrum volckmannii*, *Noccaea boissieri*, *Odontarrhena caliacrae*, *Rorippa tsaratananae*). Названия *Barbamine procumbens*, *Cochlearia microcarpa*, *Torularia karatavica* и *Tetracme leptopoda* отнесены в синонимы, соответственно, к *Barbarea ketzkhovellii*, *Rorippa austriaca*, *Strigosella scorpioides* и *Tetracme recurvata*. Для *Cochlearia microcarpa* выбран лектотип. Во флоре Турции впервые отмечена *Barbarea ketzkhovellii*. Все номенклатурные решения кратко прокомментированы.

Further work on taxonomy of the Cruciferae Juss. (Brassicaceae Burnett) representatives for the project “BrassiBase” (Kiefer et al., 2014) and some others yielded another set of nomenclatural novelties to be published. The present communication continues the series of short notes focused on validating new combinations and establishing new synonyms in various mustard genera (German, 2008, 2014).

It is an honor for me to dedicate this communication, as other articles in this issue, to the memory of Rudolf Vladimirovich Kamelin, one of the leading Soviet/Russian botanists of several last decades, an authority in taxonomy of many plant groups including the mustard family, a founder of Turczaninowia, and – from a personal perspective – an experienced companion in several field trips,

one of the first co-authors, an extremely interesting collocutor, and the teacher.

1. New combinations

Erophila macrosperma (Sebald) D. A. German, **comb. et stat. nov.** ≡ *E. verna* subsp. *spathulata* var. *macrosperma* Sebald, 1969, Stuttgarter Beitr. Naturk. 206: 19. ≡ *E. verna* subsp. *macrosperma* (Sebald) Jonsell, 2000, Nordic J. Bot. 20(2): 201.

Based on morphological, ecological, geographical, and cytological evidences presented by Sebald (1969) and Jonsell (1976, 2000), the plant is apparently the most distinct among other taxa often accepted as “main” subspecies of *E. verna* (L.) Bess. s. l. (Walters in Heywood, 1964; Schultze-Motel et al., 1986; Walters, 1993; Marhold, 2011) which are not infrequently treated as distinct species (conf. Kalheber, 2003; Raus in Raab-Straube, Raus, 2014) along with some additional recognizable entities of this complex (Bomble, 2012). Under these circumstances a species rank is required for the endemic Ethiopian *Erophila* DC. (P!, STU!).

Nowadays a general switch to treating *Erophila* as part of *Draba* L. is observed (Buttler, Hand, 2008; Koch in Kadereit et al., 2016). However, results of the most detailed phylogenetic study of *Draba* and related genera (Jordon-Thaden et al., 2010) do not uniquely preclude the contrary approach.

Isatis densiflora (Bunge ex Boiss.) D. A. German, **comb. nov.** ≡ *Pachypterygium densiflorum* Bunge ex Boiss., 1867, Fl. Orient. 1: 373.

This taxon is not always accepted as specifically distinct from the polymorphic *I. multicaulis* (Kar. et Kir.) Jafri although, unlike other ones usually treated conspecific with the latter, it is characterized by both recognizable morphology (dense, short, often secund infructescence) and its own distribution range considerably overlapping with that of *I. multicaulis* but stretching further south-westward (Boczanzeva, 1985). Therefore, approach of Boczanzeva (l. c.) and a number of previous authors in delimitation of these closely related species is preferred here with the only difference in generic placement accepted in accordance with results of recent studies (Moazzeni et al., 2007, 2010; Al-Shehbaz, 2012a).

Mostacillastrum volckmannii (Phil.) D. A. German et Al-Shehbaz, **comb. nov.** ≡ *Sisymbrium volckmannii* Phil., 1872, Anales Univ. Chile 41: 669.

= *Mostacillastrum sagittatum* (Kuntze) Al-Shehbaz, 2006, Darwiniana 44(2): 348. ≡ *Sisymbrium*

sagittatum Hook. et Arn., 1833, Bot. Misc. 3: 139, non Ait. (1789). ≡ *Hesperis sagittata* Kuntze, 1891, Revis. Gen. Pl. 2: 935.

In the recent works (Al-Shehbaz, 2006, 2012b; Al-Shehbaz et al., 2011) this species is named *Mostacillastrum sagittatum* which, as follows from the above synonymy, is inappropriate due to the illegitimacy of the alleged basionym, *Sisymbrium sagittatum* Hook. et Arn. and lack of precedence of the actual basionym, *Hesperis sagittata*, over the heterotypic *S. volckmannii*. Generic placement of a number of species of *Mostacillastrum* O. E. Schulz is likely to be changed in the future in view of its apparent polyphyly demonstrated by Bartish et al. (2012). It is likely the case of *M. volckmannii* which falls outside the clade containing *M. stenophyllum* (Gillies ex Hook. et Arn.) O. E. Schulz, the generic lectotype. Unless the taxonomy of the group is revised, the proposed name is to be in use for the species.

Noccaea boissieri (Bornm.) D. A. German, **comb. nov.** ≡ *Coluteocarpus reticulatus* var. *boissieri* Bornm., 1906, Beih. Bot. Centralbl. 19(2): 207. ≡ *C. boissieri* (Bornm.) O. E. Schulz, 1936, in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 17b: 428. ≡ *C. vesicaria* subsp. *boissieri* (Bornm.) Hedge, 1965, Notes Roy. Bot. Gard. Edinburgh 26(2): 181. ≡ *N. vesicaria* subsp. *boissieri* (Bornm.) Al-Shehbaz, 2014, Harvard Pap. Bot. 19(1): 47.

Among the two principal options of treating this taxon, a viewpoint of Schulz (1936) seems preferable to me having in mind its clear distinctness from *N. vesicaria* (L.) Al-Shehbaz in both vegetative and generative spheres combined with partial allopatry of the two taxa (Hedge in Davis et al., 1965; Al-Shehbaz, 2014).

Odontarrhena caliacrae (Nyár.) D. A. German, **comb. nov.** ≡ *Alyssum caliacrae* Nyár., 1926, Bul. Grăd. Bot. Univ. Cluj 6: 92. ≡ *Alyssum tortuosum* subsp. *caliacrae* (Nyár.) Stoj. et Stef., 1970, Fl. Reip. Pop. Bulg. 4: 508. ≡ *Odontarrhena tortuosa* subsp. *caliacrae* (Nyár.) Španiel, Al-Shehbaz et Marhold, 2015, Pl. Syst. Evol. 301(10): 2487.

This combination provides the name available for relevant taxon in the genus *Odontarrhena* C. A. Mey. ex Ledeb. at the rank of species following the often accepted approach, also by recent authors (e. g., Ančev, 2007). Sometimes it is treated as a subspecies and was recently recognized as *O. tortuosa* subsp. *caliacrae* (Nyár) Španiel, Al-Shehbaz et Marhold (Španiel et al., 2015: AlyBase

[<http://alysseae.sav.sk/>]. However, if the taxon circumscription includes *Alyssum caliacrae* subsp. *prodanii* Nyár. (1929) and *A. eximium* Nyár. (1926), as accepted by the latter authors (<http://alysseae.sav.sk/checklists/detail/1529>), two other names have precedence at the rank of subspecies and the proper name then would be “*O. tortuosa* subsp. *eximia*” in accordance with the priority established by the combination *A. tortuosum* subsp. *eximium* (Nyár.) Nyár., 1928, Bul. Grăd. Bot. Univ. Cluj 7: 134.

Rorippa tsaratananae (Jonsell) D. A. German, **comb. et stat. nov.** ≡ *R. laurentii* subsp. *tsaratananae* Jonsell, 1979, Bot. Not. 132: 535.

Although vicarious distribution pattern of *R. laurentii* Jonsell s. str. and subsp. *tsaratananae* emphasized in the protologue of the latter is one of the main traditional arguments (Meilke, 1957; Hawkes, 1963) favouring relevant rank in similar cases, morphological distinctness between the two taxa (simple vs. compound leaves, etc.: Jonsell, 1979; P!) seems to be too serious to keep them conspecific. Generic placement of species assigned to morphologically peculiar *Nasturtium* sect. *Ceriosperma* O. E. Schulz [≡ *Ceriosperma* (O. E. Schulz) Greuter et Burdet], to which *R. laurentii* s. l. was informally attributed (Jonsell, l. c.), needs further elucidation and it was since long time suspected that this group of species might eventually be recognized as a separate genus (Garnock-Jones, 1978). Available molecular data (Mitchell, Heenen, 2000; Bleeker et al., 2002), especially from nuclear markers, are too scarce yet to make sound conclusions though previously suggested heterogeneity of the group (Jonsell, l. c.) appears to get support (Bleeker et al., l. c.) even after the exclusion of *R. macrocarpa* (Boiss.) Mouterde [≡ *N. macrocarpum* Boiss.] from *Rorippa* Scop. and its transfer to *Barbarea* W. T. Aiton by Al-Shehbaz and Jacquemoud (2000). However, as a result of typification of *Ceriosperma* by this species (Greuter et al., 1993), most deviating from others assigned by Schulz (1933) to *Nasturtium* sect. *Ceriosperma* both geographically and morphologically, the name became synonymous with *Barbarea* and it is no more applicable to the rest of the group. Thus, retention of *R. tsaratananae* in *Rorippa* as originally assigned is the most reasonable taxonomic option unless precise phylogenetic position of the species is clarified.

2. New synonyms

Barbarea ketzkhovellii Mardal., 1977, Bot. Zhurn. (Moscow & Leningrad) 62(9): 1300. ≡

Barbamine ketzkhovellii (Mardal.) A. P. Khokhr., 1997, Byull. Glavn. Bot. Sada (Moscow) 175: 50.

Typus: “West Georgia. Svaneti range. Watershed of Urashi and Khobi. 3000 m s. a. l. Slightly mobile porphyritic talus slopes of the glacier circle. 24 VIII 1976. T. Mardaleyshvili” (TBI!, iso – LE!, TBI!).

= *Barbamine procumbens* A. P. Khokhr., 1997, Byull. Glavn. Bot. Sada (Moscow) 175: 51, **syn. nov.**

Typus: “Turkey, A-8, prov. Artvin. Karchal (Macahel-su), 1900–3100 m. 11–14 / VIII 1996. A. P. Khokhrjakov, M. T. Mazurenko, G. A. Martynova” (MHA!, iso – MW!).

According to the label notes, A. P. Khokhryakov initially compared his novelty (first annotated as “*Barbarea procumbens*”) with *Barbarea minor* K. Koch but later correctly found it to be closer to *B. ketzkhovellii*. From the latter, *Barbamine procumbens* was said to differ in “usually prostrate (not ascending) stems, cauline leaves truncate or broadly (not narrowly) cuneate at base, and more arcuate siliques” (Khokhryakov, 1997). These differences do not look reliable, especially in view of the characteristics “caulibus prostratis vel rarius adscendentibus” and “fructus ... incurvati” from the protologue of *Barbarea ketzkhovellii* (Mardaleyschvili, 1977). A study of the material of both taxa (LE!, MHA!, MW!, TBI!, TGM!) clearly confirmed that *Barbamine procumbens* falls within the range of variation of *Barbarea ketzkhovellii* and thus cannot be separated from the latter species easily distinguishable from its congeners by subscapose habit. Al-Shehbaz (2012a) properly synonymized *Barbamine* A. P. Khokhr. with *Barbarea* but it remained hitherto unclear whether the type species of the prior genus should be treated as a distinct member of the latter. Establishment of conspecificity of the two taxa also means a new addition to the flora of Turkey.

Unlike on the labels, D. V. Gvianidze is mentioned in the protologue of *Barbamine procumbens* as the third collector (instead of G. A. Martynova), the date is 11 VIII and the elevation is 2900–3100 m. These discrepancies should be treated as mistakes to be corrected (ICN Art. 9.1, Ex. 2: McNeill et al., 2012) as long as Khokhryakov’s material is restricted to the single gathering represented by three specimens (one in MHA and two in MW), two of which are annotated by him as holotypus and isotypus, respectively. One of the isotypes is supplied with additional label where the elevation “2000–3100 m a. s. l.” is mentioned and “Karchal” is replaced by “Karakal Dagı”. It looks like somewhat unprecise label data were subsequently corrected in the validating publication.

Rorippa austriaca (Crantz) Bess., 1822, Enum. Pl. Volhyn.: 103. ≡ *Nasturtium austriacum* Crantz, 1762, Stirp. Austr. 1: 15.

Typus (fide Jonsell, 1968: 150, 163): [Austria], “Nusdorf via” (BP).

= *Cochlearia microcarpa* DC., 1821, Reg. Veg. Syst. Nat. 2: 362, **syn. nov.**

Lectotypus (hic designatus): [Ukraine], “*Cochlearia* an *C. armoracia* ad Kriwoluka Pallas. h. Wild. ex Steven” (G-DC: G00202144! [http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=172301&base=img&lang=en]).

Cochlearia microcarpa DC. [non *C. microcarpa* K. C. Kuan, 1980, Bull. Bot. Lab. N. E. Forest Inst., Harbin 8: 40, nom. illeg. ≡ *Yinshania microcarpa* Y. H. Zhang, 1987, Acta Phytotax. Sinica 25(3): 211. ≡ *Y. acutangula* subsp. *microcarpa* (Y. H. Zhang) Al-Shehbaz et al., 1998, Harvard Pap. Bot. 3(1): 83] since the time of its description is being a rather neglected taxon of uncertain affinity. Although its flowers were unknown to Candolle (1821: 362), he assigned the species to *Cochlearia* sect. *Armoracia* (G. Gaertn., B. Mey. et Scherb.) DC. assuming the plant to have white petals. This assumption, probably driven by P. S. Pallas’ annotation “*C. armoracia*?”, apparently became the main reason impeding Candolle to recognize this plant with “habitus *Myagri austriaci*” as *Rorippa austriaca* itself. The type locality designation “Hab. in Sibiria ad Krivoluka” was also misleading because it referred to Asia instead of Europe (West Ukraine). In subsequent, almost exclusively resumptive works where *C. microcarpa* was included, this geographical characteristics was reduced to just “Sibiria” (e. g., Candolle, 1824: 173; Steudel, 1840: 392; Jackson, 1893: 575). At the same time, both taxonomic treatments and floristic accounts focused on Siberia and/or Ukraine, unless I occasionally overlooked any, completely ignored the name except for Ledebour (1841: 159) who had no opportunity to see any material and could only repeat the data from the primary source.

According to the protologue, the original material of *C. microcarpa* studied by both Ch. Steven in Willdenow’s collection and then by Candolle “in herb. Stev.” is probably partly lost or misplaced because it was not located in either B-W (where it was not found yet by Ledebour, i. e., in 1830ths) or H. The only element available for this study and designated here as the lectotype is the fragment (upper part of fruiting branch with several leaves and silicles) of the syntype unambiguously identifiable as *Rorippa austriaca* which perfectly fits the true geographic origin of the specimen.

Strigosella scorpioides (Bunge) Botsch., 1972, Bot. Zhurn. (Moscow & Leningrad) 57(9): 1041. ≡ *Dontostemon scorpioides* Bunge, 1847, Arb. Naturf. Ver. Riga 1(2): 150.

Lectotypus (Rechinger, 1968: 261; German in Al-Shehbaz et al., 2014: 63): [Uzbekistan], “[Um Buchara, 23 März 1842, Alexander Lehmann] Alexanderi Lehmann Reliquiae botanicae. No. 101. *Dontostemon scorpioides* Bge. Zwischen Agatme und Karagata 14 Apr bei Tiumen-bai 18 Apr, bei Juss-Kuduk 24 April. Steppe um Kuwan-Darja 7 Maj 1842” (LE!, left plant; iso – LE!, P!).

= *Torulularia karatavica* Myrz. et Bajt., 1979, Not. Syst. Herb. Inst. Bot. Acad. Sci. Kazachst. 11: 54. ≡ *Neotorulularia karatavica* (Myrz. et Bajt.) Czer., 1995, Vasc. Pl. Russia & Adj. States (former USSR): 145, **syn. nov.**

Typus: [Kazakhstan], “Jugum Karatau, angustiae Dzholonur. 29 V 1972. P. Myrzakulov” (AA).

It was already mentioned a while ago that the type (or any other materials) of *T. karatavica* is absent in AA (German, Veselova, 2011). Nothing was found since then, and analysis of the description has been undertaken in an attempt to clarify the identity of this enigmatic species. A set of characters (e. g., annual life cycle, presence of rigid forked trichomes, oblong to oblong-lanceolate, entire, short-petiolate leaves, lax inflorescences, flowering pedicels 1 mm long, branched-pubescent sepals 3 mm long, oblong-spatulate pink petals 5–5.5 mm long, divaricate-ascending, distally coiled, torulose, hispid siliques 3–3.5 cm × 0.8–1 mm, occurrence in intermountain clayey valleys: Myrzakulov, Bajtenov, 1979) apparently excludes any Middle Asian representatives of the family except for the two closely related *Strigosella* Boiss. species, *S. scorpioides* and, to a lesser extent, *S. brevipes* (Bunge) Botsch. As long as entire leaves are normally not characteristic of *S. brevipes* and, besides, its sepals and petals do not exceed 2.5 and 5 mm long, respectively (Rechinger, 1968; Botschantzev, Bondarenko, 1978; Zhou et al., 2001), this species, with more or less high degree of confidence, can also be ruled out from consideration. As for *S. scorpioides*, despite usually it produces bigger flowers and longer fruits, the values reported for *T. karatavica* are still within the range of variation of this species which, besides, is characterized by predominantly entire leaves. No other options look plausible, even from among the related species of *Strigosella* Boiss. or similar-looking representatives of *Neotorulularia* Hedge et J. Léonard. I dare, therefore, to assume that a rather poor specimen of *S. scorpioides* was described as *T. karata-*

vica with an admission that otherwise it would be an untypical plant of *S. brevipes*.

Details of curious typification of *S. scorpioides* are provided in Al-Shehbaz et al. (2014).

In general, existence of a desert annual occurring very locally, especially in a relatively easily accessible and rather well-studied floristically region, and known from the single specimen is highly doubtful. In such cases, the probability of a re-description of already known plant is it much higher. Therefore, distinctness of another annual species, *Strigosella myrzakulovii* Bajt. (Bajtenov, 1983), also described from Karatau based on just one gathering, is under question. As neither the type, nor the isotype (claimed to be in AA and LE, respectively) were located and it is barely possible to connect the description with any species with certainty, the problem stays pending.

Tetracme recurvata Bunge, 1847, Arb. Naturf. Ver. Riga 1(2): 158.

Lectotypus (Rehinger, 1968: 225, “typus”): [Uzbekistan], “No. 122. *Tetracme recurvata* Bge. Ad Jan-Darja [3 or 4 May 1842] Al. Lehmann” (W: W0032964!).

= *T. leptopoda* Pachom., 1974, Not. Syst. Herb. Inst. Bot. Acad. Sci. Uzbek. 19: 38, **syn. nov.**

Typus: [Uzbekistan], “South Bukhara near Termez. 1913. A. Kirichenko” (LE!, iso – LE!).

Tetracme leptopoda was segregated from *T. recurvata* based on a few gatherings from a small area in southern Uzbekistan (Pachomova, 1974a) characterized by only slightly (instead of strongly) widened fruiting pedicels and long, “5–7(8) vs. 2–4, rarely 6–7 mm”, fruit horns (Pachomova, 1974a, b). Having in mind the great variation in horn length in

T. recurvata, the latter character cannot be taken as reliable. As for pedicels, indeed, in specimens from around Termez (Termiz) they do not thicken soon after anthesis becoming nearly as thick as the fruits but, instead, stay clearly narrower than siliques, a character not seen by me in other specimens of *T. recurvata* from elsewhere. However, no studied plants of *T. leptopoda* (type, isotype, and paratypes) have fully ripened fruits and thus it is unknown whether pedicels are still narrow by complete fruit maturity. In any case, even if this character holds (and may be justifies a varietal rank), in view of the otherwise overall morphological and ecological similarity of plants from Termez area with other specimens of *T. recurvata* I do not see the ground to treat them as belonging to another biological species.

Our choice of a rich (12 plants) specimen with precise collection date (30 April 1842) and collector’s annotation from Al. A. Bunge’s herbarium (P) as lectotype of *T. recurvata* (German et al., 2006) turned out to be superfluous on account of existence of an earlier and unintended typification by Rehinger (1968). The above cited actual lectotype consists of a single plant collected on 3 or 4 May 1842.

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