Critical notes on Cruciferae

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Keywords: Barbarea, Brassicaceae, Klukia, Mutarda, Noccaea, nomenclature, priority, Rhamphospermum, Rorippa, Sisymbrium, synonymy, taxonomy, Tetracme, typification, Velarum.

Summary. Generic name Mutarda is applied instead of the recently reinstated Rhamphospermum; the latter is lectotypified and synonymized with the prior, and the combinations M. allionii, M. arvensis, M. carinata along with Ceratocnemum × mirabile are validated. Calepina irregularis var. pinnatifida, neotypified Erysimum minus and Tetracme glochidiata are found conspecific with Rorippa barbareifolia, Barbarea bracteosa and Tetracme bucharica, respectively. Lepidium culminicola is recognized as Noccaea rubescens subsp. culminicola, comb. et stat. novi. Klukia Andrzej ex Bess., a synonym of Sisymbrium L., is shown to be validly published in 1822 thus threatening the homonymic name-in-use Klukia Racib. (fossil Schizaeaceae).

Критические заметки о крестоцветных (Cruciferae)

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Ключевые слова: номенклатура, приоритет, синонимика, систематика, типификация, Barbarea, Brassicaceae, Klukia, Mutarda, Noccaea, Rhamphospermum, Rorippa, Sisymbrium, synonymy, taxonomy, Tetracme, typification, Velarum.

Аннотация. Для недавно восстановленного рода Rhamphospermum принято приоритетное название Mutarda; обнародованы комбинации M. allionii, M. arvensis, M. carinata, а также Ceratocnemum × mirabile. Установлена конспецифичность Calepina irregularis var. pinnatifida, Erysimum minus и Tetracme glochidiata, соответственно, с Rorippa barbareifolia, Barbarea bracteosa и Tetracme bucharica. Для Lepidium culminicola предложен новый статус и родовая принадлежность – Noccaea rubescens subsp. culminicola, comb. et stat. novi. Показано, что забытое и почти никогда не использовавшееся родовое название Klukia Andrzej ex Bess., являющееся синонимом Sisymbrium L., действительно обнародовано в 1822 г. и имеет приоритет над находящимся в употреблении омонимом Klukia Racib., относящимся к ископаемому роду схизейных папоротников (Schizaeaceae). Название Rhamphospermum лектотипифицировано, а для Erysimum minus обозначен неотип.

Treatment of additional Cruciferae Juss. (Brassicaceae Burnett) collections and analysis of relevant literature sources enabled making further contribution to the taxonomy and nomenclature of certain representatives of the family, viz. establishing new synonyms, unravelling the case of homonymy leading to illegitimacy of the name being in use, proposing new combinations and type designations reported below.

Material and methods

Specimens were studied in BM, LE and TASH; some of them in addition and those from G and MPU – as images online accessible via the portals/databases CHG [2022]; Global Plants (2022); RECOLNAT [2022]; MNHN, Chagnoux (2022); NHM (2014); GBIF [2022]. Nomenclatural issues were treated following the Shenzhen edition of the Inter-
Taxonomy

1. Mutarda vs. Rhamphospermum

When making a step in the direction of a long-awaited improving the generic assignment in Brassicaceae DC., the most problematic tribe in this respect in the family, Al-Shehbaz (2021) proposed several adjustments including reinstatement of Rhamphospermum Andrz. and a transfer of several species into the latter genus, including Sinapis nigra L. [Brassica nigra (L.) W. D. J. Koch]. Despite my full support of this trend, a couple of critical notes may be put forward. First, some of the species placed into the expanded Rhamphospermum (Sinapis pubescens L. and Trachystoma labasii Maire) exhibit contrasting positions in cp and nr phylogenies (Arias, Pires, 2012; Koch, Lemmel, 2019). This seems to indicate their more complex relationship to the group in question and the need of further elucidation of generic placement of these species. Second, Sinapis nigra is the type of Mutarda Bernh. (Bernhardi, 1800: 184), a 22-years old name compared to Bernh. (Bernhardi, 1800: 184), a Mutarda type of Sinapis nigra Bernh., 1800, Syst. Verz. Erfurt: 184, i.e. both are authored by Besser. Since none of them evidently demonstrated by Al-Shehbaz, l. c.) is implied synonymized Trachycnemum Maire et Sam. with Ceratocnemum Coss. et Balansa but refrained from transferring its only member to the latter genus. It is done here to make the name available for use: Ceratocnemum × mirabile (Maire et Sam.) D. A. German, comb. nov. = Trachycnemum × mirabile Maire et Sam., 1939, Ark. Bot. 29A(11): 9.

Some nomenclatural details concerning Rhamphospermum might also be noteworthy. The authorship of this generic name is usually cited as “Andrz. ex Bess.”, but in the protologue both the name itself and the validating description are accompanied by the indication “Andrz.” (Besser, 1822: 83), i.e. unambiguously ascribed to Andrzejewski who is, consequently, the sole author of the name (Turland et al., 2018: Art. 46.2). By contrast, none of the two proposed combinations, Rh. arvense and Rh. orientale (Besser, l. c.: 83, 104), is supplied with an author indication meaning that Note I of Art. 46.1 applies, i.e. both are authored by Besser. Since none of them is designated as type in the original publication (cf. Rollins, 1979) and the only subsequent such indication (mentioning R. arvense by Al-Shehbaz, l. c.) is not valid under Art. 9.23, Rhamphospermum is lectotypified here.

Similar case, although with automatic typification, is evidently demonstrated by Guenthera Andrz. and G. elongata (Ehrh.) Bess., established in the same work. One more genus also validated in Besser’s (1822) “Enumeratio...”, is worth separate mention.
2. Klukia

This name as referring to the genus of Cruciferae, usually as "Klukia Andrz. ex DC." or "Klukia Andrz. in DC.", can rarely be seen in the literature and nearly never as an accepted one. It is listed among synonyms of Malcolmia W. T. Aiton by Jackson (1895: 8) and Dalla Torre et Harms (1901: 190) or Sisymbrium L. by Schulz (1924: 46; 1936: 590). A few times it was mentioned in the context of purported nomenclatural conflict with / priority over Chamaepilum Wallr. [nom. illeg.] (Blonski, 1901) or homonymic Klukia Racib. [fossil genus of Schizaeaceae Kauf.] (Reed, 1947, 1955; Paclt, 1973). However, since Candolle (1821b: 459) only noted "Klukiae sp. Andrz. cruc. ined." in synonymy of Sisymbrium sect. Velarum DC. and thus, did not validate it (conf. Endlicher, 1839: 875; Pfeiffer, 1875: 1817), no efforts to protect the well-established Klukia Racib. were found to be needed (Traverse, 1981); accordingly, only the latter name was listed in the Index Nominum Genericorum (Zijlstra, 1979). By any reason, out of four species of “Klukia Andrz.” mentioned by Candolle (l. c.), all as synonyms, only one (“K. rigid a Andrz. ex DC.”) was included in Index Kewensis (Jackson, l. c.) and assigned to synonymy of Malcolmia torulosa (Desf.) Boiss. [presently Neotorularia torulosa (Desf.) Hedge et J. Léonard]. This viewpoint is reflected now in some global online resources (Freiberg et al., 2020; Govaerts et al., 2021; GBIF [2022]; POWO [2022]) and “Klukia Andrz. ex DC.” is treated as a synonym of Neotorularia Hedge et J. Léonard.

Meanwhile, works where conditions of a valid publication of cruciferous Klukia are met, do exist, and this name has no relation to Neotorularia. Andrzejowski (1869: 65) reached it by publishing the generic description in Polish; although no species was indicated, it obviously referred to Sisymbrium officinale (L.) Scop. However, the earliest validation is found in Besser (1822: 104) who wrote “Klukia Andrz. (Sisymbrii Sect. I. DC.),” thus publishing a nomen novum for Sisymbrium sect. I. Velarum at the rank of a genus by providing indirect, but unequivocal reference to the replacement name. This was done exactly the same way Sprenia Andrz. ex Bess. was published (conf. Mosyakin, 2016), a generic name universally accepted as validated by Besser (1822). The authorship of Klukia is therefore “Andrz. ex Bess.” while Besser alone, in the absence of any mention of Andrzejowski, is the author of the only combination validly published in this genus on the same page, namely K. officinalis (L.) Bess. “Klukia juncea” proposed on page 27 was not finally accepted for relevant species listed in the index (p. 104) as Sisymbrium junceum [(Willd.) M. Bieb.] and therefore, it remained nomen invalidum. Section Velarum initially included more than one species, what was indicated as “Erysimum officinalie Lin., etc.” in the protologue (Candolle, 1821a: 238) and subsequently specified by adding Sisymbrium corniculatum Cav. [S. cavanillesianum Castrov. et Valdés Berm.] (Candolle, 1821b: 461). Sisymbrium officinale was designated as lectotype of S. sect. Velarum [and thus of Klukia Andrz. ex Bess.] by Dorofeyev (2001: 128).

Two immediate consequences of this finding are the following. First, a six-years younger (1828) generic name Velarum (DC.) Reichenb. turns out to be unavailable for use on account of being necessarily homotypic with the predating Klukia Andrz. ex Bess. This has a moderate impact on nomenclature because Velarum, although sometimes treated as a distinct genus, is usually accepted as a synonym of Sisymbrium L., as amply proven by molecular phylogenetic studies (Warwick et al., 2002, 2006a; Žeronder Čalasan et al., 2021). Second, and most important outcome is the finally confirmed illegitimacy of Klukia Racib., the name being in continuous use starting from the very time of its description in 1890. This circumstance seems to be essential for resuming an attempt to conserve the latter name (Paclt, 1973), but now based on a solid nomenclatural ground.

3. A new subspecies of Noccaea rubescens

Noccaea rubescens subsp. culminicola (Mouterde) D. A. German, comb. et stat. nov. ≡ Lepidium culminicola Mouterde, 1970, Nouv. Fl. Liban & Syrie 2: 84, “culminicolum”.

Typus: “Liban. Qornet Saouda (près du sommet), eboulis fin calcaire. Alt. 3000–3050 m. 19. 7. [19]57. H. Pabot” (G: G00371858; https://plants.jstor.org/stable/10.5555/al.ap.specimen.g00371858; http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id =284579&base=im&lang=en).

To the best of my knowledge, Lepidium culminicola, described based on the single collection from the highest peak of Lebanon, has never been subjected to a critical taxonomic evaluation and so far, is globally accepted (Greuter et al., 1986; Warwick et al., 2006b; Marhold, 2011; Freiberg et al., 2020; Francis et al., 2021; Govaerts et al., 2021; COl [2022]; POWO [2022]; Tropicos [2022]; WFO [2022]) as originally defined by Mouterde (1970). However, morphology of its type does not support this viewpoint. Although I had no opportunity to study the specimen physically to check the number of
ovules per locule, etc. and could only make conclusion based on observation of the image online, it can be stated that it is certainly not a member of Lepidium. Habitually Pabot's plant belongs to the group of low-growing alpine Noccaea Moench species with abbreviated, often subumbellate inflorescences such as N. pumila (Steven) Steud., N. sinesisii (Hauskn. ex Bornm.) F. K. Mey., N. valerianoides (Rech. fil.) F. K. Mey. and some others. By a combination of stout stems, thickish and exclusively alternate leaves, siliques with rounded apex and short styles, it most closely approaches N. rubescens (Boiss.) F. K. Mey., a species endemic to the alpine screes of Bolkar and Ala dağları (Parolly, 1995, as Thlaspi sintenisii subsp. crassum (P. H. Davis) Parolly; Meyer, 2006), two mountain knots in the eastern part of Central Taurus in southern Turkey and thus geographically closest to the only known locality of L. culminicula. Because neither the flowers, nor ripe fruits of the latter are known, a cautious approach of recognizing it as a subspecies of N. rubescens is adopted here based on somewhat shorter (0.2–0.4 vs. 0.6–1.1 mm, rarely less) styles and upper leaves equaling or exceeding the top of infructescence, i. e. covering it completely (vs. reaching fruiting pedicels and at maximum covering them, but not siliques) accompanied by geographic isolation. Additional collections of the Lebanon plant are required in order to get better geographical isolation. Additional collections of the herb. Miller are marked. On the other hand, it lacks the direct indication “Herb. Miller”, although by itself, according to Britten (1913: 133), this might not necessarily mean otherwise. Most important, however, is the absence of author's labelling/annotations. Hence, evidence of being original material is not absolute which prevents selecting relevant specimen as lectotype.

There is one more gathering identified by Mouterde as L. culminicula collected by him in Jabal Saninne on 17. 05. 1937 (MPU: MPU078589; https://science.mnhn.fr/institution/um/collection/mpu/item/mpu078589; https://explore.recolnat.org/occurrence/06f05a8dec284f0f8c81b002f377313a2), but it is morphologically very distant from the type and fits the alternative (original?) collector's identification “L. nebrodense (Rafin.) Guss.” accompanying this specimen.

4. Three new synonyms

**Barbarea bracteosa** Guss., 1828, Fl. Sicul. Prodr. 2: 257.

Described from Sicily; type material possibly in NAP, lectotype likely not designated.

= Erysimum minus Mill., 1768, Gard. Dict., ed. 8: Erysimum n° 5, syn. nov.

Neotypus (hic designatus): “Erysimum minus. Mill. Dict. [Hort.]” (BM: BM000522264; https://plants.jstor.org/stable/10.5555/al.ap.spe-}

With the only exception of GBIF [2022], *Erysimum minus* is currently a universally unplaced/ambiguous/unresolved name (Freiberg et al., 2020; Govaerts et al., 2021; POWO [2022]; WFO [2022]), otherwise not included in the databases (Francis et al., 2021; COL [2022]; Tropicos [2022]) and generally missing in both old and modern taxonomic and floristic literature. This situation is to a large extent explained by the lack of any information on the origin of the plant (except for the indication that it is not native to England) in the protologue (Miller, 1768: *Erysimum*) as well as in the single work (Boerhaave, 1720: 16) referred to therein. This uncertainty (as “Hab. ?”) was later reproduced by Jackson (1893: 893) who, in the lack of any information on *E. minus* other than that of Miller (1768), had to accept it.

The habit of relevant specimen confirms that annotation of its folder, “*Erysimum minus* Miller = *Barbarea*”, also given at Global Plants (2022) as “*Barbara* indet.”, is correct, and such peculiarities as small (petals to 4.5 mm) flowers, erect to subappressed siliques and fully bracteate inflorescences allow its further identification as *Barbarea bracteosa*. The established conspecificity of *E. minus* and *B. bracteosa* does not affect the nomenclatural stability: despite Miller's binomial is 60 years earlier, it has no priority in *Barbarea* W. T. Aiton since the name is preoccupied by *B. minor* K. Koch validly published in 1846. Hence, *E. minus* becomes the first taxonomic synonym of *B. bracteosa* of the species rank.

The specimen designated here as the neotype very likely belongs to Miller's herbarium and might well represent original material of *E. minus*. It fits the characters mentioned by Miller, of which most noteworthy is a fully bracteate inflorescence: “... the single flowers proceeding from the sides of the stalks ... the flowers come out single from the wings of the stalk the whole length”, and bears an anonymous annotation “[Hort.]” on the sheet along with another one, “*Erysimum minus*. Mill. Dict.”, also in pencil, presumably by D. C. Solander, similar to how specimens from herb. Miller are marked. On the other hand, it lacks the direct indication “Herb. Miller”, although by itself, according to Britten (1913: 133), this might not necessarily mean otherwise. Most important, however, is the absence of author's labelling/annotations. Hence, evidence of being original material is not absolute which prevents selecting relevant specimen as lectotype.
**Rorippa barberifolia** (DC.) Kitag., 1937, J. Jap. Bot. 13: 137. = *Camelina barberifolia* DC., 1821, Reg. Veg. Syst. Nat. 2: 517.

Typus: [Russia, Transbaicalia]: “Doroininsk. Vlassov, [acc. a] mr. Fischer 1819” (G-DC: G00203785; https://plants.jstor.org/stable/10.5555/al.ap.specimen.g00203785).

= *Calepina irregularis* var. *pinnatifida* O. E. Schulz, 1935, Repert. Spec. Nov. Regni Veg. 38(6–12): 108, syn. nov.

Typus: “Turcom. sept. / [Unknown locality; obtained via H. E. F.] Richter (1844)” (BM: BM000593498!; https://data.nhm.ac.uk/object/1721ac6d-933c-4ded-b6ea-644c443a235f).

The type of *Calepina irregularis* var. *pinnatifida* is represented by the single plant collected at the very beginning of anthesis and initially identified as *C. corvini* (All.) Desv. [= *C. irregularis* (Asso) Thell.]. Schulz (1935) paid attention to the difference of the specimen from typical plants of the species (pinnate vs. repand-dentate cauleine leaves and presence of hispid vs. absence of any indumentum), but retained the species identity and established taxonomic separation only at the varietal level. Meanwhile, in addition to the above-mentioned peculiarities, the type of *C. irregularis* var. *pinnatifida* is characterized by oblong-elliptic (vs. ovate) ovaries with distinctly stalked and slightly bilobed (vs. subsessile and entire) stigmas and equal (vs. unequal) petals and cannot therefore belong to the monotypic *Calepina* Adams. Instead, in all mentioned details and habitually it fits *Rorippa barberifolia*, a NE Asian/NW North American species never found in “Turcomania” (i.e. Middle Asia). Based on the established species identity, indication of the collection area should be considered incorrect; unfortunately, I did not get any clue pointing to the actual origin of relevant plant.

**Tetracme bucharica** (Korsh.) O. E. Schulz, 1933, Bot. Jahrb. Syst. 66: 98. = *Tetracmion bucharicum* Korsh., 1898, Bull. Acad. Sci. Pétersb. 9(5): 421.

Typus: [Uzbekistan]: “Buchar, prov. Bajsun: prope Kokajty in collibus, solo arenoso solido. 5 V [18]97. № 380. S. Korshinsky” (LE!).

= *Tetracme glochidiata* (Botsch. et Vved.) Patrom., 1974, Conspr. Fl. As. Med. 4: 144. = *Tetracmion glochidiatum* Botsch. et Vved., 1941, Not. Syst. Herb. Inst. Bot. Zool. Sect. Uzbek. Acad. Sci. URSS 3: 17, syn. nov.

Typus: [Uzbekistan]: “Ad declivia argillosa in promontorio montium Babatag pr. p. Kum-Tschoka. 28 V 1928. № 70. [A. I.] Vvedensky” (TASH!; iso (ibid., № 265) – TASH 40270!).

According to the diagnosis of *Tetracmion glochidiatum* Botsch. et Vved., its only difference from the closely related *T. bucharicum* Korsh. is direction of fruit horns that are recurved instead of more or less ascending in the latter species. Botschantzev and Vvedensky (1941) also mentioned that these species may co-occur and intermediate specimens [with horizontal horns] of presumably hybrid origin are known. Subsequently accumulated information on distribution of the two species (Pachomova, 1974; Yunusov, 1978) and rich material on them (LE!) confirmed both similar eco-geographic patterns and presence of plants with horizontal horns recognized by V. P. Botschantzev as hybrids. In my opinion, the observed picture is better explained by a simpler assumption that just one species is involved here in which direction of fruit horns is a variable character. This version gets enough support by 1) the similarity of plants with differently directed horns in every other morphological aspect; 2) availability of “mixed populations”; and 3) wide range of the angle of both horn ascending and descending among or sometimes within individual plants. Finally, both ascending and slightly recurved horns are rarely found on the same plant, as demonstrated by the specimen collected 18 IV 1978 by V. P. Botschantzev and M. A. Mikhailova (№ 437) near Gaudrak, Turkmenistan. Summing the above-said up, I see no ground for recognition of two species within the former *Tetracmion* Korsh. and consider them as forms of the same species, *Tetracme bucharica* (Korsh.) O. E. Schulz, not deserving taxonomic recognition despite indeed noticeable pattern of morphological variability.

**Acknowledgements**

The kind opportunity of treating the collections provided by curators and responsible managers of the visited herbaria is deeply appreciated.

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