

NEW OR NOTEWORTHY TAXA IN THE SOUTH AFRICAN *HELIOPHILA* (BRASSICACEAE)

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Abstract. One subspecies, *Heliophila subulata* subsp. *longipila*, is described as new. Ten new combinations (*H. agtertuinensis*, *H. arenaria* subsp. *acocksii*, *H. diffusa* subsp. *flacca*, *H. elata* subsp. *pillansii*, *H. glabrescens*, *H. minor*, *H. namaquana* subsp. *sarcostyla*, *H. pusilla* subsp. *macrosperma*, *H. scabrida* subsp. *salteri*, and *H. seselifolia* subsp. *nigellifolia*) are proposed. The following 35 taxa are lectotypified: *Brachycarphaea polygaloides*, *Carponema aggregata*, *H. adpressa*, *H. anomala*, *H. aspera*, *H. basutica*, *H. dolichostyla*, *H. dregeana* var. *induta*, *H. edentula*, *H. linearifolia*, *H. macowaniana*, *H. macra*, *H. maritima*, *H. maximiliani*, *H. natalensis*, *H. odontopetala*, *H. pearsonii*, *H. pearsonii* var. *prageri*, *H. pubescens*, *H. rivalis*, *H. rosea*, *H. rostrata*, *H. scandens*, *H. schlechteri*, *H. scoparia*, *H. stylosa*, *H. suavissima*, *H. suavissima* var. *incana*, *H. sulcata* var. *modestior*, *H. torulosa*, *H. trichinostyla*, *Leptormus caledonicus*, *L. tripartitus*, *Pachystylum glabrum*, and *Peltaria capensis*.

Keywords: Brassicaceae, Cruciferae, *Heliophila*, novelties, South Africa, typification

The present contribution is part of ongoing studies on the primarily South African genus *Heliophila* L. (Brassicaceae or Cruciferae) that started almost a decade and a half ago (Mummenhoff et al., 2005; Al-Shehbaz and Mummenhoff, 2005), continued recently (Al-Shehbaz, 2019, 2020a,b), and are to be concluded eventually with a comprehensive monograph that deals with the cytological, ecological,

genomic, molecular phylogenetic, and detailed taxonomic accounts. The following nomenclatural adjustments are needed for the above-mentioned studies in progress. All taxa are numbered in one sequence regardless of their subheadings to facilitate easy search in the Appendix (Index to Numbered Collections) at the end of the paper.

A NEW SUBSPECIES

Heliophila subulata Burch. ex DC. is one of the most variable and widespread species of the genus. The variation is continuous in almost all morphological features and does not show distinct patterns that merit formal recognition. The exception, however, is in localized populations in the Cape Province that have distinctly longer trichomes than do those elsewhere in the species range. They are formally recognized below as a distinct subspecies.

1. *Heliophila subulata* subsp. *longipila* Al-Shehbaz, *subsp. nov.* TYPE: SOUTH AFRICA. Western Cape: [Overberg District, Theewaterskloof Municipality], Swartberg, Caledon, along top of rocky ridge and on stony slopes, 30 September 1980, E. Esterhuysen 35515 (Holotype: MO; Isotypes: BOL, M).

Plants of this subspecies are readily distinguished from those of subsp. *subulata* by having stem and leaf trichomes (0.3–)0.5–0.8(–1.0) versus 0.01–0.06(–0.08) mm long.

Herbs, perennial, densely hirsute to scabrous-pubescent on stems, leaves, and often pedicels. *Trichomes* (0.3–)0.5–0.8(–1.0) mm long.

Phenology and habitat: flowering late July into October (rarely into December). Plants restricted to rocky ridges, stony slopes, and hillsides at 300–750 m.

Discussion: plants of *Heliophila subulata* subsp. *longipila* are restricted to Theewaterskloof Municipality (formerly Caledon) of the Overberg District (Western Cape Province). These “Caledon”-endemics are highly restricted

perennial herbs that are densely hirsute to scabrous-pubescent, especially along the stems and on leaves and pedicels, with trichomes (0.3–)0.5–0.8(–1.0) mm long. By contrast, subsp. *subulata* is widespread throughout the Western Cape (including the City of Cape Town, West Cape, Cape Winelands, Overberg, Garden Route, and Central Karoo districts), Eastern Cape, and KwaZulu-Natal provinces. They are also perennial herbs, but in some coastal populations the plants are sometimes annuals and at higher elevations they sometimes grow into subshrubs. However, throughout this subspecies range, the plants are densely to moderately puberulent with minute trichomes only 0.01–0.06(–0.08) mm long, and rarely they are subglabrous or glabrous.

Marais (1970) assigned the collections of *Heliophila subulata* to several unnamed groups, one of which included four collections from the Caledon area that have longer trichomes than the others. These collections (*Bolus* 6772, *Esterhuysen* 18945, *Schlechter* 9783, and *van Niekerk* 398) are cited below as paratypes.

Additional specimens examined: SOUTH AFRICA. Western Cape: Overberg, Theewaterskloof [Caledon], Swartberg, lower S slopes, E. Esterhuysen 18945 (BOL, PRE); Houw Hoek F. R. R. *Schlechter* 5578 (B, MO, Z), G. van Niekerk 398 (BOL); Houw Hoek peak, R. S. Adamson 4249 (BOL); Swartberg, F. R. R. *Schlechter* 9783 (K, Z); foot of mountain near Caledon, H. Bolus 6772 (BOL, PRE); Zandfontein, E. E. Galpin 3747 (PRE).

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NEW COMBINATIONS

The study of extensive collections of several species complexes of *Heliophila* supports raising the status of some varieties to distinct species. For others, they are either synonymized or treated as subspecies instead of varieties in order to be consistent with the concept I adopted throughout most of my career.

2. *Heliophila agtertuinensis* (O.E. Schulz) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *Heliophila maximiliani* Schltr. var. *agtertuinensis* O.E. Schulz, Bot. Arch. 31: 540. 1931. Described from: "Westregion, Agtertuin, auf Hügeln, alt. 800 ft. (R. SCHLECHTER, It. II. 1897 n. 10858 – am 15. August blühend)." TYPE: SOUTH AFRICA. [Western Cape: West Coast, Cederberg], Clanwilliam, Agtertuin, 800 ft [ca. 244 m], 15 August 1897, *F. R. R. Schlechter 10858* (Holotype: K [000230382]; Isotypes: BM [000552478], BOL [133702, image seen], BR [000008887214, image seen], E [00292843], G [00160955], GRA [00009890, image seen], HBG [506077, image seen], L [1827316, image seen], MO [1926510], P [00739534], PR, PRE [04064220, image seen], S [1216057], STU [image seen], W [19070005244], WAG [0000801, image seen], Z [000089792]).

This species is extremely rare and was treated by Schulz (1931) and Marais (1966, 1970) as a variety of *Heliophila maximiliani* Schltr. and *H. arenaria* Sond., respectively. *Heliophila agtertuinensis* is unique in the genus for having densely tuberculate sepals. It is further distinguished from *H. arenaria* (including *H. maximiliani*) by having nonmoniliform fruit with straight replum and smooth valves and by being glabrous throughout. By contrast, *H. arenaria* has moniliform fruit with strongly constricted replum and often callose parts of the valve facing the seeds, and it is often densely pilose especially on the sepals, though very rarely glabrescent or sparsely pilose in the young bud. Both species superficially resemble many other annual *Heliophila* for lacking the paired glands at leaf and pedicel bases and for having blue flowers, narrow fruit, one-appendaged petals and lateral stamens, and filiform to narrowly linear or trifid leaves. Therefore, their treatment as varieties of one species ignores their remarkable differences in the sepal indumentum.

Marais (1966, 1970) stated that the type of *Heliophila maximiliani* var. *agtertuinensis* is housed at B, but a search for it by some of the curatorial staff at B and I failed to locate any trace of it. It should be noted that the Brassicaceae taxa described by Schulz and deposited at B were saved during World War II. It is absolutely certain that Marais made a mistake because Schulz (1931) described this taxon and many others based on the material he studied at Kew and enumerated on pages 439–442 of that article. Therefore, *Schlechter 10858* (K), which was annotated by Schulz in 1930, is the holotype.

3. *Heliophila arenaria* subsp. ***acocksii*** (Marais) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *H. arenaria* var. *acocksii* Marais, *Bothalia* 9: 97. 1966. Described from: "Calvinia, Lokenburg, *Acocks 19750*." TYPE: SOUTH AFRICA. [Northern Cape: Namakwa, Hantam], Calvinia, Lokenburg North, Boklandskloof, 2100 ft [640 m], 13 October 1958, *J. P. H. Acocks 19750* (Holotype: PRE [0406413-0, image seen]; Isotypes: BOL [108667, image seen], K [000230383]).

Marais (1970) used characters such as flower size, fruit indumentum, and ovule number to distinguish this subspecies (as var.) from subsp. *arenaria*. However, these characters can be quite variable in a given collection and, therefore, are unreliable for the separation of the two taxa. Instead, subsp. *acocksii* is readily separated from subsp. *arenaria* by having submoniliform or nonmoniliform (vs. strongly moniliform) fruits with straight (vs. strongly constricted) replum and cylindrical-subulate (vs. subclavate to broadly cylindrical) styles (3–)4–9 mm long (vs. 1.5–3.0[–3.5]) mm long.

4. *Heliophila diffusa* (Thunb.) DC. subsp. ***flacca*** (Sond.) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *H. flacca* Sond., *Abh. Geb. Naturwiss. Hamb.* 1: 223. 1846. Described from: "Hab. Inter frutices, (alt. II.) ad thermas prope urbem Caledon (Eckl. et Zeyh.!) Floret Augusto." TYPE: SOUTH AFRICA. [Western Cape: Overberg, Theewaterskloof], Caledon Baths, Zwarteberg, *C. F. Ecklon & C. L. P. Zeyher s.n.* (Lectotype designated by Marais [1970: 41] as type: K [000230408]; Isolectotypes: B [100153836, 100153872], C [2 sheets], GOET [002611, image seen], M [0108061], MO [102155], P [00739579], S [G8768 and unnumbered sheet], SAM, W [0009169, 18890303879]).

Sonder (1846) provided a detailed description of the species based at least on the two duplicates at S that were not examined by Marais (1966, 1970), who indicated (pp. 98 and 41, respectively) that the lectotype (as type) is at K. However, Nordestam (1980: 257) lectotypified the name based on S (G8768), but this typification is predated by that of Marais, though this S duplicate is far more complete than that at K.

Subspecies *flacca* is distinguished from subsp. *diffusa* by having wingless or narrowly margined seeds, inflated, suborbicular-ovate to broadly elliptic siliques 2.5–3.5 × 2–3 mm, 2-ovuled ovaries, and styles 2.0–3.1 mm long. By contrast, subsp. *diffusa* has seeds winged all around, latiseptate, narrowly to broadly oblong siliques or siliques (3.5–)5.0–12(–14) × 3–4(–5) mm, (2–)4- to 8-ovuled ovaries, and styles 0.7–1.8(–2.3) mm long.

The above differences may suggest that the two taxa are sufficiently different morphologically to merit recognition at the species rank. However, their remarkable similarities

in foliage, flowers, and racemes do not support that. In particular, both taxa have unappendaged stamens and petals all papillate at base, a feature extremely rare in the genus and found only in the related *H. minor* (see below).

5. *Heliophila elata* Sond. subsp. ***pillansii*** (Marais), Al-Shehbaz, *comb. et stat. nov.*

Basionym: *H. elata* var. *pillansii* Marais, *Bothalia* 9: 98. 1966. Described from: “Cape. Piketberg District, between Avontuur and Zebra Kop, Pillans 7603 (BOL, holo; GRA, K).”

TYPE: SOUTH AFRICA. [Western Cape: West Coast, Bergrivier], top of Piquetberg Range, between Avontuur and Zebra Kop, Piquetberg Div., 4000 ft (ca. 1219 m), 9 November 1934, *N. S. Pillans 7603* (Holotype: BOL [135669, image seen]; Isotypes: BOL [135668, image seen], GRA [0000996-0, image seen], K [000230364], NBG [0003141-0]).

The differences listed by Marais (1970) between vars. *elata* and *pillansii* do not hold because of the tremendous overlap, especially in characters such as the ovule number, presence versus absence of sparse trichomes on the fruiting pedicels, saccate versus nonsaccate sepals base, leaf division, and style length. Instead, subsp. *pillansii* differs by having flower-bud apices minutely puberulent (vs. glabrous), unappendaged (vs. appendaged) bases of petals and lateral stamens, and fruits 2.5–5.5 (vs. 4–8) cm long.

6. *Heliophila glabrescens* (O.E. Schulz) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *H. sabulosa* Schltr. var. *glabrescens* O.E. Schulz, *Bot. Arch.* 31: 541. 1931. Described from: “Piquetberg Div., Het Kmis [for Kruis], (E. L. STEPHENS and R. GLOVER in Percy Sladen Memorial Expedi. Etc. 1912 n. 8705 – am 17. Septbr. blühend und fruchtend).”

TYPE: SOUTH AFRICA. [Western Cape: West Coast, Bergrivier], Piketberg: Het Kruis, 17 September 1912, *E. L. Stephens & R. Glover 8705* (Holotype: K [000567805]).

Schulz (1931) and Marais (1966, 1970) treated *Heliophila glabrescens* as a variety of *H. sabulosa* and *H. arenaria*, respectively. From *H. arenaria* (including *H. sabulosa*), *H. glabrescens* differs substantially in being a very slender (vs. stout) plant with several decumbent and glabrous (vs. usually single, ascending, and hirsute to pilose stems), minutely puberulent (vs. pilose) sepals and pedicels with trichomes 0.01–0.03(–0.10) mm long (vs. 0.3–0.8(–1.3) mm long), puberulent (vs. hirsute to pilose) sepals the median pair of which is noncucullate (vs. cucullate), very slender (vs. stout) fruits 0.6–0.8 (vs. 1.0–1.5) mm wide and with obscure (vs. distinct) midvein, slender (vs. stout) fruiting pedicels (0.8–)1.0–2.0 cm (vs. 0.6–1.2 cm) long, and smaller seeds 0.6–0.8 × 0.5–0.6 mm (vs. 1.0–1.2 × 0.7–0.9 mm). In my opinion, these differences are substantial, and they justify the recognition of both *H. arenaria* and *H. glabrescens* as distinct species.

7. *Heliophila minor* (Marais) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *H. meyeri* Sond. var. *minor* Marais, *Bothalia* 9: 99. 1966.

TYPE: SOUTH AFRICA. [Western Cape: Overberg District], Swellendam Municipality, 26 September 1933, *F. M. Leighton s.n.* (Holotype: BOL [108455]).

Heliophila minor is a very rare species known thus far only from a handful collections made over half a century ago. It was described by Marais (1966) as a variety of *H. meyeri*, a species it resembles in the papillate bases of filaments and petals. In addition to lacking the appendaged filaments characteristic of *H. meyeri*, *H. minor* differs in being delicate plants 9–30 cm tall with 3- to 7-lobed basal leaves only 1–4 cm long, sepals 2.0–2.5 mm long, nonclawed petals 3–4 × 2–3 mm, filaments 1.5–1.8 mm long, ovate anthers 0.6–0.7 mm long, 8- to 14-ovuled ovaries, slightly moniliform fruits 1.0–1.7 cm × 1.2–1.7 mm, undulate replum, and suborbicular-ovate seeds 0.9–1.0 mm long. By contrast, *H. meyeri* is a more robust plant 18–50(–67) cm tall with (7–)9- to 19(–27)-lobed basal leaves 4–15(–24) cm long, sepals 3.0–4.5 mm long, short-clawed petals (5–)6–9 × 3.0–5.5 mm, filaments 2.3–4.0 mm long, oblong anthers 1.0–1.5 mm long, 12- to 18-ovuled ovaries, nonmoniliform fruit 1.5–2.5 cm × 2.5–3.0 mm, straight replum, and orbicular seeds 1.2–1.6 mm in diam.

Although both *Heliophila minor* and *H. meyeri* are restricted to the Western Cape Province, they are geographically isolated. The former occupies an easterly distribution and is confined to Langeberg and adjacent Breede Valley municipalities of the Cape Winelands District and adjacent Swellendam of the Overberg District. By contrast, *H. meyeri* occupies a further westerly range, especially in the City of Cape Town, Witzenberg, Drakenstein, Stellenbosch, and adjacent Breede Valley municipalities of the Cape Winelands District, and Theewaterskloof municipality of the Overberg District.

In conclusion, both geographical and morphological data strongly support the recognition of the above taxa as distinct species.

8. *Heliophila namaquana* Bolus subsp. ***sarcostyla*** (Schltr.) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *Heliophila sarcostyla* Schltr., *Bot. Jahrb. Syst.* 27: 138. 1899. Described from: “In regione austro-occidentali: In clivis lapidosis montis Koude-Berg, in ditone Clanwilliam, alt. c. 2600 ped., 28. Aug. 1896. – n. 8732.”

TYPE: SOUTH AFRICA. [Western Cape: West Coast, Cederberg], Mt. Koudeberg, Clanwilliam, ca. 2600 ft [ca. 792 m], 28 August 1896, *F. R. R. Schlechter 8732* (Lectotype designated by and listed as type by Marais [1970: 26]: B [00154904]; Isolectotypes: BR [0000008886088, image seen], E [00193006], G [00160959], GRA [0000962-0, image seen], H [1348769, image seen], HBG [506061, image seen], K [000230437, 000230438], L [1827317,

image seen], MO [1926507], P [00739692, 005445294, 05445297], PH [00014190, image seen], PR, S [1216096], SAM, US [00099879], W [18980002285], WAG [0000818, image seen], Z [000005046]).

Marais (1970) reduced *Heliophila sarcostyla* to synonymy of *H. namaquana* most likely because he examined only the isolectotype at K, which has no fruits. The study of fully mature fruits in several collections not studied by him strongly supports the recognition of the former, at least at the subspecific rank of the latter. Subspecies *sarcostyla* is distinguished from subsp. *namaquana* by having thickened, globose-to-obovoid styles to 2.5 mm wide, nonmoniliform fruits 2.0–2.2 mm wide, straight replum, subwoody valves, and seeds 2.0–2.2 × 1.2–1.5 mm. Subspecies *namaquana* differs by having cylindrical-subclavate to subclavate styles to 1 mm wide, moniliform to submoniliform fruits 1.0–1.5 mm wide, constricted to undulate replum, papery valves, and seeds 0.9–1.1(–2.2) × 0.6–0.8(–1.5) mm.

9. *Heliophila pusilla* L.f. subsp. *macrosperma* (Marais)

Al-Shehbaz, *comb. et stat. nov.*

Basionym: *Heliophila pusilla* var. *macrosperma* Marais, *Bothalia* 9: 100. 1966.

TYPE: SOUTH AFRICA. [Western Cape: Cape Winelands], Stellenbosch, *Prior s.n.* (Holotype: K [000230410]).

This subspecies differs from subsp. *pusilla* in having orbicular (vs. oblong) seeds 1.2–1.8 mm in diam. (vs. 0.8–1.0) mm wide, fruits (1.5–)1.7–2.3 (vs. 0.8–1.5) mm wide, orbicular (vs. elliptic) bead, as long as (vs. longer than) wide, appendaged (vs. unappendaged) and basally papillate (vs. basally glabrous) petals 4–6 × 2–3 mm (vs. 2.0–3.5 × 1.2–2.0 mm), and basally papillate (vs. glabrous) lateral filaments.

Heliophila pusilla subsp. *macrosperma* is almost exclusively restricted to Stellenbosch and adjacent Drakenstein municipalities of the Cape Winelands, whereas subsp. *pusilla* is far more widespread in the City of Cape Town, Cape Winelands, and Overberg districts of the Western Cape Province. The two subspecies are allopatric, and I have not seen any morphologically intermediate collections to indicate possible hybridizations. Therefore, it is with some hesitation that I recognize them at the subspecific rank, and future field and experimental studies may show that they merit recognition as distinct species.

TYPIFICATION

The vast majority of lectotypifications in *Heliophila* were done by Marais (1970), and his listings of the types for taxa are considered herein as lectotypifications following the excellent brief account by McNeill (2014) and the *Code* (Turland et al., 2018). The 35 cases below deal with untypified taxa or those that need a second-step lectotypification.

12. *Brachycarpea polygaloides* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 1: 7. 1834–1835. TYPE: SOUTH AFRICA. [Western Cape: West Coast, Cederberg], Clanwilliam, [1 January 1830], *C. F. Ecklon & C. L. P. Zeyher* 51

10. *Heliophila scabrida* Schltr. subsp. *salteri* (Exell) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *Heliophila salteri* Exell, *J. Bot.* 68: 246. 1930.

Described from: “*Hab.* SOUTH AFRICA: southern slope of the Twelve Apostles Mts., Cape Peninsula, fl. and fr. Oct.; T. M. Salter, 233/14 (type in Herb. Mus. Brit.)”

TYPE: SOUTH AFRICA. [Western Cape: City of Cape Town], south slope of 12 Apostles Mts., 16 October 1928, *T. M. Salter* 233/14 (Holotype: BM [000552493]).

Marais (1970) treated both *Heliophila salteri* and *H. scabrida* as informal groups within *H. concatenata* Sond., a species he believed to be of hybrid origin between *H. meyeri* and *H. coronopifolia* L. A critical comparative study of all of the above taxa failed to support that assumption. Indeed, *H. scabrida* (together with *H. salteri*) are unrelated to the other three species above, and they are recognized as distinct taxa.

Subspecies *salteri* differs from subsp. *scabrida* by having moniliform fruits 1.0–1.5 cm × 1.5–2.0 mm, constricted to undulate at replum, cylindrical styles 1.0–1.5 mm long, and white petals 4–6 × 2–3 mm. By contrast, subsp. *scabrida* has nonmoniliform fruits (1.7–)2.0–3.6 cm × 2.5–3.2 mm, straight or rarely irregularly undulate replum, clavate to subulate or cylindrical styles 2–7 mm long, and mauve or pink petals 6–12 × 3–6 mm.

11. *Heliophila seselifolia* Burch. ex DC. subsp. *nigellifolia* (Schltr.) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *Heliophila nigellifolia* Schltr., *Bot. Jahrb. Syst.* 49: 416. 1913. Described from: “Llein-Namaqualand: auf sandigen Hügeln bei Aus ca. 800 m ü. M. (R. SCHLECHTER n. 11292 [for 11229]—blühend im September 1897).”

TYPE: SOUTH AFRICA. [Northern Cape: Namakwa], Namaqualand, ca. 800 m, 13 September 1897, *F. R. R. Schlechter* 11229 (Lectotype designated by Marais [1970: 33] and listed as holotype: B [100153844]; Isolectotypes: BOL [135646, image seen], GRA [0000965-0, image seen], PRE [0404006-0, image seen]).

From subsp. *seselifolia*, subsp. *nigellifolia* differs by having unappendaged lateral stamens and torulose, strongly tortuose fruits that are alternately bulged above seeds on each side of fruit and strongly depressed between them on the other side. On the other hand, subsp. *seselifolia* has appendaged lateral stamens and nontorulose, nontortuose, flat fruits without any bulging above or between seeds.

(Lectotype here designated: B [100154808]; Isolectotypes: B [100154804], C, GOET [002720, image seen], K, M [0152588], MO [1926515], P [00739470, 99739474], PRE [0409792-0, 0631917-0, images seen], SAM, W [0075577, 18890303903]).

The above name is a synonym of the widespread and highly variable *Heliophila juncea* (P. J. Bergius) Druce.

13. *Carponema aggregata* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 1: 8. 1834–1835. TYPE: SOUTH AFRICA. [Western Cape: Overberg, Theewaterskloof], Caledon, “In locis arenosis apud Vogelvalley et in Zwartland (Stellenbosch),

Sep.," *C. F. Ecklon & C. L. P. Zeyher 55* (Lectotype here designated: SAM [00140640]; Isolectotypes: PRC [451623], PRE, S [1216080]).

Carponema aggregata is a synonym of the earlier-published *Heliophila digitata* L.f.

14. *Heliophila adpressa* O.E.Schulz, Bot. Arch. 31: 530. 1931. Described from: "Südafrika: Kap der Guten Hoffnung (BERGIUS 1815 – im September blühend, Herb. Berlin-Dahlem), an sandigen Orten des Tafelberges (ECKLON, un. it. n. 387 – im Oktober fruchtend, ad Herb. Pocker in Herb. Kew." TYPE: SOUTH AFRICA. [Western Cape]: Arenosa Mount, *C. F. Ecklon 387* (Lectotype here designated: K [000230436]; Isolectotypes: G [00161014], JE [00000396], M [0108070], PRE [0403162-0, fragments at B]).

Schulz (1931) cited two syntypes (*Bergius s.n.* at B and *Ecklon 387* at K), and both were examined by Marais (1970), who did not lectotypify the species. The former collection is an immature unicate, whereas the Ecklon collection has mature fruits, and the duplicate at K was annotated by Schulz in 1930 and is here designated as the lectotype.

15. *Heliophila anomala* Schltr., Bot. Jahrb. Syst. 49: 410. 1913. Described from: "Südwestliche Kap-Kolonie: auf grasigen Abhängen der Berge beim Tulbagh-Wasserfall ca. 1000 m ü. M. (R. SCHLECHTER n. 1682 – blühend im September 1892). Auf grasigen Flächen der Berge beim Elandsfontein, im Koude Bokkeveld (Ceres-Division) ca. 1700 m ü. M. (R. SCHLECHTER n. 10032 – blühend im Januar 1897)." TYPE: SOUTH AFRICA. [Western Cape: Cape Winelands, Witzenberg], Ceres, Koude Bokkeveld, 5500 ft [ca. 1676 m], 18 January. 1897, *F. R. R. Schlechter 10032* (Lectotype here designated: Z [000005018]; Isolectotypes: B [100153801], BM [001254227], BOL [135674, image seen], G [00160848, 00160849], GRA [0001004-0, image seen], K [000230564], PRE [0408634-0, image seen], WAG [0000825, image seen]).

Heliophila anomala is an illegitimate and superfluous name because one of its syntypes, *Schlechter 1682* (Z [000005049]), is the holotype of the earlier-published *H. tulbaghensis* Schinz. To my knowledge, the latter is known only from the unicate above, whereas the former has not been typified before.

16. *Heliophila aspera* Schltr., Bot. Jahrb. Syst. 49: 410. 1913. Described from: "Südwestliche Kap-Kolonie: an felsigen Stellen auf den Gydouwbergen (Ceres-Division) ca. 1800 m ü. M. (R. SCHLECHTER n. 10050 – blühend und fruchtend im Januar 1897)." TYPE: SOUTH AFRICA. [Western Cape: Cape Winelands, Witznberg], Ceres, Koude Bokkeveld, Gydouwberg, 19 January 1897, 6000 ft [ca. 1829 m], *F. R. R. Schlechter 10050* (Lectotype here designated: B [100153804]; Isolectotypes: BM [001254229], BOL [135685, image seen], BR [0000008886170, 0000008886897, images seen], E [00193021, 00193022], G [00160853, 00160854], GRA [0001008-0, image seen], HBG [506102, 506103, images seen], K [000230558, 000230559], L [1827576, 1827577, images seen], MO

[1806619, 1925722, 1925723], P [00710355, 00723708], PH [00014168, 00014169, 00014170, images seen], PR [two sheets], PRE [0408660-0, 0593974-0, 593975-0, images seen], S [1216102, 1216104], US [00099867, 00099868], W [18990003179, 18980007154], WAG [0000823, 0000824, images seen], Z [000005021, 000005022]).

Schlechter collected the type material and retained 2 of the 39 duplicates at Z. The name needed lectotypification, and because he (Schlechter, 1913) did not typify the name and, apparently later, annotated the sheet at B as "typus auct." I am designating that sheet as the lectotype.

17. *Heliophila basutica* Phillips, Ann. S. African Mus. 16: 38. 1917. Described from: "Qoqolosi Peak. January-February, flowers purple or pink. *A. Dieterlen*, 939 partly; *Philipps*, 975." TYPE: [LESOTHO] Basuntoland, Leribe, Qoqolosi Peak, January 1913, *A. Dieterlen 939* (Lectotype here designated: SAM [0006115-2]; Isolectotypes: P [00739713], SAM, US [00099870]).

Phillips (1917) cited the above two syntypes but did not designate a type for *Heliophila basutica*, though he annotated one sheet as the type, and that is taken here as the lectotype. Marais (1970) cited both *Philipps 975* and *Dieterlen 939* as syntypes, and although he annotated all sheets as *H. suavissima* Burch. ex DC., he too did not designate a lectotype.

18. *Heliophila dolichostyla* Schltr., Bot. Jahrb. Syst. 49: 414. 1913. Described from: "Kap-Kolonie: an steinigen Abhängen der Berge am Gracias-Pass (Riversdale – Division) ca. 450 m ü. M. ([*C. Leipoldt*] Herb. Bolus n. 10577 – blühend im Dezember 1904). An steinigen Stellen auf dem Montague-Pass (George-Division) ca. 300 m ü. M. (R. SCHLECHTER n. 5787 – blühend un fruchtend im November 1894)." TYPE: SOUTH AFRICA. [Western Cape: Cape Winelands, Langeberg], Montague Pass, 1000 ft [ca. 305 m], 2 November 1894, *F. R. R. Schlechter 5787* (Lectotype here designated: B [100153878]; Isolectotypes: GRA [0001011-0, image seen], Z [00089872]).

Heliophila dolichostyla is a synonym of *H. elongata* (Thunb.) DC. Schlechter (1913) did not indicate which of the two syntypes cited is the type, and the more complete specimen of the two duplicates I examined is designated above as the lectotype.

19. *Heliophila dregeana* Sond. var. *induta* O.E. Schulz, Bot. Arch. 31: 525. 1931. Described from: "Packhuisberg, 1000 m ü. M., an felsigen Orten (R. SCHLECHTER 1896 n. 8640, Hb. Berlin-Dahlem), Kondeberg, Cedarberge, bei Wupperthal, ca. 1000 m ü. M. (H. BOLUS 1897 u. 8923, Hb. Kew), (L. DIELS 1900 n. 875, Hb. Berlin-Dahlem)." TYPE: SOUTH AFRICA. [Western Cape: West Coast, Cederberg], Clanwilliam, Parkhimsberg, 3000 ft [ca. 914 m], 24 August 1896, *F. R. R. Schlechter 8640* (Lectotype here designated: K [000865600]; Isolectotypes: BOL [135677, image seen], BR [0000008886132, image seen], G [00160878, 00160879], MO [1925703], P [00739592], PR, PRE [0408643-0, 0631910-0, 0631911-0, images seen], S [1216081], W [18980002276], Z [000089729]).

Two of the three B syntypes cited by Schulz (1931) under *Heliophila dregeana* var. *induta*, *Schlechter 8640* and *Diels 875*, were not located, and it is likely that they were misplaced or lost during World War II. Although I have examined *Bolus 8923* (K), it is not as complete as the K duplicate of *Schlechter 8640*. Therefore, I am designating the latter as the lectotype because it is also represented by 14 duplicates that I either examined or saw images of, or both. The variety is considered a minor variant of *H. dregeana* that does not merit recognition.

20. *Heliophila edentula* O.E.Schulz, Bot. Arkiv 31: 527. 1931. Syn. nov. Described from: "Südafrika: Ohne genauen Standort (DRÈGE 1838 n. 7569, Hb. Kew, ALEX. KUHN 1903), Südl. Gross-Nama-Land, Gebiet des unteren Fischflusses bei Utschoa, auf Granitupen, 700 m ü. M. (PRAGER 1918 n. 8), Stolzenfels-Rietfontein (J. GARF PFEIL 1890/91 n. 105), Aus, auf Hügeln, 950 m. ü. M. (R. SCHLECHTER 1897 n. 11416), Aus, im Halbschatten niedriger Sträucher, 1400 m ü. M. (DINTER 1910 n. 1086, Blütenfarbe dunkelveilchenblau), Kuibis, Sandsteinplateau, 900 m ü. M. (DINTER 1910 n. 1240), Kubub am Felsen, 1400–1650 m ü. M. (RANGE 1906 n. 66, Blüten violettblau), Klein-Karas, auf Sand, 1300 m ü. M. (SCHÄFER 1909 n. 13, in Dinter, Collect. n. 1292, 1300), Tafelberge bei Buntfeldschuh (Schäfer 1913 n. 508), Klinghardtgebirge, Pietab I u. II (SCHÄFER 1913 n. 515)." TYPE: [NAMIBIA. Karas: Lüderitz District], Klinghardtgebirge, Pietab I u. II, 14 July 1913, *Schäfer 515* (Lectotype here designated: B [100153877]).

Five of the above syntypes were not located in any of the major herbaria consulted, and the remaining four that I examined belong to three unrelated species. *Drege 7569* is *Heliophila trifurca* Burch. ex DC., *Schaefer 515* and *Garf Pfeil 105* are *H. deserticola* Schltr., and *Schlechter 11416* is *H. affinis* Sond. Schulz (1931) distinguished *H. edentula* from *H. deserticola* solely by the presence versus absence of the minute petal appendage facing the lateral stamens; a feature alone does not justify the recognition of distinct species.

21. *Heliophila linearifolia* Burch. ex DC., Syst. Nat. 2: 692. 1821. Described from: "H. linearifolia. Burch! cat. geogr. pl. afr. austr. extratrop. n. 374 et 793. Hab. ad Caput Bonae-Spei. Var. α in vicinitate Urbis Cape-Town. Var. β ad Nysna in regione Antiqua-land (*Burchell*). 5. (v. s. sp. in herb. Burch.)." TYPE: SOUTH AFRICA. [Western Cape: City of Cape Town], Camps Bay, *W. J. Burchell 347* (Lectotype here designated: K [000230370]; Isolectotypes: G [00207084], K [000230369], PRE).

The above syntypes cited by de Candolle (1821) are housed in Burchell's herbarium at Kew, and the name has not been typified to the present. The lectotype designated above is a plant with leaves, flowers, and young fruits, and the fragments at G-DC consist of leaves and a flower taken from the lectotype. The isolectotype at K and the syntype are mounted on the same sheet.

22. *Heliophila macowaniana* Schltr., Bot. Jahrb. Syst. 27: 135. 1899. Described from: "In regione austro-occidentali: In arenosis prope villam Tulbagh, alt. c. 400 ped. 13. Sept.

1896. – n. 8996." TYPE: SOUTH AFRICA. [Western Cape: Cape Winelands, Drakenstein], Tulbagh Road, 600 ft [ca. 183 m], 13 September 1896, *F. R. R. Schlechter 8996* (Lectotype here designated: Z [000005035]; Isolectotypes: BM [000593515], BOL [135655, image seen], BR [000008886118, image seen], E [00193012], G [00160908], GRA [0000975-0, image seen], H [1348759, image seen], K [000230398], MO [1925734], NBG [0199105-0], P [05445277, 00739628], PH [00014199, image seen], PR, PRE [0407947-0, 0631908-0, 0631909-0, images seen], S [1216094], US [00099875], W [18980002279], WAG [0000815, image seen]).

Heliophila macowaniana needs lectotypification because Schlechter (1899) based the species description on his collection prior to distributing any duplicates, and he did not indicate where the type is housed. Marais (1970) did not lectotypify the name and listed K and PRE as the type.

23. *Heliophila macra* Schltr., Bot. Jahrb. Syst. 27: 136. 1899. Described from: "In regione austro-occidentali: In clivis arenosis montium pone rivulum 'Onrust-Rivier' in ditone Caledon, alt. 2000 ped., 29. Nov. 1896. – n. 9497; in arenosis montium pone rivulum 'Koude-Rivier' in ditone Bredasdorp, alt. c. 900 ped., 4 Dec. 1896. – n. 9626." TYPE: SOUTH AFRICA. [Western Cape: Overberg, Theewaterskloof], Caledon, Onrust River Mts, 2000 ft [ca. 610 m], 29 November 1896, *F. R. R. Schlechter 9497* (Lectotype here designated: Z [000089748]; Isolectotypes: B [100153851], BM [000552489], BR [000008886446, image seen], E [00193011], G [00160909], GRA [00001012-0, image seen: two plants on the right], HBG [506078, image seen], K [000230551], L [1827376, image seen], MO [1925732], P [00739629], PH [00014197, 00014198, images seen], PR, PRE [0409966-0, 0632500-0, 0632501-0, images seen], S [1216095], US [00099876], W [18980007155], WAG [0000816, 0000817, images seen]).

The name was not previously typified, and the collection number with more complete plants and more duplicates is taken here as the lectotype.

24. *Heliophila maritima* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 1: 11, No. 85. 1834–1835. Described from: "In collibus litoris apud 'Port Elisabeth' ad fluvium 'Zwartkopsrivier' et in 'Krakakamma' (Uitenhage), Sept. Oct." TYPE: SOUTH AFRICA. [Eastern Cape: Nelson Mandela Bay], Krakakama (Uitenhage), *C. F. Ecklon & C. L. P. Zeyher 85* (Lectotype here designated: SAM [0028110-0]; Isolectotypes: C, B [100154890], M [0152587], PRC [451625], W [0009173]).

Heliophila maritima is a synonym of the widespread and highly variable *H. subulata*.

25. *Heliophila maximiliani* Schltr., Bot. Jahrb. Syst. 27: 136. 1899. Described from: "In regione namaquensi: In sabulosis montium Karree-Bergen, alt. c. 1500 ped., 20. Jul. 1896. – n. 8229." TYPE: SOUTH AFRICA. [Western Cape: West Coast, Matzikama], Vanrhynsdorp, Karreeberg, 1500 ft [ca. 457 m], 20 July 1896, *F. R. R. Schlechter 8229* (Lectotype designated by Marais [1966: 97] as a first step,

and second step here designated: B [10 0154905 (two plants on the right)]; Isolectotypes: B [10-0154907], BM [000552477, 000552478], BOL [135662, image seen], BR [000008886880, image seen], G [00160956], GRA [00009870, image seen], HBG [506063, image seen], K [000230387], L [1827312, 1827315, images seen], MO [1926509], P [00739533], PH [00014193, image seen], PR, PRE [0406392-0, 0632490-0, images seen], S [1216055], US [552893, herb. #], W [1905000702], WAG [0000803, image seen], Z[000089791]).

Schlechter (1899) did not designate a type, and Marais (1966) indicated that the type of *Heliophila maximiliani* is at B, but he did not specify which of the two sheets was meant, though he annotated both of them on 13 March 1963 as “*Heliophila arenaria* Sond. = *H. maximiliani* Me.” Of the two sheets of the type collection of *H. maximiliani* at B, the more complete is designated herein as the lectotype. The lectotype, which is represented by the two plants on the right, is a mixed collection with *H. acuminata* (Eckl. & Zeyh.) Steud.

26. *Heliophila natalensis* O.E. Schulz, Bot. Arch. 31: 534. 1931. Described from: “*Südafrika*: Natal, Winkle Spruit bei Durban, auf sandigen, spärlich begrasteten Hügeln, ca. 25 m ü. M. (H. RUDATIS 1911 n. 1497 – am 12. November blühend und fast fruchtend, Hb. Berlin-Dahlem), Congella, auf sandigem Boden, alt. 50 ft. (J. M. WOOD 1892 n. 4676 mit *H. Woodii Conranth* – am 2. November blühend und fruchtend, Hb. Berlin-Dahlem)” TYPE: SOUTH AFRICA. [KwaZulu-Natal: e-Thekwini], Winklespruit [Winkle Spruit] (Durban City), 25 m, 12 November 1911, *H. Rudatis 1497* (Lectotype here designated: B [100153845]; Isolectotype: NBG [0218583-0]). Syntype: SOUTH AFRICA. [KwaZulu-Natal]: Congella, 2 November 1892, *J. M. Wood 4676* (B [100153846, 100154888], MO [1925737, 1925738, 1925739, 1925740], PRE [0408027-0, image seen], US).

Schulz (1931) cited and annotated two syntype collections of *Heliophila natalensis* at B. He believed that two species were represented in *Wood 4676*, and this sheet was subsequently split into two, of which one includes a larger plant annotated by Schulz as *H. natalensis* (B [100153846]), and the other is a bundle of about 14 plants believed by him to be *H. woodii* (B [100154888]). Both species names were correctly synonymized with *H. subulata* by Marias (1970).

27. *Heliophila odontopetala* Zahlbr. Ann. Nat. Hofmus. Wien, 18: 383. 1903. TYPE: SOUTH AFRICA. [Western Cape: West Coast, Cederberg], Piqueniers Mts., 22 August 1894, *A. Penther 2690* (Lectotype here designated: W [18970009359]; Isolectotypes: BM [000552492], BOL, M [0152586], W [18970006360]).

Heliophila odontopetala is a synonym of *H. digitata*, and its description by Zahlbruckner was based on the two duplicates at W without type designation.

28. *Heliophila pearsonii* O.E. Schulz, Bot. Arch. 31: 528. 1931. Described from: “Auf dem Hochplateau zwischen Krai Kluff und Wasserfall an einem breiten, tochenen, sandigen Wasserlauf (H. H. W. PEARSON, Percy Sladen

Memorial Expedition to the Great Karasberg 1912–1913 n. 7869, Blüten seher bleich lila, Hb. Berlin-Dahlem und Kew), nördlich von Nauchas, auf granitischem Sand, Percy Sladen Mem. Exp. 1915–1916 n. 9007, Hb. Kew), Hantam-Gebirge (MEYER 1869, Hb. Berlin-Dahlem).” TYPE: [NAMIBIA. Karas]: Karasberg, between Kari Kluff and Wasserfall, 20 January 1913, *H. H. W. Pearson 7869* (Lectotype here designated: K [000230421]; Isolectotypes: B [100153841], BM [001254232], BOL [not seen]).

I have examined the same material studied by Schulz (1931), and the more complete specimen is designated as the lectotype. Both *Heliophila pearsonii* and the following var. *prageri* are synonyms of *H. minima* (Stephens) Marais.

29. *Heliophila pearsonii* var. *prageri* O.E. Schulz, Bot. Arch. 31: 528. 1931. Described from: “Südliches Gross-Nama-Land, Gebiet des unteren Fischflusses, Utschoa, auf sandigem Granitboden, 900 m ü. M., nicht sehr husfig (J. PRAGER 1918 n. 2, mit hellblauer Blüte), Garub, auf Kiesboden, ca. 900 m ü. M. (RANGE n. 507 in Gesellschaft von *H. deserticola*, mit hellblauen Blüten).” TYPE: [NAMIBIA. Karas: Lüderitz-Süd], Garub, Kiesboden, ca. 900 m, Range 507 (Lectotype here designated: B [100299423]).

The *Prager 2* syntype was not located in any of the major herbaria consulted.

30. *Heliophila pubescens* Burch. ex Sond., Abh. Ges. Naturw. Hamb. 1: 208. 1846. Described from: “Hab. Rhenosterriver d. 8. Aug. 1811 (Burchell!) in locis rupestribus ad latus meridionale montis Zuureplas, Sneeuwbergen, 4–5000'. (Drège!) Floret Augusto.” TYPE: SOUTH AFRICA. [Northern Cape: Karoo Hoogland], Sutherland, between Jakhalsfontein and Kuilenberg, August 1811, *W. J. Burchell 1334* (Lectotype designated by Marais [1970: 29] as first step, and a second step is here designated: K [000230431]; Isolectotypes: K [000230433], PRE [0403177-0, image seen]).

Burchell (1822) listed his collection under *Heliophila pubescens*, but the name was a nom. nud. Sonder (1846) validated the name and cited both *Burchell 1334* and *Drège s.n.* Although Marais (1970) indicated that *Burchell 1334* (K) is the holotype, he did not specify which of the two sheets he annotated it is. Therefore, a second-step lectotypification is needed. The above-designated lectotype includes four plants, as compared with the single immature plant of K (000230433). The lectotype is a mixed collection that also includes a single plant of *Burchell 1323* (K [000230432]), but this second collection of *H. pubescens* does not concern us for the lectotypification of the name.

31. *Heliophila rivalis* Burch. ex DC., Syst. Nat. 2: 682. 1821. Described from: “*H. rivalis*. *Burch! cat. geogr. pl. afr. eustr. extratrop. n. 5496*. Hab. in locis humidis territorii Capitis Bonaee-Spei ad Melkhout-Kraal prope Nysna (*Burch.*). ♂. (v. s. sp. comm. à cl. Burchell.)” TYPE: SOUTH AFRICA. [Western Cape: Garden Route], Knysna, 29 June 1814, *W. J. Burchell 5496* (Lectotype here designated: K [000230406]; Isolectotypes: B [100153824], K [000230407], M [0108050], P [05445295, 00739689], PRE [0405043-0, image seen]).

There are two sheets of the type collection of *Heliophila rivalis* in Burchell's herbarium at K, and Marais annotated them as a synonym of *Heliophila pendula* Willd. Both sheets were anonymously annotated as type, and the one with the original handwritten description by Burchell is here designated as the lectotype.

32. *Heliophila rosea* Schltr., Bot. Jahrb. Syst. 27. 137. 1899. Described from: "In regione austro-occidentali: Juxta rivulos montium prope French-Hoek, solo arenoso, alt. c. 2500 ped., 24. Nov. 1897. – n. 9324." TYPE: SOUTH AFRICA [Western Cape: Cape Winelands, Drakenstein], French Hoek Mt., F. R. R. *Schlechter 9324* (Lectotype here designated: Z [000005042]; Isolectotypes: B [100154908], BM [000552471], BOL [135652, image seen], GRA [00009720, image seen], K [000230401], PRE [04079770, image seen]).

Taxonomic novelties described by Schlechter (1897, 1898, 1899, 1913) were based almost exclusively on his own collections. The complete set of his collections are deposited at Z, and the second set at B. In many cases, however, he annotated but did not cite the B duplicates of his novelties as types. However, in the case of *Heliophila rosea*, the B duplicate is rather fragmentary as compared with the more complete one at Z that I am designating here as the lectotype.

33. *Heliophila rostrata* C.Presl, Abh. Königl. Böhm. Ges. Wiss. ser. 5, 3: 440. 1845. Described from: "Heliophila pilosa Drege pl. Cap. exs." TYPE: SOUTH AFRICA. [Western Cape]: (as "Capland"), 1838, J. F. Drège s.n. (Lectotype designated here: PRC [452647]; Isolectotypes: HBG [506065, image seen], K, P [05122862, 05445319, 00739647], PRC [452646, plant on the left]).

There are two sheets of the type collection of *Heliophila rostrata* at PRC, where Karel Presl's herbarium is housed, and the more complete one is designated above as the lectotype. The PRC isolectotype is a mixed collection of this species and *H. africana* (L.) Marais.

34. *Heliophila scandens* Harv., Thes. Cap. 2: 43. 1863. Described from: "HAB.—Back Beach, in shady places, among shrubs, D'Urban, Natal, M. J. McKen, Aug., 1862. Natal, T. Cooper, 1268. (Herb. T. C. D.)." TYPE: SOUTH AFRICA. [KwaZulu-Natal: e-Thekwini], Natal, Back Beach, near Durban, in shady places, among shrubs, August 1862, W. T. McKen 7 (Lectotype here designated: TCD [0001710, image seen]).

Marais (1970: 66) listed both syntypes but did not lectotypify the name. Although the lectotype designated above is a unicate, it is preferred over the four-duplicate syntype *Cooper 1268* because it is more complete and carries the notes in William Harvey's handwriting. The original publication (Harvey, 1863) includes an excellent illustration (plate 166), and the species description was subsequently emended in details by Hooker (1899) and illustrated within by Matilda Smith on the basis of flowering material grown at K.

Heliophila scandens is unique in the genus in being a true liana that may exceed 3 m in height. It is endemic to KwaZulu-Natal and can easily be distinguished by the petiolate and undivided leaves and large elliptic to elliptic-lanceolate fruits (1.5–)2.0–3.7(–4.4) × (0.6–)0.8–1.4 cm with 1 or 2 suborbicular, winged seeds.

35. *Heliophila schlechteri* Schinz, Vierteljahrsschr. Naturf. Ges. Zürich 45: 235. 1910. Described from: "Südafrika Kapkolonia George, 300 m. Schlechter 2355. bl. u. fr. 18. III. 1893." TYPE: SOUTH AFRICA. Pr. George, 300 m, 18 March 1893, F. R. R. *Schlechter 2355* (Lectotype here designated: B [100299432]; Isolectotypes: BM [001254158], G [00160962], HBG [506059, 506060, images seen], K, MO [1612411], MPU [017495, image seen], P [00739693], PRC [451628], S [1216072], W [19100007316], WU [0101784]).

As recognized by this author, the type collection of *Heliophila schlechteri* clearly falls within the limits of *H. filiformis* L.f., though the isolectotype at K is a mixture of the former with a plant of *H. tulbaghensis*, and images of the duplicates BOL (135670) and GRA (00009971 and 00009972), which carry the same collection number, clearly belong to *H. subulata*.

Marais (1970) listed *Schlechter 8550* under *Heliophila africana*, but these plants have filiform leaves and sharply reflexed immature fruits, and their overall morphology is more at home in *H. filiformis* than in *H. africana*.

36. *Heliophila scoparia* Burch. ex DC., Syst. Nat. 2: 693. 1821. Described from: "H. scoparia. Burch! cat. geogr. pl. afr. eustr. extratrop. n. 7887 et 8557. Hab. ad Cap. Bonae-Spei in vicinitat urbis Cape-Town et in montibus Baviaans-Kloof (*Burchell.*) 5. (v. s. sp.)." TYPE: SOUTH AFRICA. [Western Cape: Overberg, Theewaterskloof], Caledon, W. J. Burchell 7887 (Lectotype here designated: K [000230560]; Isolectotype: G [00207081]).

The K specimen is more complete than the G duplicate, and it is not known if the latter was taken from the former.

37. *Heliophila stylosa* Burch. ex DC., Syst. Nat. 2: 692. 1821. Described from: "H. scoparia. Burch! cat. geogr. pl. afr. eustr. extratrop. n. 3291. Hab. ad Caput Bonae-Spei ad Komme dakka (*Burchell.*) 5. (v. s. sp. in h. Burch.)." TYPE: SOUTH AFRICA. [Eastern Cape: Sara Baartman, Blue Crane Route], Mt. Commadagga, Somerset East, 5 July 1813, W. J. Burchell 3291 (Lectotype here designated: K [000230553]; Isolectotypes: G [00207083], K [000230554], PRE [0410026-0, image seen]).

Heliophila elongata, *H. stylosa*, and *H. virgata* were simultaneously published by de Candolle (1821). Marais (1970) was the first to place the last two under the synonymy of the first, and therefore *H. elongata* has priority (see Article 11.5 in Turland et al., 2018).

There are two sheets of the type collection of *Heliophila stylosa* at K, and the more complete of the two (K [000230553]), which was studied by de Candolle and from which he apparently obtained fragmentary material (leaf,

fruit, and flower) and deposited in his herbarium, is here designated as the lectotype. It is likely that he also examined the second sheet.

38. *Heliophila suavissima* Burch. ex DC., Syst. Nat. 2: 691. 1821. Described from: “*H. suavissima*. Burch! cat. geogr. pl. afr. austr. extratrop. n. 2742. Hab. ad Caput Bonae-Spei prope Plettenbergs-Baaken (Burchell). 5. (v. s. sp. comm. A cl. Burch.)” TYPE: SOUTH AFRICA. [Western Cape: Garden Route?], Colesberg, between Rietfontein and Plettenbergs Beacon, March 1813, W. J. Burchell 2742 (Lectotype designated by Marais (1970: 63) as a first step and second-step lectotype designation here: K [000230358]; Isolectotypes: G [00207087], GOET [002613, image seen], GRA [0001000-0, image seen]; K [000230357, two plants on the right], M [0108045], P [00739711, 05445350], PRE [0407889-0, image seen]).

There are two sheets in the folder of the type collection at K, of which the lectotype is the more complete. The second sheet is a mixture of two collections by Burchell, but only the two plants on the right are the isolectotype. Marais (1970) annotated the latter sheet but did not indicate its type status.

39. *Heliophila suavissima* Burch. var. *incana* Sond. in Harvey & Sond., Fl. Cap. 1: 49. 1860. Described from: “...β. Springbokkeel, Zeyher. Aug. Oct. and Feb. (Herb. Hook., Sond., T.C.D. [Trinity College in Dublin].)” TYPE: SOUTH AFRICA. [Northern Cape: Namakwa, Nama Khoi], Springbokkeel, C. L. P. Zeyher 43 (Lectotype here designated: S [1216105, plant on right]; Isolectotypes: K, SAM [0028105-0], W [18890144758]).

Sonder (1860) based this variety on Zeyher’s specimens from Springbokkeel that were collected in February, August, and October and are currently deposited in K, S, and TCD. Sonder did not give any collection numbers, but the only material collected in February from Springbokkeel is Zeyher 43, and the S duplicate carries the species and varietal names in Sonder’s handwriting. Of the three duplicates he cited, I did not have the chance to study the one at TCD.

This variety, as well as the later published and illegitimate *Heliophila suavissima* var. *velutina* O.E.Schulz, is based on the same type collection, and both are synonyms of *H. minima*.

40. *Heliophila sulcata* Conrath var. *modestior* O.E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 11: 228. 1931. Described from: “Südafrika: Orange Free State, Distr. Fauresmith, on Fauresmith Botanical Reserve, alt. c. 4550–4600’ (blühend und mit jungen Früchten am 1. September 1925–C. A. SMITH, National Herbarium Pretoria n. 396, 400), eastern slope of hill, near top, alt. c. 4650’ (fast fruchtend am 3. Mai 1927–C. A. SMITH n. 3930), hill crest near South Boundary on the Fauresmith Bot. Reserve, alt. c. 4700’ (blühend und mit Fruchttresten am 24. August 1927–C. A. SMITH n. 4433), District Philippolis, Spioenkop, near crest on north slope, c. 5150’ (blühend un mit jungen Früchten am 8. September 1927–C. A. SMITH n. 4466).” TYPE: SOUTH AFRICA. [Free

State: Xhariep, Kopanong], Distr. Philippolis, Spioenkop, near crest on north slope, ca. 5150 ft [ca. 1570 m], 8 September 1927, C. A. Smith 4466 (Lectotype here designated: B [10-0154889]; Isolectotype: PRE [0407936-0, image seen]).

Of the above five syntype collections of Smith, I have examined the lectotype and Smith 396 (PRE), and both clearly belong to *Heliophila carnosa* (Thunb.) Steud.

41. *Heliophila torulosa* O.E. Schulz, Bot. Arch. 31: 537. 1931. Described from: “Südafrika: Kloof village, Asbestos Mts. (W. J. BURCHELL 1811, Catal. geogr. pl. Afric. austr. extratrop. n. 1689 – am 25. September fruchtend, Hb. Kew), im Tale des Hex River bei Doorns, alt. ca. 1700 ft. (H. BOLUS, Fl. regionis austro-occid. 1908 n. 13068 – im Januar fruchtend, Hb. Kew).” TYPE: SOUTH AFRICA. [Northern Cape: Pixley ka Seme, Siankuma], Kloof Village, Asbestos Mts, 25 September 1911, W. J. Burchell 1689 (Lectotype, here designated: K [000230391]; Isolectotype: B [100153832]).

Marais (1970) correctly assigned Burchell and Bolus syntypes of *Heliophila torulosa* to *H. remotiflora* O.E.Schulz and *H. linoides* Schltr., respectively, but he did not lectotypify the first name. Both *H. remotiflora* and *H. torulosa* were simultaneously published by Schulz (1931), and the former will have priority by the designation of Burchell’s collection as the lectotype of the latter. The B isolectotype is fragmentary material that Schulz removed from the K specimen when he annotated it in 1930.

42. *Heliophila trichinostyla* E. Phillips, Ann. S. African Mus. 9: 112. 1913. Described from: “Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September, Phillips 7577, 7621 in Percy sladen Memorial Expedition to the Khamieberg, Giftberg, and Oliphant’s River Mountains, 1911.” TYPE: SOUTH AFRICA. [Western Cape: West Coast, Matzikama], Vanrhynsdorp, Giftberg, E. P. Phillips 7577 (Lectotype here designated: SAM [0003244-0]).

Heliophila trichinostyla is one of several morphological extremes of the highly variable *H. africana*, and it is characterized by the subglobose to clavate and sparsely to densely pubescent styles. It is sporadically distributed in the Western Cape (City of Cape Town and West Coast districts) and Northern Cape (Namakawa District). Phillips 7577, instead of Phillips 7621 (B [100153831], K, and SAM [0003248-0]) syntype, is designated as the lectotype because it is more complete.

43. *Leptormus caledonicus* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 1: 9, No. 60. 1834–1835. Described from: “As montem ‘Zwarteberg’ apud thermas urbis ‘Caledon’ altit. III. Aug.” TYPE: SOUTH AFRICA. [Western Cape: Overberg, Theewaterskloof], “Mt. Zwarteberg apud thermas urbis Caledon, 3 August [no year given], C. F. Ecklon & C. L. P. Zeyher 60” (Lectotype here designated: SAM [00280020]; Isolectotypes: GOET [002610 [image seen], M [0108067], PR, PRC [451617], PRE, W [0009164]).

Duplicates of the type collections of South African

novelties described by Ecklon and Zeyher (1834–1835) are scattered in various herbaria, and many of their taxa are yet to be lectotypified. I have examined only six duplicates and one image of the type collection of *Leptormus caledonicus*, and the above lectotype is the most complete. The name is a synonym of *H. coronifolia* L.

44. *Leptormus tripartitus* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 1: 9, No. 61. 1834–1835, non *Heliophila tripartita* Thunb., Prodr. Pl. Cap. 2: 108. 1800. Described from: “In locis arenosis (alt. I) apud ‘Heerelongement’ (Clanwilliam), Oct.” TYPE: SOUTH AFRICA. [Western Cape: West Coast, Cederberg], Clanwilliam, Heerelongement, C. F. Ecklon & C. L. P. Zeyher 61 (Lectotype here designated: S [1216070]; Isolectotypes: PRE [04050780, image seen], S [1216071], SAM [00280040]).

Plants from Clanwilliam district described by Ecklon and Zeyher (1834–1935) as *Leptormus tripartitus* have inflated stems. Upon the transfer of the name to *Heliophila*, both Steudel (1840) and Sonder (1846) renamed the species as *H. zeyheri* and *H. fistulosa*, respectively, to avoid the creation of a later homonym of *H. tripartita* Thunb., which is a synonym of *H. carnosa*.

45. *Pachystylum glabrum* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 1: 13, No. 100. 1834; *Heliophila glabra* (Eckl. & Zeyh.) Steud., Nomencl. Bot., ed. 2, 1: 742. 1840. Described from: “In montium dorsis prope ‘Potberg’ (Caledon). Oct.” TYPE: SOUTH AFRICA. [Western Cape: Overberg, Theewaterskloof], Caledon, Oct., C. F. Ecklon & C. L. P. Zeyher 100 (Lectotype here designated: S [1216073]; Isolectotype: PRC [451620]).

The name needs lectotypification because the authors based their description on more than one duplicate of their collections. The name is generally recognized as a synonym of *Heliophila africana*.

46. *Peltaria capensis* L.f., Suppl. 296. 1781; *Heliophila capensis* (L.f.) C.A.Sm., Bull. Misc. Inform. Kew 1931: 155. 1931, nom illeg., non Kunze, Revis. Gen. Pl. 3(3): 5. 1898. TYPE: “Habitat in Cap. Bonae spei.” *Anonymous s.n.* (Lectotype here designated: LINN 829.3; Isolectotype: LINN 829.4; images seen).

The name is a synonym of *Heliophila diffusa* (Thunb.) DC. subsp. *diffusa*, and the more complete of the two duplicates at LINN is designated as the lectotype.

LITERATURE CITED

- AL-SHEHBAZ, I. A. 2019. The delimitation of the South African *Heliophila brachycarpa* and two related species (Brassicaceae). Harvard Pap. Bot. 24: 75–81.
- . 2020a. *Heliophila vlokii* is the correct spelling for *H. vlokii* (Brassicaceae). Phytotaxa 434: 221–222.
- . 2020b. Ten new species in the southern African genus *Heliophila* (Brassicaceae; Cruciferae). Phytotaxa 434: 65–88.
- AL-SHEHBAZ, I. A., AND K. MUMMENHOFF. 2005. Transfer of the South African genera *Brachycarpaea*, *Cycloptychis*, *Schlechteria*, *Silicularia*, and *Thlaspeocarpa* to *Heliophila* (Brassicaceae). Novon 15: 385–389.
- BURCHELL, W. J. 1822. *Travels in the Interior of Southern Africa*. Vol. 1. Longman, Hurst, Rees, Orme, and Brown, London.
- DE CANDOLLE, A. P. 1821. *Regni vegetabilis systema naturale, sive Ordines, genera et species plantarum secundum methodi naturalis normas digestarum et descriptarum*. Vol. 2. Treuttel & Würtz, Paris. Hodges, Smith, Dublin.
- ECKLON, C. F., AND C. L. P. ZEYHER. 1834–1835. Enumeratio plantarum africanae australis extratropicae quae collectae, determinatae et expositae a Christiano Friederico Ecklon & Carolo Zeyher. Perthes & Besser, Hamburg.
- HARVEY, W. H. 1863. *Thesaurus Capensis: or, Illustrations of the South African Flora, Being Figures and Brief Descriptions of South African Plants, Selected from the Dublin University Herbarium*. Vol. 2. Hodges, Smith, Dublin.
- HOOKE, J. D. 1899. *Heliophila scandens*. Curtis’s Bot. Mag. 125 (ser. 3, vol. 55): pl. 7668.
- MARAIS, W. 1966. Notes on South African Cruciferae. Bothalia 9: 97–112.
- . 1970. Cruciferae. Pages 1–118 in L. E. CODD, B. DE WINTER, D. J. B. KILLICK, AND H. B. RYCROFT, EDS., *Flora of Southern Africa*. Vol. 13. National Botanic Gardens, Kirstenbosch.
- MCNEILL, J. 2014. Holotype specimens and type citations: General issues. Taxon 63: 1112–1113.
- MUMMENHOFF, K., I. A. AL-SHEHBAZ, F. T. BAKKER, H. P. LINDER, AND A. MÜHLHAUSEN. 2005. Phylogeny, morphological evolution, and speciation of endemic Brassicaceae genera in the Cape flora of southern Africa. Ann. Missouri Bot. Gard. 92: 399–423.
- NORDENSTAM, B. 1980. Nomenclatural notes on South African Cruciferae. J. S. African Bot. 46: 251–263.
- PHILLIPS, E. P. 1917. A contribution to the flora of the Leribe Plateau and environs. Ann. S. African Mus. 16: 1–379.
- SCHLECHTER, R. 1897. *Plantae Schlechterianae novae vel minus cognitae describuntur*. I. Bot. Jahrb. Syst. 24: 434–459.
- . 1898. *Decades plantarum novarum austro-africanum*. J. Bot. 36: 314–318.
- . 1899. *Plantae Schlechterianae novae vel minus cognitae describuntur*. II. Bot. Jahrb. Syst. 27: 86–220.
- . 1913. Neue *Heliophila*-Arten. Bot. Jahrb. Syst. 49: 400–418.
- SCHULZ, O. E. 1931. *Heliophila*-Studien. Bot. Arkiv 31: 519–542.
- SONDER, W. 1846. Revision der Heliophilleen. Abh. Geb. Naturw. Hamb. 1: 173–271.
- . 1860. Cruciferae. Pages 19–54 in W. H. HARVEY AND O. W. SONDER, EDs., *Flora Capensis*. Vol. 1. Hodges, Smith, Dublin.
- STEUDEL, E. G. 1840. *Nomenclator Botanicus, seu, Synonymia plantarum universalis: enumerans ordine alphabetico nomina atque synonyma, tum generica tum specifica, et a Linnaeo et a recentioribus de re botanica scriptoribus plantis phanerogamis imposita*. 2nd ed. J. G. Cotta, Stuttgart and Tubingen.
- TURLAND, N. J., J. H. WIERSEMA, F. R. BARRIE, W. GREUTER, D. L. HAWKSWORTH, P. S. HERENDEEN, S. KNAPP, W.-H. KUSBER, D.-Z. LI, K. MARHOLD, T. W. MAY, J. MCNEILL, A. M. MONRO, J. PRADO, M. J. PRICE, AND G. F. SMITH. 2018. *International Code of Nomenclature for Algae, Fungi, and Plants (Shenzhen Code)*. Koeltz Botanical Books, Glashütten, Germany.

APPENDIX
INDEX TO NUMBERED COLLECTIONS

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