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AMARYLLIDACEAE

AMMOCHARIS DESERTICOLA (AMARYLLIDACEAE), A NEW SPECIES FROM NAMIBIA AND A KEY TO SPECIES OF THE GENUS

Ammocharis Herb. is a small, sub-Saharan genus in the family Amaryllidaceae. When last revised in 1939 the genus included five species (Milne-Redhead & Schweickert 1939). More recently, phylogenetic analyses using nuclear and limited plastid non-coding DNA sequences (Meerow *et al.* 2003; Kwembeya *et al.* 2007) have supported the taxonomic reassessments of two anomalous species from genera closely related to *Ammocharis* (Lehmiller 1992; Snijman & Williamson 1994): *Cybistetes longifolia* (L.) Milne-Redh. & Schweick. was reinstated in *Ammocharis* and *Crinum nerinoides* Baker was transferred to *Ammocharis* (Snijman & Archer 2003). In addition, Nordal (1982) reduced *A. heterostyla* (Bullock) Milne-Redh. & Schweick. to synonymy in *A. angolensis* (Baker) Milne-Redh. & Schweick.

The genus is most closely allied to *Crinum* L. from which it is distinguished by leaves that, unlike those of *Crinum*, are not obviously sheathing at the base and have an intercalary meristem allowing the base of a leaf to continue developing intermittently over several growing seasons. Due to this pattern of regrowth after a leaf has died back, the mature leaves characteristically have truncate tips. In addition, the leaves are biflabellately arranged and most often have flat blades. *Ammocharis*, like all taxa in the tribe Amaryllideae, has fleshy, recalcitrant seeds which fail to become dry and dormant before germinating. In contrast to the other genera, however, *Ammocharis* has two modes of seed dispersal. Most commonly the seeds are dispersed by means of the fleshy fruits being released individually from the fruiting head in close proximity to the mother plant. *A. longifolia*, which occupies the extreme western parts of winter rainfall southern Africa, is exceptional in having a wind-dispersed infructescence. The entire fruiting head rapidly dries off and is shed as a single unit that is dispersed by rolling away in the wind.

The genus comprises two widespread species, *Ammocharis coranica* (Ker Gawl.) Herb. which occurs in seasonally damp areas throughout the summer rainfall area of southern Africa (Milne-Redhead & Schweickert 1939), and *A. tinneana* (Kotschy & Peyr.) Milne-Redh. & Schweick., which inhabits grassland or wooded grassland, extends from Ethiopia southwards to Botswana and northern Namibia (Nordal 1982). Other species, which have relatively restricted distribution ranges, occupy more specific habitats within the landscape: flood plains of rivers [*A. baumii* (Harms) Milne-Redh. & Schweick.]

and limestone pans (*A. nerinoides*). Namibia has all but one species of *Ammocharis* within its borders, whereas other countries have two species at most.

While on a botanical expedition in the extremely arid Namib Naukluft Park in late February 2006, Namibian botanist Dr Patricia Craven photographed flowering plants of an unknown species that has leaves like *Ammocharis coranica* and *A. longifolia* but exceptionally long flowers. Four years later, flowering and fruiting plants were collected in the same region. The infructescences were remarkable in being dry, with widely radiating, straight pedicels, a condition previously known only in *A. longifolia*. Following exceptionally good summer rains in 2011, additional collections of this taxon were made, allowing a more thorough study of the plants. The strap-shaped leaves, with truncate tips characteristic of an intercalary meristem, the unusually long flowers and the dry infructescences indicate clearly that these newly discovered Namibian plants are an undescribed species of *Ammocharis*, closely related to *A. longifolia*. We describe this new species here as *A. deserticola* and provide a key to identify the seven species currently recognized in *Ammocharis*.

***Ammocharis deserticola* Snijman & Kolberg, sp. nov.**

Bulbus ± ovatus, tunicatus, 80–110 mm latus, superne conspicue attenuatus, collum ± 80 × 25–35 mm. *Folia* 6–8, disticha, biflabellatim disposita, patentia vel adpressa, ligulata 7–250 × 8–30 mm, vetustiora apice truncata. *Scapus* compressus, ad 210 × 12–18 mm. *Umbella* 11–25-flora. *Pedicelli* 30–60 × 3–4 mm, transverse ± trigoni, sub fructu valde elongati, rigidi et radiantes. *Flores* actinomorphi, tubaeformes, rosei; perigonii tubus cylindricus, rectus, 50–90 mm longus; segmenta oblanceolata, 70–80 × 8–12 mm, patentia, recurva versus apicem; stamina e perigonii tubo valde exserta; filamenta actinomorpha, 53–60 mm longa; antherae oblongae, curvatae, 5 × 1.5 mm, pallidae; ovarium obtuse 3-angulatum, 10–15 mm longum; stylus filiformis, exsertus; stigma integrum. *Capsula* indehiscens, obovoidea, 20–40 × 15–45 mm, valde 6-costata, rostrata; rostrum 14–50 mm longum. *Semina* carnosae, subglobosae, ± 15 mm lata, pallida.

TYPE.—Namibia, 2215 (Trekopje): Erongo region, Namib Naukluft Park, 5 km N of Langer Heinrich mine

on track towards Swakop River, 565 m, (–CD), 17 Feb. 2011, H. Kolberg & T. Tholkes HK2998 (WIND, holo., NBG, iso.).

Deciduous bulbous herb, 200–350 mm tall when flowering. *Bulb* solitary, hypogeal, \pm ovate, 80–110 mm diam., extended into a neck, \pm 80 \times 25–35 mm, outer tunics brown to tan-coloured, with darker brown longitudinal veins, leathery to somewhat brittle, inner tunics cream-coloured, with tan longitudinal veins. *Leaves* 6–8, green at flowering, in 2 opposite spreading fans, laxly spreading, later becoming prostrate, some curved sideways at base, strap-shaped, 7–250 \times 8–30 mm, plane, glaucous-green, glabrous; margin pale, smooth; apex of mature leaves dying back as if cut across. *Inflorescence* 1 or rarely 2 mature at once, laxly 11–25-flowered, umbel-like, \pm 250 mm diam.; scape erect, longitudinally compressed, up to 210 \times 12–18 mm, green sometimes flushed pink near base or apex; spathe valves 2, oblong-lanceolate, up to 50–80 \times \pm 20 mm, soon reflexed and dry; bracteoles filiform, \pm 35 mm long. *Flowers* erect in bud, soon spreading; pedicels erect at first, soon spreading, 30–60 \times 3–4 mm, trigonous in cross section, green; perigone trumpet-shaped, actinomorphic, dark pink, with paler pink tube, backed with narrow, brownish pink median stripes on segments, faintly scented; tube cylindrical, straight, 50–90 mm long, widening slightly up to 5 mm at throat, firm; segments oblanceolate, 70–80 \times

8–12 mm, recurved distally, mucronate on tip. *Stamens* inserted in throat, \pm evenly spreading; filaments 53–60 mm long, 3 inner \pm $\frac{2}{3}$ as long as tepals, 3 outer \pm as long as tepals, \pm inwardly curved, pink; anthers dorsifixed, oblong, \pm curved, 5.0 \times 1.5 mm, cream-coloured; pollen cream-coloured. *Ovary* \pm trigonous in cross section, 10–15 mm long, scarcely wider than pedicels and perigone tube, green, style filiform, reaching 10–15 mm beyond outer stamens, pink, stigma small, undivided, minutely penicillate. *Infructescence* dry; pedicels widely radiating, straight, thickened, 50–130 \times 5–8 mm; capsule indehiscent, obovoid, 20–40 \times 15–45 mm, strongly 6-ribbed, with thin, papery walls disintegrating irregularly, with stout, apical beak, 14–50 mm long. *Seeds* few, subglobose, \pm 15 mm diam., fleshy, with a thin, pale, corky covering. *Flowering time*: mid-February to early March. Figures 14, 15.

Distribution and ecology: *Ammocharis deserticola* is currently recorded only from the Namib Naukluft Park, in the central Namib, Namibia (Figure 16). The species occurs along well-drained, sandy rivulets and in gravelly soil on the northern slopes of undulating hills, often benefiting from fog that drifts inland from the coast. The surrounding vegetation is sparse and comprises species of *Stipagrostis* (Poaceae), *Adenolobus pechuelii* (Fabaceae) and *Tetraena stapffii* (Zygophyllaceae). Rainfall occurs in the summer months with an annual

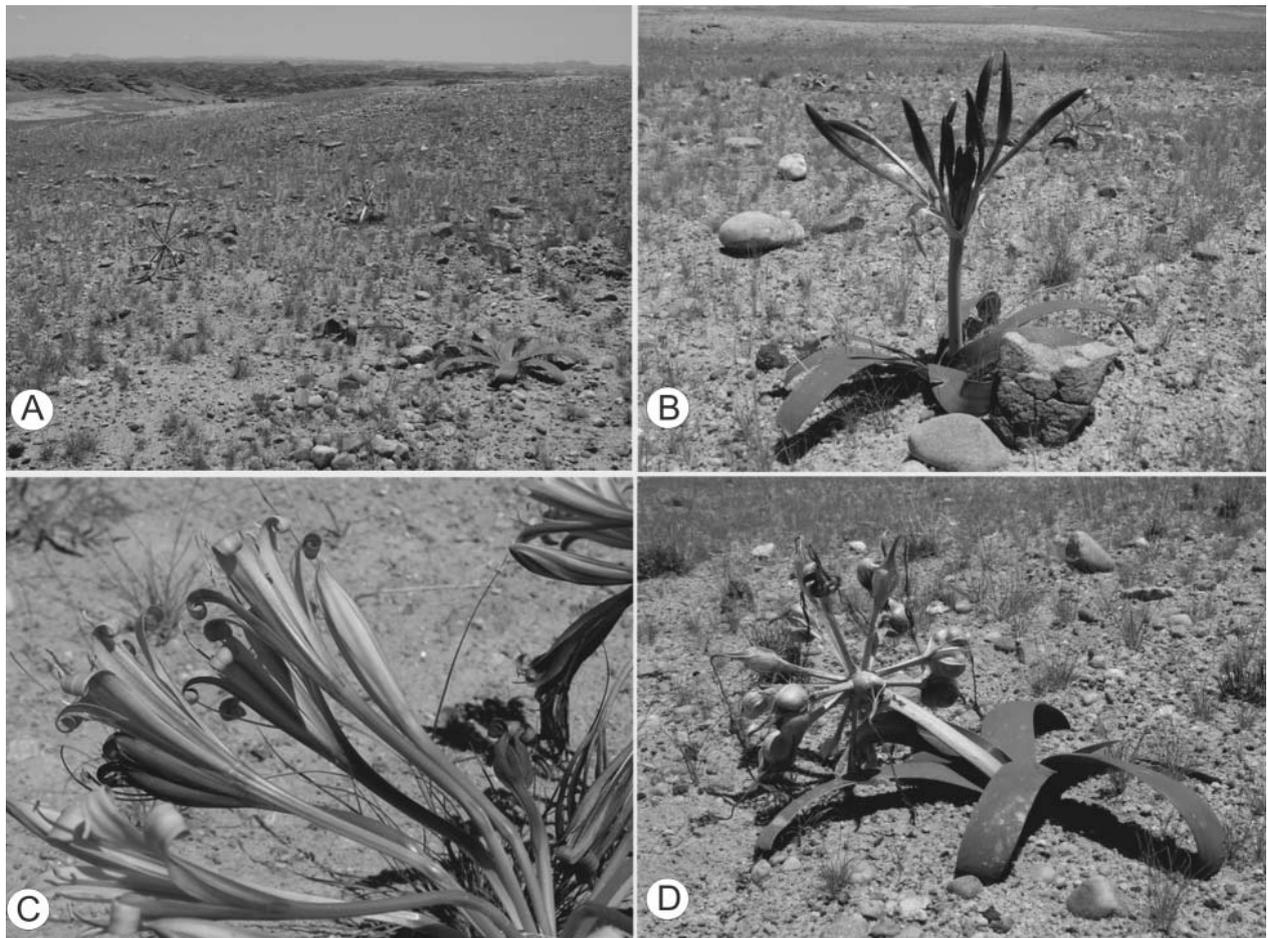


FIGURE 14.—Habitat and habit of *Ammocharis deserticola*. A, typical, open habitat in the Namib Naukluft Park, Namibia, between low hills in gravelly soil; B, plant in bud showing leaves with truncate leaf tips; C, flowering plant showing distinctive, long perigone tube; D, fruiting plant showing dry infructescence. Photographs by H. Kolberg.



FIGURE 15.—*Ammocharis deserticola*. A, dried bulb cut in half lengthwise with pressed leaves and pressed inflorescence; B, pressed infructescence cut in half lengthwise. Voucher specimen: H. Kolberg & T. Tholkes HK2998 (NBG). Scale bars: A, B = 100 mm.

average of 50–100 mm, but it is highly erratic and completely rainless years are not uncommon. Minimum temperatures on average are 9–10°C, whereas they reach an average of 32–33°C in the summer months (Mendelsohn *et al.* 2002). At the type locality, between 300 and 400 plants were visible in February 2011, whereas at two other localities in the same quarter-degree grid, an estimated 100 to 150 plants were seen. Two populations, including the one at the type locality, occur near the Langer Heinrich uranium mine, but are afforded protection by falling within a national park. The third population of up to 100 plants, however, falls within the mine's operational area and the plants there will be endangered. Plans are under way to rescue these and use them in the restoration of mine sites. There are unconfirmed reports of this species occurring also in the quarter-degree grids 2315CA and 2515DA.

Diagnostic features and relationships: *Ammocharis deserticola* is easily identified by a combination of floral and fruiting features. The flowers have a characteristically long perigone tube (50–90 mm) with broad, lanceolate, perigone segments. The infructescence is dry at maturity and has stout pedicels that radiate 'spoke-wise' from their attachment with the scape. Each pedicel carries a dry, heavily 6-ribbed capsule which is topped with a stout, 14–50 mm long, apical beak. The thin, papery walls of the capsules break open irregularly, often allowing the extremely large seeds to drop to the ground before the infructescence is rolled away in the wind. The relatively broad perigone segments and specialized

infructescence which are shared with *A. longifolia* suggest a close alliance with that species. In *A. deserticola*, however, the perigone tube is more than twice as long as that of *A. longifolia* (50–90 vs 8–15 mm long).

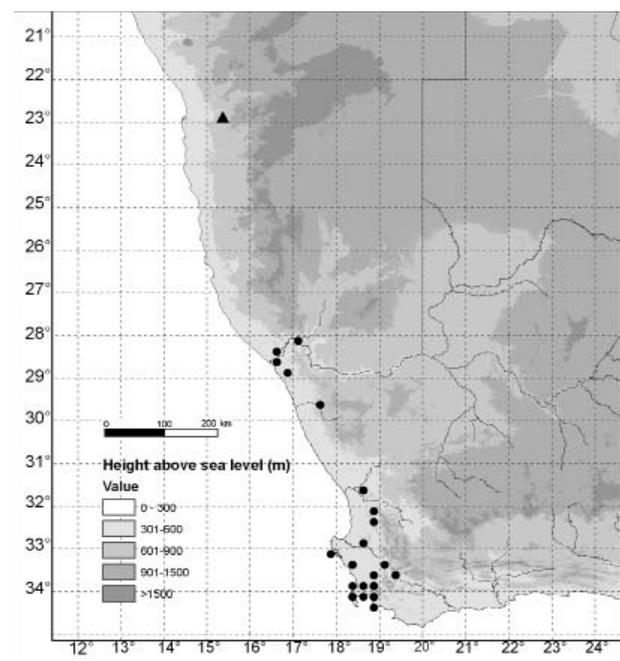


FIGURE 16.—Known distribution of *Ammocharis deserticola*, ▲; and *A. longifolia*, ●.

More than 600 km separate the populations of *Ammocharis deserticola* from the closest known populations of *A. longifolia* in the Sperrgebiet, southern Namibia. Elsewhere, *A. longifolia* is found in South Africa, extending southwards from the sand plains of the Richtersveld, through the Namaqualand lowlands to the sand flats of the Cape Peninsula and Breede River Valley, Western Cape (Figure 16). It is remarkable that such a showy species as *A. deserticola* has been overlooked in the past. This is probably the result of the bulbs not flowering for long intervals until sufficient rain falls and because their area of occupancy was largely inaccessible to botanists prior to the mining activities in the central Namib.

Other specimens examined

NAMIBIA.—2215 (Trekkopje): Erongo region, Namib Naukluft Park, track west of Langer Heinrich mine towards Swakop River, 5 km N of main mine road, 560 m, (–CD), 17 Mar. 2010, *H. Kolberg & T. Tholkes HK2915* (NBG, PRE, WIND); Erongo region, Namib Naukluft Park, just W of entrance to Langer Heinrich mine, 625 m, (–CD), 17 Feb. 2011, *H. Kolberg & T. Tholkes HK2997* (NBG).

Key to species

- 1a Leaves linear, straight, ± erect *A. baumii*
 1b Leaves narrowly to broadly lorate, at least some falcate, spreading on ground:
 2a Flowers with style included in perigone tube *A. angolensis*
 2b Flowers with style well-exserted from perigone throat:
 3a Perigone segments with apex spirally recurved at anthesis *A. tinneana*
 3b Perigone segments recurved at anthesis but never spirally:
 4a Pedicels not elongating after anthesis; infructescence drooping on ground; fruit walls smooth, membranous:
 5a Bulb 20–51 mm diam. at maturity; leaves 2–4(–10) mm wide; scape 2.5–5.0 mm wide; flower head 60–130 mm diam. *A. nerinoides*
 5b Bulb 90–160 mm diam. at maturity; leaves (5–)25–75 mm wide; scape 15–25 mm wide; flower head 150–200 mm diam. *A. coranica*
 4b Pedicels lengthening after anthesis; infructescence detaching at ground level; fruit walls papery, heavily 6-ribbed:
 6a Perigone tube 8–15 mm long *A. longifolia*
 6b Perigone tube 50–90 mm long *A. deserticola*

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ALLIACEAE

MICROMORPHOLOGY AND CYTOLOGY OF *PROTOTULBAGHIA SIEBERTII*, WITH NOTES ON ITS TAXONOMIC SIGNIFICANCE

Four genera of the Alliaceae are known to occur in sub-Saharan Africa, in total comprising 35 indigenous and two naturalized alien species (Table 2) (Archer 2003; Klopper *et al.* 2006). *Tulbaghia* L. is the most diverse and widespread genus of the family in southern Africa, but the other two indigenous sub-Saharan genera, *Allium* L. and *Prototulbaghia* Vosa, are each represented by a single restricted-range species, of which the latter has only been described recently (Vosa 2007). This note supplements the existing description of *P. siebertii* Vosa, which is endemic to the Sekhukhuneland Centre of Endemism (Van Wyk & Smith 2001), South Africa (Vosa *et al.* 2011), where it is restricted to the summit of the Leolo Mountain Range, Limpopo Province. Although macro-morphological characters of *Prototulbaghia* have been documented by Siebert *et al.* (2008), little is known about the micromorphology and cytology of *P. siebertii*.

Live material of *Prototulbaghia siebertii* was collected from the wild in November 2005 and cultivated in clay pots in a mixture of compost, peat, sand and garden soil. Plants were housed in a greenhouse at

TABLE 2.—Sub-Saharan genera of Alliaceae and no. species per genus recorded for *Flora of southern Africa* (FSA) (Archer 2003) and tropical African flowering plants (EPFAT*) respectively (Klopper *et al.* 2006)

Genera	Species per genus		Total sub-Saharan Africa
	FSA	EPFAT*	
<i>Allium</i>	1 + †1	2	3 + †1
† <i>Nothoscordum</i>	†1	†1	†1
<i>Prototulbaghia</i>	1	0	1
<i>Tulbaghia</i>	25	9	31
Total: 4	27 + †2	11 + †1	35 + †2

†alien taxa; * Enumération des plantes à fleurs d'Afrique tropicale.