



Hyobanche thinophila (Orobanchaceae), a new species from the Western Cape of South Africa

ANDREA D. WOLFE

Department of Evolution, Ecology, and Organismal Biology, The Ohio State University, 318 W. 12th Avenue, Columbus, Ohio 43210.
E-mail: wolfe.205@osu.edu

Abstract

The new species *Hyobanche thinophila* is described and illustrated. It is distinguished from *H. sanguinea* by the absence of glandular hairs on the interior surface of the corolla, and differences in the shape and color of the corolla and inflorescence. The interior surface of the *H. thinophila* corolla is glabrous except for a zone of long multicellular hairs at the level of stamen insertion. *Hyobanche sanguinea* lacks this character. The new species occurs in dune areas along the coast of Western Cape, South Africa.

Key words: Cape Floristic Province, holoparasite, parasitic plant, sand dune endemic

Introduction

Hyobanche L. (Orobanchaceae) is a small holoparasitic genus endemic to southern Africa (Welman 1993, Wolfe & Randle 2001). The described species are primarily found in South Africa, with some species also recorded from Lesotho, Namibia, and Swaziland (Welman 1993, Goldblatt & Manning 2000). *Hyobanche sanguinea* L. has the largest distribution (Lesotho; South Africa: Eastern Cape, Northern Cape, Orange Free State, Western Cape; Swaziland), followed by *H. rubra* N.E. Brown (Lesotho; South Africa: Eastern Cape, Northern Cape, Western Cape) and *H. glabrata* Hiern (South Africa: Northern Cape, Western Cape); the rest of the species are restricted to narrow geographic ranges (*H. atropurpurea* Bolus—South Africa: southwest mountains of Western Cape; *H. barklyi* N.E. Brown—southwest Namibia, South Africa: northwest Northern Cape; *H. fulleri* Phillips—South Africa: coast of KwaZulu-Natal from Durban to Port Shepstone; *H. robusta* Schönland—South Africa: southeast coast between Knysna and East London).

Most of the species were described in the early 1900s with little taxonomic information available for the genus aside from their protologues (Wolfe & Randle 2001). The broad description of the genus provided in *Flora Capensis* (Hiern 1904) lacked pertinent details and had inconsistent descriptions for each of five species included in the treatment (*H. atropurpurea*, *H. barklyi*, *H. glabrata*, *H. rubra*, and *H. sanguinea*). For example, the description of the inflorescence for *H. glabrata* included this information: "...spike terminal, rather flat on top, about the size of an infant's fist, 2–4 in. long, involucrate at the base with fleshy purple, ovate or ovate-oblong obtuse ciliate scale." The description of the inflorescence of *H. rubra* stated only "...flowers very densely corymbose-spicate." Hiern's 1904 treatment stated the key differences between *H. atropurpurea* and the other four species were flower color and the apex of the bracteoles (dusky-purple and acuminate for *H. atropurpurea*, red and obtuse for the others, respectively). The key characters used to distinguish *H. sanguinea* from *H. barklyi*, *H. glabrata*, and *H. rubra* were whether the flowers were sessile or shortly pedicellate, and the inflorescence shape (sessile and spike oblong or pyramidal for *H. sanguinea*, shortly pedicellate and subcorymbose for the others, respectively). It is very difficult to determine whether flowers are sessile or shortly pedicellate in these species because pedicellate flowers appear only in very

mature inflorescences (personal observation). This has resulted in collections that were difficult to differentiate based on the Hiern (1904) key, with most specimens keying primarily to *H. sanguinea* if the inflorescences were other than subcorymbose. During a taxonomic study of morphological and molecular variation of *Hyobanche*, which included nine field seasons in southern Africa (1996 to 2010), I noted that several populations along the coast of Western Cape, South Africa, identified from herbarium records as *H. sanguinea* were morphologically very different from this species. In addition, phylogenetic analysis based on *rbcL* and ITS sequence data (unpublished results) reveal these populations to be more closely related to *H. robusta* than *H. sanguinea*.

***Hyobanche thinophila* A. Wolfe sp. nov.** Fig. 1 A–H

TYPE:—SOUTH AFRICA. Western Cape: Koeberg Nature Reserve, 33°08'56.8" S, 18°24' 55.9" E, 26 m, 10 September 2004, Wolfe 1174 (Holotype: NBG!).

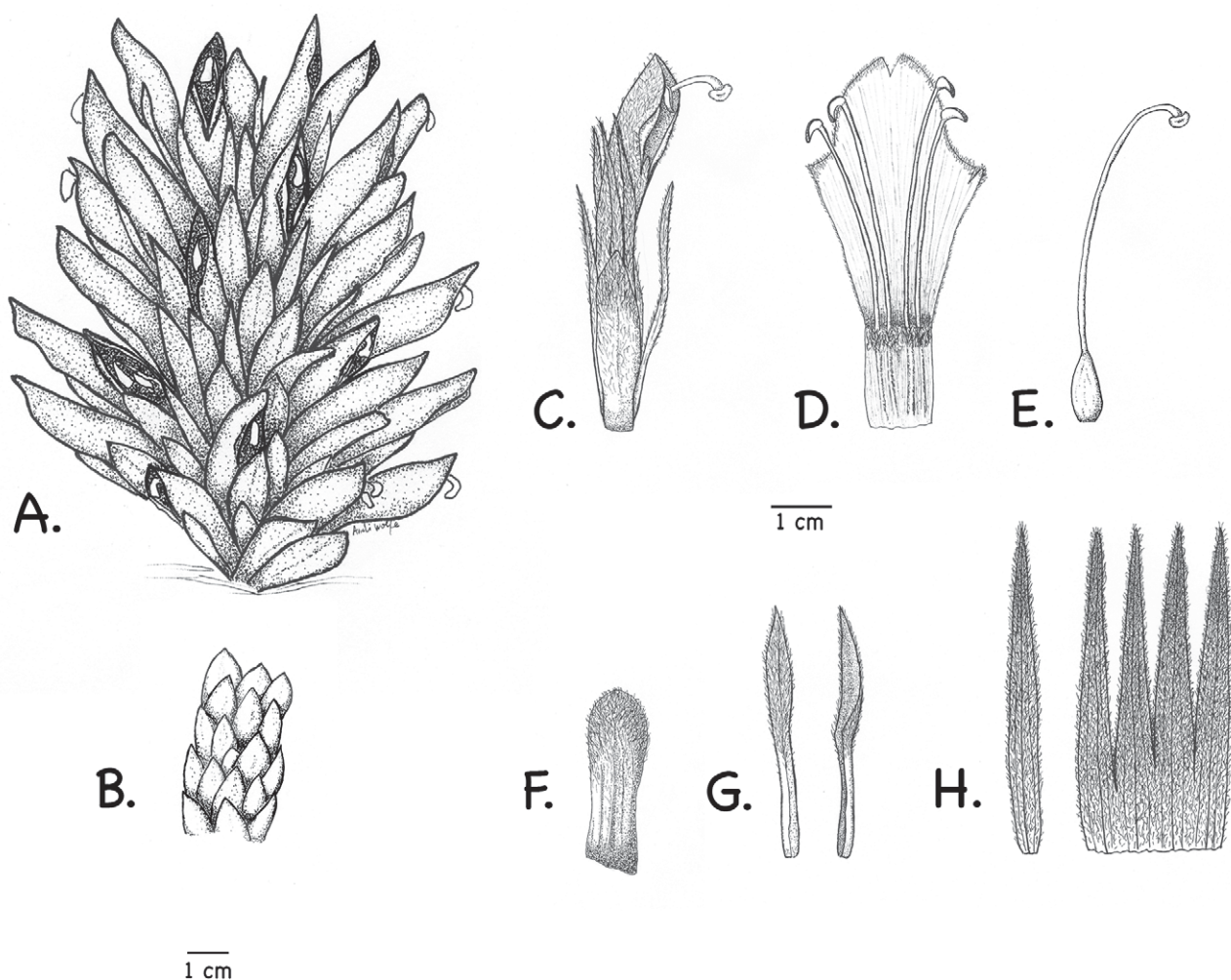


FIGURE 1. A–H *Hyobanche thinophila*. Scale bar for A–B below B; scale bar for C–H below D. A. Habit. B. Rhizome. C. Complete flower with bract and bracteoles. D. Corolla interior. E. Pistil. F. Flower bract. G. Flower bracteoles. H. Calyx, showing four fused sepals and one free.

Perennial holoparasitic herb; achlorophyllous, lacking leaves and roots; rhizomatous with one to several yellowish rhizomes extending deep into sand dune, numerous secondary haustoria forming from scales where host roots contact rhizome; scales ovate to oblong, 5.0–13.0 × 4.0–10.0 mm, apex acute to slightly obtuse,

upper margin ciliate with short multicellular trichomes, abaxial surfaces of above-ground scales puberulent near apex, scales mostly glabrous below ground. Inflorescence a densely-flowered spike, ovate to slightly oblong, 8.3–15.4 × 3.8–6.7 cm; flowers tubular with two lateral bracteoles, subtended by a single bract on the abaxial side; floral bract 1.9–3.4 × 0.7–1.4 cm, oblong and keeled adaxially, acute to slightly obtuse, upper margins slightly scarious and entire, proximally pubescent, becoming pubescent to pilose on the distal abaxial surface and densely pubescent on the distal adaxial surface; bracteoles 2.7–3.9 × 0.2–0.5 cm, lanceolate to broadly linear, acute to acuminate, the upper half pilose. Flowers sessile to subsessile; calyx 3.8–5.1 cm, four of five sepals fused to ¼–½ their length, the abaxial sepal free or connected to other sepals near calyx base, sepal lobes lanceolate to broadly linear, acute, pilose; corolla light pink, 5.6–6.2 × 1.0–1.4 cm, tubular or slightly curved, slightly inflated above constricted tube 1.1–1.8 × 0.5–0.9 cm, densely pilose with two minute lapel-like lateral lobes and a small denticle at the base of the corolla mouth, lateral lobes slightly to fully reflexed, denticle 1.7–3.3 mm, corolla mouth 1.4–2.0 cm; stamens 4, inserted in the corolla at the point of constriction, 3.4–4.2 cm, one pair slightly shorter than the other, filaments straight with slightly inflated bases, pubescent to tomentose zone at base of stamens and ringing interior surface of corolla at level of insertion, anthers 3.0–5.0 × 2.0–3.0 mm, calceiform, one-celled, small knob or spur on proximal end from vestigial theca, apical pore elongated and slightly recurved, even with corolla mouth to slightly exerted at maturity; pistil recurved ca 90° below stigma, stigma exerted, clavate to nearly capitate, slightly bilobed dorsiventrally. Fruits not seen.

Phenology. *Hyobanche thinophila* flowers in the late winter to early spring (August–September), depending on the timing of the winter rains in the Western Cape. One to several inflorescences arise from a single rhizome that may be more than a meter in length.

Distribution. Sand dunes along the coast of South Africa from Struisbaai in the south to Yzerfontein in the west (Fig. 2).

Ecology. *Hyobanche thinophila* occurs in early successional sand fynbos habitat (Mucina & Rutherford 2006). The host range for *Hyobanche* is difficult to determine based on the proximity of other plants because the rhizome system of the parasite can be quite extensive. However, host roots attached to the rhizome of the parasite were collected and their DNA extracted for a barcoding study aimed at identifying the hosts of *Hyobanche thinophila* (unpublished data). Three genera have thus far been identified as hosts to *H. thinophila*: *Metalasia* R. Brown and *Chrysanthemoides* Tournefort ex. Medikus (Asteraceae), and *Passerina* L. (Thymelaeaceae).

Etymology. The specific epithet is after the Greek words for sand-dune-loving.

Common names [Afrikaans (English)]. Duin katnaels (dune cat nails), duin wolwekos (dune wolves food), duin inkbloem (dune ink bloom). The white, exerted and recurved styles of *Hyobanche* are the primary reason for katnaels as a common name. Wolwekos as a common name is a misnomer. Wolves are not native to South Africa; the niche of wolves is filled by the African wild dog. The origin of this common name is unknown, but may refer to the resemblance of the inflorescence to fresh scraps of carrion (Manning 2007). Inkbloem refers to the use of the plant for making ink (Smith 1966). *Hyobanche*, similar to other genera in Orobanchaceae, tends to dry black after harvesting the inflorescence. Dried material is then ground into powder and added to liquid to make ink.

Taxonomic notes. *Hyobanche thinophila* is easily differentiated from *H. sanguinea* by dissecting the corolla to examine the interior vestiture: a ring of long multicellular hairs at the level of stamen insertion in *H. thinophila* vs. short glandular hairs scattered throughout the interior surface of the corolla in *H. sanguinea*. The shape of the inflorescence is ovate to slightly elongated in *H. thinophila* vs. compact to oblong in *H. sanguinea*. Flowers of *H. thinophila* are light pink, tubular and non-galeate, and slightly curved to straight vs. scarlet to deep red, galeate and strongly curved in *H. sanguinea*.

Additional specimens examined: SOUTH AFRICA. Western Cape: Koeberg Nature Reserve, 33°08'56.8" S, 18°24' 55.9" E, 26 m, 06 September 2002, *Wolfe 1026* (OS); Cape Peninsula: Fish Hoek, 1916, *Glover s.n.* (BOL); Cape Peninsula: Noordhoek Beach, 34°S 18°E, 3 m, 20 September 2010, *Wolfe 1364* (OS); Pringle Bay, 34.38190 S, 18.82493 E, 12 m, 22 September 2001, *Wolfe 939* (OS); Pringle Bay,

34°20'46.5" S, 18°49'40.2" E, 16 m, 16 September 2002, *Wolfe 1060* (OS); Hangklip, 34°22'54.9" S, 18°49'30.2"E, 10 m, 4 September 2002, *Wolfe 1021* (OS); Betty's Bay, 20 m, 6 September 1942, *Leighton s.n.* (BOL); Betty's Bay, 34°S, 18°E, 20 m, 14 August 1982, *Burman 830* (BOL); Struisbaai, 34°45.631 S, 20°02.650 E; 2 m, 24 September 2004, *Wolfe 1202* (OS); Struisbaai, August 1940, *Esterhuysen 5042* (BOL).

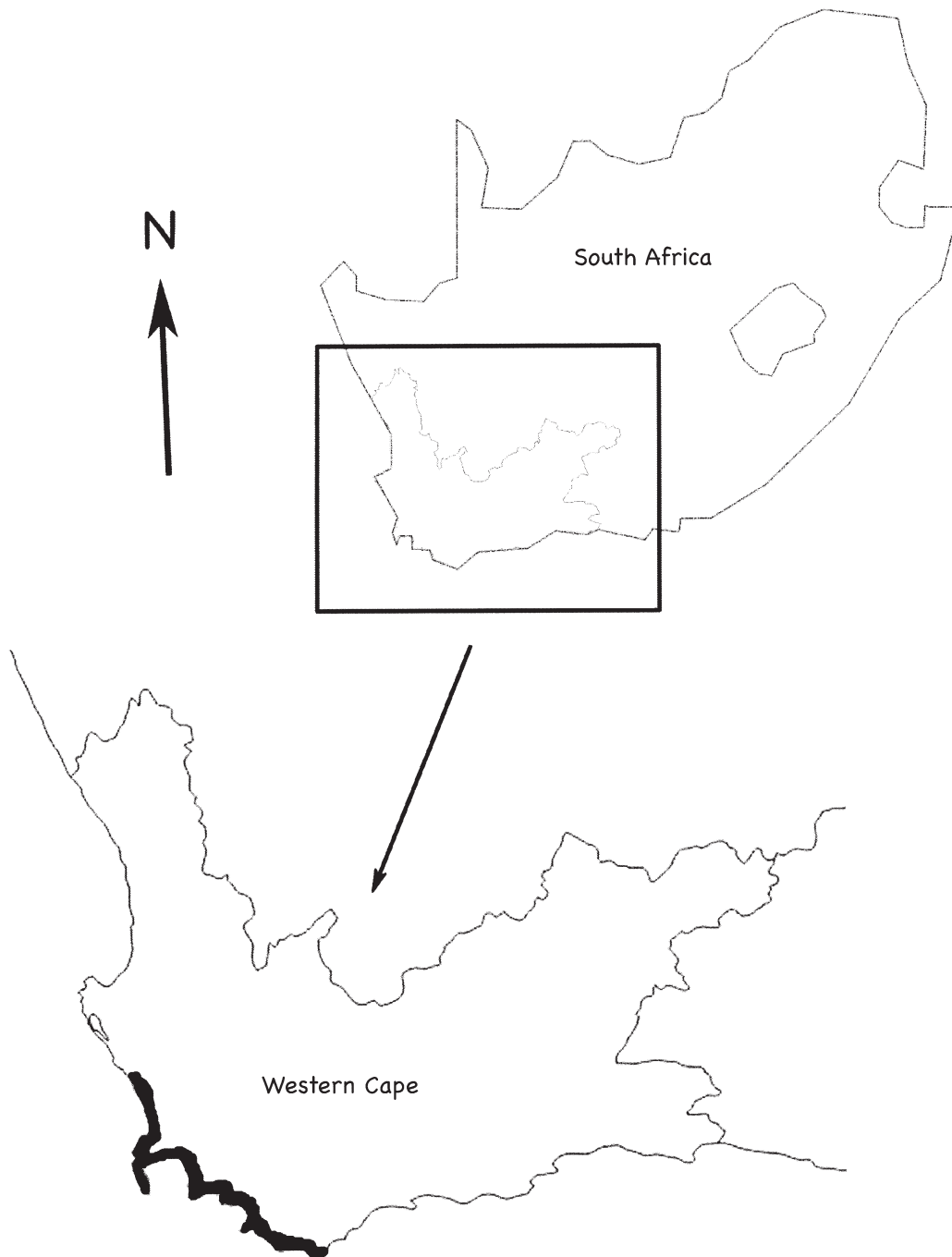


FIGURE 2. Distribution map of *Hyobanche thinophila*, which is endemic to the coastline of the Western Cape from Cape Agulhas to the Atlantic coast.

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References cited

- Goldblatt, P. & Manning, J. (2000) *Cape Plants. A conspectus of the Cape flora of South Africa*. *Strelitzia* vol. 9. p. 552. National Botanical Institute, Pretoria & MBG Press, St. Louis.
- Hiern, W.P. (1904) Scrophulariaceae *In*: Thiselton-Dyer, W.T. (ed.) *Flora Capensis: Being a systematic description of the plants of the Cape Colony, Caffraria, & Port Natal (and neighboring territories)*, Vol. 4, pt. 2, Lovell Reed & Co., London, 479 pp.
- Manning, J. (2007) *Field Guide to Fynbos*. pp. 466–467. Struik Nature, Cape Town.
- Mucina, L. & Rutherford, M.C. (2006) *The vegetation of South Africa, Lesotho, and Swaziland*. *Strelitzia* vol. 19, pp. 135–145. South African National Biodiversity Institute, Pretoria.
- Smith, C.A. (1966) *Common names of South African plants*. p. 255. Botanical Survey Memoir No. 35; Department of Agricultural Technical Services, Pretoria.
- Welman, W.G. (1993) Scrophulariaceae (Part B) *In*: Arnold, T.H. & de Wet, B.C. (eds.), *Plants of Southern Africa: Names and Distribution*. National Botanical Institute, Pretoria, p. 647.
- Wolfe, A.D. & Randle, C.P. (2001) Relationships within and among species of the holoparasitic genus *Hyobanche* (Orobanchaceae) inferred from ISSR banding patterns and nucleotide sequences. *Systematic Botany* 26: 120–130.