

# New taxa and new combinations of Eriocaulaceae from Thailand

A. Prajaksood<sup>1</sup>, J. A. N. Parnell<sup>2</sup> & P. Chantaranonthai<sup>1</sup>

**Summary.** Eight species, three subspecies, four varieties and three combinations of *Eriocaulon* L. from Thailand are described, preparatory to a revision of the Eriocaulaceae for the *Flora of Thailand*.

**Key Words.** *Eriocaulon*, taxonomy.

## Introduction

The Eriocaulaceae is a large family of perennial or occasionally annual herbs usually with grass-like leaves. Stützel (1998) recognised 10 genera and approximately 1,300 species in the family. Recently, Sano (2004) has proposed recognition of the section *Actinophalus* of *Paepalanthus* Kunth as a separate genus. *Eriocaulon* L. is one of the most widespread genera in tropical and subtropical areas of the world (Stützel 1998). In Asia, the Eriocaulaceae are represented only by *Eriocaulon*. The number of species reported differs between countries; for example, 36 species in Japan (Satake 1940), 32 species in China (Ma 1991), 65 species in India (Ansari & Balakrishnan 1994). In Thailand, there were five major studies of these species between 1955 and 1999 (Koyama 1955; Hansen 1969; Moldenke 1971; Satake 1974; Zhang 1999). In total, 59 taxa of *Eriocaulon* were reported from Thailand, 13 of which were endemic and 5 of which were synonyms. A recent study of *Eriocaulon* in East Asia by Zhang (1999), however, recognised only 29 taxa in Thailand (Table 1).

## Materials and Methods

To ensure comprehensive coverage of the Eriocaulaceae of Thailand, approximately 2,400 herbarium specimens from 15 herbaria were examined (see acknowledgements for list of herbaria). In addition, the Eriocaulaceae were studied in the field in 21 Thai National Parks, two Wildlife Sanctuaries and 25 other Districts covering 26 Changwat (Provinces) in Thailand. The data from these examinations revealed 15 Eriocaulaceae taxa which were new to science. These comprise eight species, three subspecies and four varieties, and are described below. Three new combinations have also proved necessary; therefore, 8 new synonyms are reported. The regions under the

distribution heading follow the Floristic Regions of the *Flora of Thailand* and the concept of infraspecific taxa follows Stace (1980). The conservation status of each species follows IUCN Red List Categories and Criteria version 3.1 (IUCN 2001). The selected specimens examined that are described in this paper include only one specimen from each Changwat although additional specimens were examined. A complete list of specimens examined is available from the first author. Except for vulnerable taxa, every geographical site is given here. This paper forms part of a series which will result in an account of the family being published as part of the *Flora of Thailand* series.

## New taxa

**1. *Eriocaulon chantaranonthaii* Praj. & J. Parn., sp. nov.**  
Differt *E. smitinandii* bracteae flores pilis brevi albis indutus, petalis masculi inaequalis longis florum peripheralium e capitulo exsertis; flores foeminei sepalis minuta, petalis glandulata. Typus: Thailand, Sakon Nakhon, Phu Phan National Park, 7 Nov. 1997, A. Prajaksood & P. Chantaranonthai 2 (holotypus KKU!; isotypi BK!, BKF!, K!, TCD!).

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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 1.5 – 2 cm long, 1 mm wide, hairy, apex acute. *Scapes* numerous, up to 23 cm long, hairy. *Sheaths* 2.5 – 3 cm long, hairy, apex acute. *Capitula* globose, 3 – 5 mm long, 4 – 6 mm in diam., white. *Receptacle* convex, pilose. *Involucral bracts* broadly elliptic to oblanceolate, 1.5 – 2 mm long, brown, pilose, apex obtuse to acute. *Floral bracts* oblanceolate, 1.5 mm long, light brown, hairy in the upper part, apex acuminate. *Male flowers*: calyx spatheate, 3-lobed, acute, 1 mm long, brown, hairy in the

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<sup>1</sup> Department of Biology, Faculty of Science, Khon Kaen University, Khon Kaen, 40002, Thailand. e-mail: amopra@kku.ac.th

<sup>2</sup> Herbarium, Department of Botany, School of Natural Sciences, Trinity College Dublin, Dublin 2, Ireland.

**Table 1.** Comparison of selected major works of Eriocaulaceae in Thailand. – = not reported, / = reported, syn = reported as synonym, \* = reported as endemic to Thailand.

No.	Taxa	Koyama (1955)	Hansen (1969)	Moldenke (1971)	Satake (1974)	Zhang (1999)
1	<i>E. achiton</i> Körn.	–	–	/	–	–
2	<i>E. alatum</i> Lecomte	–	–	–	–	syn
3	<i>E. alpestre</i> Hook. f. & Thomson	–	–	/	–	–
4	<i>E. australe</i> R. Br.	–	–	–	–	/
5	<i>E. bassacense</i> Moldenke	–	–	–	–	–
6	<i>E. brownianum</i> Mart.	–	–	–	–	/
7	<i>E. christopheri</i> Fyson	–	–	–	–	–
8	<i>E. cinereum</i> R. Br.	–	–	/	–	/
9	<i>E. cristatum</i> Mart.	–	–	–	–	/
10	<i>E. diana</i> e Fyson	–	–	/	–	–
11	<i>E. diana</i> e var. <i>longibracteatum</i> Fyson	–	–	/	–	–
12	<i>E. dipsacoides</i> Satake	–	–	–	/*	/
13	<i>E. echinulatum</i> Mart.	–	–	/	–	/
14	<i>E. echinulatum</i> var. <i>tenue</i> Satake	–	–	–	/*	syn
15	<i>E. eglandulatum</i> Z. X. Zhang	–	–	–	–	/*
16	<i>E. escape</i> Hansen	–	/*	–	–	–
17	<i>E. hamiltonianum</i> Mart.	–	–	/	–	/
18	<i>E. henryanum</i> Ruhland	–	–	/	–	–
19	<i>E. heterolepis</i> Steud.	–	–	–	–	–
20	<i>E. hookerianum</i> Stapf	–	–	/	–	–
21	<i>E. infirmum</i> Steud.	–	–	/	–	–
22	<i>E. intermedium</i> Körn.	–	–	/	/	syn
23	<i>E. intermedium</i> var. <i>brevicaulae</i> Satake	–	–	–	/*	syn
24	<i>E. intermedium</i> var. <i>glabrum</i> Satake	–	–	–	/*	syn
25	<i>E. kathmanduense</i> Satake	–	–	–	–	–
26	<i>E. kradingense</i> Satake	–	–	–	/*	/
27	<i>E. lepidum</i> T. Koyama	/*	–	/	–	–
28	<i>E. longifolium</i> Nees	–	–	–	–	–
29	<i>E. luzulifolium</i> Mart.	–	–	/	–	/
30	<i>E. minimum</i> Lam.	–	–	–	–	–
31	<i>E. nakayense</i> T. Koyama	/*	–	/	–	–
32	<i>E. nautiliforme</i> Lecomte	–	–	–	–	/
33	<i>E. nepalense</i> Prescott ex Bong.	–	–	–	–	/
34	<i>E. odoratum</i> Dalzell	–	–	/	–	–
35	<i>E. oryzetorum</i> Mart.	–	–	/	–	/
36	<i>E. pseudoescape</i> Praj. & Chantar.	–	–	–	–	–
37	<i>E. pseudonepalense</i> Satake	–	–	–	/*	/
38	<i>E. quinquangulare</i> L.	–	–	/	–	/
39	<i>E. redactum</i> Ruhland	–	–	/	–	–
40	<i>E. robusto-brownianum</i> Ruhland	–	–	/	–	–
41	<i>E. setaceum</i> L.	–	–	/	/	/
42	<i>E. sexangulare</i> L.	–	–	/	/	/
43	<i>E. siamense</i> Moldenke	–	–	/*	–	/
44	<i>E. siamense</i> var. <i>leiophyllum</i> Z. X. Zhang	–	–	–	–	/*
45	<i>E. smitinandii</i> Moldenke	–	–	/*	–	/
46	<i>E. sollyanum</i> Royle	–	–	/	–	–
47	<i>E. souchei</i> Moldenke	–	–	/	–	–
48	<i>E. stellulatum</i> Körn.	–	–	/	–	–
49	<i>E. tagawae</i> Satake	–	–	–	/*	–
50	<i>E. thailandicum</i> Moldenke	–	–	/*	–	/
51	<i>E. tokinense</i> Ruhland	–	–	–	–	/
52	<i>E. truncatum</i> Buch.-Ham. ex Mart.	–	–	/	–	/
53	<i>E. ubonense</i> Lecomte	–	–	/	–	–
54	<i>E. wightianum</i> Mart.	–	–	–	–	/
55	<i>E. willdenovianum</i> Moldenke	–	–	/	–	/
56	<i>E. xenopodium</i> T. Koyama	/*	–	/	–	/
57	<i>E. xeranthemum</i> Mart.	–	–	–	–	/
58	<i>E. zollingerianoides</i> Z. X. Zhang	–	–	–	–	/
59	<i>E. zollingerianum</i> Körn.	–	–	/	–	/
	Total (Taxa)	3	1	32	10	29

upper part; petals unequal, hairy, acute, two small, the third about twice as long and exerted beyond the

floral bract, subapical glands present; vestigial gynoe-cium present; anthers 6, black. *Female flowers*: sepals 1 –

3, narrowly linear, acute, 0.5 – 1 mm long, light brown, hairy in the upper part (deciduous); petals 3, unequal, elliptic or lanceolate, attenuate, acute, 1.5 – 2 mm long, brown, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.5 mm long, brown, glabrous. Fig. 1.

**DISTRIBUTION.** Asia: Thailand. Largely found in the North-Eastern region.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Phitsanulok: Tung Salaeng Luang, 500 m, 10 Feb. 1964, *B. Hansen, G. Siedenfaden & T. Smitinand* 11099 (AAU, BKF, C, K, L). Sakon Nakhon: Along the way to Ang Kob-Kam Pak Nam, Phu Phan National Park, 210 m, 7 Nov. 1997, *A. Prajaksod & P. Chantaranothai* 2 (holotype KKU; isotypes BK, BKF, K, TCD). Nakhon Phanom: Ban Phaeng Distr., 120 m, 30 Oct. 1998, *Th. Wongprasert et al.* s.n. (BKF). Mukdahan: Lann Phu Wat, Phu Sra Dok Bua National Park, 13 Nov. 1998, *A. Prajaksod & P. Chantaranothai* 70 (BK, BKF, K, KKU, TCD).

**HABITAT.** Common on sandy soils in open marshy places or on the borders of barren sandstone rocks; 120 – 500 m.

**CONSERVATION STATUS.** Least Concern (LC). Locally common in a moderate number of sites spread over the North-Eastern region.

**PHENOLOGY.** October – February.

**NOTES.** This species is similar to *Eriocaulon smitinandii* Moldenke as the scapes and involucral bracts are hairy but it differs in having shorter and white hairs on the floral bracts; unequal male petals, one of which is exerted beyond the floral bracts; minute female sepal(s) and glandular petals. The type was collected with Prof. Dr Pranom Chantaranothai, in whose honour it is named.

**2. *Eriocaulon chiangmaiense* Praj. & J. Parn. sp. nov.** Differt *E. nautiliformis* folia brevis angustata, bracteae flores apicem acutatus, petalis masculi aequalis, sepalis foemineus uniformis. Typus: Thailand, Chiang Mai, west of Bo Luang, on fen area, 29 Jan. 1964, *B. Hansen, G. Seidenfaden & T. Smitinand* 10976 (holotypus BKF!; isotypi AAU!, C!, E!, K!, L!).

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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear or crescentic, 5 – 11 cm long, 3 – 10 mm wide, glabrous, apex acute. *Scapes* few, up to 41 cm long, glabrous. *Sheaths* 4 – 10 cm long, glabrous, apex acute. *Capitula* globose, 6 – 8 mm long, 6 – 10 mm in diam., greyish. *Receptacle* convex to elongate, glabrous. *Involucral bracts* oblanceolate to oblong, 2.5 mm long, brownish, glabrous, apex acute. *Floral bracts* oblanceolate, 3 mm long, blackish, apex acute. *Male flowers:* calyx spatheate or fused at the base, 3-lobed, acute, 1.5 mm long,

blackish, hairy in the upper part; petals equal, hairy, obtuse, subapical glands present; vestigial gynoeceum present; anthers 6, black. *Female flowers:* sepals 3, weakly keeled, acute, 2 mm long, blackish, hairy in the upper part; petals 3, unequal, elliptic, attenuate, obtuse, 2 – 2.5 mm long, whitish, hairy, subapical glands present; ovary 3-locular; seed 0.5 mm long, brown, tuberculate. Fig. 2.

**DISTRIBUTION.** Asia: Thailand. Endemic to one Changwat in the Northern region where it is found in a number of locations.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Chiang Mai: 5 km W of Bo Luang, Mae Cham, Doi Inthanon, 1,020 m, 26 Feb. 1959, *Th. Sorensen, K. Larsen & B. Hansen* 7049 (C, L). Unknown Changwat: Northern Siam, Grass on Plain of Mountain Ngat in moist places, 14 March 1893, *J. H. Smiles* s.n. (K).

**HABITAT.** On stream banks, common in fen areas. Dipterocarp — pine or mixed deciduous forest; 900 – 1,100 m.

**CONSERVATION STATUS.** Least Concern (LC). Locally common and known only from six sites all located in a single Changwat in Thailand but with no evidence of decline or extreme fluctuations in key criteria.

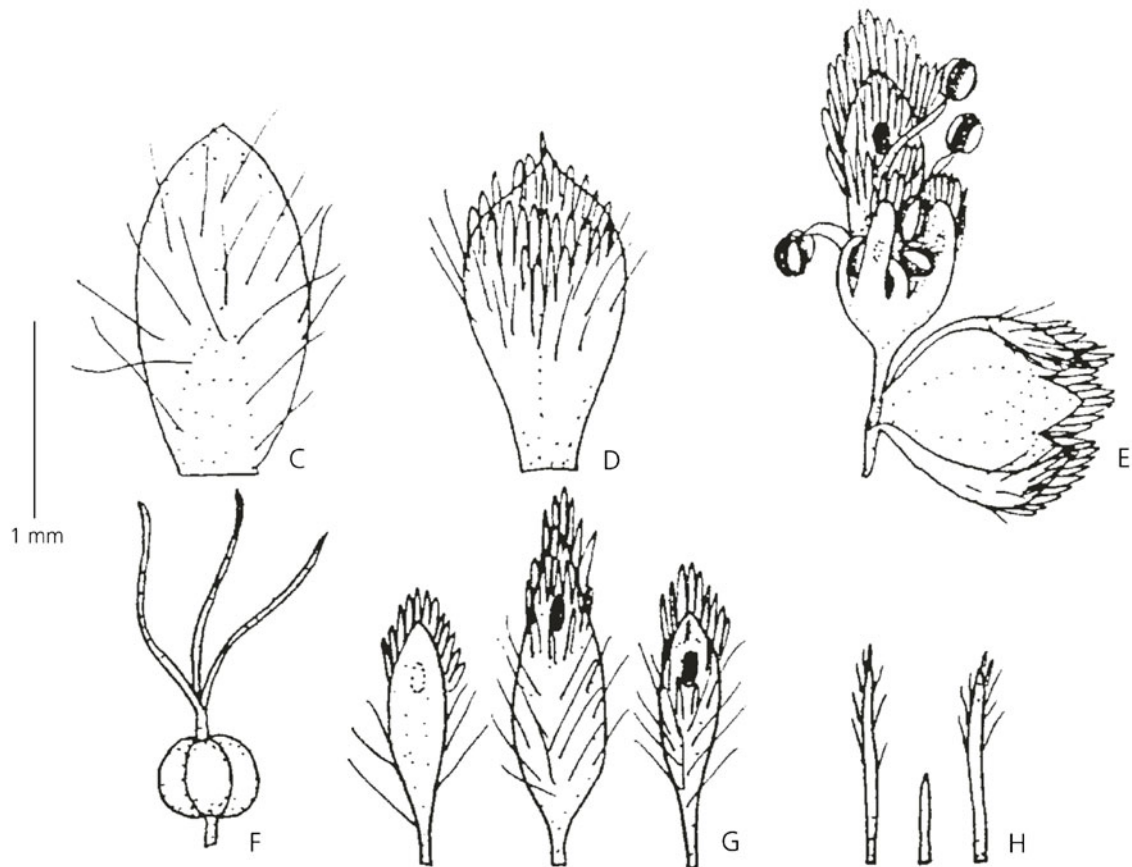
**PHENOLOGY.** January – April.

**NOTES.** This species is similar to *Eriocaulon nautiliforme* Lecomte but the leaves are shorter and narrower, the floral bracts acute, the male petals equal in size and the female sepals all of similar shape, whereas *E. nautiliforme* has longer and broader leaves, the floral bracts are acuminate, one of the male petals is larger than the others and the median female sepal is shell-like.

**3. *Eriocaulon chiangmaiense* subsp. *leucanthemum* Praj. & J. Parn. subsp. nov.** Haec subspeciei a forma typica speciei capitula alba receptaculum pilosum flores masculi petala eglandulosa antheris eborinus flores feminei sepala alba petala eglandular ovata attenuatus semina glabratus. Typus: Thailand, Nong Khai, Bueng Karn, Huay Poo, 17 Nov. 1966, *T. Smitinand* 10091 (holotypus BKF!; isotypi C!, K!).

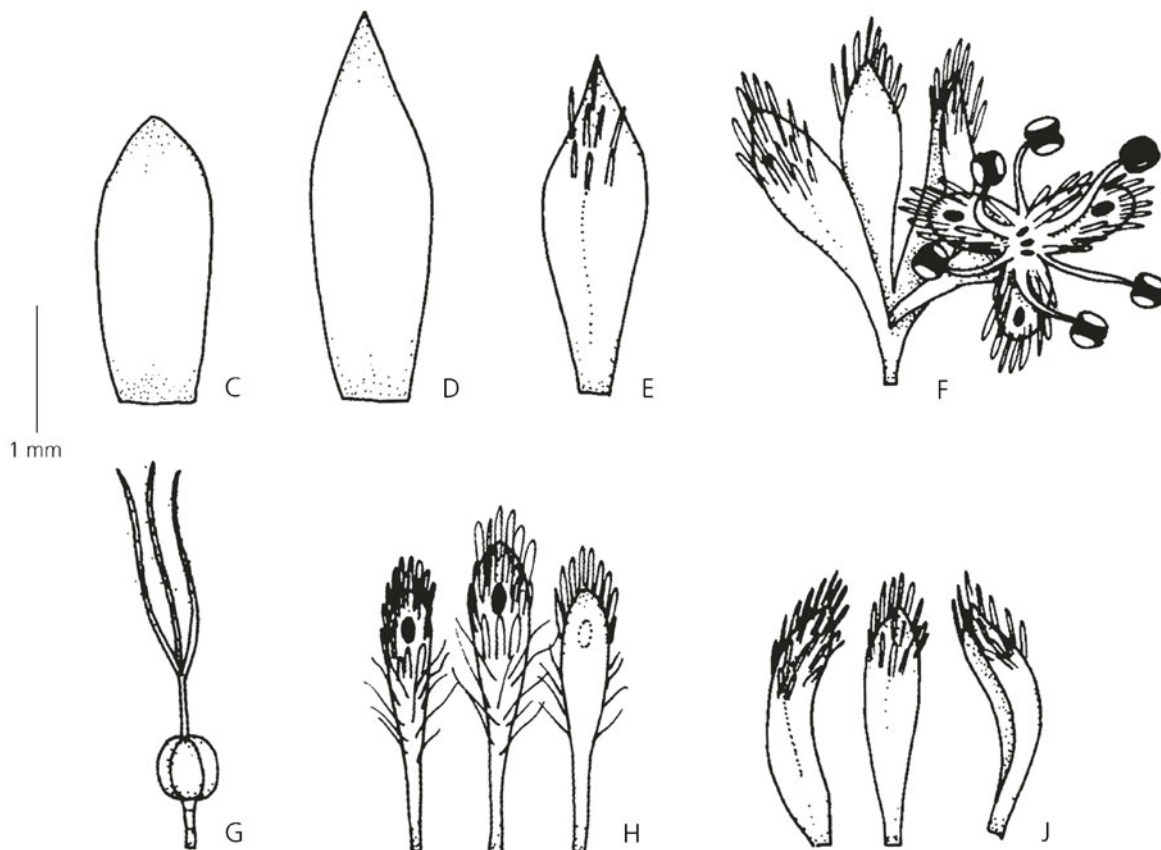
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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 2.5 – 7 cm long, 3 – 6 mm wide, glabrous, apex acute. *Scapes* few or numerous, up to 31 cm long, glabrous. *Sheaths* 4 – 7 cm long, glabrous, apex acute. *Capitula* globose to ovoid, 4 – 7 mm long, 5 – 7 mm in diam., whitish. *Receptacle* elongate, pilose. *Involucral bracts* obovate to oblong, 3 mm long, brownish, glabrous, apex acute to obtuse. *Floral bracts* obovate, 2.5 mm long, pale brown, blackish and hairy in the upper part, apex acute to acuminate. *Male flowers:* calyx spatheate or fused at the



**Fig. 1.** *Eriocaulon chantaranothai*. A habit; B capitulum; C involucral bract; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. A – B from A. Prajaksood & S. Suddee 321 (KKU); C – H from A. Prajaksood & P. Chantaranothai 864BRT. DRAWN BY A. PRAJAKSOOD.





**Fig. 2.** *Eriocaulon chiangmaiense*. A habit; B capitulum; C – D involucre: C outer whorl, D inner whorl; E floral bract; F male flower; G – J female flower: G gynoecium, H petals, J sepals. All from *B. Hansen, G. Seidenfaden & T. Smitinand* 10976 (BKF). DRAWN BY A. PRAJAKSOOD.

base, 3-lobed, acute, 1.7 mm long, pale brown, blackish and hairy in the upper part; petals unequal, hairy, acute, eglandular; vestigial gynoeceium present; anthers 6, whitish. *Female flowers*: sepals 3, weakly keeled, acute, 2 mm long, pale brown, hairy in the upper part; petals 3, unequal, ovate, attenuate, obtuse, 2 – 2.2 mm long, whitish, hairy, eglandular; ovary 3-locular; seed 0.3 – 0.4 mm long, brown, glabrous. Fig. 3.

**DISTRIBUTION.** Asia: Thailand. A rare endemic known only from a single location in a single Changwat which lies along the Mekong River in the North-Eastern region.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Nong Khai: Bueng Karn, Huay Poo, 100 m, 17 Nov. 1966, *T. Smitinand* 10091 (holotype BKF; isotypes C, K).

**HABITAT.** In wet sandy soil along edge of barren sandstone rocks; 100 m.

**CONSERVATION STATUS.** Vulnerable (VU D2). Only known from a single site in a single Changwat in Thailand.

**PHENOLOGY.** November.

**NOTES.** This subspecies differs from the typical one in having inflorescences whitish, receptacle pilose, male petals eglandular, anther whitish, female sepals whitish, female petals ovate, attenuate, eglandular and its seeds are glabrous. The geographical distribution of this subspecies is separate from the typical subspecies (Changwat Chiang Mai).

**4. *Eriocaulon hamiltonianum* Mart. var. *acuminatum* Praj. & J. Parn., var. nov.** Haec varietas differt a forma typicali speciei bracteae flores acuminate. Typus: Thailand, Sakon Nakhon, Phu Phan National Park, 11 Nov. 2002, *A. Prajaksod* & *S. Suddee* 318 (holotypus KGU!; isotypi BK!, BKF!, K!, TCD!).

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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 2 cm long, 2 mm wide, glabrous, apex acuminate. *Scapes* numerous, up to 15 cm long, glabrous. *Sheaths* 2.5 cm long, glabrous, apex acute. *Capitula* ovoid to elliptic, 3 – 4 mm long, 2 – 3 mm in diam., brown. *Receptacle* elongate. *Involucral bracts* broadly elliptic, 1.5 – 2 mm long, brown, glabrous, apex acuminate. *Floral bracts* oblanceolate to broadly ovoid, 2 – 2.5 mm long, blackish-brown, glabrous, apex long-acuminate. *Male flowers*: calyx spatheate, 2 – 3-lobed, acute, 1.3 mm long, brown, glabrous; petals equal, glabrous, acute, eglandular; vestigial gynoeceium present; anthers (4 –) 5 (– 6), black. *Female flowers*: sepals 2 – 3, linear, acute, 1.3 mm long, brown, blackish in the upper part, glabrous; petals absent or 2, filiform, hairy at the tip; ovary 3-locular; seed 0.5 mm long, brown, glabrous. Fig. 4.

**DISTRIBUTION.** Asia: Thailand. Confined to the Northern, North-Eastern and Eastern regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Chiang Mai: Bo Luang Tableland, Dry dipterocarp forest, [18.45°N, 98.25°E], 1,000 m, 14 Dec. 1969, *C. F. van Beusekom* & *C. Phengkhai* 2517A (K). Kamphaeng Phet: Raheng Distr., Near Tapofsah, Wang Chaow forest, 8 Jan. 1904, *E. Lindhard* 20 (C). Sakon Nakhon: Along the way from headquarters to Tham Chan-Lan Sao Ae, Phu Phan National Park, 210 m, 31 Oct. 1998, *A. Prajaksod* & *P. Chantaranonthai* 48 (KKU). Chaiyaphum: Tungkamang, [16.20°N, 101.45°E], 800 m, 14 Dec. 1971, *C. F. van Beusekom*, *C. Phengkhai*, *R. Geesink* & *B. Wongwan* 4261a (BKF, P).

**HABITAT.** Common on sandy soils in open marshy places, by streams, in muddy places. Dry dipterocarp forest; 210 – 1,000 m.

**CONSERVATION STATUS.** Least Concern (LC). Locally common, known from a number of sites widely scattered over Thailand.

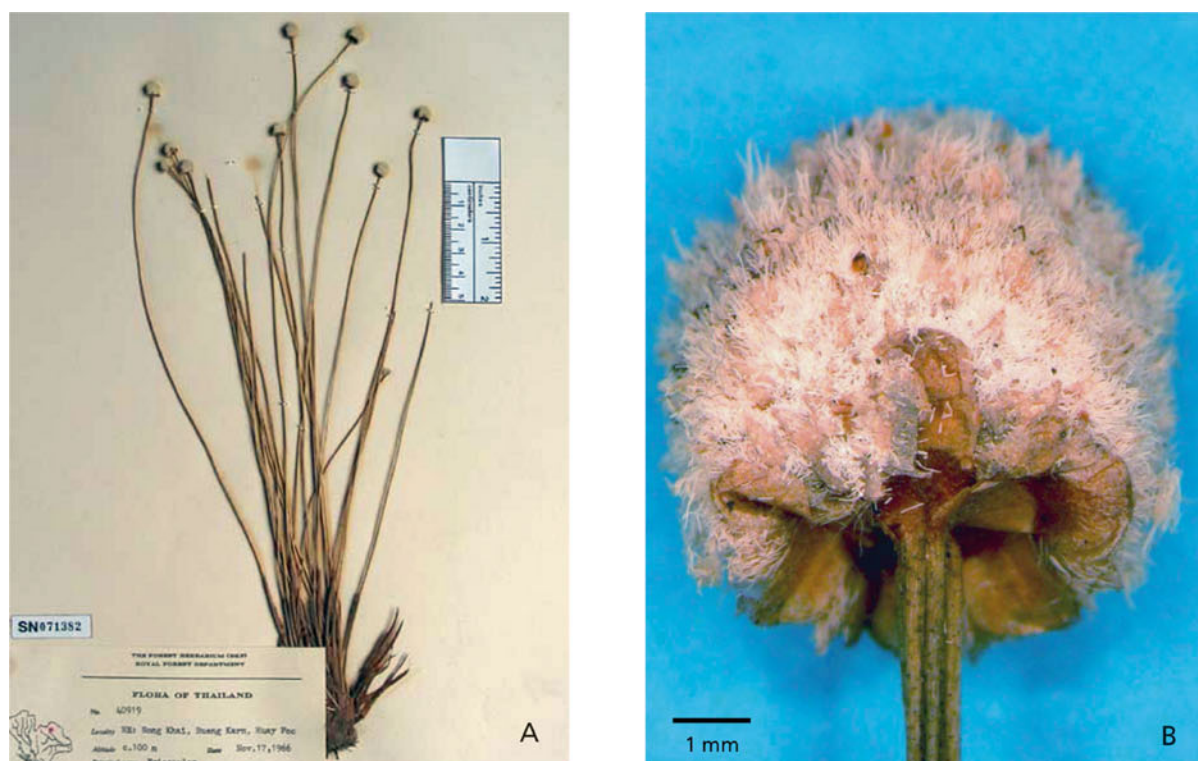
**PHENOLOGY.** October – January.

**NOTES.** This variety differs from the typical form (Martius 1832) in having acuminate floral bracts. The geographical distribution of this variety and typical one overlap as both varieties are found in Changwat Kamphaeng Phet, Sakon Nakhon and Chiang Mai.

**5. *Eriocaulon nautiliformoides* Praj. & J. Parn. sp. nov.** Affinis *E. smitinandii* sed flores foemineus sepala dimorphus unum anticum incurvatum nautiliforme; petala glandula. Typus: Thailand, Nakhon Phanom, on the way to That Phanom, 16 Dec. 1963, *T. Smitinand* 8443 (holotypus BKF!).

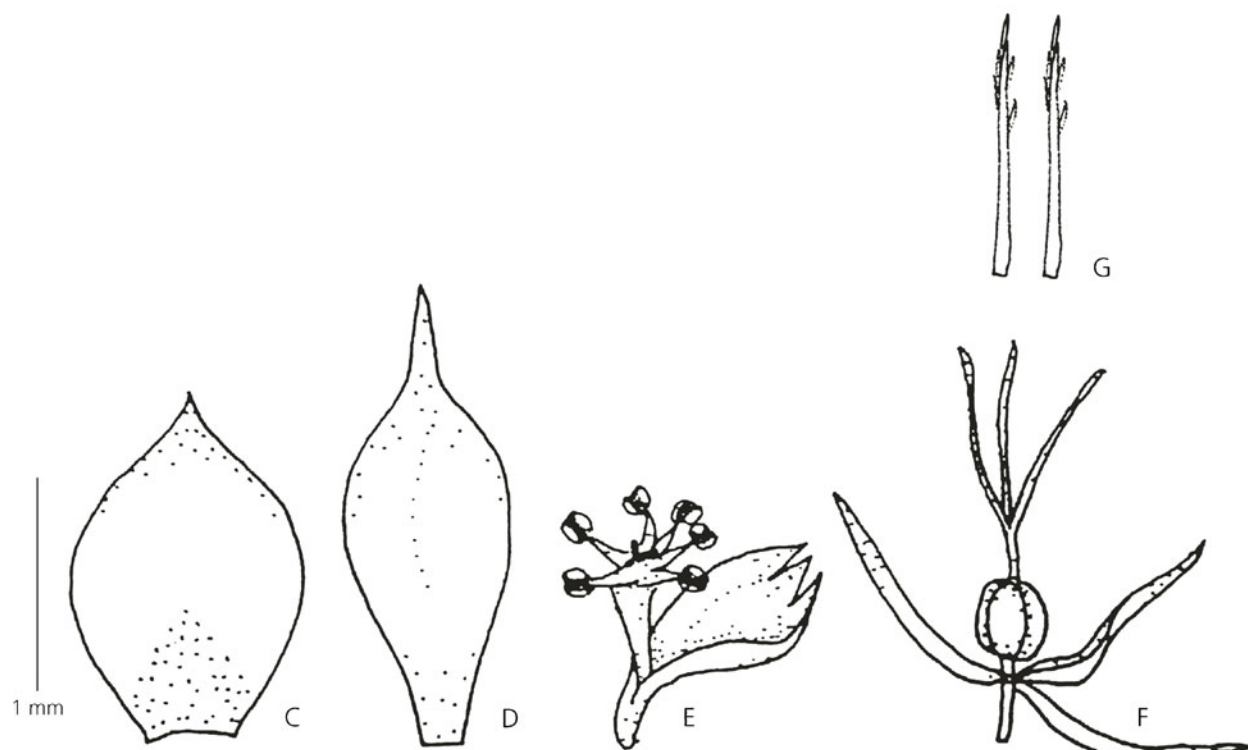
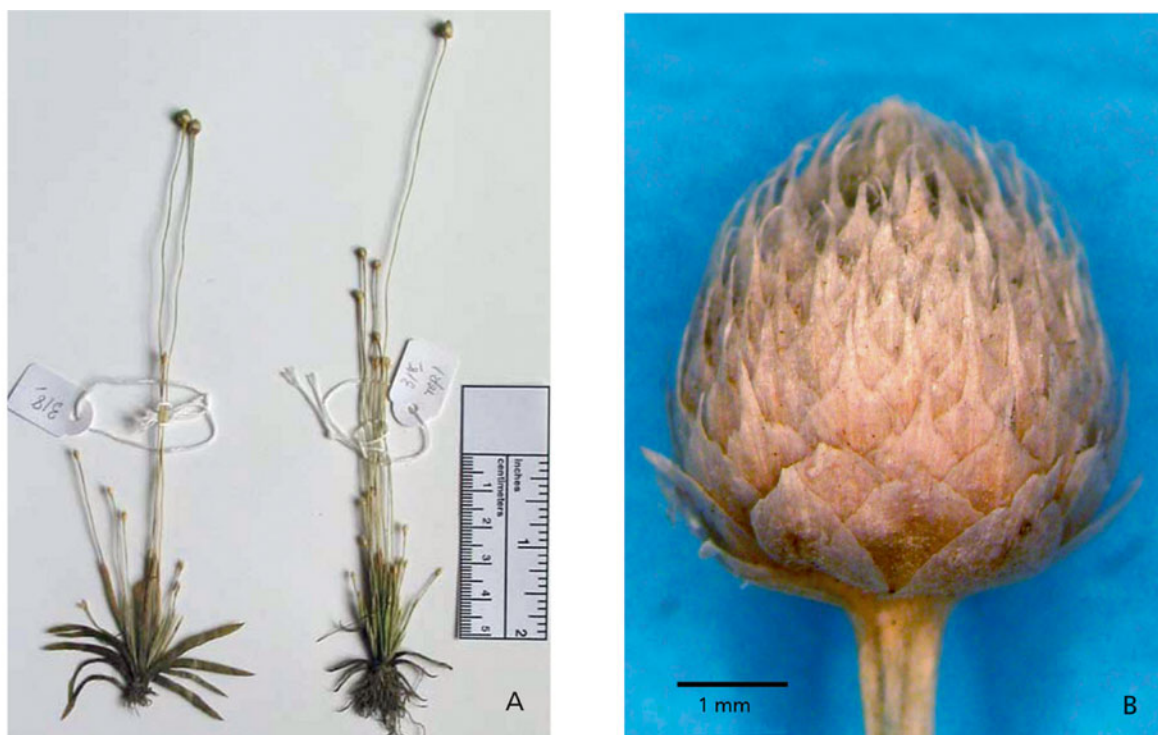
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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 2.5 – 3 cm long, 1 mm wide, glabrous, apex acute. *Scapes* numerous, up to 14 cm long, hairy. *Sheaths* 3.5 cm long, glabrous, apex acute or 2-lobed. *Capitula* globose, 5 – 6 mm long, 4 – 5 mm in diam., brownish-white. *Receptacle* elongate, pilose. *Involucral bracts* broadly elliptic to oblanceolate, 1.5 – 2 mm long, brown, pilose, apex acuminate. *Floral bracts* oblanceolate, 1.5 – 2 mm long, light brown, hairy in the upper part, apex acuminate. *Male flowers*: calyx spatheate, 3-lobed, acute, 1.5 – 2 mm long, brown, hairy in the upper part; petals equal, hairy, acute, subapical glands present; vestigial gynoeceium present; anthers 6, black. *Female flowers*: sepals 3, dissimilar, two lateral ones oblanceolate, acute, the middle one shell-like, acuminate, 1.5 mm long, brown, hairy in the upper part; petals 3, narrowly elliptic, attenuate, acute, 1.5 mm long, brown, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.5 mm long, brown, glabrous. Fig. 5.



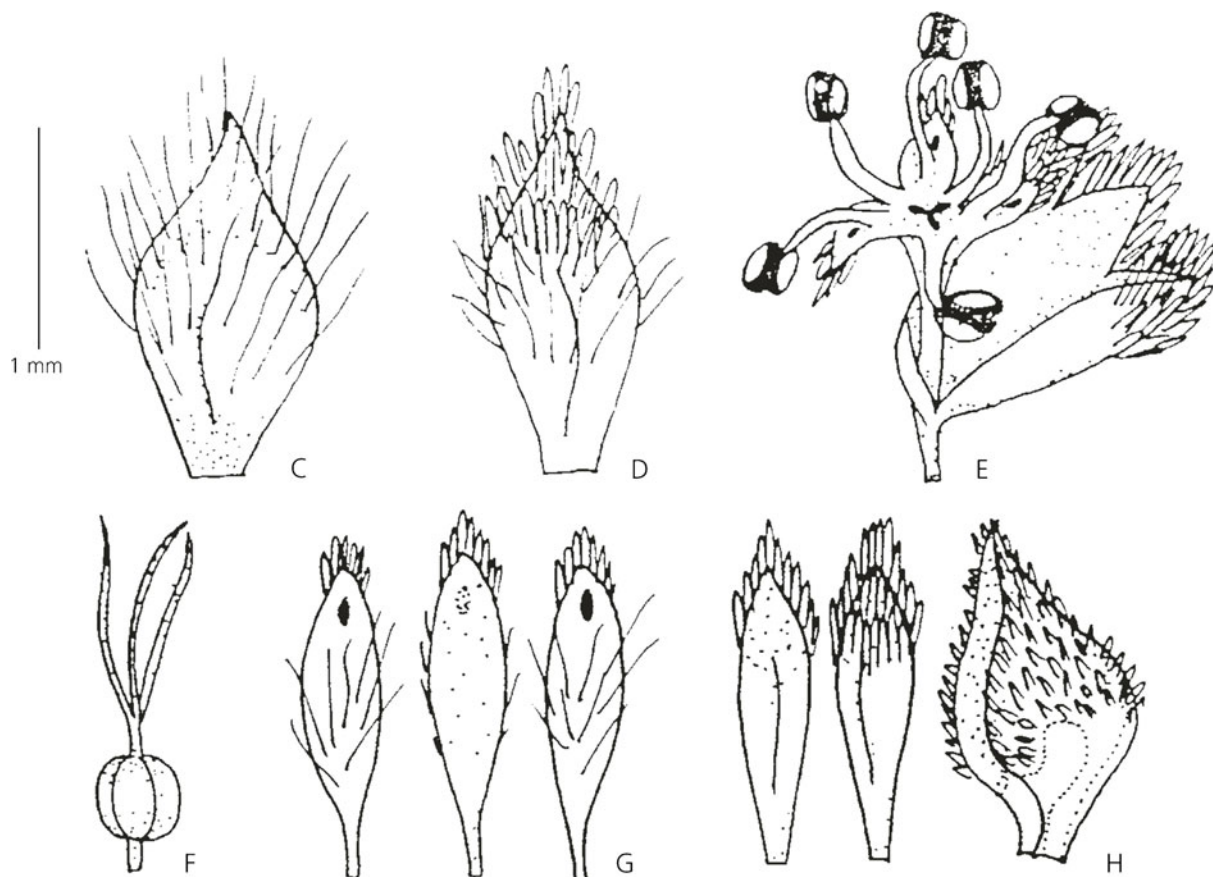
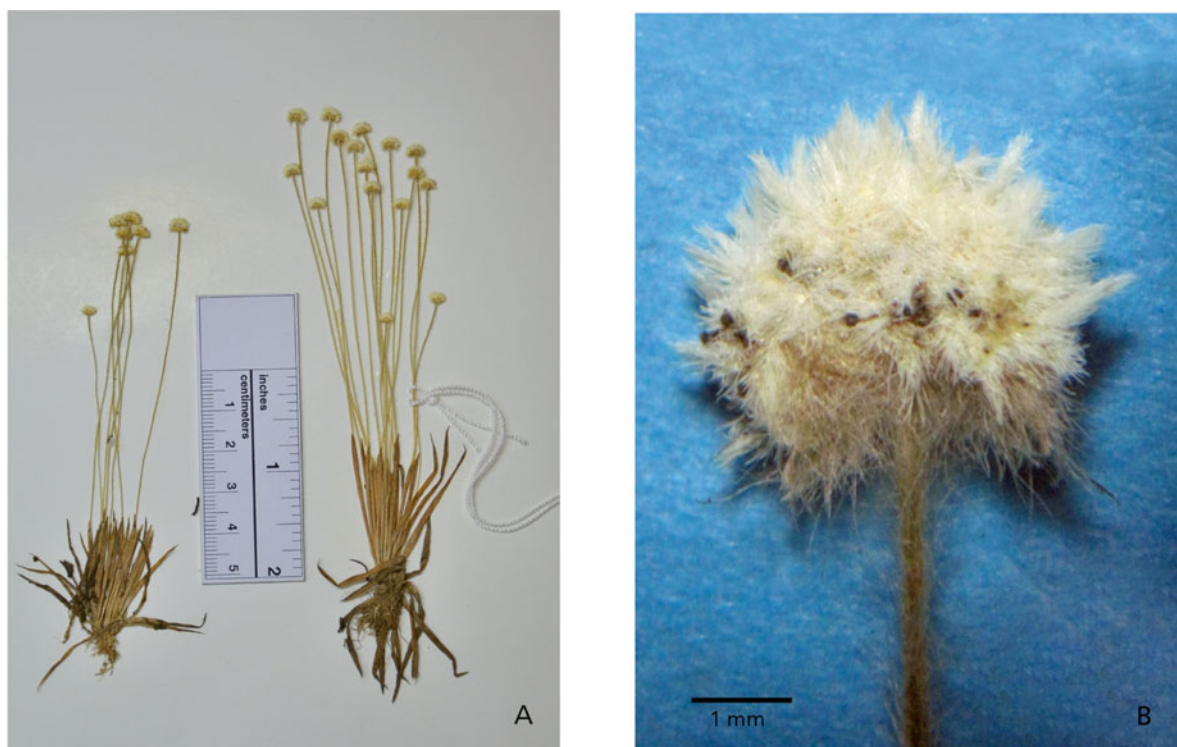
**Fig. 3.** *Eriocaulon chiangmaiense* subsp. *leucanthemum*. A habit; B capitulum; C involucre bract; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. All from *T. Smitinand* 10091 (BKF). DRAWN BY A. PRAJAKSOOD.





**Fig. 4.** *Eriocaulon hamiltonianum* var. *acuminatum*. A habit; B capitulum; C involucre bract; D floral bract; E male flower; F – G female flower: F gynoecium and petals, G sepals. All from A. Prajaksood & S. Suddee 318 (KKU). DRAWN BY A. PRAJAKSOOD.





**Fig. 5.** *Eriocaulon nautiliformoides*. A habit ; B capitulum; C involucre bract; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. A – B from A. Prajaksod & P. Chantaranothai 108 (KKU); C – H from T. Smitinand 8443 (BKF). DRAWN BY A. PRAJAKSOD.

**DISTRIBUTION.** Asia: Thailand. Endemic to two Changwat bordering the Mekong River in the North-Eastern region.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Nakhon Phanom: On the way to That Phanom, 150 m, 16 Dec. 1963, *T. Smitinand* 8443 (BKF). Ubon Ratchathani: Along the road at 4th km of road number 2112, 10 km further to Khong Chiam, 14 Nov. 1998, *A. Prajaksood & P. Chantaranonthai* 108 (BK, BKF, K, KKU, TCD); Ban Udomsuk, Tambon Kudprathai, Dacha Udom Distr., by the side of the road route 2172, km 26 – 27, [14.98°N, 105.33°E], 8 Dec 2002, *A. Prajaksood & S. Suddee* 264 (BK, BKF, K, KKU, TCD); Korat Plateau, [15.00°N, 104.00°E], 500 m, Oct./Nov. 1956, *R. Gillett* 21a (K); Warinchamrab, 24 Feb. 1961, *Chirayupin* 173 (BK).

**HABITAT.** On the borders of barren sandstone rocks or paddy fields, in open marshy places, on sandy soil. Dry dipterocarp forest; 150 – 500 m.

**CONSERVATION STATUS.** Vulnerable (VU D2). Known only from three or perhaps four sites in two Changwat in Thailand. However, both Changwat are under-recorded (Parnell *et al.* 2003).

**PHENOLOGY.** October – February.

**NOTES.** This species is similar to *Eriocaulon smitinandii* in the colour and size of capitula, the glabrous sheaths and leaves and in the scapes which are hairy. Its female sepals, however, are dimorphic, the middle one being shell-like and in this regard similar to *E. nautiliforme*. The female petals are all glandular.

**6. *Eriocaulon nautiliformoides* var. *hexagynum* Praj. & Chantar. var. nov.** Haec varietas differt a forma typicali speciei hexagynum. Typus: Thailand, Ubon Ratchathani, Dacha Udom, 8 Nov. 2002, *A. Prajaksood & S. Suddee* 265 (holotypus KKU!; isotypi BK!, BKF!, K!, TCD!).

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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 1.5 – 2.5 cm long, 1 mm wide, glabrous, apex acute. *Scapes* numerous, up to 14 cm long, hairy. *Sheaths* 3.5 cm long, glabrous, apex acute or 2-lobed. *Capitula* globose, 5 – 6 mm long, 4 – 5 mm in diam., brownish-white. *Receptacle* convex to elongate, pilose. *Involucral bracts* broadly ovate to broadly obovate, 2 mm long, brown, pilose, apex acuminate. *Floral bracts* obovate to oblanceolate, 1.5 mm long, light brown, hairy in the upper part, apex acuminate. *Male flowers:* calyx spatulate, 3-lobed, acute, 1.5 – 2 mm long, brown, hairy in the upper part; petals equal, hairy, acute, subapical glands present; vestigial gynoeceum present; anthers 6, black. *Female flowers:* sepals 3, dissimilar, two lateral ones oblanceolate, acute, the middle one shell-like, acuminate, 1.5 mm long, brown, hairy in the upper part; petals 3,

elliptic, attenuate, acute, 1.5 mm long, brown, hairy in the upper part, subapical glands present; ovary 5 – 6-locular; *seed* 0.5 mm long, brown, glabrous. Fig. 6.

**DISTRIBUTION.** Asia: Thailand. Endemic to two adjacent Changwat which lie along the Mekong River in the Eastern region, wherein it is confined to two locations.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Amnat Charoen: 120 m, 3 Dec. 1968, *T. Smitinand & J. Turbang* 10492 (BK, BKF). Ubon Ratchathani: Ban Udomsuk, Tambon Kudprathai, Dacha Udom Distr., by the side of the road route 2172, km 26 – 27, [14.98°N, 105.33°E], 8 Nov. 2002, *A. Prajaksood & S. Suddee* 265 (holotype KKU; isotypes BK, BKF, K, TCD).

**HABITAT.** On sandy soils in paddy fields; 120 m.

**CONSERVATION STATUS.** Vulnerable (VU D2). Known only from two sites in two Changwat in Thailand.

**PHENOLOGY.** November – December.

**NOTES.** This variety differs from the typical variety in having a 5 – 6-locular ovary. This is the first report of the presence of a 5- or 6-merous ovary in *Eriocaulon* and it is therefore a remarkable and exceptional finding. Such plants are not simply occasional mutant forms but often form large coherent stands, hence the formal taxonomic recognition here. The geographical distribution of this variety and the typical one overlap; both varieties are found in Changwat Ubon Ratchathani.

**7. *Eriocaulon nepalense* Prescott ex Bong. var. *luzulifolium* (Mart.) Praj. & J. Parn. comb. et stat. nov.** Type: as for *Eriocaulon luzulifolium*. Type: India, Silhet, Wallich 6071 (holotype K!; isotypes B!, CAL, K-WA!).

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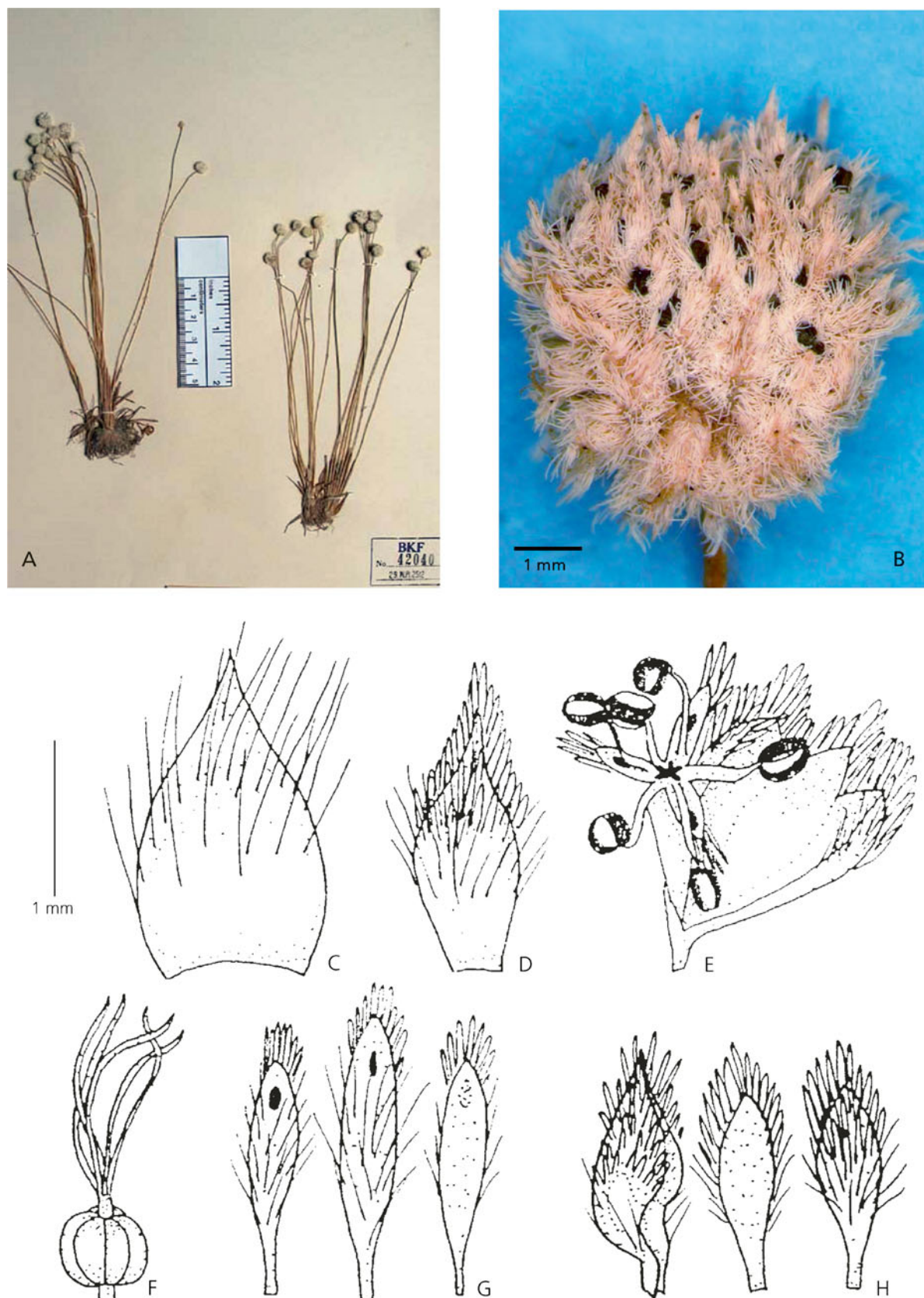
*E. luzulifolium* Mart. in Wall., *Pl. Asiat. Rar.* 3: 28 (Wallich 1832); Kunth (1841: 553); Steudel (1855: 270); Körnicke (1856: 636); Thwaites (1864: 341); Hooker (1894: 582); Hooker & Trimmen (1900: 7); Ruhland in Engler (1903: 88); Fyson (1921: 200); Malla *et al.* (1986: 679); Zhang in Kück (1999: 97 – 99). Type: India, Silhet, Wallich 6071 (holotype K!; isotypes B!, CAL, K-WA!), **synon. nov.**

*E. kathmanduense* Satake in H. Hara (1971: 157); Malla *et al.* (1986: 679). Type: Nepal, Sundarijal waterfall, near Kathmandu, 20 Sept. 1963, *H. Hara, H. Kanai & S. Kurosawa* s.n. (holotype TI), **synon. nov.**

*E. pseudonepalense* Satake (1974: 50). Type: Thailand, Loei, Phu Kradung, 29 Nov. 1965, *M. Tagawa, K. Iwasaki & N. Fukuoka* T – 764 (or T 764) (holotype KYO!; isotype BKF!), **synon. nov.**

*E. papuanum* P. Royen (1959: 37). Type: Papua New Guinea, near Nondugl, Western Highlands, 2 April 1953, *Womersley & Hooglang* 4956 (holotype L!), **synon. nov.**





**Fig. 6.** *Eriocaulon nautiliformoides* var. *hexagynum*. A habit; B capitulum; C involucre bract; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. All from *T. Smitinand & J. Turbang* 10492 (BKF). DRAWN BY A. PRAJAKSOOD.



*E. lepidum* T. Koyama (1955: 371 – 372). Type: Thailand, Chiang Mai, Doi Sutep, 3 Oct. 1921, B. Hayata s.n. (holotype TI), **synon. nov.**

*E. pumilio* Hook. f. (Hooker 1894: 581). Type: India, alt. 3,000 – 4,000 m, 3 Oct. 1884, Duthie 3454 (K!), NW India, alt. 8,000 – 9,000 m., 19 Sept. 1885, Duthie 4473 (K! (000098634), (000098635)), **synon. nov.**

Annual herbs. *Stem* forming a basal disc or if near water or in water then up to 2 cm long. *Leaves* crowded into a basal rosette or if stem leafy then cauline, linear, 0.5 – 8 cm long, 1 – 6 mm wide, glabrous, apex acute. *Scapes* few or numerous, up to 3 – 22 cm long, glabrous. *Sheaths* 1 – 7 cm long, glabrous, apex acute. *Capitula* hemispherical to ovoid, 2.5 – 6 mm long, 3 – 6 mm in diam., blackish-grey. *Receptacle* convex. *Involucral bracts* broadly obovate, 2 mm long, brown to blackish-brown, glabrous, apex obtuse. *Floral bracts* oblanceolate to oblong, 2 mm long, black, hairy in the upper part, apex acute to acuminate. *Male flowers*: calyx spatulate or fused at the base, 3-lobed, acute, 1.5 – 2 mm long, blackish, hairy in the upper part or only at the tip; petals equal and glabrous if all minute but if unequal, two small and glabrous and the third hairy acute, eglandular; vestigial gynoeceum present; anthers 6, black. *Female flowers*: sepals 3, linear to narrowly oblanceolate, acute, 2 mm long, black, hairy in the upper part; petals 3, linear, acute, 1.5 mm long, brown, hairy in the upper part, eglandular; ovary 3-locular; seed 0.5 mm long, brown, papillate. Fig. 7.

**DISTRIBUTION.** Asia: Thailand. Absent from any part of the Peninsular and South-Eastern regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Chiang Mai: Chiang Dao, Doi Chiang Dao Animal Sanctuary, E of Huay Nae Cawk Station, 1,475 m, 11 Sept. 1995, J. F. Maxwell 95-659 (BKF). Chiang Rai: Doi Langka, top of Kiu Luang, 1,760 m, 31 Oct. 1938, Garrett H. B. G. 1107 (K, L, P). Uttaradit: Phu Soi Dao National Park, Tambon Houy Moon, Nampad Distr., on the plain at its summit (Lann Son or Pine forest), on the way from tent areas to Lan How, Pine forest, [17.75°N, 100.95°E], 1,633 m, 17 Oct. 2002, A. Prajaksood & S. Suddee 199 (BK, BKF, K, KKU, TCD). Phitsanulok: Tung Sa laeng Luang, 500 m, 10 Feb. 1964, B. Hansen, G. Seidenfaden & T. Smitinand 11098 (C). Phetchabun: Thung Non Son, Thung Salangluang National Park, Tambon Nongmaena, Khao Khor Distr., on the plain at its summit, Pine forest, [16.60°N, 100.80°E], 20 Oct. 2002, A. Prajaksood & S. Suddee 206 (BK, BKF, K, KKU, TCD). Loei: Phu Kradung, Tambon Srithan, Phu Kradung Distr., on the plain at its summit, Phone Phoob waterfall - Pra Bhuddha Matta route, by the side of the path, Pine forest, [16.90°N, 101.80°E], 1,300 m, 1 Nov. 2002, A. Prajaksood & S. Suddee 233

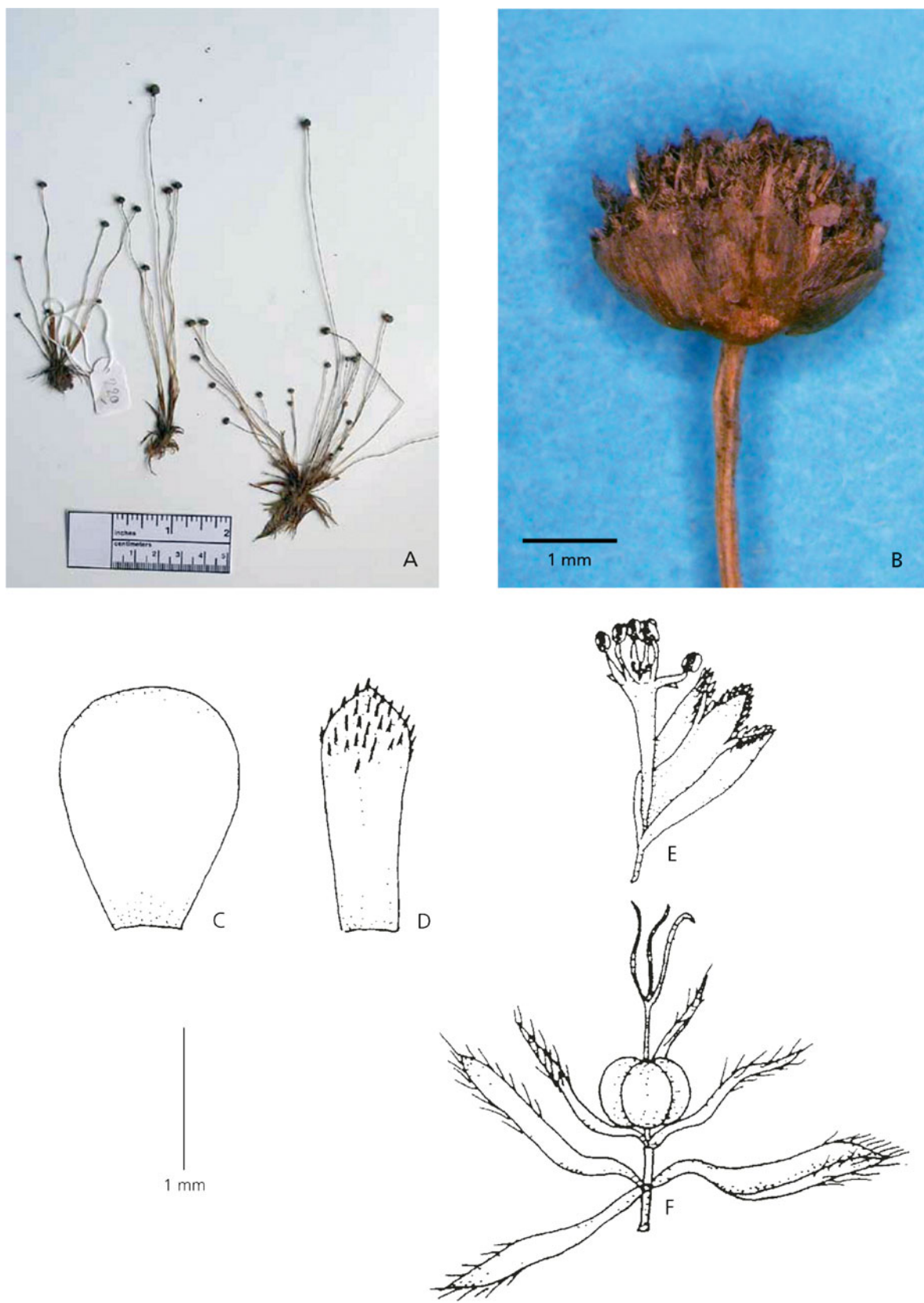
(BK, BKF, K, KKU, TCD). Nong Khai: The seasonal pond near Tham Phun Waterfall, Phu Wau National Park, 11 Nov. 1998, A. Prajaksood & P. Chantaranonthai 61 (BK, BKF, K, KKU, TCD). Sakon Nakhon: Along the way in open area, NE of ICS to Kam Hom waterfall, Phu Phan National Park, Dipterocarp forest, [17.08°N, 103.59°E], 210 m, 4 Oct. 1997, A. Prajaksood & P. Chantaranonthai BRT 753 (KKU). Chaiyaphum: Tungkramang, [16.20°N, 101.45°E], 800 m, 14 Dec. 1971, C. F. van Beusekom, C. Phengkhilai, R. Geesink & B. Wongwan 4261b (C, K, L, P). Ubon Ratchathani: Beside the bridge 26 km further to Pha Tam National Park on road number 2112, Khong Chiam Distr., 13 Nov. 1998, A. Prajaksood & P. Chantaranonthai 81 (BK, BKF, K, KKU, TCD). Kanchanaburi: Huay Bankau, [14.55°N, 90.45°E], 9 Nov. 1971, C. F. van Beusekom, C. Phengkhilai, R. Geesink & B. Wongwan 3602 (BKF, C, K, L, P). Nakhon Nayok: 3 km from the crossroad of road number 3182 to Khao Khaew, Khao Yai National Park, 21 Oct. 1998, A. Prajaksood & P. Chantaranonthai 34 (BK, BKF, K, KKU, TCD).

**HABITAT.** Paddy fields, common on sandy soils in open marshy places, on the borders of seasonal ponds, on the borders of barren sandstone rocks or on the edges of streams; 200 – 1,633 m.

**CONSERVATION STATUS.** Least Concern (LC). Widespread and abundant.

**PHENOLOGY.** September – February.

**NOTES.** Malla *et al.* (1986) recognised 3 species from the Kathmandu Valley: *Eriocaulon nepalense*, *E. luzulifolium* and *E. kathmanduense*. They separated *E. nepalense* from the others because of its glabrous receptacle (the other 2 species have a pilose receptacle). The male petals of *E. kathmanduense* allow separation from *E. luzulifolium* as they are unequal rather than equal. Satake (1974) indicated that *E. pseudonepalense* differs from *E. nepalense* in its pilose receptacles, narrower female sepals and eglandular female petals. Eglandular female petals are also found in *E. nepalense*, however. Additionally, field experience suggests that the growth conditions for this species have a big impact on a plant's morphology. When plants grow in water they are bigger: such material has been named *E. luzulifolium* and *E. kathmanduense*. Material growing in drier conditions has been named *E. pseudonepalense*. We consider these all to be one species, with some characters differing depending on moisture. For example, in drier conditions, the male petals will all be minute and glabrous but in wetter conditions they will be larger. Var. *luzulifolium* differs from the typical variety in having its leaf apex acute, margin entire and receptacle pilose; its distribution is wider than the typical variety. The geographical distribution of this variety and the typical one overlap as both varieties are found in Changwat Chiang Mai, even though the typical variety is found only Changwat Chiang Mai and Lampang.



**Fig. 7.** *Eriocaulon nepalense* var. *luzulifolium*. A habit; B capitulum; C involucral bract; D floral bract; E male flower; F female flower. A – B from A. Prajaksood & S. Suddee 220 (KKU); C – F from M. Tagawa, K. Iwasuki & N. Fukuoka T – 764 (BKF), isotype of *E. pseudonepalense* Satake. DRAWN BY A. PRAJAKSOOD.

**8. *Eriocaulon parnellii* Praj. & Chantar. sp. nov.** Differt *E. odoratum* capitulis non niveo-villosis, sepalis foemineis 3 penitus carino-navicularibus, omnibus apice curvi-acuminatus. Typus: Thailand, Loei, Phu Kradung, on the plain at its summit, Pra Bhuddha Matta: Anodad pond route, 1 Nov. 2002, A. Prajaksood & S. Suddee 242 (holotypus KKU!; isotypi BK!, BKF!, K!, TCD!).

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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear or acicular, 0.5 – 2.0 cm long, 0.5 – 1 mm wide, glabrous, apex acute. *Scapes* few or numerous, up to 12 cm long, glabrous. *Sheaths* 1.3 – 2.0 cm long, glabrous, apex acute or 2-lobed. *Capitula* hemispherical to globose, 2 – 4 mm long, 3 – 5 mm in diam., blackish-greyish. *Receptacle* convex, pilose. *Involucral bracts* oblanceolate to broadly obovate, 1.5 – 2 mm long, brownish, glabrous, apex obtuse. *Floral bracts* oblanceolate to obovate, 1.5 – 2 mm long, pale brown, blackish and hairy in the upper part, apex acute to acuminate. *Male flowers*: calyx spatheate, 3-lobed, obtuse to acute, 1 – 1.2 mm long, blackish, hairy at the tip; petals unequal, two small petals hairy at the tip, the third hairy all over, acute, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers*: sepals 3, keeled, boat-shaped, curvi-acuminate, 1.7 – 2 mm long, blackish, hairy in the upper part, rarely pilose on the inner surface; petals 3, subequal, linear or narrowly elliptic, attenuate, acute, 1 – 1.5 mm long, whitish, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.6 mm long, brown, papillate. Fig. 8.

**DISTRIBUTION.** Asia: Thailand. Confined to a single Changwat in the North-Eastern region.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Loei: Phu Luang, 1,300 m, 15 Nov. 1968, C. Chermisrivathana 1079 (BK); Top of Phu Kradung, along footpaths from Mon Thien Thong House to Anodad pond, 1,300 m, 16 Nov. 1998, A. Prajaksood & P. Chantaranonthai 126 (KKU, TCD).

**HABITAT.** On the borders of seasonal ponds, by paths, on sandy soils in open marshy places or on the borders of barren sandstone rocks. Pine forest; 1,300 m.

**CONSERVATION STATUS.** Vulnerable (VU D2). Known only from two high altitude sites in a single Changwat in Thailand; although common at those sites.

**PHENOLOGY.** November.

**NOTES.** A very distinctive species with dark, small inflorescences. The form of each female flower is diagnostic. Superficially similar to *Eriocaulon odoratum* Dalzell but differing considerably in the number and shape of the female sepals (2, oblanceolate, acuminate in *E. odoratum*; 3, broadly ovate, curvi-acuminate in *E. parnellii*) and the length of the hairs (long in

*E. odoratum*, short in *E. parnellii*). It is a pleasure to name this species after Prof. Dr John A. N. Parnell.

**9. *Eriocaulon phatamense* Praj. & Chantar. sp. nov.** Affinis *E. thysanocephalum* sed folia vaginae et bracteae involucentes pilis, sepala 2, flores feminei petala mediana crassus late ellipticus attenuatus. Typus: Thailand, Ubon Ratchathani, Pha Mon, Pha Tam National Park, 14 Nov. 1998, A. Prajaksood & P. Chantaranonthai 89 (holotypus KKU!; isotypi BK!, BKF!, K!, TCD!).

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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 1 – 4.5 cm long, 1 – 5 mm wide, hairy, apex acute. *Scapes* numerous, up to 20 cm long, hairy only near head. *Sheaths* 2 – 4 cm long, hairy, apex acute. *Capitula* hemispherical to globose, 3 – 6 mm long, 3 – 7 mm in diam., white. *Receptacle* elongate, pilose. *Involucral bracts* obovate to ovate, 1.3 mm long, brown, hairy, apex acute. *Floral bracts* broadly oblanceolate, 1.5 mm long, light brown, hairy in the upper part, apex acuminate. *Male flowers*: sepals 2, free, oblanceolate, acute, 1 mm long, light brown, hairy in the upper part; petals unequal, hairy, acute, subapical glands present; vestigial gynoecium present; anthers 5 – 6, black. *Female flowers*: sepals 2, narrowly oblanceolate or linear, acute, 1 mm long, light brown, hairy in the upper part; petals 3, dissimilar, two lateral ones elliptic, attenuate, 1 mm long, the middle one broadly elliptic, attenuate, exerted beyond the floral bract, apex thick, 2 mm long, obtuse, light brown, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.5 mm long, dark-brown, glabrous. Fig. 9.

**DISTRIBUTION.** Asia: Thailand. Confined to the North-Eastern and Eastern regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Mukdahan: Phu Pha Therb National Park, 150 m, 27 Oct. 1998, Th. Wongprasert s.n. (BKF); Lann Phu Wat, Phu Sra Dok Bua National Park, 13 Nov. 1998, A. Prajaksood & P. Chantaranonthai 69 (BK, BKF, K, KKU, TCD). Ubon Ratchathani: Pha Tam National Park, Soi Sawan Fall, 150 m, 4 Dec. 1999, T. Santisuk s.n. (BKF).

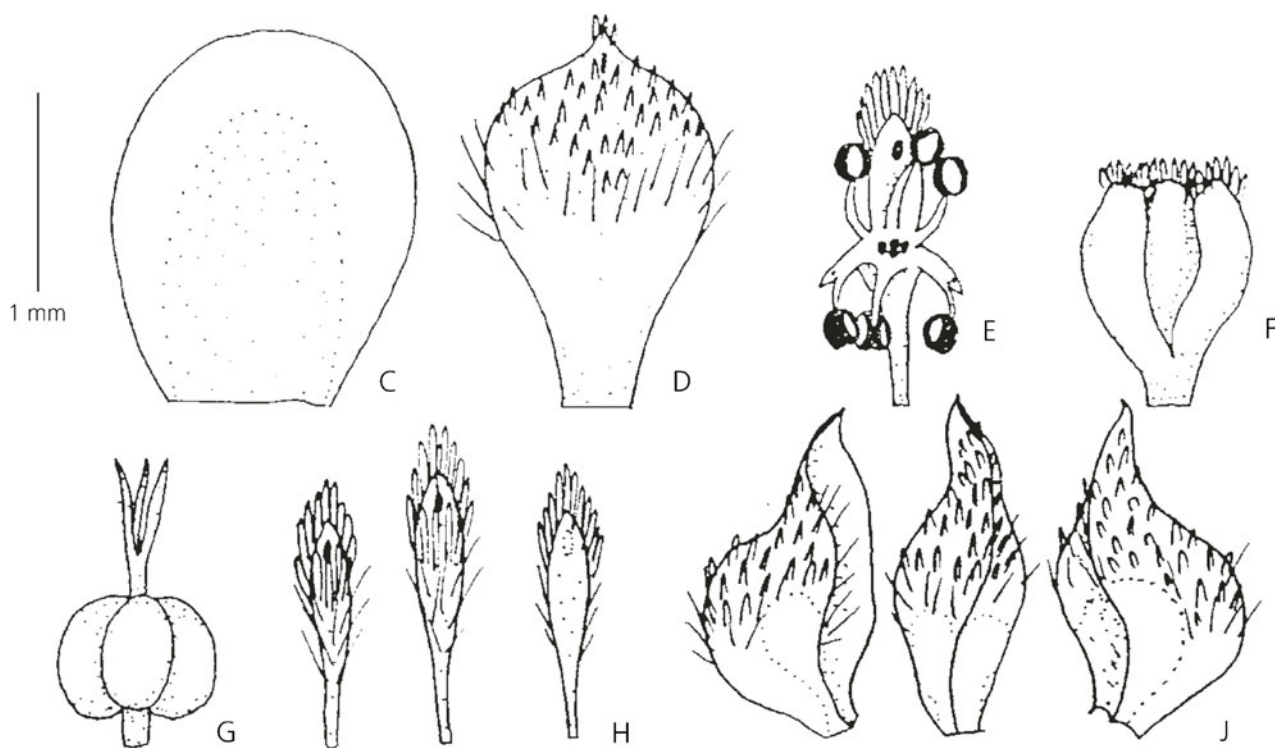
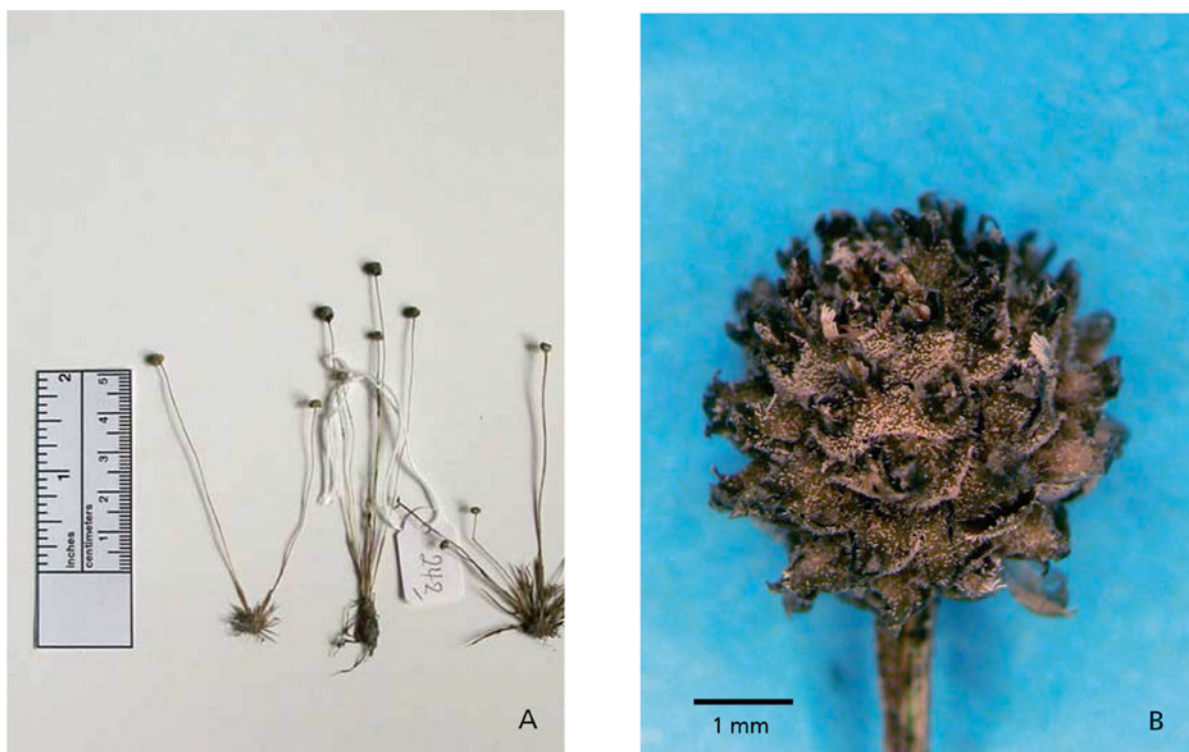
**HABITAT.** On sandy soils in open marshy places or on the borders of barren sandstone rocks; 150 m.

**CONSERVATION STATUS.** Vulnerable (VU B1 ac(iii)). Known only from three sites in two Changwat. The species grows at low altitude mountain along the Mekong River.

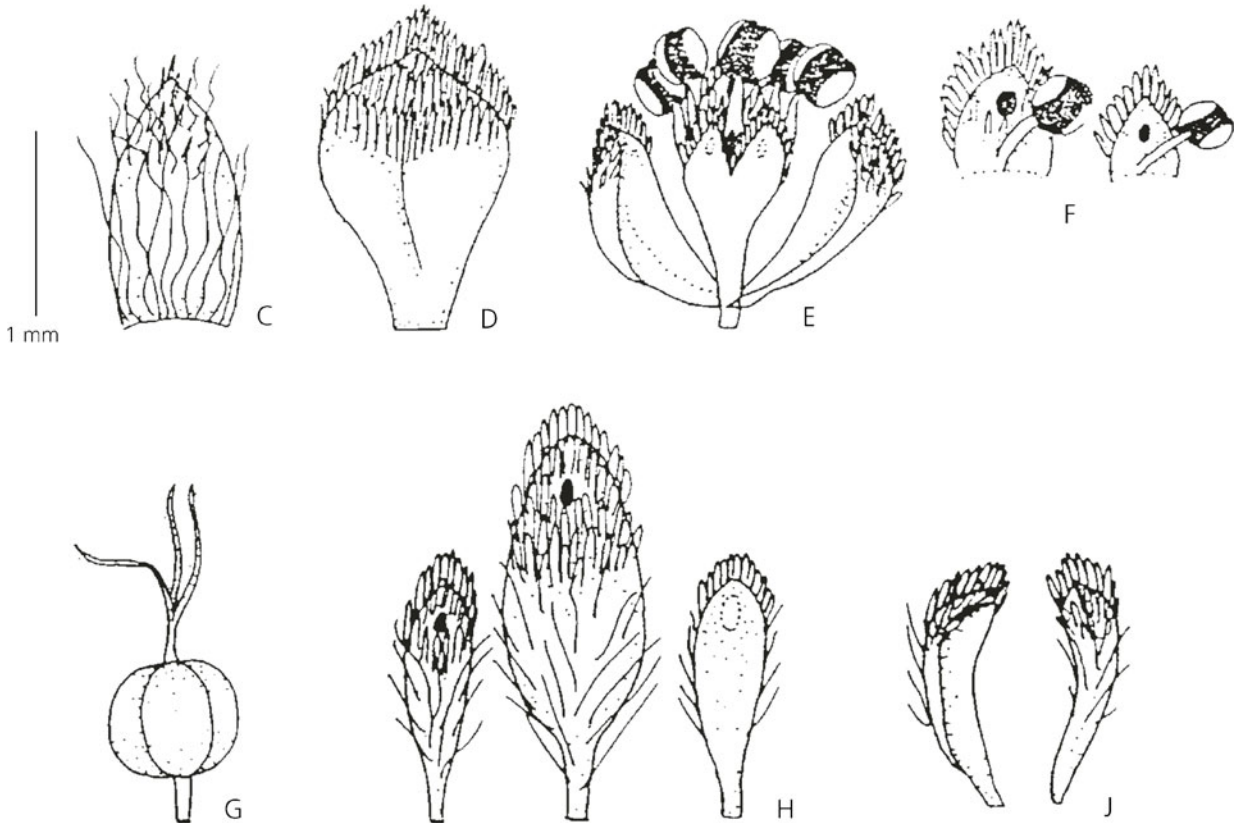
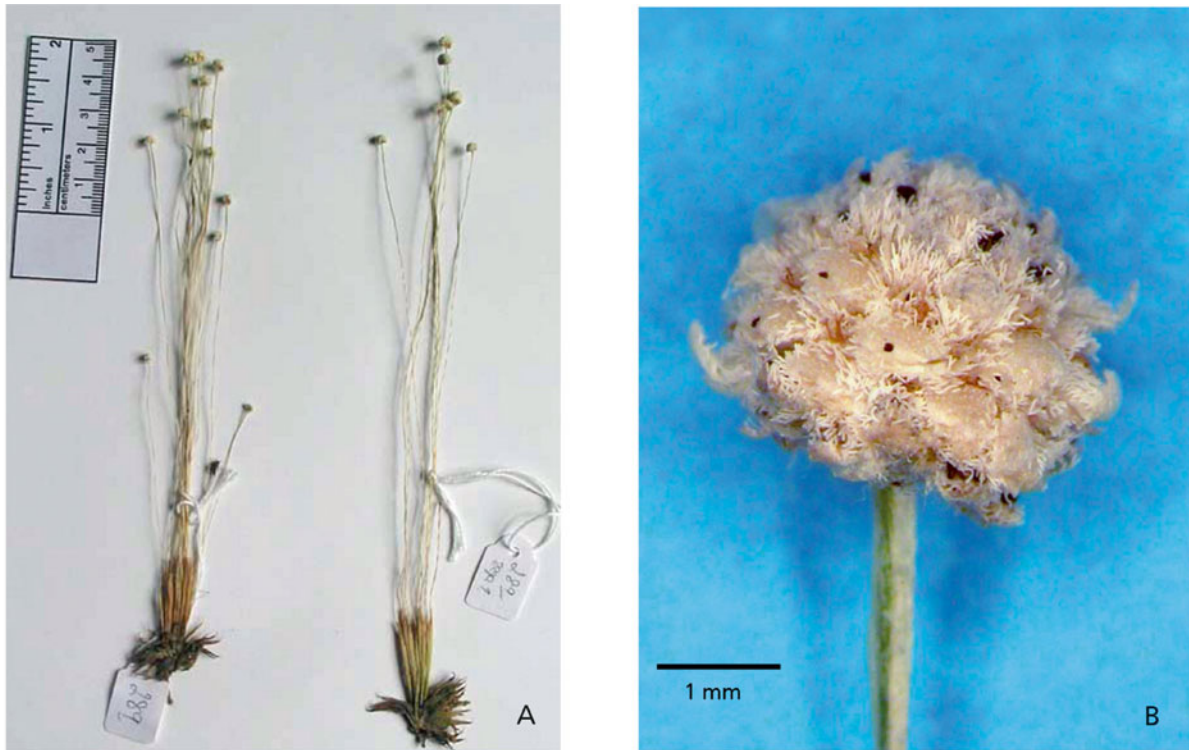
**PHENOLOGY.** October – December.

**NOTES.** This species is similar to *Eriocaulon thysanocephalum* S. M. Phillips (1994) from Ceylon, but it differs in having hairs on the leaves, sheaths and involucre bracts. Additionally, the 2 sepals in the male and female flowers and the median female petals are thicker and broadly elliptic-attenuate.





**Fig. 8.** *Eriocaulon parnellii*. A habit; B capitulum; C involucral bract; D floral bract; E – F male flower: E androecium and petals, F sepals; G – J female flower: G gynoecium, H petals, J sepals. All from A. Prajaksood & S. Suddee 242 (KKU). DRAWN BY A. PRAJAKSOOD.



**Fig. 9.** *Eriocaulon phatamense*. A habit; B capitulum; C involucral bract; D floral bract; E – F male flower: E male flower, F petals; G – J female flower: G gynoecium, H petals, J sepals. A – B from A. Prajaksood & S. Suddee 289 (KKU); C – J from A. Prajaksood & P. Chantaranonthai 89 (KKU). DRAWN BY A. PRAJAKSOOD.

**10. *Eriocaulon phuchongense* Praj. & Chantar. sp. nov.** Affinis *E. dimorphoelytrum* sed bracteae flores longus acuminatus, flores feminei apice pilis. Typus: Thailand, Ubon Ratchathani, along the road to Khong Chiam, 14 Nov. 1998, A. Prajaksood & P. Chantaranothai 100 (holotypus KKU!).

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Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 1 – 3.5 cm long, 1 – 2.5 mm wide, glabrous, apex acute. *Scapes* numerous, up to 10 cm long, glabrous. *Sheaths* 2 – 3.5 cm long, glabrous, apex acute. *Capitula* hemispherical to globose, 3 – 5 mm long, 4 – 6 mm in diam., white. *Receptacle* elongate. *Involucral bracts* elliptic to lanceolate, 2.5 – 3 mm long, light brown, glabrous, apex acute. *Floral bracts* oblanceolate, 3 mm long, light brown, hairy in the upper part, apex long-acuminate. *Male flowers*: calyx spatheate, 3-lobed, acute, 1.5 mm long, light brown, hairy in the upper part; petals equal, hairy, acute, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers*: sepals united, spatheate, 3-lobed, acute, 1.5 mm long, light brown, hairy in the upper part; petals 3, unequal, elliptic, attenuate, acute, 1.3 – 1.5 mm long, light brown, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.4 mm long, brown-yellow, tuberculate. Fig. 10.

**DISTRIBUTION.** Asia: Thailand. Endemic to a single Changwat, which lies along the Mekong River, in the Eastern region.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Ubon Ratchathani: By Ubon Ratchathani Forest Dept, Tambon Naphoglang, Khong Chium Distr., by the side of the road route 2112, km 100 – 101, [15.65°N, 105.50°E], 8 Nov. 2002, A. Prajaksood & S. Suddee 300 (BK, BKF, K, KKU, TCD); Phu Chong Nayoy National Park, Tambon Nacharuey, Nacharuey Distr., Phalanphachad, Dipterocarp forest, [14.50°N, 105.30°E], 8 Nov. 2002, A. Prajaksood & S. Suddee 260 (BK, BKF, K, KKU, TCD).

**HABITAT.** On sandy soils in open marshy places or near paddy fields. Dipterocarp forest.

**CONSERVATION STATUS.** Vulnerable (VU D2). Known only from two sites in a single Changwat in Thailand.

**PHENOLOGY.** November.

**NOTES.** This species differs from *Eriocaulon dimorphoelytrum* Koyama (1984) from Japan, in having long-acuminate floral bracts and hairs in the upper part of the female petals.

**11. *Eriocaulon phuphanense* Praj. & J. Parn. sp. nov.** Affinis *E. ubonense* sed bracteae involucrantes tenuis, flores masculi et feminei sepala 2. Typus: Thailand,

Sakon Nakhon, Phu Phan National Park, 24 Jan. 1998, A. Prajaksood & P. Chantaranothai 55 (holotypus KKU!; isotypi BK!, BKF!, K!, TCD!).

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Annual or perennial herbs. *Stem* forming a basal disc or shortly rhizomatous. *Leaves* crowded into a basal rosette, linear, 5 – 9 cm long, 5 – 10 mm wide, glabrous, apex acute. *Scapes* numerous, up to 35 cm long, glabrous. *Sheaths* 5 – 8 cm long, glabrous, apex acute. *Capitula* globose to ovoid, 4 – 8 mm long, 5 – 6 mm in diam., white. *Receptacle* elongate. *Involucral bracts* elliptic to obovate, 3 mm long, brown, glabrous, apex obtuse to acute. *Floral bracts* oblanceolate, 2 mm long, brown, blackish and hairy in the upper part, apex acuminate. *Male flowers*: sepals 2, lanceolate, acute, 2 mm long, light brown, hairy in the upper part and pilose in the lower; petals unequal, hairy, obtuse, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers*: sepals 2, oblanceolate, acute, 2 mm long, light brown, hairy in the upper part; petals 3, unequal, elliptic, attenuate, acute, 1.5 – 2 mm long, light brown, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.5 mm long, brown, papillate. Fig. 11.

**DISTRIBUTION.** Asia: Thailand. Endemic to a single National Park in the North-Eastern region.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Sakon Nakhon: Along the way to Ang Kob-Kam Pak Nam, Phu Phan National Park, 210 m, 13 Dec. 1997, A. Prajaksood & P. Chantaranothai 18 (BK, BKF, K, KKU); Phu Phan National Park, boggy area in clearing in dry Dipterocarp forest, [17.02°N, 104.02°E], 400 – 600 m, 23 Feb. 1993, P. Chantaranothai, J. Parnell, D. Middleton & D. Simpson 871 (TCD).

**HABITAT.** On sandy soils in open marshy places. Dipterocarp forest; 210 – 600 m.

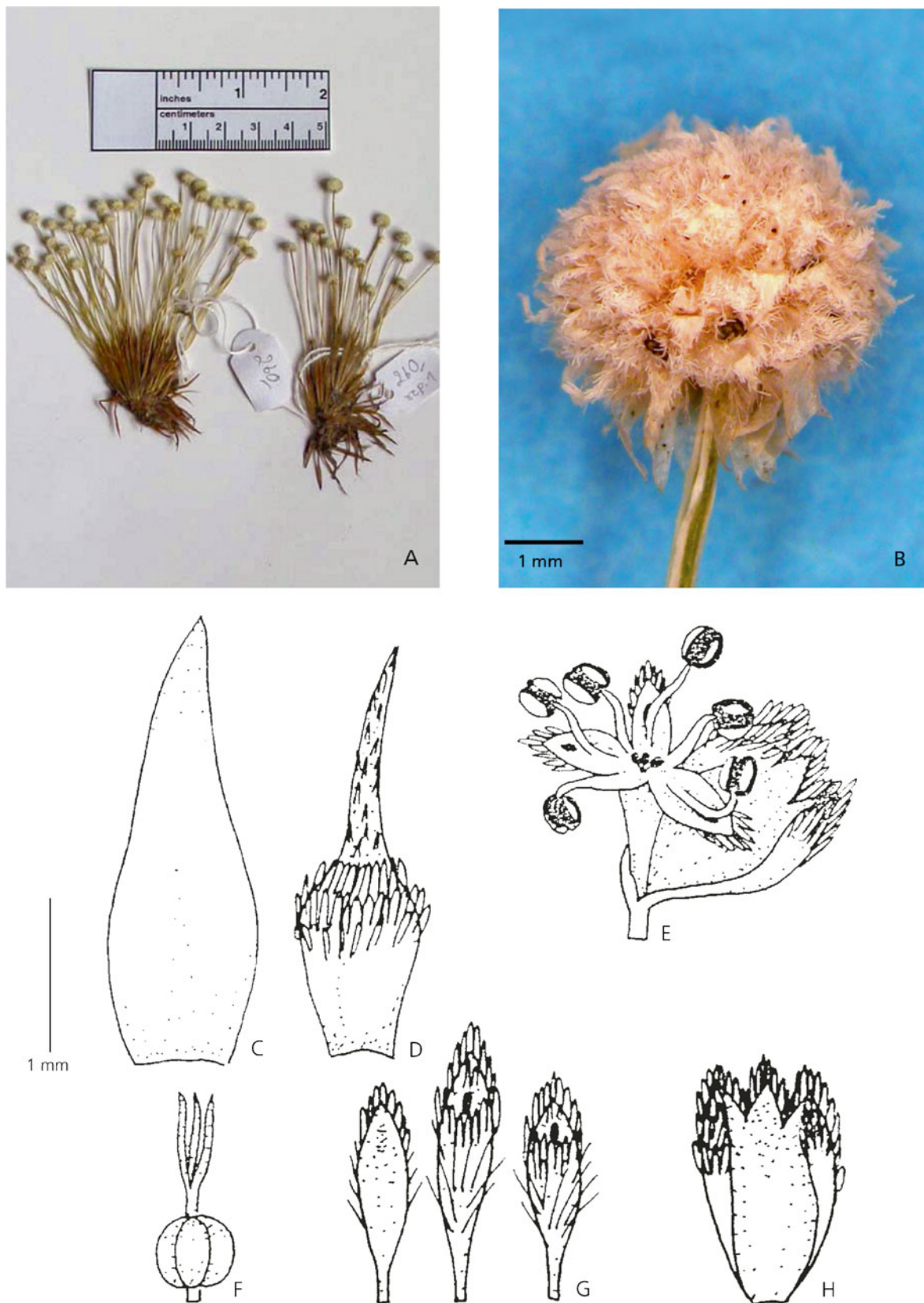
**CONSERVATION STATUS.** Vulnerable (VU D2). Although known only from two sites in a single National Park in a single Changwat in Thailand, there is no evidence of decline or extreme fluctuations in key criteria which could, otherwise, lead to an EN B1/2ab/c rating.

**PHENOLOGY.** December – March.

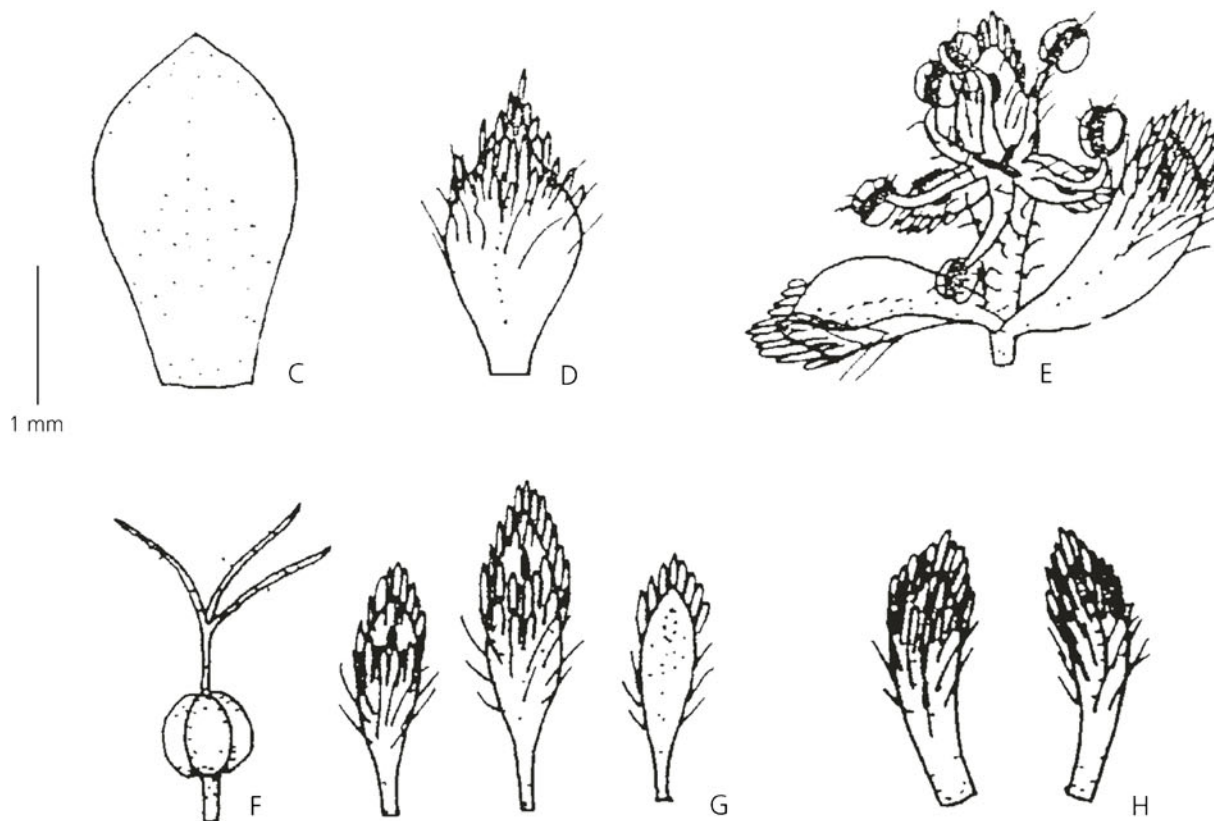
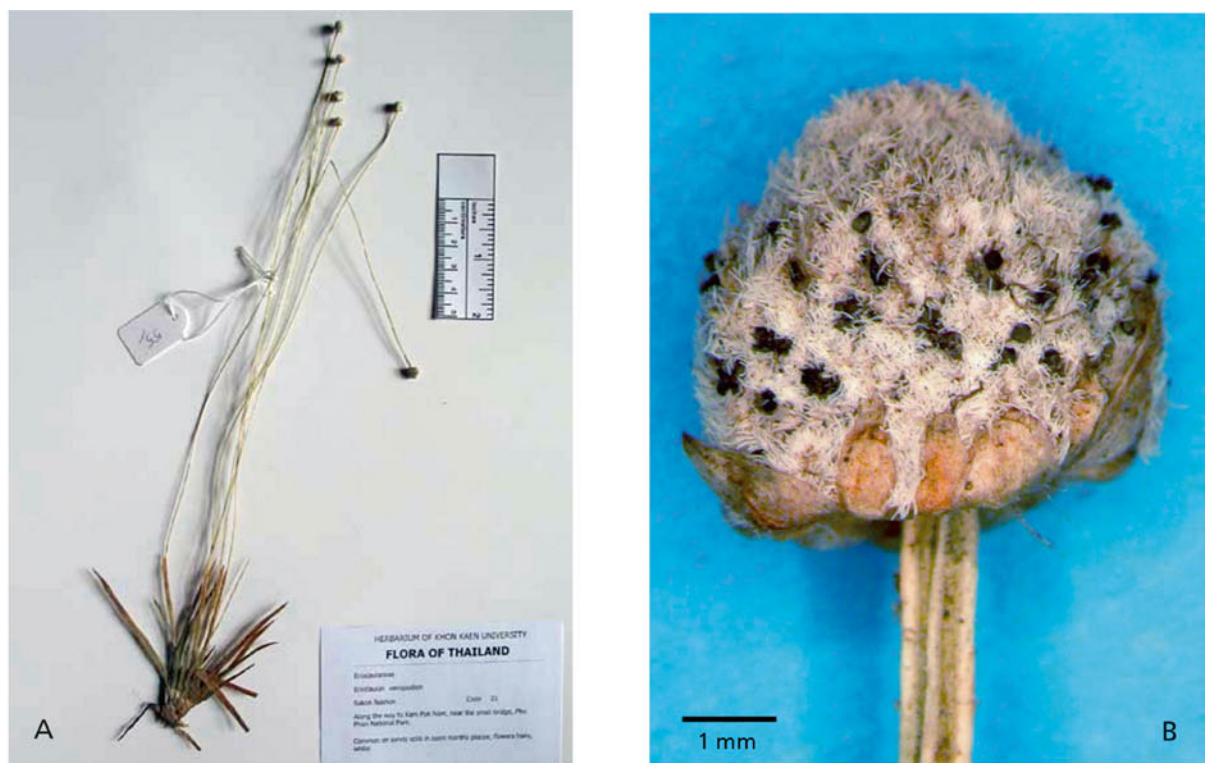
**NOTES.** This species differs from *Eriocaulon ubonense* Lecomte (1908) as the involucral bracts are thinner and there are 2 sepals in the male and female flowers.

**12. *Eriocaulon phuphanoides* Praj. & J. Parn. sp. nov.** Affinis *E. phuphanense* sed planta parvulus, bracteae involucrantes papyraceus alba, corolla fasciatus glabra, seminis testaque glabra. Typus: Thailand, Ubon Ratchathani, Khong Chium, 8 Nov. 2002, A.





**Fig. 10.** *Eriocaulon phuchongense*. A habit; B capitulum; C involucral bract; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. A – B from A. Prajaksood & S. Suddee 260 (KKU); C – H from A. Prajaksood & P. Chantaranonthai 100 (KKU). DRAWN BY A. PRAJAKSOOD.



**Fig. 11.** *Eriocaulon phuphanense*. A habit; B capitulum; C involucre bract; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. All from A. Prajaksood & P. Chantaranonthai 55 (KKU). DRAWN BY A. PRAJAKSOOD.

*Prajaksood & S. Suddee* 299 (holotypus KKU!; isotypi BK!, BKF!, K!, TCD!).

<http://www.ipni.org/urn:lsid:ipni.org:names:77117198-1>

Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 1.5 – 3 cm long, 1 – 3 mm wide, glabrous, apex acute. *Scapes* numerous, up to 6 cm long, glabrous. *Sheaths* 2 – 5.5 cm long, glabrous, apex acute. *Capitula* hemispherical to globose, 3 mm long, 5 mm in diam., white. *Receptacle* elongate, pilose. *Involucral bracts* broadly elliptic, 2 – 3 mm long, white, glabrous, apex acute. *Floral bracts* oblanceolate, 1.5 mm long, white, hairy in the upper part, apex acuminate. *Male flowers*: sepals 2, narrowly oblanceolate, acute, 1 mm long, white, hairy in the upper part; petals unequal, hairy, acute, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers*: sepals 2, narrowly oblanceolate, acute, 1 mm long, white, hairy in the upper part; petals 3, unequal, elliptic, attenuate, acute, 1.5 – 2 mm long, white, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.5 mm long, yellow, glabrous. Fig. 12.

**DISTRIBUTION.** Asia: Thailand. Absent from the Peninsular, South-Eastern and South-Western regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Chiang Mai: Mae Tang. Open marshy ground, 1,000 m, 4 July 1922, *A. F. G. Kerr* 6230 (BK, K). Nong Khai: Near Tham Phun Waterfall, Phu Wau National Park, common on sandy soils in open places, 11 Nov. 1998, *A. Prajaksood & P. Chantaranothai* 62 (BK, BKF, K, KKU). Sakon Nakhon: along the way from Evergreen forest to open area of Ang Kob, Phu Phan National Park, [7.03°N, 103.58°E], 210 m, 3 Oct. 1997, *A. Prajaksood & P. Chantaranothai* BRT 752 (BK, BKF, K, KKU). Ubon Rachathani: along the road number 2112 (Khe marat-Pha Tam), near Ban Na Pa Nieng Or, Pho Sai Distr., 13 Nov. 1998, *A. Prajaksood & P. Chantaranothai* 72 (BK, BKF, K, KKU, TCD).

**HABITAT.** Common on the borders of barren sandstone rocks or sandy soils, open marshy places; 210 – 1,000 m.

**CONSERVATION STATUS.** Least Concern (LC). Relatively common in a number of widely scattered localities.

**PHENOLOGY.** July – November.

**NOTES.** This species is similar to *Eriocaulon phuphanense* but is of somewhat smaller general aspect. Also the white and papery involucral bracts, the glabrous lower part of the fused corolla and the glabrous seeds are distinctive.

**13. *Eriocaulon quinquangulare* L. subsp. *longibracteatum* Praj. & J. Parn. subsp. nov.** Haec subspeciei differt a forma typical speciei longi bractee involucrantis, flores feminei petala linear eglandulatus. Typus: Thailand, Sakon Nakhon, Phu Phan National Park, 11 Nov.

2002, *A. Prajaksood & S. Suddee* 317 (holotypus K!; isotypi BK!, BKF!, KKU!).

<http://www.ipni.org/urn:lsid:ipni.org:names:77117199-1>

Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 3 – 7 cm long, 2 – 4 mm wide, glabrous, apex acute. *Scapes* numerous, up to 30 cm long, glabrous. *Sheaths* 4 – 6 cm long, glabrous, apex acute. *Capitula* globose, 3 – 6 mm long, 5 – 7 mm in diam., blackish-grey. *Receptacle* convex or elongate, pilose. *Involucral bracts* obovate to oblong, 2.5 mm long, light brown, glabrous, apex obtuse to acute. *Floral bracts* oblanceolate-cuneate, 2 mm long, brown but blackish and hairy in the upper part, apex acuminate to cuspidate. *Male flowers*: calyx spatheate, 3-lobed, acute, 1.5 mm long, brown but blackish in the upper part, hairy at the tip; petals unequal, hairy, acute, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers*: sepals 2 – 3, narrowly linear, acute, 1 mm long, light brown to blackish brown, glabrous or deciduous hairy in the upper part; petals 3, linear, acute, 1.5 mm long, light brown, hairy in the upper part, eglandular; ovary 3-locular; seed 0.5 mm long, brown, glabrous. Fig. 13.

**DISTRIBUTION.** Asia: Thailand. — Absent from the Peninsular and South-Eastern regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Chiang Mai: Doi Saket, Huay Ka, 400 m, 2 March 1959, *T. Smitinand & G. Seidenfaden* 5531 (BK, BKF, K). Kamphaeng Phet: Distr. Raheng, Wang chow forest, near Tapofsah, 8 Jan. 1904, *E. Lindhard* s.n. (C, K, M); Wang-Djao, W.S.W. Savannenwald, hanfig, 14 Nov. 1904, *C. C. Hosseus* 102 (C, E, L). Loei: Wangsaphung Sithan, 300 m, 17 Oct. 1955, *T. Smitinand* 3065A (BKF). Sakon Nakhon: Along the way from evergreen forest to open area of Ang Kob, Phu Phan National Park, [07.03°N, 103.58°E], 210 m, 3 Oct. 1997, *A. Prajaksood & P. Chantaranothai* BRT 748 (KKU). Khon Kaen: Kok Phu Taka, Phu Wieng, 20 Oct. 1998, *K. Phoonphong & P. Phornphongroongrueng* 2 (KKU). Kanchanaburi: Rintin Forest, Thong Pha Phum Distr., 210 m, 6 Nov. 1979, *T. Shimizu, H. Toyokuni, H. Koyama, T. Yahara & C. Niyomdham* T-21888b (BKF).

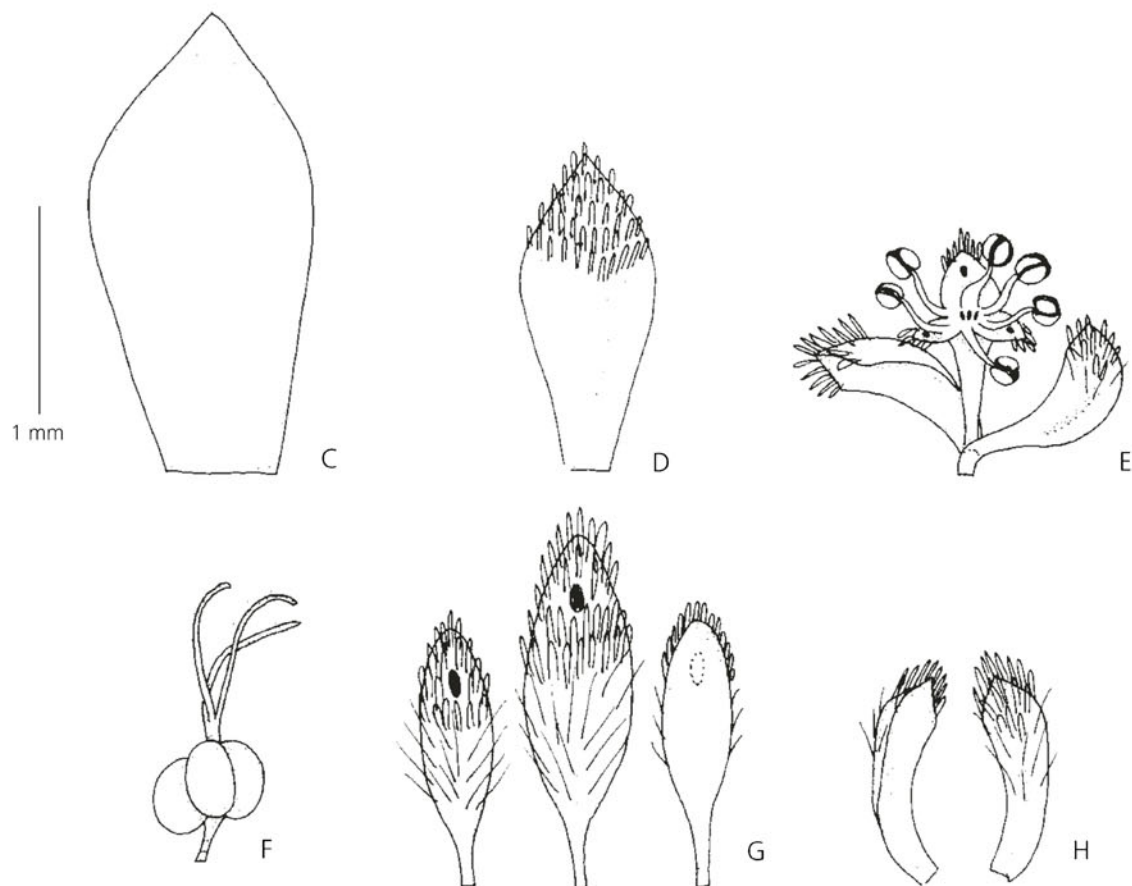
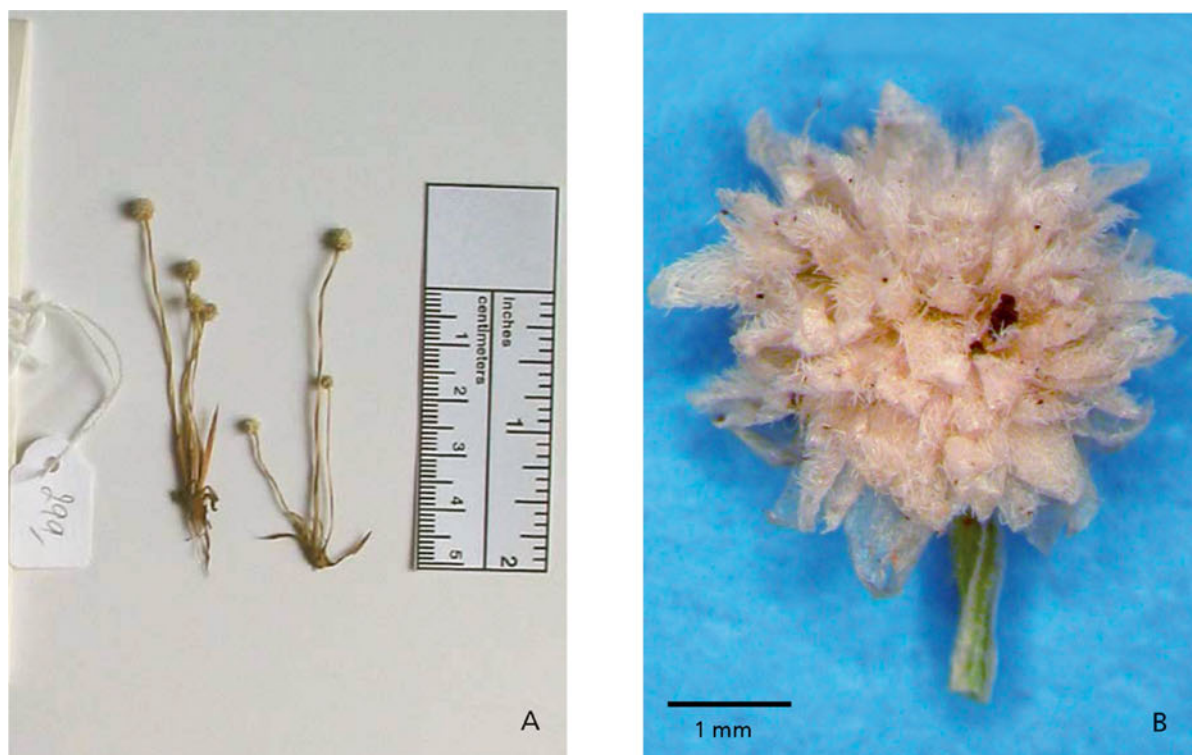
**HABITAT.** Common on sandy soils in open marshy places; 100 – 900 m.

**CONSERVATION STATUS.** Least Concern (LC). Relatively common in a number of widely scattered localities.

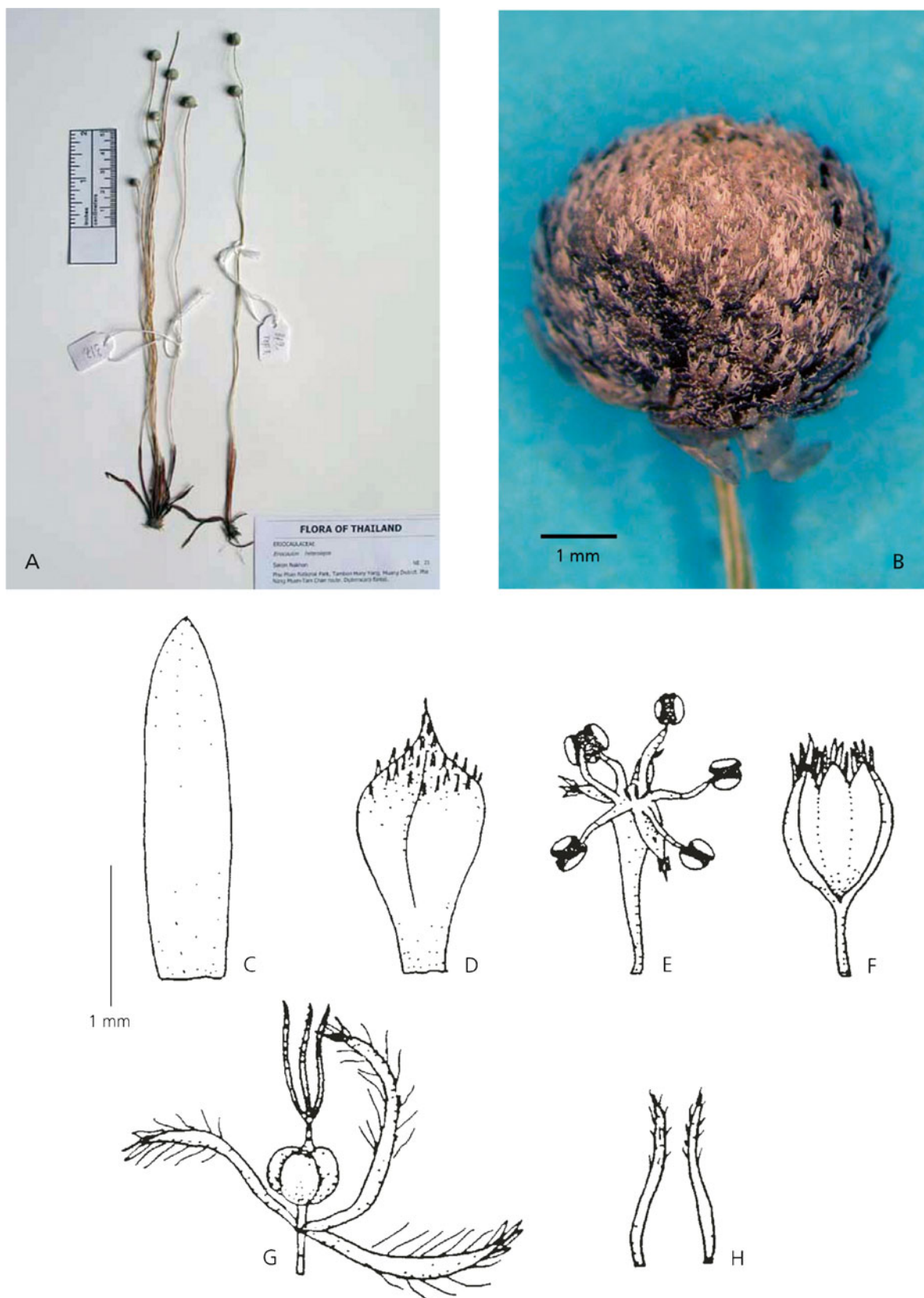
**PHENOLOGY.** October – March.

**NOTES.** This subspecies differs from the typical species (Linnaeus 1753) in having longer involucral bracts and linear and eglandular female petals. The geographical distribution of this subspecies is separate from the typical one (absent in Thailand).





**Fig. 12.** *Eriocaulon phuphanoides*. A habit; B capitulum; C involucre; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. All from A. Prajaksood & S. Suddee 299 (KKU). DRAWN BY A. PRAJAKSOOD.



**Fig. 13.** *Eriocaulon quinquangulare* subsp. *longibracteatum*. A habit; B capitulum; C involucral bract; D floral bract; E – F male flower: E androecium and petals, F sepals; G – H female flower: G gynoecium and petals, H sepals. All from A. Prajaksood & S. Suddee 317 (KKU). DRAWN BY A. PRAJAKSOOD.

**14. *Eriocaulon sexangulare* L. var. *australe* (R. Br.) Praj. & J. Parn. comb. et stat. nov.** Type: as for *E. australe*. Type: Australia, New South Wales, Port Jackson, R. Brown, 5821 (lectotype BM!, chosen here).

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*E. australe* R. Br., *Prodr. Fl. Nov. Holland*: 254 (Brown 1810); Bentham (1861: 382); Lecomte (1912: 8); P. H. Hô (1993: 482); Z. X. Zhang in U. Kück (1999: 154). Type: Australia, New South Wales, Port Jackson, R. Brown, 5821 (lectotype BM!, chosen here), **synon. nov.**

Perennial herbs. *Stem* rhizomatous. *Leaves* crowded into a basal rosette, linear, 9 – 37 cm long, 5 – 8 mm wide, hairy, apex obtuse. *Scapes* numerous, up to 70 cm long, hairy. *Sheaths* 7 – 17 cm long, hairy, apex acute. *Capitula* hemispherical to globose, 5 – 6 mm long, 7 – 8 mm in diam., whitish-grey. *Receptacle* elongate, glabrous. *Involucral bracts* broadly obovate, 2.5 mm long, brown, hairy in the upper part, apex acute. *Floral bracts* obovate, 2.5 mm long, brown, blackish and hairy in the upper part, apex acuminate. *Male flowers*: calyx spatheate, crenate, 2.2 mm long, light brown, hairy at the apex; petals 3, equal, hairy at the apex, acute, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers*: sepals 3, the lateral sepals boat-shaped winged and keeled, the median sepal linear, 2.2 – 2.3 mm long, light brown, hairy in the upper part, acute; petals 3, equal, linear, acute, 2 mm long, light brown, hairy at the apex, subapical glands present; ovary 3-locular; seed 0.6 – 0.8 mm long, reddish-brown, papillate. Fig. 14.

**DISTRIBUTION.** Asia: Thailand. Confined to the Peninsular and South-Eastern regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Chanthaburi: Foot of Khao Soi Dao, [13.00°N, 102.40°E], 400 m, 12 Nov. 1969, C. F. van Beusekom & T. Smitinand 2145 (AAU, C, E, GH, K, L, P). Trat: 18 km N of Klong Yai, [11.50°N, 102.48°E], 2 Sept. 1972, K. Larsen, S. S. Larsen, I. Nielsen & T. Santisuk 32318 (AAU, BKF, C, L, NY). Satun: Thung Kai, 50 m, 9 Feb. 1961, T. Smitinand 7135 (BKF). Songkhla: Had Yai Distr., Klong Hoy Kong, W of Toong Loong. 6 May 1985, J. F. Maxwell 85-440a (L). S of Songkhla, <100 m, 8 Oct. 1988, K. Larsen & S. S. Larsen 40292 (AAU).

**HABITAT.** On sandy soils in open marshy places; 0 – 400 m. **CONSERVATION STATUS.** Vulnerable (VU B1 ac(iii)), known only from five sites which are well separated and from the Changwat which are poorly collected (Parnell *et al.* 2003).

**PHENOLOGY.** September – May.

**NOTES.** *Eriocaulon australe* R. Br. was considered as differing from *E. sexangulare* L. or *E. wallichianum* Mart. (treated here as a synonym) in having hairy

leaves (Bentham 1861; Zhang 1999), sheaths, involucral bracts and receptacle (Zhang 1999). We also found that this taxon is always a perennial herb with a rigid rhizome, the median female sepal is thinner than in *E. sexangulare*, the female petals are linear and there are short, white hairs at the apex. In contrast, in *E. sexangulare* the female petals are filiform and the hairs are long and translucent and are not confined to the apex of the female petals but occur all over the upper part of the female petals. Because other characters are similar to *E. sexangulare*, we recognise this taxon as a variety within *E. sexangulare*. The geographical distribution of this variety and the typical one overlap; both varieties are found in Changwat Trat.

**15. *Eriocaulon siamense* Moldenke var. *macrophyllum* Praj. & J. Parn. var. nov.** Haec varietas differt a forma typicali speciei late et obtuse foliis. Typus: Thailand, Loei, Phu Kradung, 14 July 1959, T. Smitinand T. & F. Floto 5935 (holotypus: BKF!; isotypi BK!, K!).

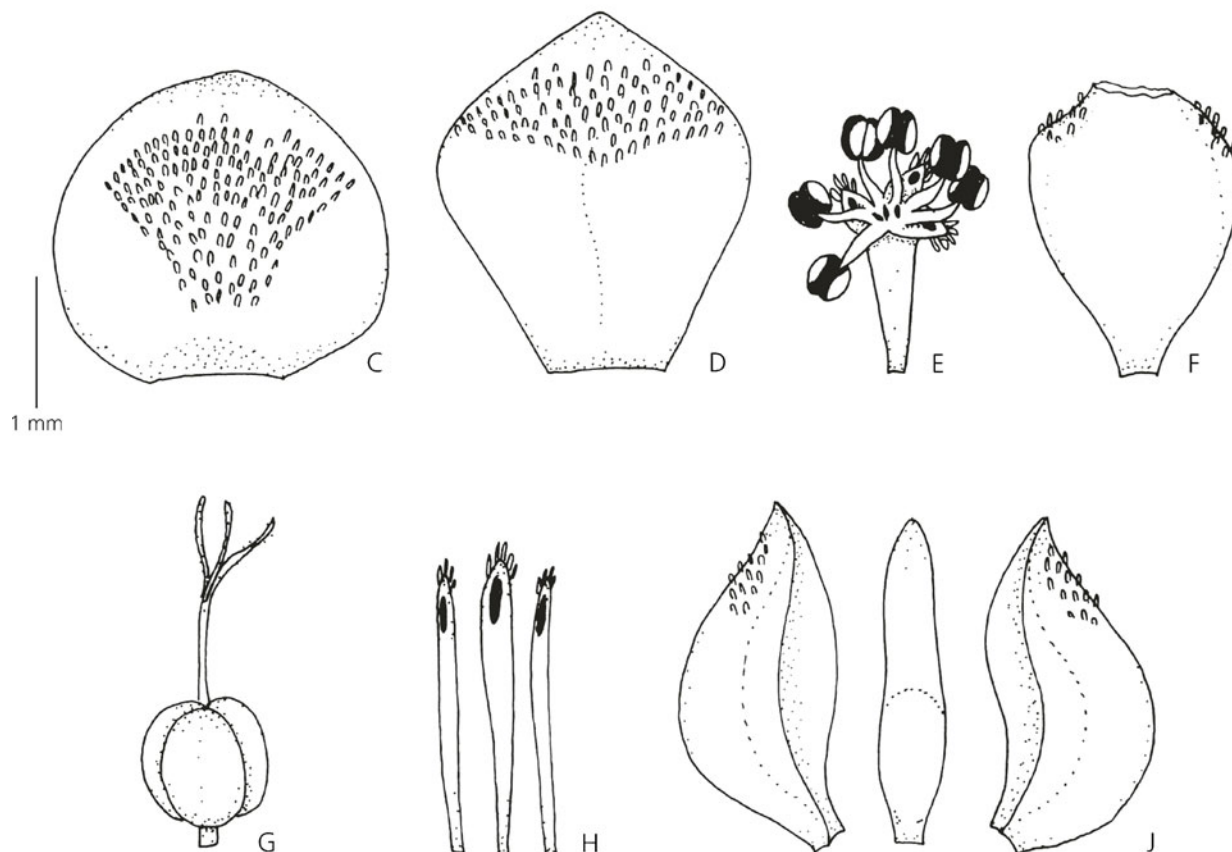
<http://www.ipni.org/urn:lsid:ipni.org:names:77117201-1>

Perennial herbs. *Stem* shortly rhizomatous. *Leaves* crowded into a basal rosette, reddish or green, linear, 3 – 8 cm long, 3 – 10 mm wide, glabrous, if leaves narrow (less than 2 mm) and young (in the centre) then papillate, apex obtuse. *Scapes* few or numerous, up to 45 cm long, glabrous. *Sheaths* 6 – 8 cm long, glabrous, apex acute. *Capitula* globose to broadly elliptic, 6 – 9 mm long, 6 – 8 mm in diam., white. *Receptacle* elongate, pilose. *Involucral bracts* obovate, 1.5 mm long, brown, hairy in the upper part, apex acuminate. *Floral bracts* oblanceolate, 1.5 mm long, brown, blackish and hairy in the upper part, apex thick and acuminate. *Male flowers*: calyx spatheate or fused at the base, 3-lobed, thick and obtuse, 1 – 1.5 mm long, brown, blackish and hairy in the upper part; petals unequal, hairy, two small and acute, the third about twice as long and exerted beyond the floral bract, thick and obtuse, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers*: sepals 3, oblanceolate, thick and acute, 1 mm long, brown, blackish and hairy in the upper part; petals 3, dissimilar, two laterals obovate, attenuate, 1.5 mm long, the middle petal broadly elliptic, attenuate, 2 mm long and exerted beyond the floral bract, thick, obtuse or acute, brown, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.5 mm long, brown, papillate. Fig. 15.

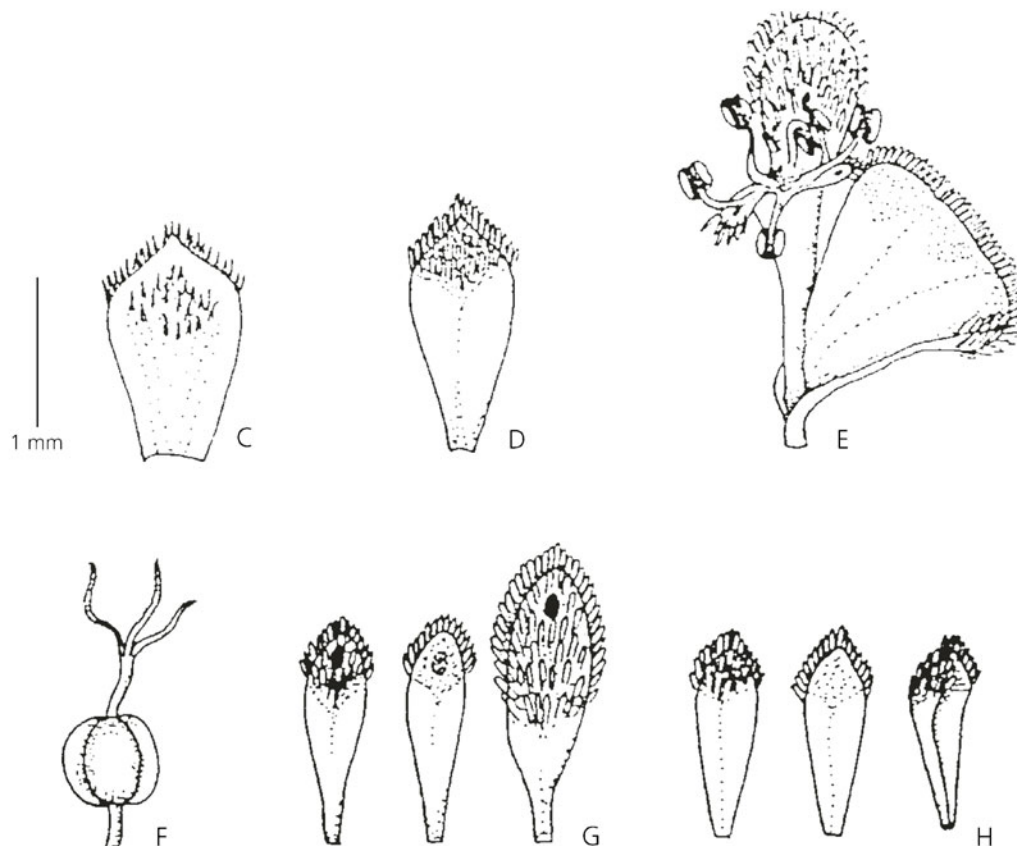
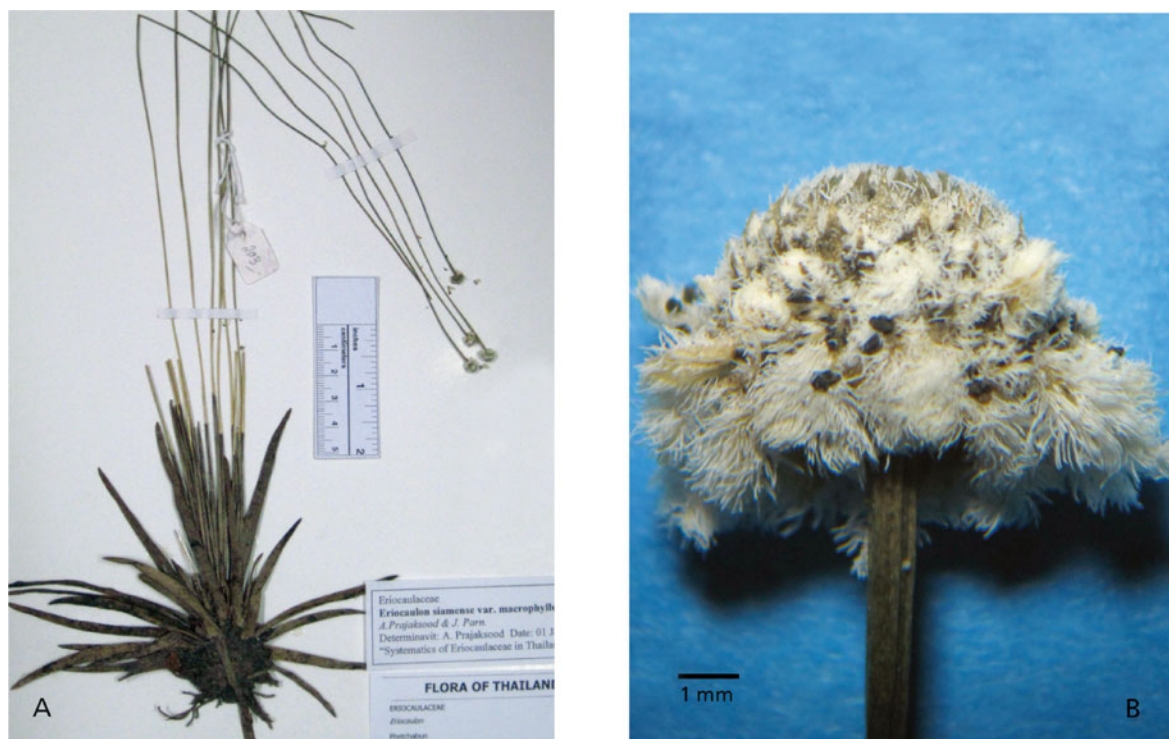
**DISTRIBUTION.** Asia: Thailand. Confined to the Northern and North-Eastern regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Chiang Mai: Samoeng-Ban Watchan Route (c. 80 km), 1,000 m, 17 Jan. 1988, T. Santisuk 6682 (BKF). Phetchabun: Thung Non Son, Thung Salangluang National Park, [16.60 N,





**Fig. 14.** *Eriocaulon sexangulare* var. *australe*. A habit; B capitulum; C involucral bract; D floral bract; E – F male flower: E androecium and petals, F sepal; G – J female flower: G gynoecium, H petals, J sepals. A – B from C. F. van Beusekom & T. Smitinand 2145 (L), C – J from T. Smitinand 7135 (BKF). DRAWN BY A. PRAJAKSOOD.



**Fig. 15.** *Eriocaulon siamense* var. *macrophyllum*. A habit; B capitulum; C involucre bract; D floral bract; E male flower; F–H female flower: F gynoecium, G petals, H sepals. A–B from A. Prajaksood & S. Suddee 203 (KKU); C–H from T. Smitinad & F. Floto 5935 (BK). DRAWN BY A. PRAJAKSOOD.

100.80E], 20 Oct. 2002, A. Prajaksood & S. Suddee 203 (BK, BKF, K, KKU, TCD). Loei: Phu Kradung, the way to Arnodad pond, [16.90°N, 101.80°E], 1,300 m, 1 Nov. 2002, A. Prajaksood & S. Suddee 241 (BKF, KKU, TCD).

**HABITAT.** On sandy soils in open marshy places, open boggy areas, sandy paths, by streams, in pine-dipterocarp forest, pine forest, savannah, evergreen forest; 1,000 – 1,300 m.

**CONSERVATION STATUS.** Vulnerable (VU D2). Known only from three separated sites all at high altitude.

**PHENOLOGY.** All year, mostly September – November.

**NOTES.** This variety differs from the typical variety (Moldenke 1954) in having broad and obtuse leaves. It is noted that mostly the leaves are glabrous. However, papillate leaves could be found in younger (near the centre) and narrower leaves on the same plant. The geographical distribution of this variety and the typical one overlap; both varieties are found in Changwat Loei.

**16. *Eriocaulon siamense* Moldenke var. *hexagynum* Praj. & Chantar. var. nov.** Haec varietas differt a forma typicali speciei hexagynumlate, longus bracteeae involu-crantes. Typus: Thailand, Ubon Ratchathani, Khong Chium, 8 Nov. 2002, A. Prajaksood & S. Suddee 281 (holotypus KKU!; isotypi BK!, BKF!, K!, TCD!).

<http://www.ipni.org/urn:lsid:ipni.org:names:77117204-1>

Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 1 – 6 cm long, 1 – 2 mm wide, rarely papillate, apex acute. *Scapes* few or numerous, up to 27 cm long, glabrous. *Sheaths* 3 – 5 cm long, glabrous, apex acute. *Capitula* ovoid to globose, 5 – 6 mm long, 4 – 8 mm in diam., white. *Receptacle* elongate, pilose. *Involucral bracts* narrowly oblong, 3 – 4.5 mm long, brown, glabrous, apex acute. *Floral bracts* oblanceolate, 2 mm long, light brown, black and hairy in the upper part, apex acuminate. *Male flowers:* calyx spatheate, 3-lobed, acute, 1.5 mm long, light brown, black and hairy in the upper part; petals unequal, hairy, acute, two lateral ones small, the third about twice as long and exerted beyond the floral bract, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers:* sepals 3, narrowly oblanceolate, acute, 1.5 mm long, light brown, black and hairy in the upper part; petals 3, unequal, two lateral ones 1.7 mm long, the middle one 2 – 2.2 mm long, exerted beyond the floral bract and recurved, elliptic, attenuate, acute, light brown, hairy in the upper part, subapical glands present; ovary 6-locular; seed 0.4 mm long, brown-yellow, papillate. Fig. 16.

**DISTRIBUTION.** Asia: Thailand. Endemic to a single Changwat which runs along the Mekong River in Eastern region.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Ubon Ratchathani: along the road at 4th km of road number 2112, 10 km further to Khong Chiam, 14 Nov. 1998, A. Prajaksood & P. Chantaranothai 104 (BK, BKF, K, KKU, TCD).

**HABITAT.** On sandy soils in open marshy places, near rice fields and in dry dipterocarp forest.

**CONSERVATION STATUS.** Vulnerable (VU D2). Known only from one site in single Changwat and no evidence for decline or fluctuation in key criteria at its known site.

**PHENOLOGY.** November.

**NOTES.** This variety differs from the typical variety (Moldenke 1954) in being hexagynoecious. It also possesses long involucral bracts. The geographical distribution of this variety and the typical one overlap as both varieties were found in Changwat Ubon Ratchathani.

**17. *Eriocaulon ubonense* Lecomte f. *kradungense* (Satake) Praj. & J. Parn. comb. et stat. nov.** Type: as for *E. kradungense* Satake.

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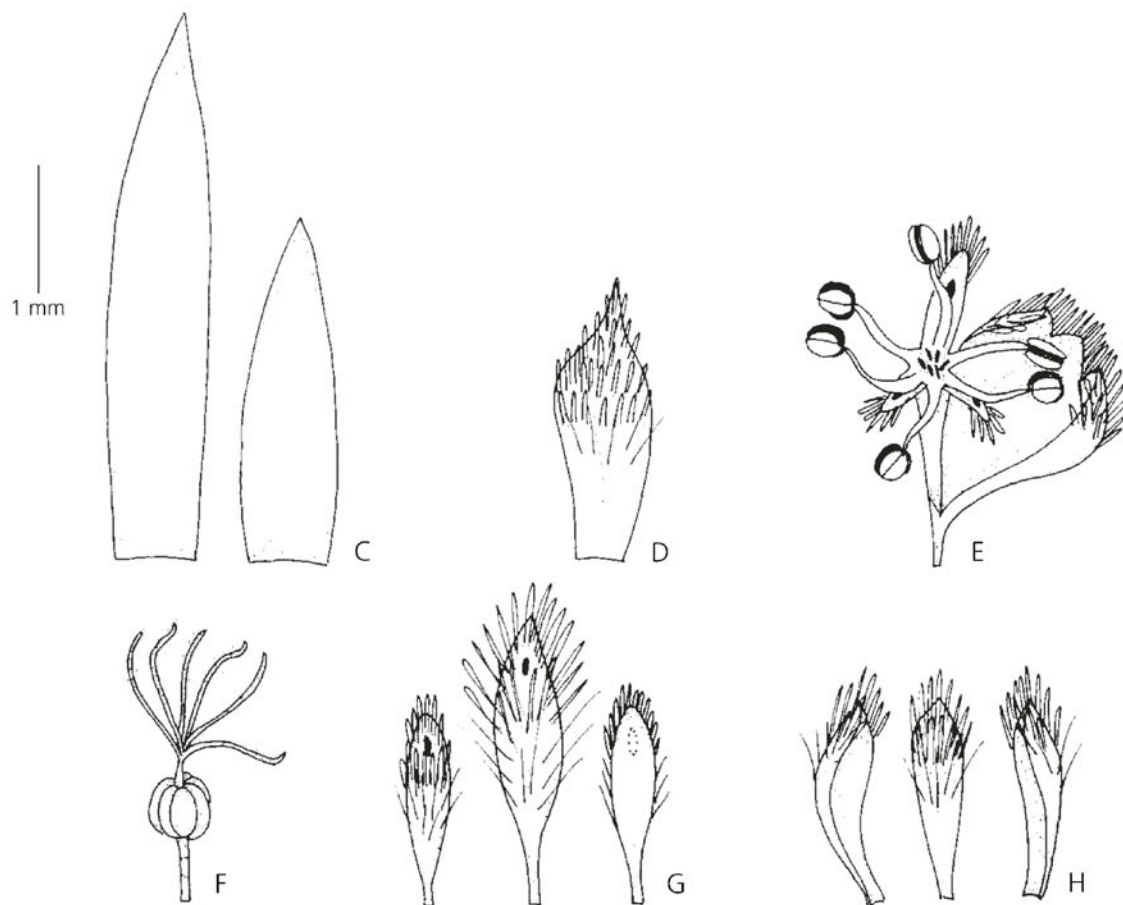
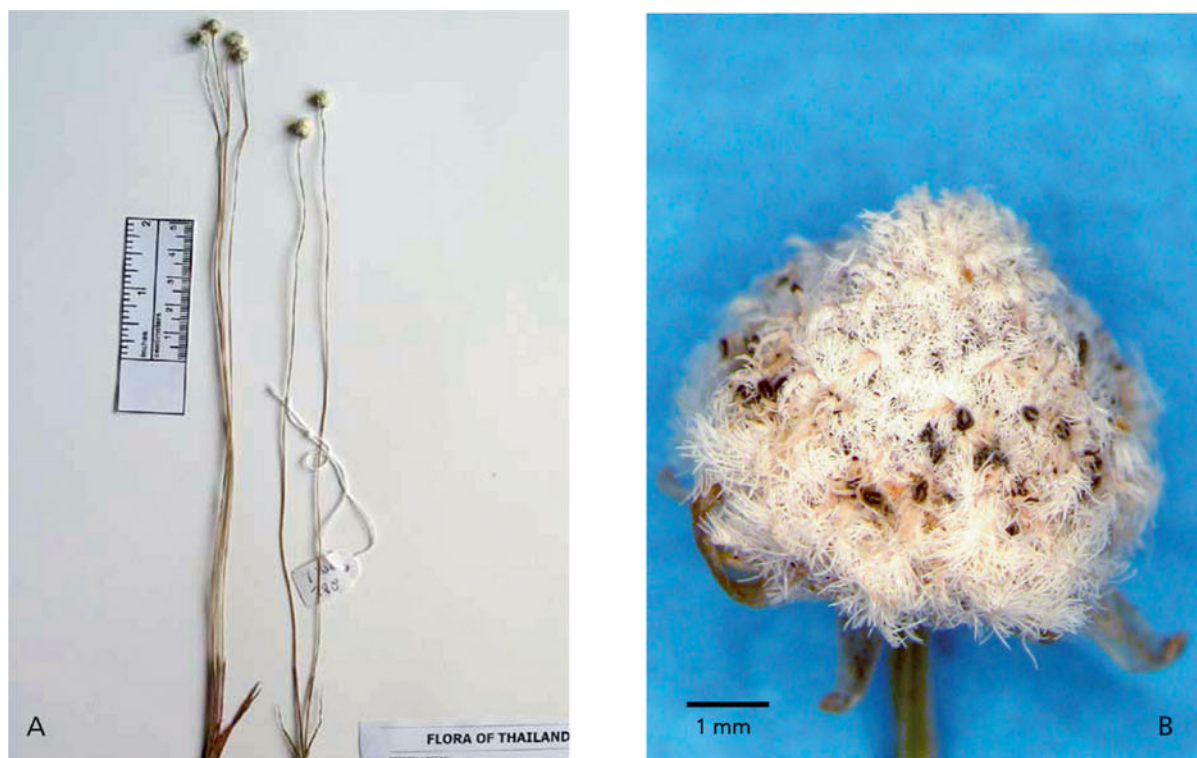
*E. kradungense* Satake, *Acta Phytotax. Geobot.* 26: 50 (1974); Z. X. Zhang in U. Kück (1999: 145). Type: Thailand, Loei, Phu Kradung, 4 Sept. 1967, T. Shimizu, M. Hutoh & D. Chaiglom T 8884 (holotype KYO; isotypes BKF!, C!, K!, L!, P!), **synon. nov.**

Annual or perennial herbs. *Stem* forming a basal disc or shortly rhizomatous. *Leaves* crowded into a basal rosette, linear, 2.5 – 8 cm long, 2 – 6 mm wide, glabrous, apex obtuse. *Scapes* few, up to 35 cm long, glabrous. *Sheaths* 5 – 7 cm long, glabrous, apex acute or 3-lobed. *Capitula* globose to cylindrical, 4 – 6 mm long, 8 – 9 mm in diam., white. *Receptacle* convex, pilose. *Involucral bracts* broadly ovate to elliptic, 2 – 2.5 mm long, brown, blackish in the upper part, glabrous, apex obtuse. *Floral bracts* narrowly oblanceolate, 2 – 2.5 mm long, brown, blackish and hairy in the upper part, apex acute to acuminate. *Male flowers:* calyx spatheate or fused at the base, 3-lobed, acute, 1.5 – 2 mm long, brown, blackish and hairy in the upper part; petals unequal, hairy, acute, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers:* sepals 3, oblanceolate, acute, 1.5 – 2 mm long, brown, blackish (or brown) and hairy in the upper part; petals 3, unequal, narrowly elliptic, attenuate, acute, 1.5 – 2.5 mm long, brown, hairy in the upper part, subapical glands present; ovary 3-locular; seed 0.4 – 0.5 mm long, brown, glabrous. Fig. 17.

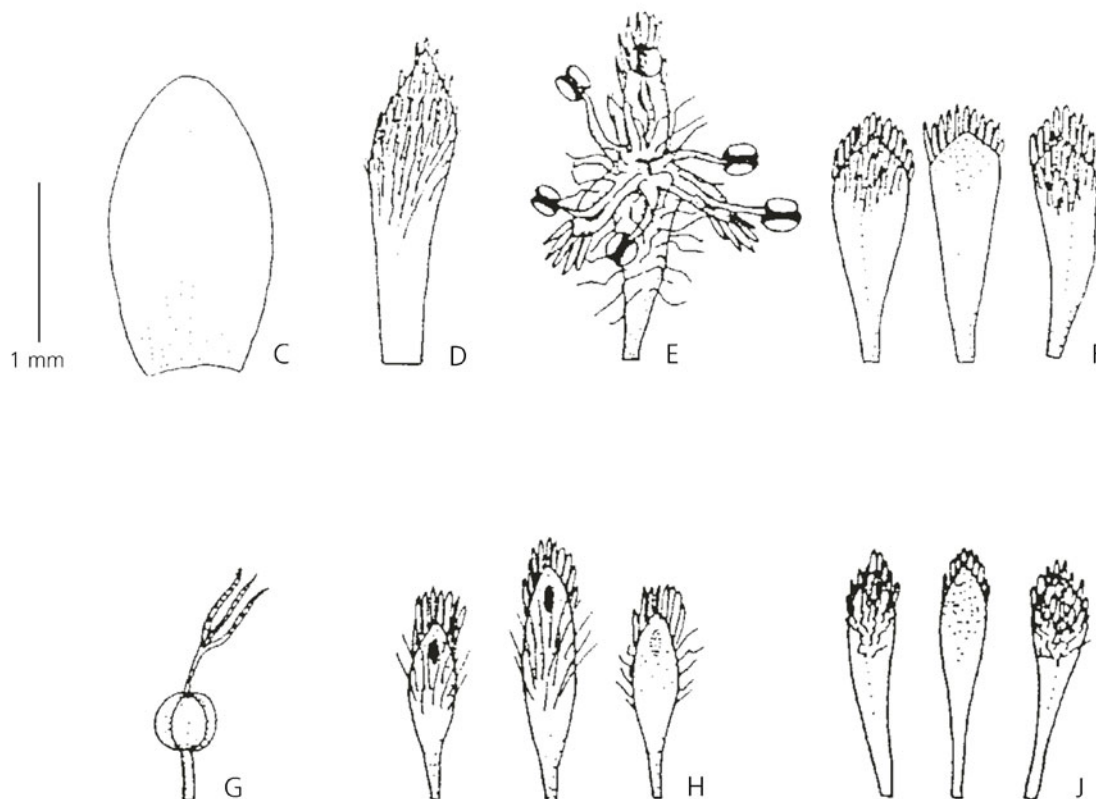
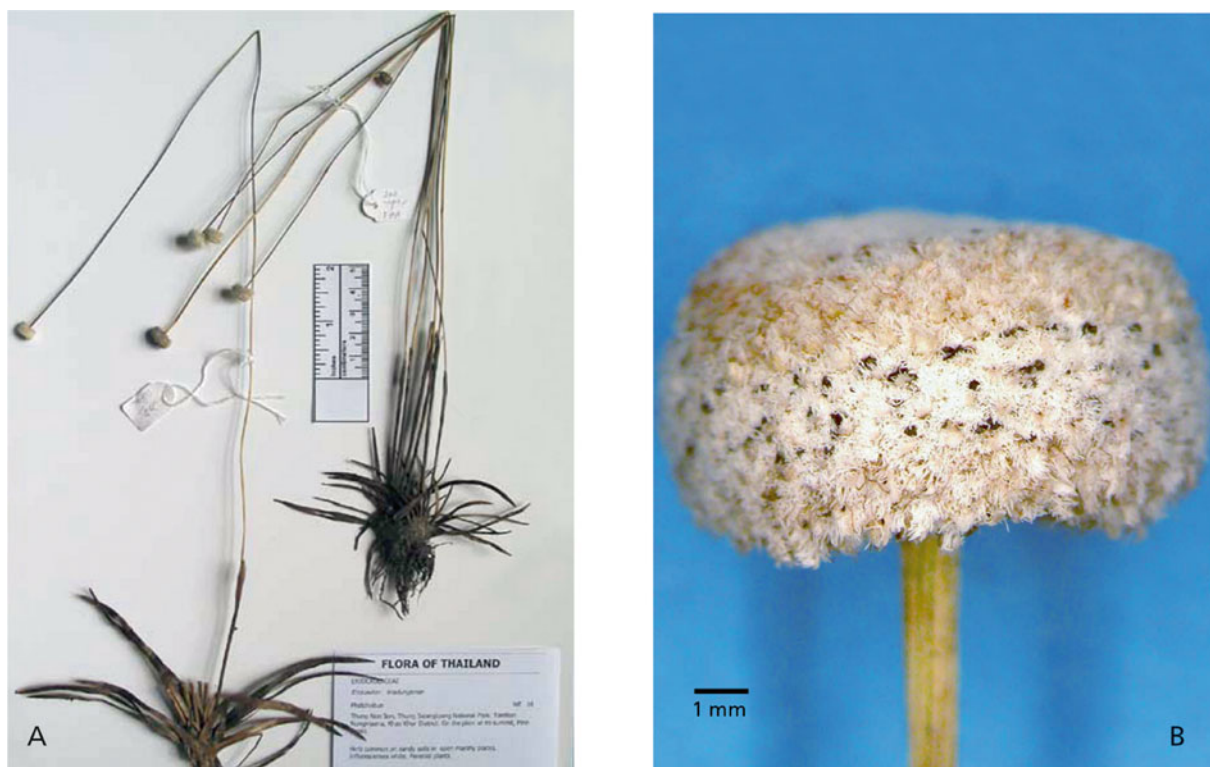
**DISTRIBUTION.** Asia: Thailand. Confined to the North-Eastern and Eastern regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Phetchabun: Thung Non Son, Thung Salangluang National Park [16.60°N, 100.80°E], 20 Oct. 2002, A. Prajaksood &

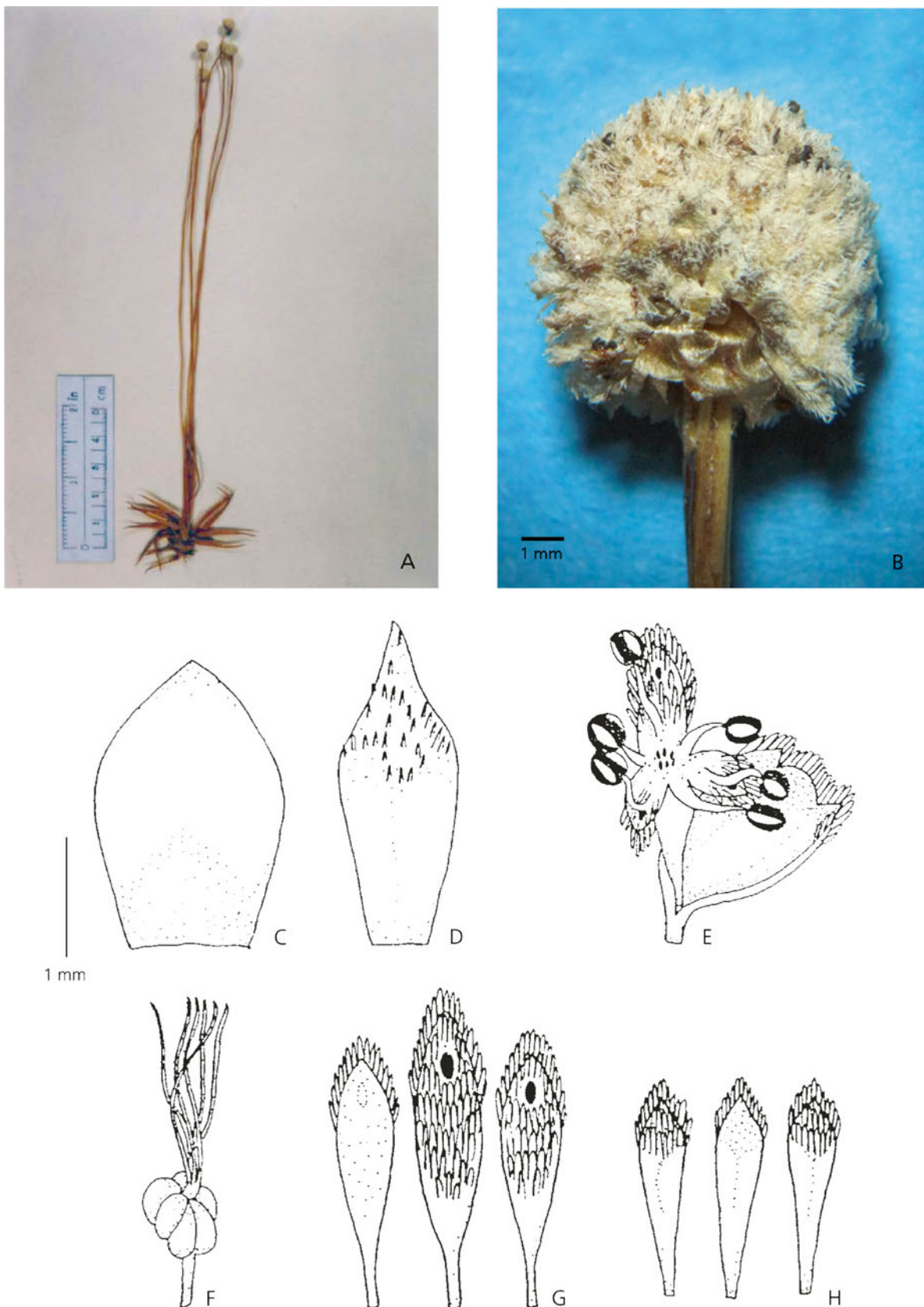




**Fig. 16.** *Eriocaulon siamense* var. *hexagynum*. A habit; B capitulum; C involucre bracts; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. All from A. Prajaksood & S. Suddee 281 (KKU). DRAWN BY A. PRAJAKSOOD.



**Fig. 17.** *Eriocaulon ubonense* f. *kradungense*. A habit; B capitulum; C involucral bract; D floral bract; E – F male flower: E androecium and petals, F sepals; G – J female flower: G gynoecium, H petals, J sepals. A – B from A. Prajaksood & S. Suddee 202 (KKU); C – J from T. Shimizu, M. Huton & D. Chaiglom T 8884 (BKF), isotype of *E. kradungense* Satake. DRAWN BY A. PRAJAKSOOD.



**Fig. 18.** *Eriocaulon ubonense* subsp. *hexagynum*. A habit; B capitulum; C involucre; D floral bract; E male flower; F – H female flower: F gynoecium, G petals, H sepals. All from Pradit 677 (BK). DRAWN BY A. PRAJAKSOOD.



*S. Suddee* 202 (BK, BKF, K, KKU, TCD). Loei: Phu Kradung, [16.52°N, 101.52°E], 1,300 m, 25 Dec. 1971, C. F. van Beusekom, C. Phengklai, R. Geesink & B. Wongwan 4589 (BKF, K). Si Sa ket: Dongrak Range at Cong Bat Rak, Kantaralak distr., [14.30°N, 104.00°E], 550 m, 18 Aug. 1976, J. F. Maxwell 76-544 (AAU, BK).

**HABITAT.** On sandy soils in open marshy places; 550 – 1,300 m.

**CONSERVATION STATUS.** Vulnerable (VU D2). The sites are well separated and the Changwat are poorly collected (Parnell *et al.* 2003).

**PHENOLOGY.** June – March.

**NOTES.** We recognise *Eriocaulon kradungense* as separable from typical *E. ubonense* (Lecomte 1908) as it differs from the typical form in its involucre bracts, floral bracts and male sepals, which are all blackish in the upper part. Material of this species from Phu Kradung is all of this form. The geographical distribution of this form is separate from the typical one (found in the Peninsular, North-Eastern and South-Eastern regions in Thailand but not found in Changwat Phetchabun, Loei and Si Sa ket).

**18. *Eriocaulon ubonense* Lecomte subsp. *hexagynum* Praj. & Chantar. subsp. nov.** Haec subspeciei differt a forma typical speciei *hexagynum*, lamina acutatus. Typus: Thailand, Udon Thani, Ban Phue, 18 Nov. 1963, Pradit 677 (holotypus BK!).

<http://www.ipni.org/urn:lsid:ipni.org:names:77117203-1>

Annual herbs. *Stem* forming a basal disc. *Leaves* crowded into a basal rosette, linear, 2 – 2.5 cm long, 4 – 6 mm wide, glabrous, apex acute. *Scapes* numerous, up to 25 cm long, glabrous. *Sheaths* 5 – 7 cm long, glabrous, apex acute. *Capitula* elongate to globose, 5 – 7 mm long, 8 mm in diam., white. *Receptacle* elongate. *Involucre bracts* broadly oblanceolate, 2.5 mm long, brown, glabrous, apex acute. *Floral bracts* oblanceolate, 2.5 – 3 mm long, brown, hairy in the upper part, apex acuminate. *Male flowers:* calyx spatulate, 3-lobed, acute, 2 mm long, light brown, hairy in the upper part; petals unequal, hairy, acute, subapical glands present; vestigial gynoecium present; anthers 6, black. *Female flowers:* sepals 3, narrowly oblanceolate, acute, 1.7 mm long, light brown, hairy in the upper part; petals 3, unequal, elliptic, attenuate, acute, 2 – 2.5 mm long, light brown, hairy in the upper part, subapical glands present; ovary 6-locular; seed 0.4 mm long, yellow, glabrous. Fig. 18.

**DISTRIBUTION.** Asia: Thailand. Known from only two Changwat in the North-Eastern and Eastern regions.

**SELECTED SPECIMENS EXAMINED. THAILAND.** Udon Thani: Banphue, 18 Nov. 1963, Pradit 677 (BK). Ubon Ratchathani: Korat Plateau, [15.00 N, 104.00E], 500 m, Oct./Nov. 1956, R. Gillett 21c (K).

**HABITAT.** On sandy soils in open marshy places; 500 m. **CONSERVATION STATUS.** Data Deficient (DD). Currently, known only from two widely separated sites.

**PHENOLOGY.** November.

**NOTES.** This subspecies differs from the typical one (Lecomte 1908) in being hexagynoecious, and it differs in its acute leaves. The geographical distribution of this subspecies is separate from the typical one (found in the Peninsular, North-Eastern and South-Eastern regions in Thailand but not found in Changwat Udon Thani and Ubon Ratchathani).

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