APHRAGMUS BOUFFORDII, A NEW SPECIES FROM TIBET AND A SYNOPSIS OF *APHRAGMUS* (BRASSICACEAE)

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Abstract. *Aphragmus bouffordii* from Tibet is described and illustrated, and its relationship to the other members of the genus are discussed. A synopsis and key to all seven species of *Aphragmus* is presented.

Keywords: *Aphragmus*, Brassicaceae, Tibet, synopsis.

As delimited by Al-Shehbaz (2000), *Aphragmus* Andrzejowski ex de Candolle was expanded to include *Staintoniella* H. Hara and consisted of five species. Since then, Al-Shehbaz (2002) added a new species, *A. ladakiana* Al-Shehbaz, from India and with the description of *A. bouffordii* Al-Shehbaz below, the genus now consists of seven species. Except for *A. eschscholtzianus* Andrzejowski ex de Candolle, which is restricted to Alaska and Canada (Schulz, 1924; Rollins, 1993), the remaining species of the genus grow in Asia, with the highest concentration in the Himalayas (Al-Shehbaz, 2000).

The present paper describes the new species *Aphragmus bouffordii*, provides a brief synopsis of all seven species of the genus, and presents an updated key to the species.

KEY TO THE SPECIES OF *APHRAGMUS*

1a. Plants appearing annual, with slender long rhizomes; fruit linear; fruiting pedicels often recurved; seeds uniseriate . . . . . 1. *A. obscurus*
1b. Plants distinctly perennial, with compact or rhizome-like caudex; fruit elliptic to lanceolate; fruiting pedicels straight; seeds biseriate 2
2a. Plants with many branched, rhizome-like caudex covered with distinct internodes separating whorls of petiolar remains of successive growing seasons; petals (6–)7–9 mm long . . . . . 2. *A nepalensis*
2b. Plants with compact caudex not differentiated into distinct internodes; petals 2.5–5(–6) 3
3a. Septum lacking; plants of Alaska and Canada . . . . . 7. *A. eschscholtzianus*
3b. Septum complete or perforate; plants of Asia 4
4a. Racemes ebracteate; fruit linear; seed/ovules 28–32 per fruit/ovary . . . . . 3. *A. ladakiana*
4b. Racemes bracteate; fruit oblong, elliptic, or ovate; seeds/ovules up to 16 per fruit/ovary 5
5a. Bracts ovate; taproot fleshy; Russia and Mongolia . . . . . 6. *A. involucratus*
5b. Bracts linear or narrowly oblanceolate; taproot not fleshy; Himalayas and Central Asia 6
6a. Petals 1.8–2.5 × 0.7–1 mm; sepals persistent to fruit maturity, puberulent; infructescence subumbellate; fruits and cauline leaves sessile . . . . . 4. *A. bouffordii*
6b. Petals 3.5–5(–6) × 1.5–3(–4) mm; sepals soon caducous, glabrous; infructescence an elongated racemes; fruits stipitate; cauline leaves short petiolate . . . . . 5. *A. oxycarpus*

Full synonymies of the species was given by Al-Shehbaz (2000) and will not be repeated here, and only basionyms, type data, and distributions are given in the following synopsis.

1. Aphragmus obscurus (Dunn) O. E. Schulz, Repert. Sp. Nov. Regni Veg. 31: 330. 1933.
Basionym: *Draba obscura* Dunn, Bull. Misc. Inform. Kew 1924: 383. 1924. TYPE: Kashmir, Sonamarg, 12,000–13,000 ft., Sept. 1917, *R. R. & I. D. Stewart 3547* (holotype, K).

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Distribution: endemic to Kashmir.

2. Aphragmus nepalensis (H. Hara) Al-Shehbaz, Harvard Pap. Bot. 5: 112. 2000.

Basionym: *Staintoniella nepalensis* H. Hara, J. Jap. Bot. 49: 196. 1974. TYPE: W Nepal, Dolpo, Tarap, sandy shale, 29°2'N, 83°11'E, 16,500 ft, 3 July 1963, *Stainton 4394* (holotype, BM; isotype, E).

Distribution: endemic to Nepal.

3. Aphragmus ladakiana Al-Shehbaz, Novon 12: 310. 2002. Type: NW India. Ladak: Rupshu, Parang Valley, 4860 m, 32°30'N, 78°06'E, 25 July 2000, *Leos Klimeš s.n.* (holotype, MO).

Distribution: endemic to Ladak (India).

4. Aphragmus bouffordii Al-Shehbaz, *sp. nov.* TYPE: China. Xizang (Tibet): Zogang Xian, Dongda La (pass), border of Markam and Zogang Xian on highway 318, 29°42'39"N, 98°0'9"E, 5100–5300 m, scree slopes, rocky vegetated slopes and adjacent area at pass, mostly level gravelly areas around pass, 16 July 2003, *D. E. Boufford, S. L. Kelley, R. H. Ree & S. K. Wu 29463* (holotype, GH; isotypes, KUN, MO). Fig. 1.

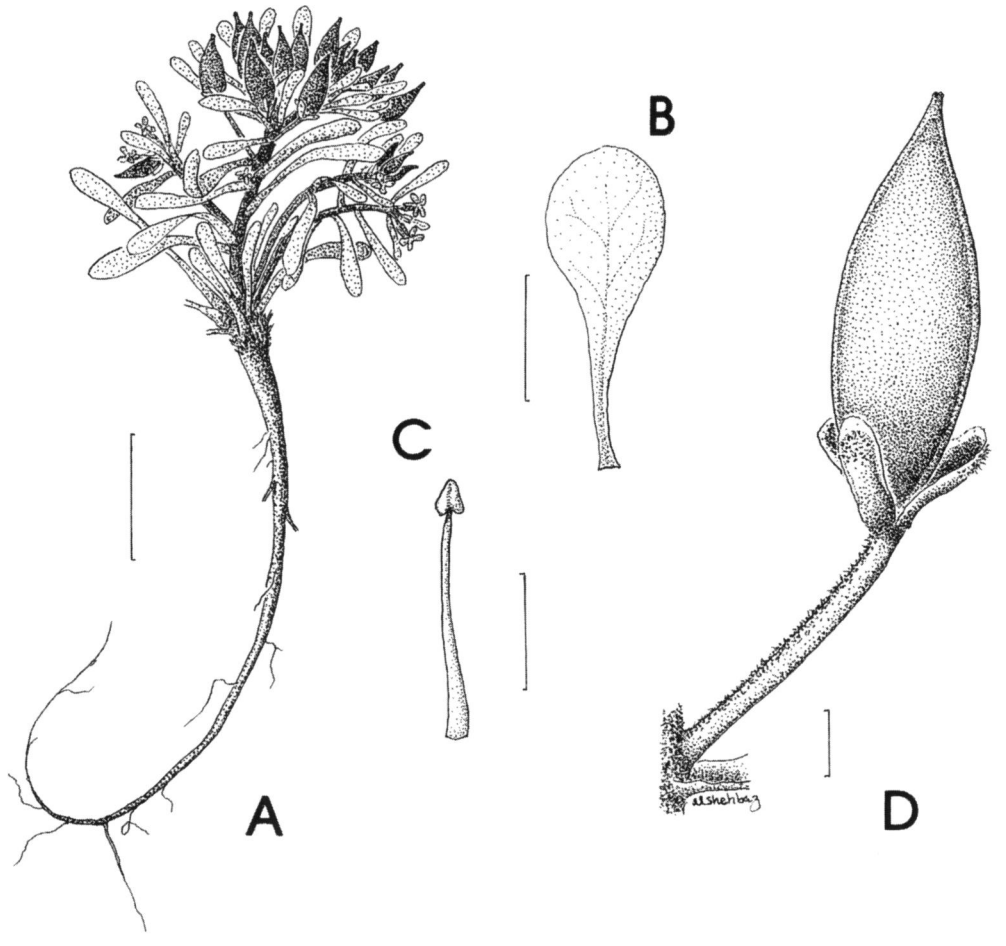

FIGURE 1. *Aphragmus bouffordii* Al-Shehbaz. A, plant; B, petal; C, stamen; D, fruiting pedicel, sepals and fruit. Scale: A = 1 cm; B–D = 1 mm. Drawn by Al-Shehbaz from the isotype, *Boufford et al.29463* (MO).

Herba perennis, 1–5 cm alta, puberula, pilis simplicibus et furcatis; folia basalia spathulata, oblanceolata, vel oblonga, 3–10 × 1.5–3 mm, petiolis 2–10 mm longis; folia caulina sessilia; racemi fructiferi bracteati, subumbellati; sepala persistens, puberula; petala spathulata, 1.8–2.5 × 0.7–1 mm; pedicelli fructiferi 2–7 mm longi, adaxialiter puberuli, abaxialiter

glabri; ovula 8–12; fructus elliptico-oblongi, 5–7 × 1.5–2 mm, sessili; septum completum; semina ovata, 0.9–1 × 0.6–0.7 mm, biseriata.

Perennial herbs 1–5 cm tall; taproot somewhat fleshy; caudex simple, not covered with petiolar bases of previous years. Stems 1 or few from caudex, erect, branched above, minutely puberulent with simple and forked minute trichomes 0.03–0.07 mm long. Basal leaves rosulate, subfleshy, glabrous or sparsely puberulent at margin; petiole 3–10 mm long; leaf blade spatulate, oblanceolate, or oblong, 3–10 × 1.5–3 mm, base cuneate, margin entire, apex obtuse. Cauline leaves nearly all bracts, sessile, subfleshy, glabrous, narrowly oblong to oblong-oblanceolate, 4–10 × 1–2 mm, reduced in size upward, base attenuate, margin entire, apex obtuse. Racemes bracteate throughout, subumbellate in fruit; bracts narrowly oblanceolate. Fruiting pedicels erect or ascending, 2–7 mm long, puberulent adaxially, glabrous abaxially. Sepals green with white margin, oblong, 1.5–2 × 0.7–1 mm, sparsely puberulent, persistent to fruit maturity. Petals pink fading white, spatulate, 1.8–2.5 × 0.7–1 mm, apex rounded; claw 1–1.5 mm long. Filaments ca.1.5 mm long; anthers ca. 0.2 mm long. Ovules 8 to 12 per ovary. Fruit elliptic-oblong, 5–7 × 1.5–2 mm, compressed, sessile, glabrous; septum complete; style ca. 0.3 mm long. Seeds ovate, 0.9–1 × 0.6–0.7 mm, biseriate.

Aphragmus bouffordii is named in honor of Dr. David E. Boufford, one of the collectors of the type material who has been conducting extensive field work in China during the past three decades. The new species is most closely related to *A. oxycarpus* (J. D. Hooker & Thomson) Jafri, from which it is easily distinguished by having sessile cauline leaves, subumbellate fruiting racemes, persistent and puberulent sepals, smaller petals 1.8–2.5 × 0.7–1 mm, and sessile fruits. By contrast, *A. oxycarpus* has short-petiolate cauline leaves, distinctly elongated fruiting racemes, caducous and glabrous sepals, larger petals 3.5–5(–6) × 1.5–3(–4) mm, and stipitate fruits.

Paratype: China. Xinjiang: Fukang Xian, Tian Shan, south of Tianchi Lake, alpine meadows and rocky slopes, 3400 m, 43°47'30"N, 88°13'26"E, 19 July 2001, *B. Bartholomew, A. Abbas, I. Al-Shehbaz & A. Tumur 8488* (CAS, MO, XJU).

Although the type locality is disjunct from that of the paratype by some 1500 air kilometers, it is believed that the species is more widespread than what these two collections indicate. Because of its very small size, *Aphragmus bouffordii* is easily overlooked, and it is likely that the plants are passed as tiny forms of *A. oxycarpus*. However, the morphological differences separating the two species are obvious, and with additional collections from western Himalayas and southwestern Tian Shan, it is quite possible that the overall species range would be expanded to look less drastically disjunct.

5. Aphragmus oxycarpus (J. D. Hooker & Thomson) Jafri, Notes Roy. Bot. Gard. Edinburgh 22: 96. 1956.

Basionym: *Braya oxycarpa* J. D. Hooker & Thomson, J. Linn. Soc., Bot. 5: 169. 1861. TYPE: W. Tibet, Piti prope Lara, 12,000–13,000 ft, *T. Thomson s.n.* (holotype, K).

Distribution: Afghanistan, Bhutan, China, India, Kashmir, Nepal, Pakistan, Sikkim, Tajikistan.

6. Aphragmus involucratus (Bunge) O. E. Schulz in Engler, Pflanzenreich IV. 105(Heft 86): 198. 1924.

Basionym: *Platypetalum involucratum* Bunge, Verzeichn. Pfl. Altai 77. 1836. TYPE: [Russia], Altai to Chuya River, *Bunge s.n.* (holotype, LE).

Distribution: Mongolia, Russia (Altai, Siberia).

7. Aphragmus eschscholtzianus Andrzejowski ex de Candolle, Prodr. 1: 210. 1824. TYPE: Aleutian Islands, 1817, *Eschscholz s.n.* (holotype, LE).

Distribution: Alaska (U.S.A) and Yukon (Canada).

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