

# A new combination in the genus *Tetrataenium* (Apiaceae)

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**Abstract:** The species of *Heracleum* L. native to the Western Ghats, except endemic *Heracleum dalgadianum* S.M.Almeida has been transferred to *Tetrataenium* (DC.) Manden. Through morphological and carpological analysis, we propose its new combination in *Tetrataenium*.

**Keywords:** *Combinatio nova*, Endemism, *Heracleum dalgadianum*, Nomenclature, Sect. *Tetrataenium*, *T. dalgadianum*.

## Introduction

*Heracleum* L. is a widespread, taxonomically complex genus established by Linnaeus (1753), with a native range in the temperate northern hemisphere, Northwest Africa, Eritrea, and Malawi (POWO, 2024). The genus was assigned to the Apiaceae (tribe *Peucedaneae*; subtribe *Tordyliinae*) by Drude (1898). Pimenov and Leonov (1993) moved it to the tribe *Tordylieae* and the recent molecular phylogenetic analysis (Downie *et al.*, 2001; Ajani *et al.*, 2008) confirmed this treatment. Candolle (1830) assigned six sections in *Heracleum*, viz., sect. *Tetrataenium* DC., sect. *Euheracleum* DC. *nom. illeg.* (=sect. *Heracleum*), sect. *Sphondylium* (Mill.) DC., sect. *Carmelia* DC., sect. *Wendtia* (Hoffm.) DC., and sect. *Trichogonium* DC. Candolle's sect. *Tetrataenium* is characterized by yellow symmetric flowers with equal petals and by the presence of additional tubules on the fruits, and consisted of three species, viz. *Heracleum nepalense* D.Don, *H. obtusifolium* Wall. ex DC., and *H. rigens* Wall. ex DC. Mandenova (1959) elevated this section to a genus *Tetrataenium* (DC.) Manden. with five species, viz., *Tetrataenium hookerianum* (Wight & Arn.) Manden., *T. nepalense* (D.Don) Manden., *T. olgae* (Regel & Schmalh.) Manden., *T. rigens* (Wall. ex DC.) Manden., and *T. sprengelianum* (Wight & Arn.) Manden.

As circumscribed by Mandenova, the genus *Tetrataenium* differs from *Heracleum* in having symmetric flowers (*vs.* asymmetric flowers with enlarged outer petals), yellow petals (*vs.* white petals), long and thin secretory ducts (*vs.* short, broad and clavate secretory ducts), and seed face plane sulcate under the vittae (*vs.* seed face plane, not sulcate). The genus is also characterized by its carpological features which include large-keeled dorsal mericarp ribs with very wide marginal wings, 1–3 vallecular vittae, dorsal and commissural vittae of equal length (rarely sub equal), and 2–6 commissural vittae, extending c. 2/3 to 3/4 as long as mericarp as opposed to filiform dorsal mericarp ribs, single vallecular vittae, dorsal and commissural vittae of unequal length, and 2 commissural vittae, extending c. 1/4 to 1/2 as long as mericarp (sometimes absent) in *Heracleum* (Yu *et al.*, 2011; Liu & Downie, 2017; Plunkett *et al.*, 2018; Kljuykov *et al.*, 2019). Cauwet-Marc *et al.* (1982) and Mandenova (1986, 1987, 1991, 1995) transferred 19 species to *Tetrataenium*. Later two more species were described by Kljuykov *et al.* (2019) and Wang *et al.* (2021) respectively. Among them, *T. candidans* (Wall. ex DC.) Manden., *T. obtusifolium* (Wall. ex DC.) Manden., *T. pinnatum* (C.B. Clarke) Manden. are currently treated under the genus *Heracleum* while *T. himalayense* Manden. (= *T. canescens* (Lindl.) Manden.), *T. candolleianum* (Wight & Arn.) Manden. and *T. ligusticifolium* (Wight & Arn.) Manden. (= *T. rigens* (Wall. ex DC.) Manden.) are treated as synonyms. A broader circumscription of the genus *Heracleum* was adopted by Mukherjee and Constance (1993), Watson (1999), and Pu and Watson (2005). They emphasized the limited morphological divergence between *Heracleum* and *Tetrataenium* and highlighted shared characteristics, such as

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petal coloration and petal expansion, as evidence against maintaining *Tetrataenium* as a distinct genus. However, the molecular investigations of Logacheva *et al.* (2010) and Yu *et al.* (2011) confirmed the distinctiveness of *Tetrataenium*, which was followed subsequently by different authors (Pimenov, 2017; Plunkett *et al.*, 2018; Xiao *et al.*, 2018). The genus is distributed along the Himalayas, the Western Ghats, Sri Lanka, Iran, China, and Central Asia (Mandenova, 1959, 1987; Pimenov & Kljuykov, 2002; Xiao *et al.*, 2018), and currently includes 21 species (Xiao *et al.*, 2018; POWO, 2024).

During a taxonomic revision of the family Apiaceae in the Western Ghats, it was found that seven species originally described under *Heracleum* from this region, except *H. dalgadianum* S.M.Almeida, were transferred to *Tetrataenium*. *Heracleum dalgadianum* was described by Almeida (1985) from the Savantwadi region of the Sindhudurg district of Maharashtra. An investigation of pertinent literature revealed that *H. dalgadianum* was known only from its type collection. A critical analysis of the type specimen housed at BLAT revealed that *H. dalgadianum* has symmetric flowers with yellow petals, long secretory ducts and schizocarp with wide marginal wings, large dorsal ribs, equal length of commissural and dorsal vittae, agreeing with *Tetrataenium*. Hence a new combination is made here under the genus *Tetrataenium*.

### Taxonomic Treatment

***Tetrataenium dalgadianum*** (S.M.Almeida) C.Rekha & Manudev, *comb. nov.* *Heracleum dalgadianum* S.M.Almeida, Indian Forester 111(3): 158. 1985; S.M.Almeida, Fl. Savantwadi, 195. 1990; M.R.Almeida, Fl. Maharashtra 354. 1996; N.P.Singh *et al.*, Fl. Maharashtra 98. 2001; V.P.Prasad, J. Bombay. Nat. Hist. Soc. 102(3): 380. 2005; P.K. Mukh. & Constance, Umbel. India 151. 1993; Karthik. *et al.*, Fl. Pl. India Dicotyl. 1: 110. 2009; P.K.Mukh., R.Manik. & Murug. in Mao & Dash, Fl. Pl. India Annot. Checkl. Dicot. 621. 2020. *Type*: INDIA, **Maharashtra**, Sindhudurg district, Amboli-Savantwadi, 11.09.1980, S.M. Almeida SMA-2815-A (holo BLAT!; iso BLAT!).

**Fig. 1**

*Flowering & fruiting*: Flowering from June to August, and fruiting from August to November.



**Fig. 1.** Holotype of *Tetrataenium dalgadianum* (S.M.Almeida) C.Rekha & Manudev © BLAT, Mumbai. Reproduced with permission.

*Habitat*: Sloppy areas in forests and hill slopes.

*Distribution*: India.

*Notes*: *Tetrataenium dalgadianum* is morphologically allied to *T. aquilegifolium* (C.B.Clarke) Manden. and *T. grande* (Dalzell & A.Gibson) Manden., but differs from the former by ovate-lanceolate leaflets (*vs.* broadly ovate), peduncles (6–10 *vs.* 3–6 cm long), carpophores as long as the fruit and persistent (*vs.* short, not persistent), commissural vittae (4–6 *vs.* 6–8), and from the latter by linear-lanceolate bracts and bracteoles (*vs.* oblong or obovate) and slightly pubescent mericarps with broad wings (*vs.* glabrous with narrow wings).

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## Literature Cited

- AJANI Y., AJANI A., CORDES J.M., WATSON M.F. & S.R. DOWNIE 2008. Phylogenetic analysis of nrDNA ITS sequences reveals relationships within five groups of the Iranian Apiaceae subfamily Apioideae. *Taxon* 57(2): 383–401. <https://doi.org/10.2307/25066011>
- ALMEIDA S.M. 1985. A note on *Heracleum* from Maharashtra a new species and a new combination. *Indian Forester* 111(3): 158–160. <http://dx.doi.org/10.36808/if/1985/v111i3/10181>
- CAUWET-MARC A.M., CARBONNIER J. & M. FARILLE 1982. Contribution to the karyological study of the Umbelliferae of Nepal, II. *Candollea* 37: 551–564.
- CANDOLLE A.P. DE 1830. Umbelliferae. In: CANDOLLE A.P. DE (ed.), *Prodromus systematis naturalis regni vegetabilis*. Volume 4. Treuttel & Wurtz, Paris. p. 106.
- DOWNIE S.R., PLUNKETT G.M., WATSON M.F., SPALIK K., KATZ-DOWNIE D.S., VALIEJO-ROMAN C.M., TERENTIEVA E.I., TROITSKY A.V., LEE B.Y., LAHHAM J. & A. EL-OQLAH 2001. Tribes and clades within Apiaceae subfamily Apioideae: the contribution of molecular data. *Edinburgh Journal of Botany* 58(2): 301–330. <https://doi.org/10.1017/S0960428601000658>
- DRUDE C.G.O. 1898. Umbelliferae. In: ENGLER A. & K. PRANTL (eds.), *Die Natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten, insbesondere den Nutzpflanzen, unter Mitwirkung zahlreicher hervorragender Fachgelehrten begründet*. Volume 3(8). Wilhelm Engelmann, Leipzig. pp 63–250.
- KLJUYKOV E., TERENTIEVA E., SAMIGULLIN T., UKRAINSKAJA U. & D. LYSKOV 2019. *Tetrataenium kumaonense* (Apiaceae), a new species from northern India, and the taxonomic assessment of *Tetrataenium himalayense*. *Botany Letters* 166(4): 417–424. <https://doi.org/10.1080/23818107.2019.1619194>
- LINNAEUS C. 1753. *Species plantarum*. Volume 1. Laurentius Salvius, Stockholm.
- LIU M. & S.R. DOWNIE 2017. The phylogenetic significance of fruit anatomical and micromorphological structures in Chinese *Heracleum* species and related taxa (Apiaceae). *Systematic Botany* 42(2): 313–325. <https://doi.org/10.1600/154823217X695539>
- LOGACHEVA M.D., VALIEJO-ROMAN C.M., DEGTJAREVA G.V., STRATTON J.M., DOWNIE S.R., SAMIGULLIN T.H. & M.G. PIMENOV 2010. A comparison of nrDNA ITS and ETS loci for phylogenetic inference in the Umbelliferae: an example from tribe Tordylieae. *Molecular Phylogenetics and Evolution* 57(1): 471–476. <https://doi.org/10.1016/j.ympev.2010.06.001>
- MANDENOVA I.P. 1959. Materials on systematics of tribe Pastinaceae K.-Pol. emend. Manden. (Umbelliferae–Apioideae) [Materialy Po Sistematičke Tribu Pastinaceae K.-Pol. Emend. Manden. (Umbelliferae–Apioideae).] *Trudy Tbilisskogo Botanicheskogo Instituta* 20: 3–57.
- MANDENOVA I.P. 1986. De genere *Tetrataenium* (DC.) Manden. (Umbelliferae) notulae systematicae. *Zametki Po Sistematičke I Geografii Rastenii* 141: 43–46.
- MANDENOVA I.P. 1987. *Tetrataenium* (DC.) Manden. In: RECHINGER K.H. (ed.), *Flora Iranica*. Volume 162. Akademische Druck-u. Verlagsanstalt, Graz. pp. 502–506.
- MANDENOVA I.P. 1991. De Genere *Tetrataenium* (DC.) Manden. (Umbelliferae) Notulae Systematicae. *Zametki Po Sistematičke I Geografii Rastenii* 142: 11–14.
- MANDENOVA I.P. 1995. A review of species of the genus *Tetrataenium*. *Botanicheskii Zhurnal* 80(4): 90–96.
- MUKHERJEE P.K. & L. CONSTANCE 1993. *Umbelliferae (Apiaceae) of India*. American Institute of Indian Studies & Oxford and IBH Publishing, New Delhi.
- PIMENOV M.G. 2017. Updated checklist of Chinese Umbelliferae: nomenclature, synonymy, typification, distribution. *Turczaninowia* 20(2): 106–239. <https://doi.org/10.14258/turczaninowia.20.2.9>
- PIMENOV M.G. & M.V. LEONOV 1993. *The genera of the Umbelliferae. A nomenclator*. Royal Botanic Gardens, Kew & Botanical Garden of Moscow University, Russia.
- PIMENOV M.G. & E.V. KLJUYKOV 2002. *Umbelliferae of Kirghizia*. KMK Scientific Press, Moscow.
- PLUNKETT G.M., PIMENOV M.G., REDURON J.P., KLJUYKOV E.V., VAN WYK B.E., OSTROUMOVA T.A. & M.J. HENWOOD 2018. Apiaceae. In: KUBITZKI K. (ed.), *Families and genera of vascular plants*. Volume 15. Springer, Hamburg. pp. 1–30.
- POWO 2024. *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Available at: <http://www.plantsoftheworldonline.org/> (Accessed on 01.01.2024).

- PU F. & M.F. WATSON 2005. *Heracleum* L. In: WU Z.Y., RAVEN P.H. & D.Y. HONG (eds.), *Flora of China*. Volume 14. Science Press, St. Louis & Missouri Botanical Garden Press, Missouri. pp. 195–202.
- WANG Z.H., WANG Y., LIU B.L. WANG C.H. & X.G. FU 2021. A new species of *Tetrataenium* (Tordyliinae, Apiaceae) from SW Yunnan, China, based on morphological and molecular data. *Phytotaxa* 491(1): 85–91. <https://doi.org/10.11646/phytotaxa.491.1.10>
- WATSON M.F. 1999. Umbelliferae. In: GRIERSON A.C. & D.F. LONG (eds.), *Flora of Bhutan: including a record of plants from Sikkim*. Volume 2(2). Royal Botanic Garden Edinburgh & Royal Government of Bhutan. pp. 434–504.
- XIAO Y., Yu Y., XIE F., GUO L. & J. HE 2018. *Angelica oncosepala* and *Heracleum yunnanense* are synonyms and refer to a species of *Tetrataenium* (Apiaceae). *Nordic Journal of Botany* 36(3): njb-01563. <https://doi.org/10.1111/njb.01563>
- YU Y., DOWNIE S.R., HE X. & L. YAN 2011. Phylogeny and biogeography of Chinese *Heracleum* (Apiaceae, tribe Tordylieae) with comments on their fruit morphology. *Plant Systematics and Evolution* 296: 179–203. <https://doi.org/10.1007/s00606-011-0486-3>