
A New Species of the Genus *Lagochilus* (Lamiaceae) from Khorassan–Kopet Dagh Floristic Province

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ABSTRACT. A new species of the genus *Lagochilus* Bunge ex Benth. from Iran and Turkmenistan, *L. khorassanicus* Zeraatkar, F. Ghahrem. & Joharchi, is described and illustrated here. The new species most closely resembles *L. schugnanicus* Knorring of Afghanistan, Pakistan, and the mountain ranges of Central Asia. It is easily differentiated from other species of the *Flora Iranica* area by the bracteole morphology and number of flowers in verticillasters. A key to the species of that area and a distribution map of the new species and its relatives are provided.

Key words: Iran, Irano–Turanian region, Khorassan–Kopet Dagh floristic province, *Lagochilus*, Lamiaceae, Turkmenistan.

The genus *Lagochilus* Bunge ex Benth. (Bentham, 1834) is nearly restricted to the Irano–Turanian region and represented by ca. 40 species distributed over Central Asia, Afghanistan, northwestern Pakistan, Iran, and northwestern China (Mabberley, 2008). Due to inconsistent treatment in different floristic accounts and lack of a consistent monographic view of species across their range, some of the species differ in only minor characteristics, and there is no clear-cut delimitation among them. In carrying out a review of *Lagochilus* across its entire range, we identified specimens from Khorassan–Kopet Dagh floristic province that did not match any existing species (Knorring, 1954; Rechinger, 1982; Jamzad, 1988; Hedge, 1990; Jamzad, 2012; Dehshiri & Mozaffarian, 2013). These are described as a new species here.

Herbarium specimens were carefully compared with *Lagochilus* specimens at FAR, FUMH, LE, P, T, W, and the Shiraz University Herbarium along with high-resolution images of specimens from B, K, W, and PE.

To examine trichome morphology using SEM, a small piece of abaxial corolla apex was mounted directly on a stub fitted with adhesive tape and coated with a gold layer. The specimen stub was imaged with a Hitachi SU3500 Scanning Electron Microscope (Hitachi High-Technologies Corp., Tokyo, Japan) at accelerating potential voltage of 1.5 kV and 60× magnification in the central laboratory of Shahid Beheshti University. In addition, stereomicroscopic micrographs of bracteoles were taken under a stereomicroscope (Zeiss Stemi SV8; Zeiss, Oberkochen, Germany).

Lagochilus khorassanicus Zeraatkar, F. Ghahrem. & Joharchi, sp. nov. TYPE: Iran. North Khorassan: Dargaz, Tandureh Natl. Park, Chehelmir, 1035–1200 m, 16 June 2004, *F. Memariani* & *H. Zangooei* 35558 (holotype, FUMH!, isotypes, FAR!, T!, Shiraz University herbarium!). Figures 1–3.

Diagnosis. *Lagochilus khorassanicus* Zeraatkar, F. Ghahrem. & Joharchi is closely related to *L. schugnanicus* Knorring, differing by calyx teeth unequal (vs. subequal to equal), often narrowly oblong (vs. broadly oblong), 7–23 × 1.8–2.5(–3) mm (vs. 7–18 × 5–7 mm), and acuminate or rarely subacute at apex (vs. rounded to obtuse); leaf segments 0.1–1(–2) mm wide and revolute (vs. 1.5–5 mm wide, flat or slightly revolute); corolla ca. 22 mm (vs. 25–30 mm); and bracts substipitate (vs. sessile).

Perennial herbs. Stems diffuse, white, 20–45 cm high, numerous, simple or branched, erect or slightly curved, basal part glabrous, apical part covered with short, simple, 2- to 4(to 5)-jointed long hairs and sessile capitate glands; nodes usually densely pubescent with 2- to 4(to 5)-jointed long hairs. Leaves usually clustered at axillary nodes, opposite in verticillasters, 4 per node;



Figure 1. Holotype of *Lagochilus khorassanicus* Zeraatkar, F. Ghahrem. & Joharchi (F. Memariani & H. Zangooei 35558, FUMH). Photo by M. R. Joharchi.

leaf blade rhomboid, deeply dissected, 1- to 2-pinnate, often bipinnate, $18\text{--}32 \times 10\text{--}30$ mm; segments linear-oblong with revolute margins, acuminate or rarely subacute, $1\text{--}8 \times 0.1\text{--}1$ mm (to 2 mm wide in lowermost), apex of leaf segments of apicalmost leaves rarely short-spinescent with spine 0.25–0.5 mm; both surfaces

eglandular or moderately-sparsely covered with sessile capitate glands on both sides; margins adpressed, ciliate; petiole 0–2 mm in inner leaves, outer leaves sessile. Verticillasters 4- to 6-flowered, often compact. Bracteoles spinescent, 2(4) compound-bifurcated pairs, 0.5–2.2 mm, unequal, thin, substipitate, sessile in lower



Figure 2. *Lagochilus khorassanicus* Zeraatkar, F. Ghahrem. & Joharchi. —A. Habit. —B. Close-up of flower. Photos by A. Zeraatkar from Mashhad—Kalat rd. (May 2016).

part of stem, obviously twice-trifurcated in verticillasters and near them, the middle branch strongly reduced and bracts superficially twice-bifurcated in lower part of stem; stalk (0–)1–1.7 mm, tomentose, glabrous at apex, covered with short, simple trichomes; basalmost part of stem without bracteoles. Calyx 20–30 mm, campanulate, at least 1.5(to 2.5) times as long as tube, 5-toothed or rarely 4-toothed; tube 6–10 × 2–3 mm, sometimes bearing sparse 2- to 4(to 5)-jointed trichomes 40–50 μm; teeth narrowly oblong, unequal, 7–23 × 1.8–2.5(–3) mm, apex acuminate or rarely subacute terminating in a prickle 0.5–1.2 mm; both surfaces covered with sessile capitate glands and short, simple trichomes on tube and nerves as well as at margin. Corolla ca. 22 mm, whitish, with distinct purple veins, cream to pale brown when dried; upper lip emarginate, with 2 equal teeth, densely covered with silky hairs abaxially, adaxially glabrous; lower lip trilobate, middle lobe notched, obovate, lateral lobes linear-lanceolate, abaxially sparsely pubescent, adaxially glabrous. Posterior stamens 15–18 mm, anterior 13–16 mm. Nutlets smooth, 3 × 0.5 mm.

Phenology. *Lagochilus khorassanicus* was observed to flower from mid-May to mid-June and to fruit from late June to mid-July.

Distribution and ecology. *Lagochilus khorassanicus* is very likely restricted to Khorassan–Kopet Dagh floristic province. It is relatively common in the cited area and shows a geographically distinct distribution from the adjacent species, i.e., *L. aucheri* Boiss., *L. cabulicus* Benth., and *L. balchanicus* Czerniak., which occur in the southeast, south to west, and northwest of the area, respectively (Fig. 4). Therefore, the novelty is isolated geographically from other species. The new species grows together with several hemicyptophytes such as *Matthiola farinosa* Bunge ex Boiss., *M. afghanica* Rech. f. & Köie, *Hymenocrater sessilifolius* Benth., *Hedysarum monophyllum* Boriss., and *Stachys lavandulifolia* Vahl.

IUCN Red List category. GeoCAT (<<http://geocat.kew.org/>>; Bachman et al., 2011), extent of occurrence (EOO) was calculated to be 31,123 km² and area of occupancy (AOO) 20,480 km² based on a user-defined cell width of 32 km. *Lagochilus khorassanicus* has been collected from several localities in North Khorassan and Razavi Khorassan Provinces in Iran, and also from southern Turkmenistan (those specimens were mentioned by Rechinger [1982] and Knoring [1954] as *L. cabulicus*), but is restricted to a small part of Khorassan–Kopet Dagh floristic province (Fig. 4). Thus a preliminary assessment of Near Threatened (NT), based on the criteria of IUCN (2001), is indicated.

Etymology. The species epithet refers to Khorassan Province in northeastern Iran.

Taxonomic notes. *Lagochilus khorassanicus* is most similar to *L. schugnanicus* in having 4- to 6-flowered verticillasters and twice-trifurcated bracts but differs from the latter by the characters given in Table 1 (see also Fig. 3A–E). *Lagochilus schugnanicus* occurs in northwestern Pakistan (the specimens mentioned as *L. cabulicus* by Hedge [1990]; see the identification key), northeastern Afghanistan, Pamir–Alay, and Tien Shan (Rechinger, 1982). Additionally, the new species is readily distinguished from *L. balchanicus* (not included in the *Flora Iranica* area [Rechinger, 1982]) and seven other Iranian species of *Lagochilus* by its 4- to 6-flowered (vs. 2-flowered) verticillasters and twice-trifurcated (vs. twice-bifurcated) bracts (Fig. 3). A key to the species of the *Flora Iranica* area is provided below.

Paratypes. IRAN. North Khorassan: Bojnurd, Rakhtian to Hesar, 4 July 1993, G. Faghihnia & H. Zangooei 23549 (FUMH); Faruj, beginning of Khosraviyeh, 60 km to Quchan, 1550 m, 18 June 1981, S. J. Ghorashi 1054G (FUMH); Bojnurd, Gifan, 2 km Ghezelghan to Ayub, 1 July 1981, S. J. Ghorashi 1147G (FUMH); Bojnurd, betw. Goynek & Baghleh, 11 June 2001, M. R. Joharchi 33711 (FUMH); Esfarayen, NW Nasrabad, 1500 m, 16 June 2006, M. R. Joharchi 34756 (FUMH); Shirvan, Gelyan to Estarkhi, 9 June 1983, M. R. Joharchi & H. Zangooei

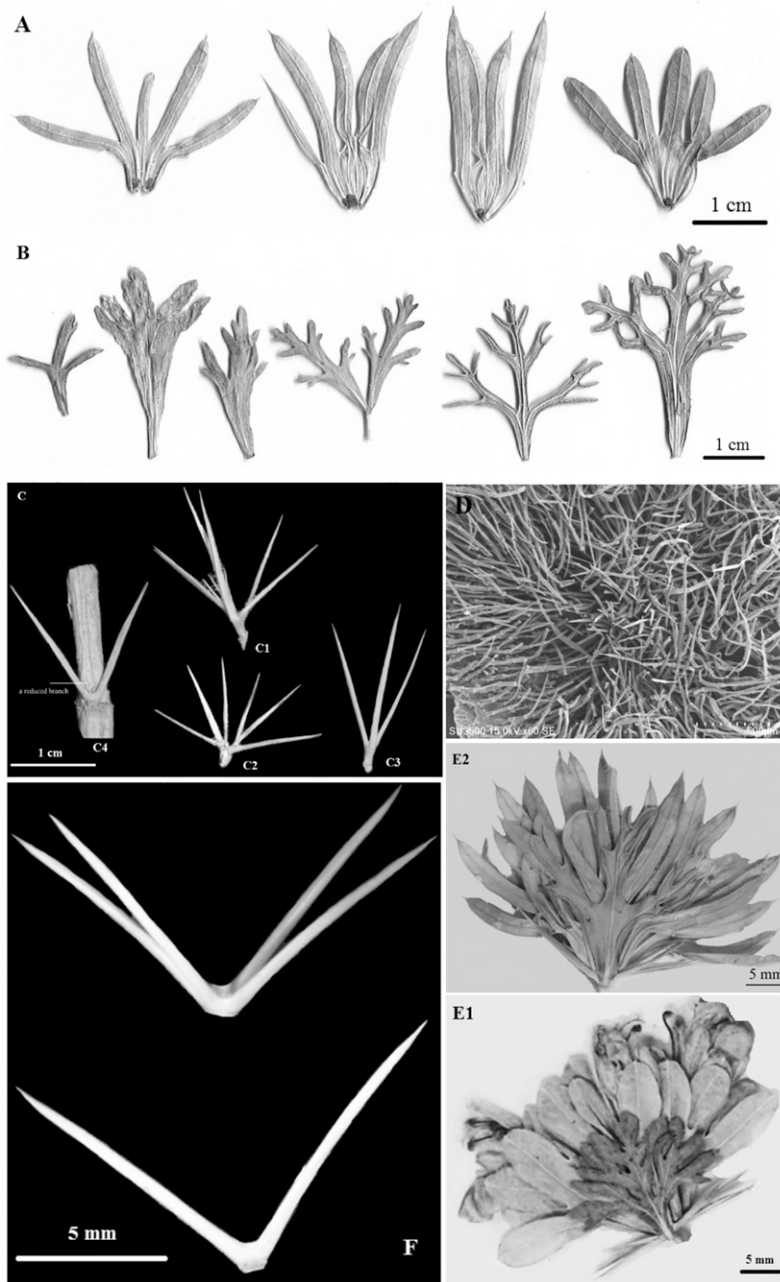


Figure 3. A–D. *Lagochilus khorassanicus* Zeraatkar, F. Ghahrem. & Joharchi. —A. Calyx. —B. Leaves. —C. Stereoscopic micrographs of bract diversity. —C1–C3. Bracteoles from upper part of stem. —C4. Bracteole from lower part of stem with middle branch strongly reduced. —D. Long uniseriate-unicellular trichomes on corolla apex. E. Close-up of verticillaster. —E1. *Lagochilus schugnanicus* Knorring, O. Anders (KUFS 020724). —E2. *Lagochilus khorassanicus*, Memariani & Zangoeei 35558 (T, isotype). —F. Bracteoles in *L. aucheri* Boiss. Photos by A. Zeraatkar.

10422 (FUMH); Bojnurd, 11 km Pakotal to Assadli, 37°16'47.10"N, 57°30'51.60"E, 16 June 2008, M. R. Joharchi & H. Zangoeei 40828 (FUMH); Bojnurd, Beshghardash, 1050 m, 14 May 1988, M. R. Joharchi & H. Zangoeei 16530 (FUMH); Bojnurd, Saluk, Zow-e Garivan, after Firouzeh, 1 June 1998, S. S. Hojjat & H. Zangoeei 31215 (FUMH); Bojnurd,

Qorkhud protected area, 37°23'28.10"N, 56°26'27.40"E, 1540–1600 m, 7 June 2010, F. Memariani & A. A. Arjmandi 43826 (FUMH); Bojnurd, 4 km SE Raz to Pirboz, 37°53'49.60"N, 57°8'28.10"E, 21 May 2008, F. Memariani & H. Zangoeei 40300 (FUMH); Bojnurd, Jargalan, 3 km Guynik to Goynek, 38°4'34.80"N, 56°58'51.60"E, 11 June 2008, F. Memariani



Figure 4. Distribution map of cited *Lagochilus* species: *L. khorassanicus* Zeraatkar, F. Ghahrem. & Joharchi (dot), *L. schugnanicus* Knorring (S), *L. aucheri* Boiss. (square), *L. cabulicus* Benth. (triangle), *L. lorestanicus* Dehshiri & Mozaff. (L), *L. macracanthus* Fisch. & C. A. Mey. (M), *L. lasiocalyx* (Stapf) Jamzad (cross), *L. balchanicus* Czerniak (B), *L. alutaceus* Bunge (A), *L. quadridentatus* Jamzad (Q), *L. cuneatus* Benth. (C).

& *H. Zangoeei* 40778 (FUMH); Faruj, 1.5 km S Koran Kordiyeh, 37°24'43.70"N, 58°16'18.70"E, 1507 m, 1 June 2009, *F. Memariani* & *H. Zangoeei* 42771 (FUMH); Sarigol Natl. Park, ca. 2 km W Qaleh Maran, 2103 m, 2 June 2009, *N. Rahchamani* 6383 (T); S Sarigol Natl. Park, 36°56'2.00"N, 57°45'40.00"E, 1608 m, 3 June 2009, *N. Rahchamani* 6473 (T); Shirvan, Borzeli village, 26 June 1995, *A. Rafeie* & *H. Zangoeei* 25997 (FUMH). **Razavi Khorassan:** Quchan, Rahvard to Assibolagh, 10 June 1998, *G. Faghini* & *H. Zangoeei* 31504 (FUMH); Quchan, N Bajgiran, Baba Aselmah, 1600 m, 15 July 1992, *G. Faghini* & *H. Zangoeei* 22243 (FUMH); Quchan, Dorbadam to Bajgiran, 30 km to Bajgiran, 1800 m, *G. Faghini* & *H. Zangoeei* 22214 (FUMH); Chenaran, beginning of Boqmech, E Radkan, 1750–1800 m, 20 May 1982, *S. J. Ghorashi* 1719G (FUMH); Quchan, rd. of Bardar–Bajgiran, S mtns. Bajgiran, 1700 m, 16 June 1981, *S. J. Ghorashi* 796G (FUMH); Quchan, Shoql abad, Pass Hesar Mtn., 1900 m, 12 June 1983, *M. R. Joharchi* & *H. Zangoeei* 10441 (FUMH); NW Neyshabur, Bar village, 36°31'19.06"N, 58°45'20.29"E, 2046 m, 7 May 2016, *A. Zeraatkar* 16025 (FAR, T, Shiraz University herbarium); Mashhad, 125 km to Kalat from Mashhad, 9 June 2016, *A. Zeraatkar* 16026 (FAR, T, Shiraz University herbarium). 100 km to Kalat from Mashhad, 1548 m, 9 May 2016, *A. Zeraatkar* 16027 (T). **TURKMENISTAN. Kisil-Arwat:** Karakala in monte Sundsodagh, 18 May 1901, *P. Sintenis* 1717 (K000929091, K000929090, as images). **Regio Transcaspica:** Aschabad: Suluklu (Saratowka), July 1900, *P. Sintenis* 807 (P03834564, P03519714, B100277291, as images).

KEY TO THE SPECIES OF *LAGOCHILUS* IN THE FLORA IRANICA AREA

1. Verticillasters 4- to 6-flowered, bracts twice-trifurcated...2
2. Shrubs, leaves simple.....*L. cuneatus* Benth.
- 2'. Perennial herbs, leaves pinnate3
3. Leaves 1- to 2-pinnate, segments 0.1–1(–2) mm wide; bracts subsitpitate (sessile in lower part of stem); calyx teeth

unequal, at least 1.5(to 2.5) times as long as tube, often narrowly oblong, 7–23 × 1.8–2.5(–3) mm, acuminate or rarely subacute at apex...*L. khorassanicus* Zeraatkar, F. Ghahrem. & Joharchi

- 3'. Leaves 2-pinnate, segments 1.5–5 mm wide; bracts sessile; calyx teeth equal (subequal), equal to or sometimes slightly shorter or longer than calyx tube, broadly oblong, 7–18 × 5–7 mm, obtuse or rounded at apex...*L. schugnanicus* Knorring
- 1'. Verticillasters 2-flowered, bracts twice-bifurcated.....4
4. Leaves simple; calyx teeth shorter than calyx tube, triangular-lanceolate.....*L. lorestanicus* Dehshiri & Mozaff.
- 4'. Leaves usually divided; calyx teeth longer or shorter than or equal to calyx tube, oblong or linear-lanceolate.....5
5. Calyx teeth linear-lanceolate, acute at apex; calyx tube always covered with stiff hairs...*L. lasiocalyx* (Stapf) Jamzad
- 5'. Calyx teeth oblong, acute or obtuse at apex; calyx tube glabrous or rarely with stiff hairs6
6. Calyx teeth equal to or shorter than calyx tube7
7. Leaves 15–25 mm; calyx teeth shorter than or equal to the length of tube.....*L. macracanthus* Fisch. & C. A. Mey.
- 7'. Leaves 7–13 mm; calyx teeth as long as calyx tube.....*L. alutaceus* Bunge
- 6'. Calyx teeth longer than calyx tube.....8
8. Calyx 10–22 mm, 5-toothed; calyx teeth 10–12 × 2 mm....*L. cabulicus* Benth.
- 8'. Calyx 17–30 mm, 4-, 5-, or 4- and 5-toothed on the same plant; calyx teeth 11–20 × 2–5 mm.....9
9. Calyx 5-toothed (sometimes 4- and 5-toothed on the same plant); calyx teeth oblong, 2–3 mm wide, acute at apex.....*L. aucheri* Boiss.

Table 1. Diagnostic morphological characters of *Lagochilus khorassanicus* Zeraatkar, F. Ghahrem. & Joharchi and *L. schugnanicus* Knorring.

	<i>L. khorassanicus</i>	<i>L. schugnanicus</i>
Leaves	1- to 2-pinnate	2-pinnate
Leaf segments	0.1–1(–2) mm wide, revolute at margin throughout	1.5–5 mm wide, flat or slightly revolute
Leaf segment apex	acuminate or rarely subacute	rounded to obtuse
Bracts	substipitate (sessile in lower part of stem), stalk 1–1.7 mm	sessile
Calyx teeth shape	unequal, at least 1.5(to 2.5) times as long as tube, often narrowly oblong	equal (subequal); equal to or sometimes slightly shorter or longer than calyx tube, broadly oblong
Calyx teeth size	7–23 × 1.8–2.5(–3) mm	7–18 × 5–7 mm
Calyx teeth apex	acuminate or rarely subacute	obtuse or rounded
Corolla size	ca. 22 mm	25–30 mm
Long uniseriate-unicellular trichomes	2- to 4(to 5)-jointed	1- to 2-jointed
Distribution	Khorassan–Kopet Dagh floristic province	Central Asia

9'. Calyx 4-toothed (sometimes 4- and 5-toothed on the same plant); calyx teeth broadly oblong, 4–5 mm wide, rounded at apex.....*L. quadridentatus* Jamzad

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