

LESSER KNOWN ORCHIDS OF HIMACHAL PRADESH (NORTHWEST HIMALAYA): II - GENUS *GALEARIS* RAF. AND *PONERORCHIS* RCHB. F.

Jagdeep Verma, Jaspreet K Sembi¹, and Promila Pathak¹

Department of Botany, Shoolini Institute of Life Sciences and Business Management, Solan – 173 212, Himachal Pradesh, India

¹Department of Botany, Panjab University, Chandigarh – 160 014, UT, India

Abstract

Genus *Galearis* Raf. is represented by a single [*G. spathulata* (Lindl.) P. F. Hunt] and *Ponerorchis* Rchb. f. by two [*P. chusua* (D. Don) Soó, *P. nana* (King and Pantl.) Soó] species in Himachal Pradesh, NorthWest Himalaya. These species occupy open grasslands at higher altitudes beyond 3000 m amsl in Chamba, Lahaul and Spiti, Shimla, and Sirmaur districts of the state. Present communication provides information on their taxonomy, habitat characteristics, distribution, and flowering and fruiting periods. A brief note is also provided on possible threats and conservation of these orchids.

Introduction

HIMACHAL PRADESH is a mountainous Indian state with vast geographical expanse (55672 km²) and remarkable altitudinal variation (350-7000 m). It is located in NorthWest part (30°22' to 33°12' N latitude, 75°47' to 79°04' E longitude) of the Himalayan range. With 85 species, orchids represent an important component of the state Flora (Vij *et al.*, 2013). Many of these are quite popular because of their strikingly beautiful flowers and/ or curative properties. Some of the most fascinating orchid species of Himachal Pradesh include the lady slippers (*Cypripedium* spp.), the fox-tails (*Aerides multiflora*, *Rhynchostylis retusa*), the jewels (*Goodyera* spp.), marsh orchid (*Dactylorhiza hatagirea*), and species of *Calanthe*, *Epipactis*, *Eulophia*, *Habenaria*, *Nervilia*, *Platanthera* and *Vanda*. There are, however, many other species (belonging to genus *Androcorys*, *Galearis*, *Pachystoma*, *Ponerorchis*, *Zeuxine*, etc.) that are not of much direct importance to man, and are therefore of very little interest for horticulturists and herbalists. Recently, Verma *et al.* (2014) provided details on genus *Zeuxine* Lindl. in Himachal Pradesh, and in present communication notes are provided on taxonomy, habitat characteristics, distribution, and flowering and fruiting periods of two other lesser known orchid genera, *Galearis* Raf. and *Ponerorchis* Rchb. f.

Material and Methods

Present results are based on the orchid collections made in Himachal Pradesh during years 2002-2012. The species were identified following standard Flora (Deva and Naithani, 1986; Duthie, 1906), and

information on habitat characteristics, flowering and fruiting periods, and threats was collected during field observations. The reports on occurrence of these species in the state and their general distribution are based on present field trips as well as earlier available records (Aswal and Mehrotra, 1985, 1999; Chowdhery and Wadhwa, 1984; Deva and Naithani 1986; Duthie, 1906; Hooker, 1890; Murti, 2001; Nair, 1977; Subramani and Kapoor, 2011; Vij *et al.*, 2013). Plants were described and illustrated from freshly collected materials.

Results

Galearis Raf. is represented by a single [*G. spathulata* (Lindl.) P. F. Hunt] and *Ponerorchis* Rchb. f. by two [*P. chusua* (D. Don) Soó, *P. nana* (King and Pantl.) Soó] species in Himachal Pradesh. All of these species occur in open grasslands at higher altitudes beyond 3000 m amsl. *Ponerorchis nana* is closely allied to, and usually sympatrically distributed with *P. chusua*. In World Checklist of Selected Plant Families (Govaerts *et al.*, 2015), it has been treated as a synonym of *P. chusua*. But such a treatment has not been followed presently because of marked difference in their lip character. *P. nana* has also been treated as an independent species by Jalal *et al.* (2007), Lucksom (2007), and Vij *et al.* (2013).

The first report of occurrence of *Galearis spathulata* in Himachal Pradesh was by Nair (1977); it was based on author's own collection from Chansil pass (Nair 36118). The species was later also reported from Rupin valley and Dodra Kanwar. *P. chusua* was first reported from the state by Duthie (1906) based upon its

collection from Chamba (Lace, 1992). Subsequent workers also recorded it from Rohtang pass and Churdhar. Aswal and Mehrotra (1985) first reported *P. nana* from Himachal Pradesh based on its collection from Rohtang slopes (Aswal 6970); this also constituted the very first report of this species from NorthWestern Himalayan region. More recently, this species was collected from Churdhar. There is no reference of genus *Ponerorchis* in state Flora compiled by Chowdhery and Wadhwa (1984).

In what follows, taxonomic keys are provided for both genera (*Galearis*, *Ponerorchis*), and both species of *Ponerorchis*. The genera and their species are described. Species description is followed by notes on their habitat characteristics, distribution, and flowering and fruiting periods.

Key to Genera

1. Plants rhizomatous; leaf solitary, usually spathulate *Galearis*
- 1'. Plants having tubers; leaves 1-3, linear-oblong or linear-lanceolate *Ponerorchis*

Species Description

1. *Galearis* Raf. Herb. Raf.: 71. 1833. Type: *Galearis spectabilis* (L.) Raf.

Terrestrial herbs. *Stem* arising from long and creeping rhizome, thin. *Roots* many, thin. *Leaf* solitary, arising from the base of the stem. *Inflorescence* raceme or spike, bearing one to four laxly arranged flowers. *Floral bracts* foliaceous, generally exceeding the flowers in length. *Flowers* small, purple or rarely white. *Sepals* and *petals* forming a hood. *Lip* entire or rarely faintly lobed, as long as or longer than sepals, base spurred. *Spur* nearly half of the ovary length, stout or incurved. *Column* short, without foot. *Pollinia* 2, with caudicles and viscid gland, the latter enclosed in a single pouch (bursicula).

The genus comprises of about 10 species distributed from the Himalaya to Russian Far East, and Subarctic America to North Central and Eastern USA. Two species are reported from NorthWest Himalaya (Deva and Naithani, 1986), and only one (*G. spathulata*) occurs in Himachal Pradesh.

***Galearis spathulata* (Lindl.) P. F. Hunt**, Kew Bull. 26: 172. 1971; Vij *et al.*, Orch. Him. Pradesh 73. t. 9. 2013. *Gymnadenia spathulata* Lindl., Gen. Sp. Orchid. Pl. 280. 1835. *Orchis spathulata* (Lindl.) Rchb. f. ex Benth., J. Linn. Soc. Bot. 18: 355. 1880 (*non* L.); Hook. f., Fl. Brit. India 6: 127. 1890; King & Pantl., Ann.

Roy. Bot. Gard. (Calcutta) 8: 301. t. 400. 1898; Duthie, Ann. Roy. Bot. Gard. (Calcutta) 9: 174. 1906. *Habenaria spathulata* (Lindl.) Benth., J. Linn. Soc., Bot. 18: 355. 1881. *Galeorchis spathulata* (Lindl.) Soó, Acta Bot. Acad. Sci. Hung. 12: 351. 1966. *Aorchis spathulata* (Lindl.) Verm., Jahresber. Naturwiss. Vereins Wuppertal 25: 33 (1972); Seidenfaden & Arora, Nord. J. Bot. 2: 9. 1982; Deva & Naithani, Orch. Fl. N. W. Himal. 105. t. 47. 1986. **Figs. 1a, 2a-c.**

Terrestrial herbs. *Stem* 4.5-12 cm tall with a thin underground rhizome, 2-2.5 mm thick, erect, base clothed with 1-2 loose tubular sheaths. *Roots* ca. 1 mm thick, present at irregular distances on rhizome. *Leaf* solitary, membranous, ovate to narrow-elliptical or spathulate, petiolate, blade 4-7 × 1.8-2 cm, petiole 1-2.5 cm, sometimes another small leaf present near middle of the scape. *Inflorescence* spike, short, 1-2 flowered. *Floral bracts* leaf-like, lanceolate, subacute, longer than the flower, ca. 12 × 5 mm, 5-veined, with highly intricated veinlets. *Flowers* purple or white, 1-1.3 cm across. *Sepals* subequal; the dorsal ca. 5 × 2.5 mm, ovate, subacute, connivent with the petals to form a hood; the laterals slightly longer than the dorsal, oblanceolate, subacute, spreading. *Petals* of the size of dorsal sepal, obliquely ovate, subacute. *Lip* almost equaling the sepals, ca. 5.5 × 3.5 mm, entire, margins crenulate, broadly elliptic or obovate, spotted near the base, upper surface with many shallow grooves extending from the base nearly to the apex. *Spur* small, nearly straight, about half the length of the ovary. *Column* small, 1-1.5 × 1 mm. *Pollinia* 2, pyriform, caudicles short and tapering.

Etymology

The specific name *spathulata* (Latin: spoon shaped) refers to solitary, spathulate leaf.

Type

India, Kedarkanta, Royle 55 (holo, K-LINDL).

Habitat Characteristics

Grows in alpine open grasslands (> 3500 m) individually or in groups of 2-3 plants. Grasses, *Fragaria nubicola*, *Geum elatum*, *Meconopsis* spp., *Pedicularis* spp., *Potentilla cuneata*, *Trollius acaulis* etc., comprise associated vegetation.

Flowers and Fruits

July-October.

Occurrence in Himachal Pradesh

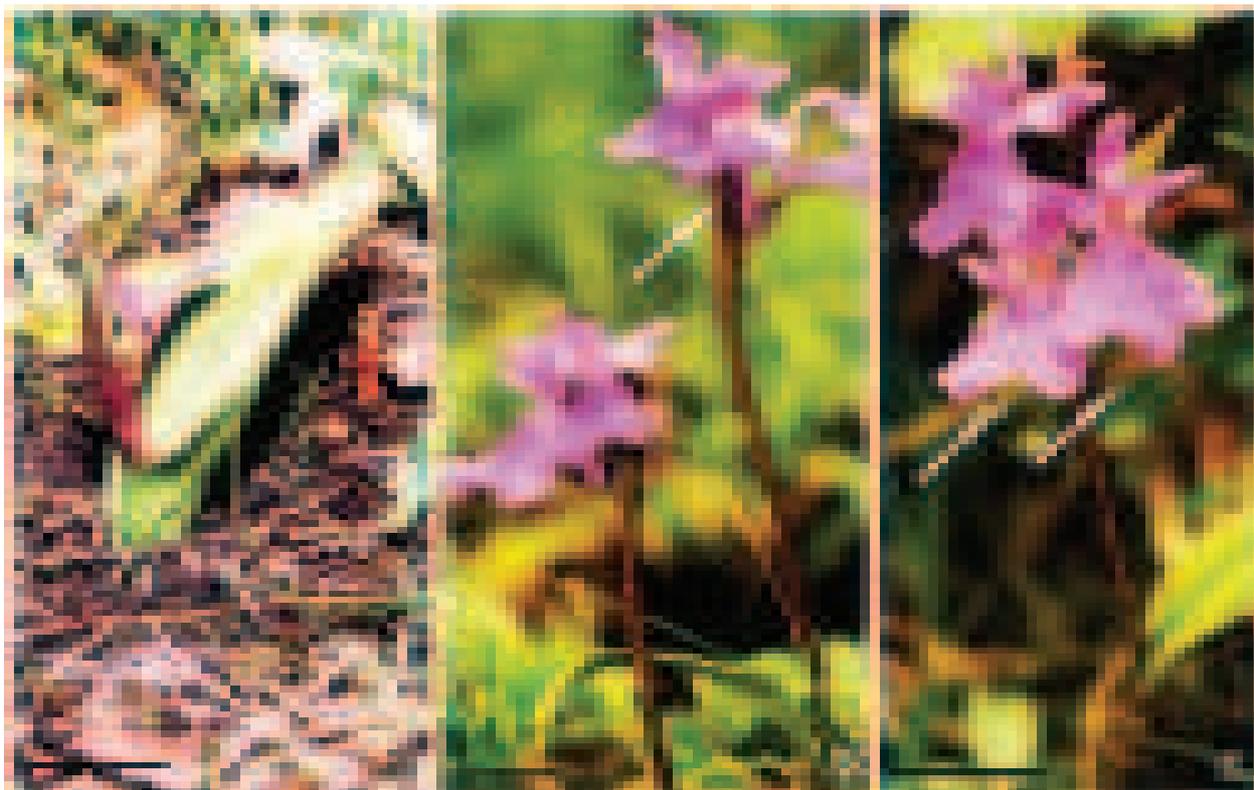


Fig. 1a-c. Genus *Galearis* Raf. and *Ponerorchis* Rchb. f. (Orchidaceae) in Himachal Pradesh: a, *Galearis spathulata* (Lindl.) P. F. Hunt; b, *Ponerorchis chusua* (D. Don) Soó (note the deeply lobed lip); c, *Ponerorchis nana* (King and Pantl.) Soó (note the shallower lip lobes). Scale bars = 1cm.

Shimla (Dodra Kanwar, Larot-Chansil pass, Rupin valley).

Voucher Specimens

Deva 3805 (DD), Nair 36118 (BSD), Vij & Verma 288 (PAN).

Distribution

India (Himachal Pradesh, Uttarakhand), Bhutan, China, Nepal.

2. *Ponerorchis* Rchb. f. Linnaea 25: 227. 1852.
Type: *Ponerorchis graminifolia* Rchb. f.

Terrestrial herbs with underground undivided tubers. *Stem* small, erect. *Leaves* 1-3. *Inflorescence* many flowered. *Floral bracts* foliaceous, more or less equaling the ovary. *Flowers* small, purple, spurred. *Sepals* and *petals* subequal, dorsal sepal forming hood with petals. *Lip* more or less 3-lobed, usually bent at or below the middle. *Column* short. *Pollinia* 2, each with caudicle and viscidium.

Ponerorchis is a genus of about 20 species distributed mainly in temperate to arctic climates, chiefly in Asia. It is represented by three species in India, all of which

are reported from NorthWest Himalaya (Deva and Naithani, 1986). Two species (*P. chusua*, *P. nana*) occur in Himachal Pradesh.

Key to Species

1. Lip deeply 3-lobed, all lobes almost equal, leaves 1-3 *P. chusua*

1'. Lip very shallowly 3-lobed, leaf 1
..... *P. nana*

***Ponerorchis chusua* (D. Don) Soó**, Acta Bot. Acad. Sci. Hung. 12: 352. 1966; Seidenfaden & Arora, Nord. J. Bot. 2: 24. 1982; Deva & Naithani, Orch. Fl. N.W. Himal. 195. t. 105. 1986; Aswal & Mehrotra, Fl. Lahaul-Spiti 587. 1999; Vij et al., Orch. Him. Pradesh 135. t. 37. 2013. *Orchis chusua* D. Don, Prodr. Fl. Nepal. 23. 1825; Hook. f., Fl. Brit. India 6: 127. 1890; King & Pantl., Ann. Roy. Bot. Gard. (Calcutta) 8: 303. t. 402. 1898; Duthie, Ann. Roy. Bot. Gard. (Calcutta) 9: 173. 1906. **Figs. 1b, 2d-f.**

Terrestrial. *Tubers* small, elliptic or oblong, 12-15 × 5 mm. *Stem* 13-20 cm long, 2-3 mm thick, with two blunt, tubular sheaths at the base. *Roots* many, 1-2 mm thick. *Leaves* 1-3, spreading, membranous, linear-oblong or linear-lanceolate, acute or acuminate, 5-8

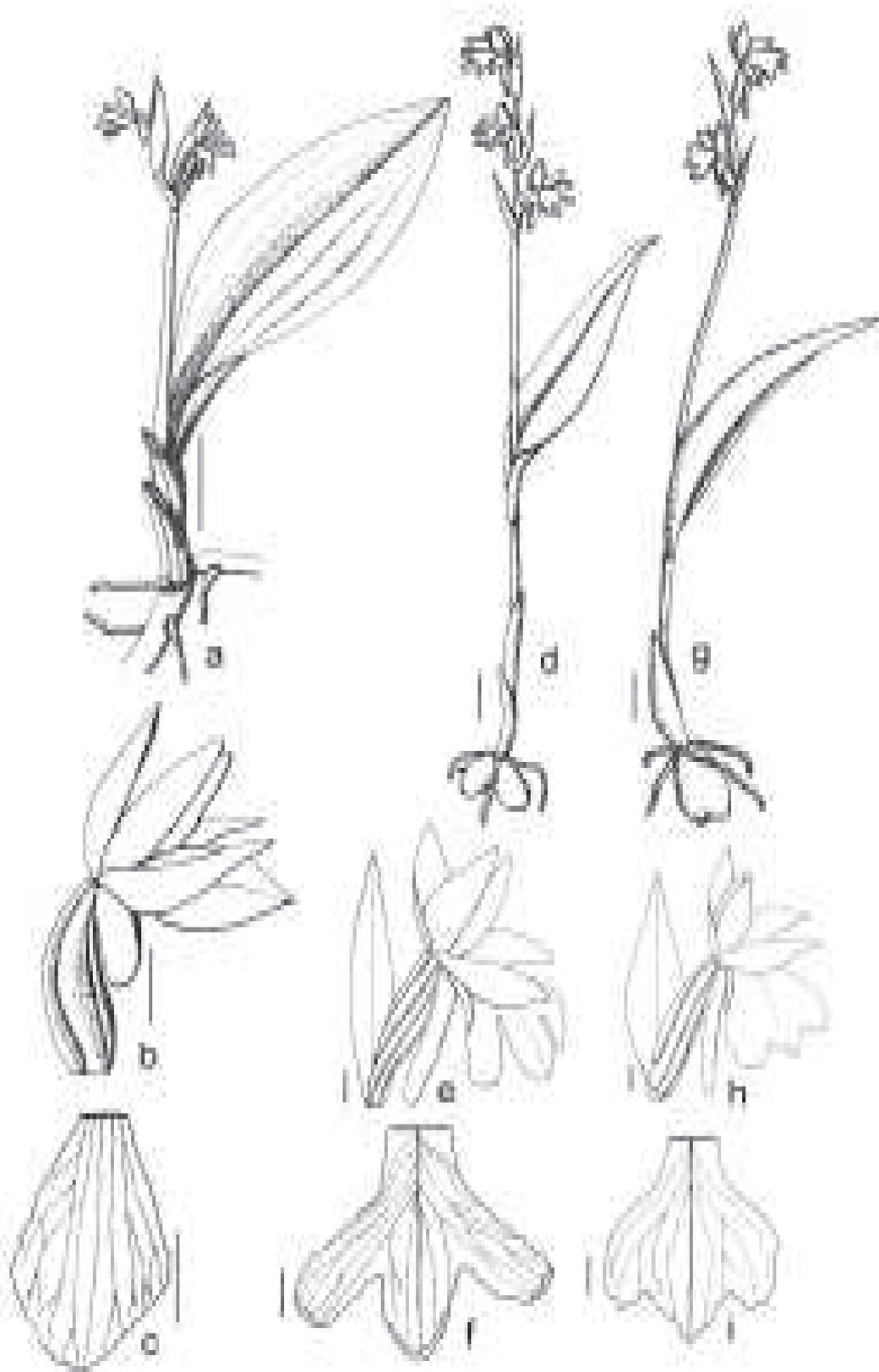


Fig. 2a-i. Genus *Galearis* Raf. and *Ponerorchis* Rchb. f. (Orchidaceae) in Himachal Pradesh. a-c, *Galearis spathulata* (Lindl.) P. F. Hunt: a, plant showing habit; b, flower; c, lip. d-f, *Ponerorchis chusua* (D. Don) Soó: d, plant showing habit; e, flower; f, lip. g-i, *Ponerorchis nana* (King and Pantl.) Soó: g, plant showing habit; h, flower; i, lip. Scale bars: a, d, g = 1cm; b, c, e, f, h, i = 2mm.

× 0.8-1.2 cm. *Inflorescence* spike, erect, 2.5-8 cm long, one or few to many flowered. *Floral bracts* lanceolate, acuminate, 15-16 × 3-4 mm, equaling or slightly longer than ovary. *Flowers* purple, 12-15 mm across. *Sepals* subequal, ca. 8 × 3 mm, oblong, obtuse; the dorsal erect; the laterals curved. *Petals* broadly and obliquely ovoid, base truncate, 8-9 × 3 mm. *Lip* longer than the sepals, 11-12 mm long, deeply 3-lobed, the lobes almost equal, oblong, obtuse, the lateral ones diverging. *Spur* stout, cylindrical, as long as and lying parallel and compressed to ovary. *Column* short, ca. 2 mm long. *Pollinia* 2, ovoid-globose, caudicles long, viscidium small, each lying in a small pouch.

Etymology

The epithet *chusua* (Latin: from Nepalese name Choo Swa) is derived from the Nepalese local name of this species.

Type

China, Yunnan, *Forrest 6464* (holo, K).

Habitat Characteristics

Grows in exposed grasslands individually or in small groups (3400-4500 m). *Gaultheria trichophylla*, *Thalictrum alpinum*, grasses, junipers, and ferns comprise the associated vegetation.

Flowers and Fruits

July-September.

Occurrence:

Chamba, Lahaul & Spiti (Rohtang pass), Sirmaur (Churdhar, Raicha).

Voucher Specimens

Aswal 10541 (BSD), Lace 1992 (DD), Vij & Verma 311 (PAN).

Distribution

India (Himachal Pradesh to Arunachal Pradesh), Nepal, Bhutan, Tibet, China.

***Ponerorchis nana* (King & Pantl.) Soó**, Acta Bot. Acad. Sci. Hung. 12: 353. 1966; Seidenfaden & Arora, Nord. J. Bot. 2: 24. 1982; Deva & Naithani, Orch. Fl. N.W. Himal. 199. t. 106. 1986; Aswal & Mehrotra, Fl. Lahaul-Spiti 588. 1999; Vij et al., Orch. Him. Pradesh 137. t. 38. 2013. *Orchis chusua* var. *nana* King & Pantl., Ann. Roy. Bot. Gard. (Calcutta) 8: 303. t. 402A. 1898. *O. nana* (King & Pantl.) Schltr., Fedde, Repert. 9: 434. 1911. *Chusua roborowskyi* (Maxim.)

Hunt var. *nana* (King & Pantl.) Hunt, Kew Bull. 26: 1976. 1971. *C. nana* (King & Pantl.) Pradhan, Ind. Orch. Guide Ident. & Cult. 2: 678. 1979; Subramani & Kapoor, Int. J. Biol. Tech. 2 (2): 8. 2011. **Fig. 1c, 2g-i.**

Terrestrial. *Tubers* oblong, ca. 12 × 5 mm. *Stem* 9-11 cm long, ca. 2 mm thick, with one or two, blunt, tubular sheaths at the base, upper portion above the leaf naked. *Roots* many, 1-2 mm thick. Leaf solitary, spreading, membranous, linear-lanceolate, acute or acuminate, 5-7 × 0.7-1.1 cm. *Inflorescence* spike, erect, 2.5-5 cm long, one to three flowered. *Floral bracts* lanceolate, acuminate, 16-18 × 4-5 mm, equaling or slightly longer than ovary. *Flowers* purple, 10-12 mm across. *Sepals* subequal, ca. 7 × 3 mm, oblong, subacute; the dorsal erect; the laterals spreading. *Petals* broadly ovoid, ca. 8 × 3 mm. *Lip* longer than the sepals, 11-12 mm long, very shallowly 3-lobed, giving an appearance of a broad truncate apex, margins crenate. *Spur* cylindrical, equal to but not compressed to ovary. *Column* short, ca. 2 mm long. *Pollinia* 2, globose, caudicles long, viscidium small, each lying in a small pouch.

Etymology

The epithet *nana* (Latin: short, small or dwarf) refers to the small sized plants of this species.

Type

India, Sikkim, *Pantling 326* (holo, CAL).

Habitat Characteristics

Grows in subalpine-alpine climates (3000- 4000 m) in exposed situations singly or in small groups. *Gaultheria trichophylla*, *Polygonum somdevae*, *Potentilla argyrophylla*, *Rhododendron anthopogon*, *Thalictrum alpinum*, grasses, junipers, and ferns comprise the associated vegetation. It usually grows sympatrically with *Ponerorchis chusua*.

Flowers and Fruits

July-September.

Occurrence

Lahaul & Spiti (Rohtang slopes), Sirmaur (Choordhar).

Voucher Specimens

Aswal 6970 (BSD), Vij & Verma 312 (PAN).

Distribution

India (Himachal Pradesh, Uttarakhand, Sikkim), Nepal.

Threat and Conservation

Anthropogenic activities at high altitude alpine habitats in Himachal Pradesh are very less as compared to subtropical and temperate zones. The only threat to orchids is overgrazing by cattle, sheep and goats. It results in uprooting of herbaceous vegetation, and increases the chances of soil erosion and land slips in affected areas. Grazing should be permitted on rotational basis (same area should not be used for this purpose during every year) so that the affected plant populations may get enough time to get established better.

References

- Aswal, B. S. and B. N. Mehrotra. 1985. *Flora of Himachal Pradesh* – Some additional notes. *Indian. J. For.*, **8** (4): 310-17.
- Aswal, B. S. and B. N. Mehrotra. 1999. *Flora of Lahaul-Spiti*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Chowdhery, H. J. and B. M. Wadhwa. 1984. *Flora of Himachal Pradesh* Vol. 3. Bot. Surv. India, Calcutta, India.
- Deva, S. and H. B. Naithani. 1986. *The Orchid Flora of North West Himalaya*. Print and Media Associates, New Delhi, India.
- Duthie, J. F. 1906. The Orchids of North-Western Himalaya. *Ann. Roy. Bot. Gard. Calcutta*, **9**: 81-211.
- Govaerts, R., M.A. Campacci, D.H. Baptista, P. Cribb, A. George, K. Krenuz, J. Wood, P. Bernet, K. Kartochvil, G. Gerlach, G. Carr, P. Alrich, A.M. Pridgeon, J. Pfahl, H. Tigges, and J. Shaw. 2015. World Checklist of Orchidaceae. Royal Botanic Garden, Kew, UK, Published on the internet; <http://apps.kew.org/wcsp/> Accessed on May 2015.
- Hooker, J. D. 1890. *Flora of British India*. Vol. 5. Reeve and Co., Kent, USA.
- Jalal, J. S., G. S. Rawat, and Y. P. S. Pangtey. 2007. *Ponerorchis nana* (King & Pantl.) Soó (Orchidaceae): A new record for Uttarakhand. *J. Bombay Nat. Hist. Soc.*, **104**(2): 249-50.
- Lucksom, S. Z. 2007. *The Orchids of Sikkim and NorthEast Himalaya*. S. Z. Lucksom, Gangtok, India.
- Murti, S. K. 2001. *Flora of Cold Deserts of Western Himalaya*. Vol. 1. (Monocotyledons). Bot. Surv. India, Calcutta, India.
- Nair, N. C. 1977. *Flora of Bashahr Himalayas*. International Bioscience Publishers, Hissar, India.
- Subramani, S. P. and K. S. Kapoor. 2011. New distributional records of two little-known orchids of Himachal Pradesh from Churdhar Wildlife Sanctuary, Sirmour district, India. *Int. J. Biol. Tech.*, **2**(2): 8-11.
- Verma, J., Kusum, K. Thakur, and S. P. Vij. 2014. Lesser known orchids of Himachal Pradesh: I - Genus *Zeuxine* Lindley. *Pleione*, **8**(1): 1-8.
- Vij, S. P., J. Verma, and C. Sathish Kumar. 2013. *Orchids of Himachal Pradesh*. Bishen Singh Mahendra Pal Singh, Dehradun, India.