

Odontochilus putaoensis (Orchidaceae), a new record and key to the genus for China

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Abstract: *Odontochilus putaoensis* X.H.Jin, L.A.Ye & A.T.Mu, a jewel orchid hitherto known only from Myanmar and Laos, is recorded from China for the first time. A detailed morphological description and a colour figure are provided, together with information on habitat, distribution and tentative conservation status. An updated identification key to the genus *Odontochilus* in China is also provided.

Keywords: Flora, Jewel orchid, Key, Taxonomy.

Introduction

Odontochilus Blume (Orchidaceae, subtribe Goodyerinae, tribe Cranichideae) includes autotrophic or rarely holomycotrophic, terrestrial or lithophytic herbs with a creeping rhizome that is cylindrical and fleshy. Species of *Odontochilus* usually have bifid epichiles and mesochiles decorated with filaments or teeth and subglobose hypochiles containing a pair of fleshy calli. In addition, their columns usually have two wings and the stigmatic lobes separate to confluent, located below rostellum (Chen *et al.*, 2009).

Odontochilus includes 70 species distributed from North India and Himalaya to Japan, Southeast Asia, and the southwestern Pacific. In China, the genus is represented by 20 species and one subspecies (seven species and one subspecies endemic), of which nine species have been found in Yunnan Province (Chen *et al.*, 2009; Pedersen, 2011; Lin *et al.*,

2016; Shaw, 2016; Tang *et al.*, 2016; Yukawa, 2016; Zhou *et al.*, 2016; Chen *et al.*, 2019; Govaerts *et al.*, 2021).

Based on floral morphology, the genus is found to be closely related to *Chamaegastrodia* Makino & F.Maek. and *Anoectochilus* Blume. Being found polyphyletic in recent molecular studies, the genus has been expanded to include *Evrardianthe* Rauschert, *Kuhlhasseltia* J.J.Sm., *Myrmechis* Blume, *Pristiglottis* Cretz. & J.J.Sm. and *Vexillabium* F.Maek. (Shaw, 2016; Yukawa, 2016; Chen *et al.*, 2019). However, a universal consensus is yet to be made in this regard with Bhattacharjee and Chowdhery (2018) who treated *Myrmechis* as a distinct genus. Even the generic assignments of various species in this genus are still unsettled. Among these, *Odontochilus poilanei* (Gagnep.) Ormerod and *O. guangdongensis* S.C.Chen, S.W.Gale & P.J.Cribb are worth noticing in this regard. Unlike most species of *Odontochilus*, they are holomycotrophic. In the molecular phylogeny of Liu (2015), they were clustered together with other species of *Chamaegastrodia*, which implies that more research is needed. Taxonomic issues pertaining members of genus *Chamaegastrodia* and *Anoectochilus* are outside the scope of the current article, hence, we follow Govaerts *et al.* (2021).

During our fieldwork in Malipo County, Yunnan Province, in November 2019, a small population of *Odontochilus* caught our attention. It was different from all known members of the genus *Odontochilus* in China. It was subsequently identified as *O. putaoensis* X.H.Jin, L.A.Ye & A.T.Mu, a species

previously recorded only from Myanmar (Aung *et al.*, 2018) and Laos (Lanorsavanh *et al.*, 2019). The population discovered in Malipo represents a new distributional record of *O. putaoensis* for China.

Materials and Methods

Voucher specimens of *O. putaoensis* were collected from Malipo, Yunnan, and deposited in the herbarium of East China Normal University (HSNU). Measurements for *O. putaoensis* from China were based on one dried specimen, field photographs, and three flowers stored in 50% ethanol. Measurements for *O. putaoensis* from Myanmar and Laos were based on literature (Aung *et al.*, 2018; Lanorsavanh *et al.*, 2019).

Taxonomic Treatment

Odontochilus putaoensis X.H.Jin, L.A.Ye & A.T.Mu, *PhytoKeys* 103: 20. 2018. *Type*: MYANMAR, **Kachin state**, Putao township, Hponkanrazi Wildlife Sanctuary, X.H.Jin *et al.* PT-ET 959 (PE, n.v.). **Fig. 1**

Vernacular name: 葡萄齿唇兰 (pu tao chi chun lan in Mandarin).

Terrestrial herbs, autotrophic, 18–60 cm long. Rhizomes creeping, cylindric, fleshy. Roots fibrous, arising from rhizome nodes. Stems ascending, terete, pubescent, 2–7-leaved, internodes 1.5–3.5 cm long. Leaves alternate, laminae ovate-lanceolate or ovate-elliptic, 2.5–9.7 × 2.5–4.2 cm, base cuneate, margins entire, apex acute, glabrous, dark green; petiole like base plus tubular sheath 1–4 cm long. Inflorescence erect, terminal, racemose, 12–16-flowered; peduncles *c.* 4 cm long, pubescent, reddish-brown, with several sterile bracts; rachis *c.* 7.5 cm long, pubescent. Pedicelled ovary cylindric, twisted, sparsely pubescent. Floral bracts ovate lanceolate, *c.* 0.8–1.2 × 0.4 cm, shorter or nearly as long as pedicelled ovary, apex long acuminate, membranous, abaxially pubescent, reddish brown. Flowers resupinate. Sepals separate. Dorsal sepal forming a hood with petals, ovate to orbicular, 6–7.5 × 3–4 mm, apex acute, abaxially pubescent, dark

greenish brown to reddish brown. Lateral sepals elliptic, oblique, 8–9 × 4–5 mm, apex acute, abaxially pubescent, dark greenish brown to reddish brown. Petals obliquely ovate-falcate, 5–7.5 × 3–4 mm, apex acute, membranous, glabrous, white or white tinted with reddish brown. Labellum T-shaped, curled up, 10–12 mm long, light yellow or white; hypochile sub globose, bi-saccate, 1.2–2 mm in diam., with central septum and a pair of lamellar calli which apically emarginate; mesochile 4–5 mm long, with pair of pectinate flanges, each flange with two or three narrow filaments, one broad tooth, narrow filaments 1.5–4 mm long, broad blade-like or triangular tooth, 1–3 mm long; epichile bi-lobed, lobes erect, diverging at obtuse angle to each other, elliptic, concave, 5–5.5 × 2–3 mm, margins entire, apex obtuse. Column stout, *c.* 1 mm long, ventrally with pair of lamellate appendages; appendages nearly axe-shaped, *c.* 1 × 1 mm; rostellum bifid, *c.* 3 mm long, apex twisted; anther acuminate in front, *c.* 4 mm long, apex twisted; pollinia two, clavate or obovate-clavate, *c.* 4 mm long; stigma lobes confluent.

Flowering & fruiting: Flowering from October to December. The plants found in Myanmar flowered in October (Aung *et al.*, 2018), and the population recorded from Laos flowered in December (Lanorsavanh *et al.*, 2019). In China, we observed the flowers at the beginning of November, but they were fading, thus we assume that the population we found also started to flower in October. Fruit not seen.

Habitat: Plants were found growing in damp places in evergreen broad leaved forests, in association with other Orchidaceae such as *Anoectochilus roxburghii* (Wall.) Lindl. and *Zeuxine nervosa* (Wall. ex Lindl.) Benth. ex Trimen, at an elevation of about 1100 m.

Distribution: China, Laos and Myanmar.

Specimen examined: CHINA, **Yunnan**, Malipo, *c.* 1130 m, 03.11.2019, H.Z. Tian & M. Sun 20191103039 (HSNU00079857).

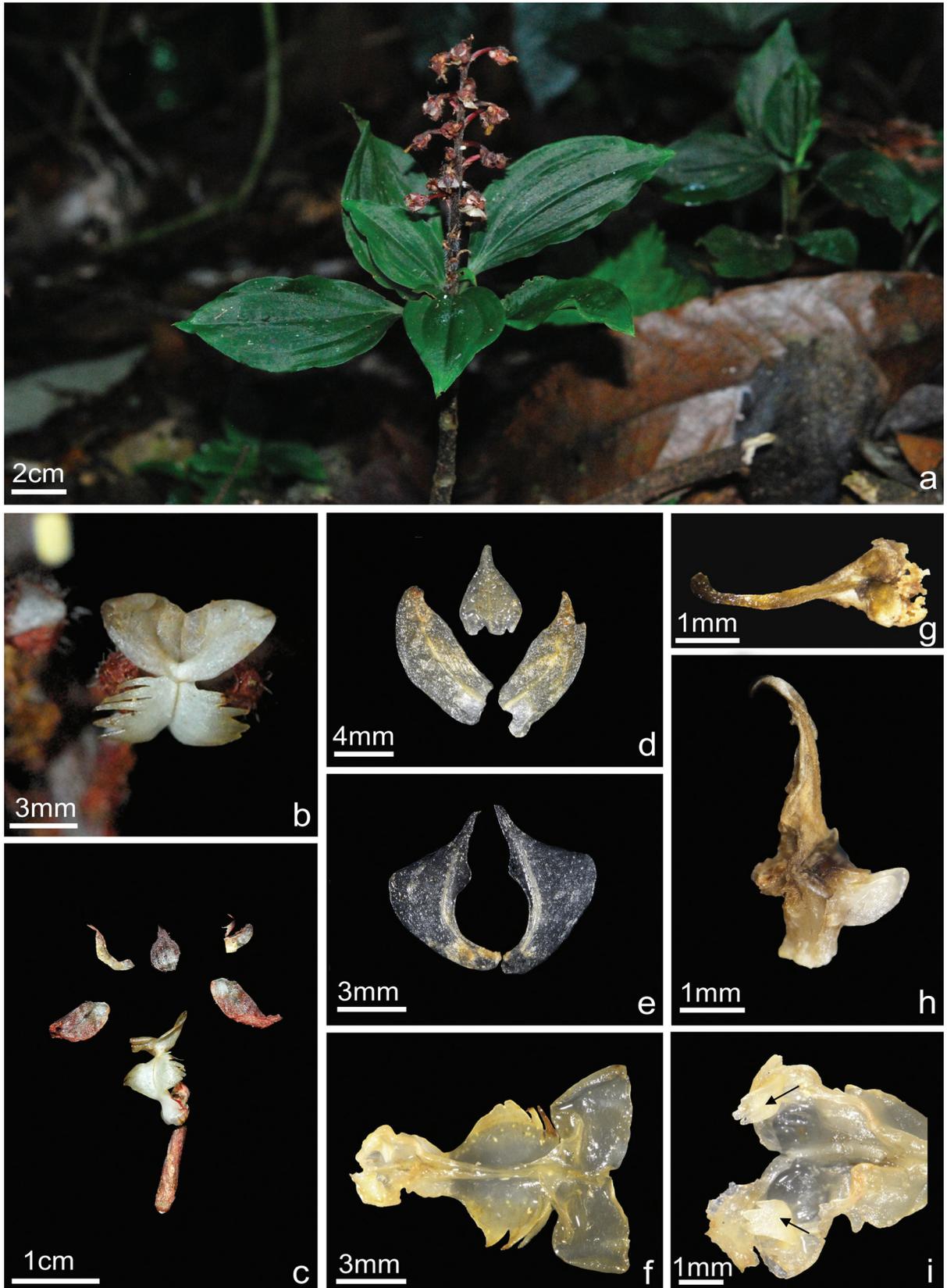


Fig. 1. *Odontochilus putaoensis* X.H.Jin, L.A.Ye & A.T.Mu: **a.** Habit; **b.** Flower (front view); **c.** Dissected flower (front view); **d.** Sepals (dorsal view); **e.** Petals (front view); **f.** Lip (front view); **g.** Pollinia; **h.** Column (lateral view); **i.** Hypochile (arrows point to the calli); Some flowers (d-i) have been soaked in 50% ethanol and are more yellow than in fresh specimens (from H.Z. Tian & M. Sun 20191103039; photos by H.Z. Tian & M. Sun).

Conservation status: Including the site in Malipo County, China, three populations of this species have been discovered so far. The first population being in the Hponkanrazi Wildlife Sanctuary in Putao township, Myanmar, which was reported to contain *c.* 200 mature individuals (Aung *et al.*, 2018). The second population was found in Laos in Phou Chom Voy Provincial Protected Area with 15 mature individuals (Lanorsavanh *et al.*, 2019). The population found in Malipo County, China, comprised around 20 mature individuals and is located outside the protected area and in close vicinity of a village. Hence, the known overall population size comprised of around 235 mature individuals. However, owing to such a disjunct distribution range, the species is likely to occur in similar habitats in intervening regions. To ascertain this, extensive fieldwork is needed. Due to these limitations, the species is assessed as Data Deficient [DD] following the IUCN guidelines (IUCN, 2019).

Notes: The individuals from China and Laos both have milky white lips (Lanorsavanh *et al.*, 2019), whereas the ones from Myanmar have light yellow lips. The plants we observed and the ones reported from Laos were found at the end of the flowering period, whereas the ones in Myanmar were in full bloom, hence this variation may be a result of the maturity state of the flowers. Most species of *Odontochilus* have white lips with pale green or yellow pectinate flanges, some others have yellow lips, such as *O. lanceolatus* (Lindl.) Blume and *O. clarkei* Hook.f.. Therefore, it is unclear whether the variable lip colours of *O. putaoensis* may be attributable to intraspecific genetic variation, different microhabitat conditions and/or different stages of maturity of the flowers. More studies are required here.

Key to the species of *Odontochilus* in China

1. Plants holomycotrophic, leafless 2
1. Plants autotrophic, leafy 4

2. Flowers resupinate; lip white *O. saprophyticus*
2. Flowers not resupinate; lip orange or light yellow 3
3. Dorsal sepal *c.* 7 × 4 mm; lip orange–yellow, with a pair of elongate introrse lobules at the epichile lobes *O. poilanei*
3. Dorsal sepal *c.* 4 × 2 mm; lip light yellow, without a pair of elongate introrse lobules at the epichile lobes *O. guangdongensis*
4. Flowers non-resupinate *O. napoensis*
4. Flowers resupinate 5
5. Sepals connate in their basal part; column without lamellate appendages 6
5. Sepals separate; column with a pair of lamellate appendages 7
6. Sepals shallowly connate at the base *O. yakushimensis*
6. Sepals connate for about half of their length *O. nakaianus*
7. Leaves usually less than 1.5 cm in length; anther apex not twisted 8
7. Leaves usually more than 1.5 cm in length; anther apex twisted 12
8. Epichile entire, occasionally slightly emarginate; calli subquadrate 9
8. Epichile obviously bifid; calli transversely elliptic or sub-oblong 10
9. Petals ovate; lip *c.* 5 mm long, epichile obcordate or obovate, 1–1.5 mm wide *O. chinensis*
9. Petals ovate-oblong; lip *c.* 7 mm long, epichile transversely oblong to obtriangular, 3–3.5 mm wide *O. japonicus*
10. Sepals 8–9 mm long; petals oblique; lip 10–12 mm long; calli suboblong, bidentate *O. drymoglossifolius*
10. Sepals 5–7 mm long; petals not oblique; lip 7–8 mm long; calli transversely elliptic, apex obtuse, truncate or slightly concave 11

- 11. Petals broadly ovate, urceolate, *c.* 3.5 mm wide; mesochile entire *O. urceolatus*
- 11. Petals oblanceolate-oblong, *c.* 2 mm wide; mesochile serrulate *O. pumila*
- 12. Leaves less than 2 cm long 13
- 12. Leaves more than 2 cm long 14
- 13. Lip without reddish purple spots, mesochile with short irregular teeth *O. crispus*
- 13. Lip with reddish purple spots, mesochile with fimbriate filaments *O. nanlingensis*
- 14. Lip curved upwards *O. putaoensis*
- 14. Lip stretched forward 15
- 15. Lip yellow 16
- 15. Lip white or light yellow 18
- 16. Ovary pubescent; sepals and petals with a deep purplish red stripe on each side of mid-vein; lip yellow tinted with purplish red *O. clarkei*
- 16. Ovary glabrous or pubescent in its distal part; sepals yellowish green; petals whitish green; lip yellow 17
- 17. Without two flesh appendages on either side of the column; rostellum bifid *O. lanceolatus*
- 17. With two flesh appendages on either side of the column; rostellum twisted *O. bisaccatus*
- 18. Sepals and petals with conspicuous dark-green or brownish-green patches *O. tashiroi*
- 18. Sepals and petals without patches or with weaker dark-green patches 19
- 19. Sepals and petals without patches; mesochile margin with slender filaments *O. elwesii*
- 19. Sepals and petals with weak dark-green patches; mesochile margin with short and wide irregular teeth 20
- 20. Ovary apex straight; lateral sepals spreading *O. tortus*
- 20. Ovary apex downcurved; lateral sepals not spreading 21

- 21. Sepals and petals with dark green tessellation; mesochile have short irregular teeth *O. brevistylis*
- 21. Sepals and petals without dark green tessellation; mesochile have long fringes *O. brevistylis* subsp. *candidus*

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