

中国合耳菊属(菊科-千里光族)两新记录种

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摘要: 首次报道了红脉合耳菊 [*Synotis rufinervis* (DC.) C. Jeffrey & Y. L. Chen] 和须弥合耳菊 [*S. kunthiana* (Wall. ex DC.) C. Jeffrey & Y. L. Chen] (菊科-千里光族) 在中国的分布记录。两种植物都在中国西藏南部有分布。提供了它们的详细形态描述、形态特征图及其在中国的地理分布, 同时报道了两种植物的花药领构型和花药内壁细胞增厚方式。

关键词: 菊科; 新记录; 合耳菊属; 分类学

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Two Newly Recorded Species of *Synotis* (Asteraceae-Senecioneae) in China

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Abstract: Two species of the genus *Synotis* (Asteraceae-Senecioneae), *S. rufinervis* (DC.) C. Jeffrey & Y. L. Chen and *S. kunthiana* (Wall. ex DC.) C. Jeffrey & Y. L. Chen, are reported from China for the first time. In China, both species are currently known only from southern Xizang (Tibet). We provide descriptions, illustrations and distributional map in China for the two species. Two important floral micromorphological characters, anther-collar configuration and anther endothelial tissue cell wall thickenings, are also given for the two species.

Key words: Asteraceae; New record; *Synotis*; Taxonomy

Synotis (C. B. Clarke) C. Jeffrey & Y. L. Chen (Asteraceae-Senecioneae) is a genus of about 56 species endemic to the Sino-Himalayan region except for *S. atractylidifolia* (Y. Ling) C. Jeffrey & Y. L. Chen, which occurs in northern China^[1-6]. For China 45 species have been recorded in the genus^[1,5-6].

During a botanical expedition in Xizang (Tibet), China, in 2013, we collected two species of *Synotis* previously not recorded to occur in China, *S. rufinervis* (DC.) C. Jeffrey & Y. L. Chen and *S. kunthiana* (Wall. ex DC.) C. Jeffrey & Y. L. Chen. Here we provide descriptions and illustrations of the two species, and

report two important floral micromorphological characters, anther-collar configuration and anther endothelial tissue cell wall thickenings, for the two species.

1 Materials and methods

For observation of the anther-collar and anther endothelial cell wall thickenings of *Synotis rufinervis* (voucher: M. Tang & C. Ren 530, IBSC) and *S. kunthiana* (voucher: M. Tang & C. Ren 485, IBSC), heads were boiled in distilled water for 3 min, and then fixed in Carnoy's solution (glacial acetic acid:

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absolute ethanol = 1 : 3). Mature disc florets removed from the fixed heads were dehydrated in 70% ethanol for 30 min, then placed in 99% ethanol for 1 h before they were treated with 5% NaOH overnight. The anther tissue was isolated from the florets on the slide, flooded with 50% glycerol and a cover slip was applied. Samples were then examined at 100 × (anther-collar) and 400 × (endothelial cell wall thickenings) magnification by light microscopy and photographed.

2 Taxonomic treatment

2.1 *Synotis rufinervis* (DC.) C. Jeffrey & Y. L. Chen, *Kew Bull.* **39**: 288. 1984. — *Senecio rufinervis* DC., *Prodr.* **6**: 369. 1838. — Type: Northwestern India, *Blinkworth* (syntype, G–DC; isosyntype, K–W 3115!; isosyntype, P!); *Gerard* (syntype, G–DC; isosyntype, K–W 3115!). Fig. 1: A, Fig. 2

Perennial rhizomatous shrubby herb. Stem erect, up to 150 cm tall, glabrescent when old, simple, leafless in lower part at flowering time. Leaves petiolate, broadly oblong-elliptic, 10–13 cm long, 6–10 cm broad, acuminate, finely to coarsely mucronulate-serrate, attenuate at the base, papyraceous, sparsely to densely pubescent-setulose above, pubescent on the veins, densely whitish arachnoid-tomentose beneath, reddish-villose on the veins, pinnately veined, lateral veins 6–9, arcuate-ascending; petioles 2–3 cm long, often auriculate at the base, upper leaves smaller. Capitula radiate, usually 20–30 in dense rounded axillary and terminal glomeruliform corymbs; peduncles short, ca. 5 mm long, densely whitish arachnoid-tomentose, bearing a few linear or linear-subulate bracts. Involucres narrowly campanulate, 3.5–4.5 mm long, 1.5–2 mm broad, calyculate; bracts of calyculus ca. 5, linear-lanceolate, 2–3 mm long,



Fig. 1 Specimens of two species of *Synotis*. A: *S. rufinervis*, Gyirong, Xizang, China, M. Tang & C. Ren 530 (IBSC); B: *S. kunthiana*, Nyalam, Xizang, China, M. Tang & C. Ren 485 (IBSC).

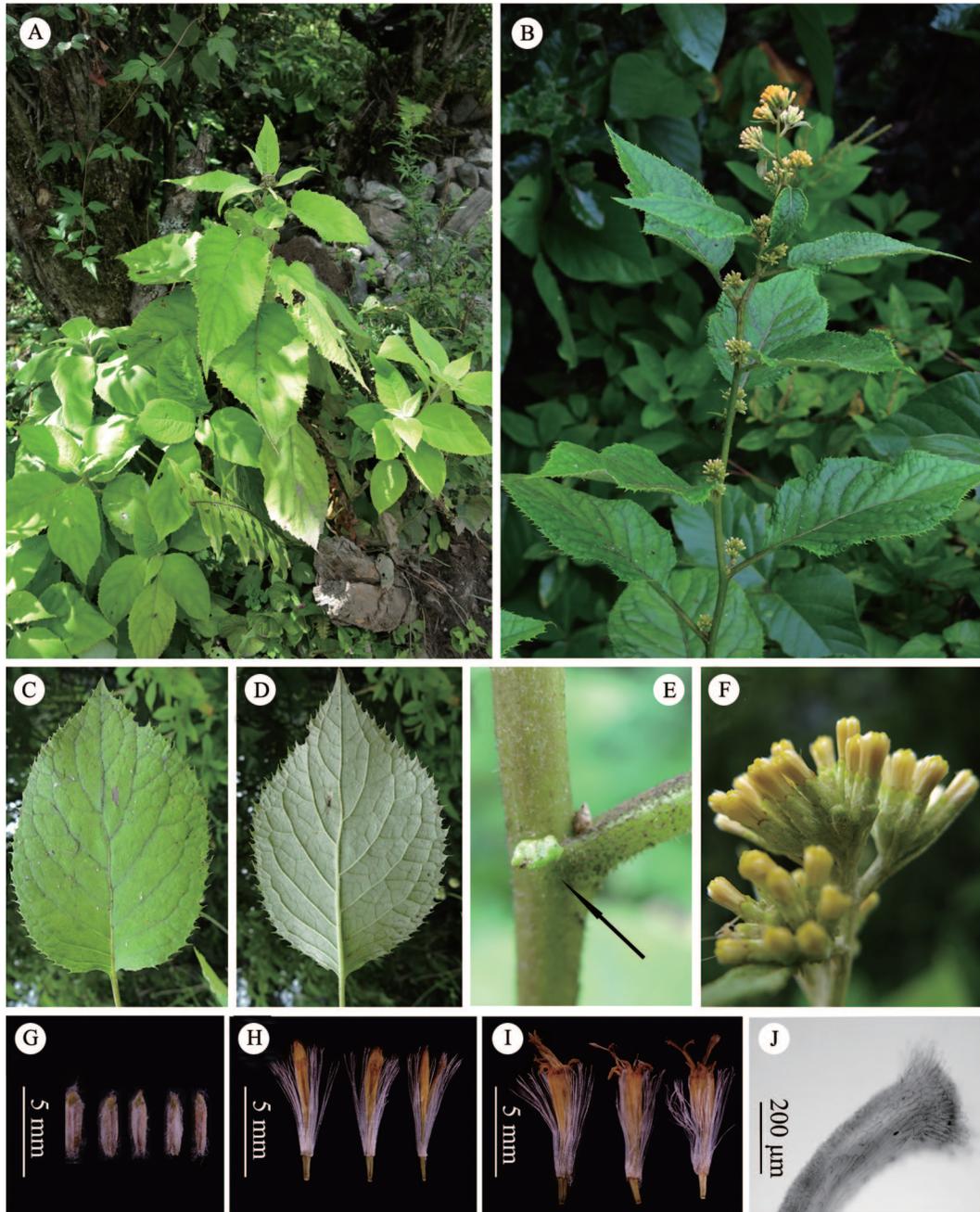


Fig. 2 *Synotis rufinervis*. A: Habitat; B: Habit; C: Leaf, adaxial side; D: Leaf, abaxial side; E: Detail of auricle; F: Capitula; G: Involucral bracts; H: Ray-florets; I: Disc-florets; J: Style-arm. All from M. Tang & C. Ren 530 (IBSC).

acuminate; phyllaries 5, rarely 6, linear-lanceolate, 1–2 mm broad, obtuse to acute, herbaceous with scarious margins, densely white arachnoid-tomentose. Ray-florets 2 or 3; corolla-tube about 1 mm long; rays yellow, 2 or 3, ca. 5 mm long, ca. 1 mm broad, 2–3-denticulate, 3 or 4-veined; disc-florets 3 or 4; corolla yellow, ca. 6 mm long, with ca. 2 mm long tube and infundibuliform limb; lobes ovate-oblong, 3–3.5 mm long, acute. Anthers ca. 2.5 mm long; anther-tails

slightly exceeding the anther-collars; appendages ovate-oblong; anther-collars slightly dilated at the base. Style-arms ca. 1 mm long, fringed with short papillae, apical tuft not evident. Achenes cylindrical, ca. 1 mm long, glabrous. Pappus ca. 5 mm long, white.

Floral micromorphology: The anther-collar is balusterform, being basally dilated and consisting of larger cells (Fig. 3: A). The anther endothelial cell wall thickenings are distributed along all the inner

walls, and thus are radial (Fig. 3: C). The findings agree with reports for other species of *Synotis*^[1,5-6].

Phenology: Flowering September to November; fruiting December.

Distribution: China (southern Xizang) (Fig. 4), northwestern India, Nepal.

Habitat: Margins of open mixed forests, grassy slope or bushes at 2700–3100 m above sea level.

Additional specimens examined. China. Xizang: Gyirong, M. Tang & C. Ren 530 (IBSC), Y. S. Chen et al. 605 (PE), Z. C. Ni et al. 2397 (PE).

Notes: *Synotis rufinervis* is similar to *S. yakoensis* (J. F. Jeffrey) C. Jeffrey & Y. L. Chen in habit and in leaf texture, indumentum and venation, but differs by the broader leaf blade (6–10 cm vs. 4–5 cm), smaller involucre (1.5–2 mm vs. 2.5–3.5 mm) and fewer disc-florets (3 or 4 vs. 8–12).

Jeffrey and Chen^[1], and Chen^[2] divided *Synotis* into two well-marked sections, sect. *Synotis* and sect. *Atractylidifoliae* C. Jeffrey & Y. L. Chen; all but one of the species (*S. atractylidifolia*) fall within the former, which itself is divisible into five not very clearly differentiated series. *Synotis rufinervis*, with its stems erect, leafy, inflorescences corymbose, style-arms fringed with short papillae, and capitula heterogamous, can be readily referred to ser. *Erectae* (C. B. Clarke) C. Jeffrey & Y. L. Chen.

2.2 *Synotis kunthiana* (Wall. ex DC.) C. Jeffrey & Y. L. Chen, Kew Bull. **39**: 288. 1984. — *Senecio kunthianus* Wall. ex DC., Prodr. **6**: 369. 1838. Type: Northwestern India, *Blinkworth* (syntype, BM, G-DC; isosyntype, K-W 3118!); *Gerard* (syntype, G-DC; isosyntype, K-W 3118!) Fig. 1: B, Fig. 5

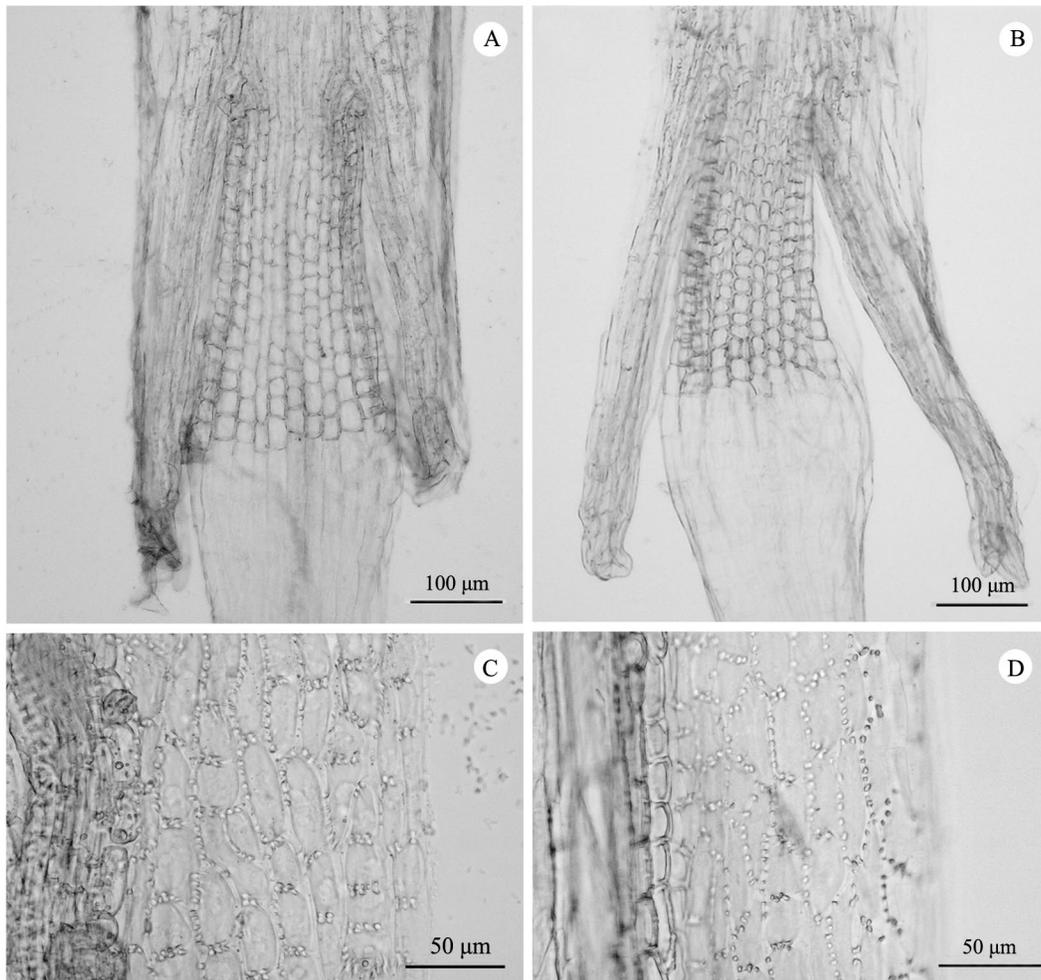


Fig. 3 Anther-collar (A, B) and anther endothelial cell wall thickenings (C, D) of *Synotis rufinervis* (A, C) and *S. kunthiana* (B, D). A and C from M. Tang & C. Ren 530 (IBSC) from Gyirong, Xizang, China; B and D from M. Tang & C. Ren 485 (IBSC) from Nyalam, Xizang, China.

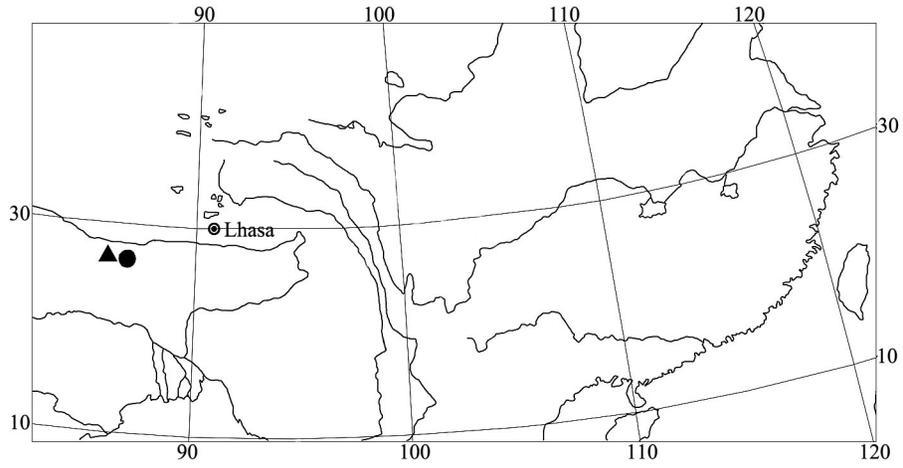


Fig. 4 Distribution in China of *Synotis rufinervis* (▲) and *S. kunthiana*(●)

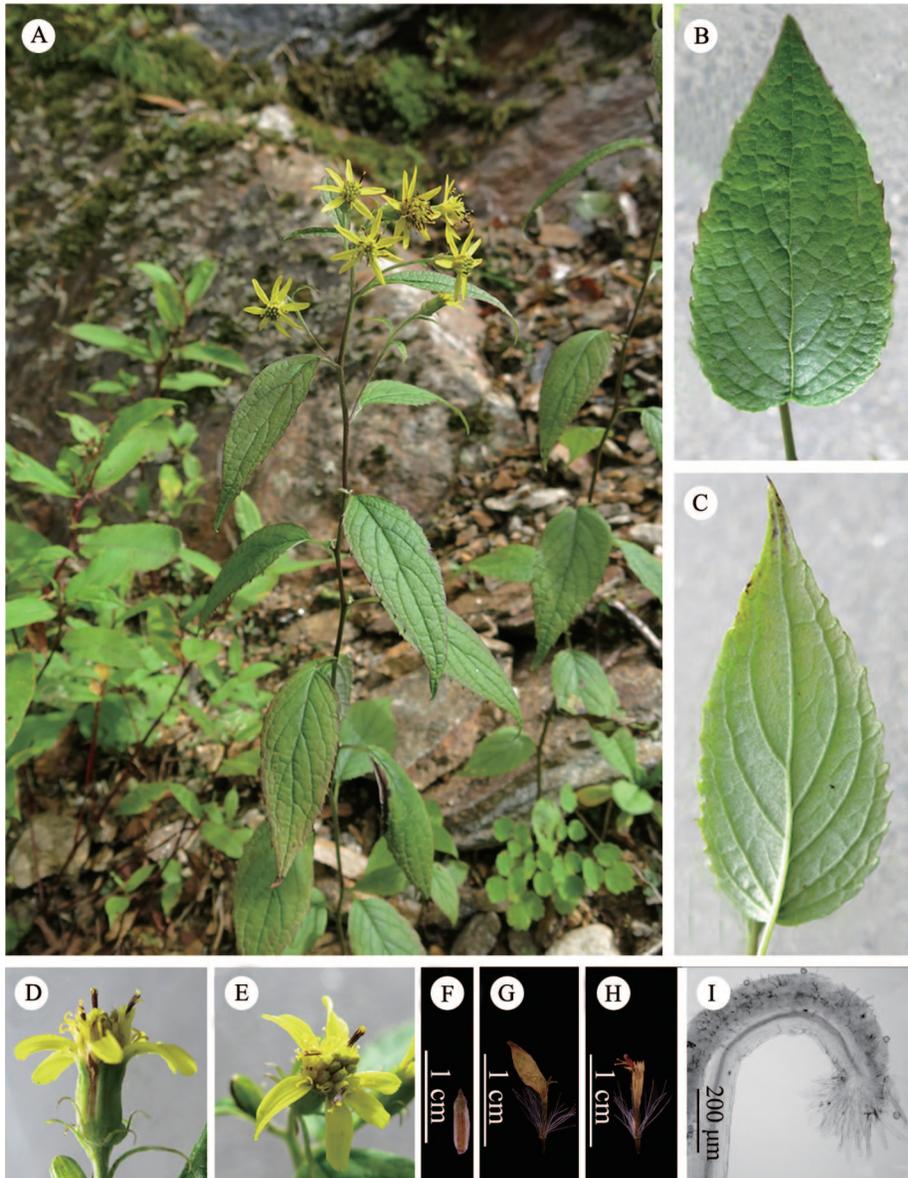


Fig. 5 *Synotis kunthiana*. A: Habitat and habit; B: Leaf, adaxial side; C: Leaf, abaxial side; D: Capitulum, lateral view; E: Capitulum, top view; F: Involucre bract; G: Ray-floret; H: Disc-floret; I: Style-arm. All from M. Tang & C. Ren 485 (IBSC).

Perennial rhizomatous herb. Stem solitary, erect, up to 50 cm tall, glabrous, leafless in lower part at flowering time, shortly branching in the inflorescence. Leaves petiolate, oblong-elliptic, 6–10 cm long, 2.5–3.5 cm broad, acuminate, coarsely mucronulate-serrate, attenuate at the base, exauriculate, papyraceous, subglabrous above, densely whitish arachnoid-tomentose beneath, pinnately veined, lateral veins 4, rarely 5, ascending; petioles 1–1.5 cm long; upper leaves smaller. Capitula radiate, usually 4–25 in terminal compound corymbs on the inflorescence-branches; peduncles 2.5–3.5 cm long, bearing a linear bract or bracteole. Involucres campanulate, 8–10 mm long, 4–6 mm broad, calyculate; bracts of calyculus ca. 10, linear-lanceolate, 6–8 mm long, acuminate; phyllaries 8–13, linear-lanceolate, 1–2 mm broad, obtuse to acute, herbaceous with scarious margins. Ray-florets 6–8; corolla-tube 3–4 mm long; rays yellow, 4–5 mm long, 1.5–2 mm broad, 2–3-denticulate, 3–4-veined; disc-florets 15–24; corolla yellow, 7–10 mm long, with 3–4 mm long tube and infundibuliform limb; lobes ovate-oblong, 3–4 mm long, acute. Anthers 3–3.5 mm long; anther-tails ca. 1.5 times the length of the anther-collars; appendages ovate-oblong; anther-collars slightly dilated at the base. Style-arms ca. 1 mm long, fringed with short papillae, the apical tuft evident and longer than the laterals. Achenes cylindrical, 2–3 mm long, glabrous. Pappus ca. 7 mm long, white.

Floral micromorphology: The anther-collar is balusterform, being basally dilated and consisting of larger cells (Fig. 3: B). The anther endothelial cell wall thickenings are distributed along all the inner walls, and thus are radial (Fig. 3: D). The findings agree with reports for other species of *Synotis*^[1,5–6].

Phenology: Flowering July to September; fruiting October.

Distribution: China (southern Xizang) (Fig. 4), northwestern India, Nepal, Pakistan.

Habitat: Growing at the mountain slope along the roadside.

Additional specimens examined: China. Xizang: Nyalam, M. Tang & C. Ren 485 (IBSC).

Notes: *Synotis kunthiana*, with its stems leafy, inflorescences corymbose, more or less flat-topped, and style-arms fringed with short papillae, can be readily referred to ser. *Fulvipapposae* C. Jeffrey & Y. L. Chen. Within the series it is distinguished by the leaves oblong-elliptic and abaxially densely whitish arachnoid-tomentose and by the larger, radiate capitula.

It should be noted that the plants of *Synotis kunthiana* we discovered in Xizang are different from those from India, Nepal and Pakistan in the number of phyllaries (8–13 vs. 5–8) and of disc-florets (15–24 vs. 6–10), although they perfectly match with each other in other characters.

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