



***Oreocharis glandulosa*, a new species of Gesneriaceae from southern Yunnan, China**

YUN-HONG TAN*, JIAN-WU LI, BO PAN, BIN WEN, JIAN-TAO YIN & QIANG LIU

Key Laboratory of Tropical Forest Ecology, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Menglun, Mengla, Yunnan 666303, China;

* Author for correspondence. E-mail: tyh@xtbg.org.cn

Abstract

Oreocharis glandulosa, a new species of Gesneriaceae from southern Yunnan, China, is here described and illustrated. It is similar to *O. bodinieri* in its corolla shape, but can be easily distinguished by its dense glandular pubescence on the outside of the corolla, the limb distinctly two-lipped, the adaxial lip bilobed to near base, the lobes ovate to triangular-ovate, the abaxial lip trilobed to the base, the included stamens, the glabrous anther connectives and the ring-like, glabrous, entire or subentire disc.

Introduction

Evolutionary relationships revealed by recent molecular phylogenetic analyses (Möller *et al.* 2009, 2011a) have led to considerable realignment of the taxonomy of Old World Gesneriaceae (Möller *et al.* 2011b, Puglisi *et al.* 2011, Wang *et al.* 2011, Weber *et al.* 2011a, 2011b, 2011c). One of the most drastic changes is the new delimitation and expansion of *Oreocharis* Benth. in Bentham & Hooker (1876: 1021) by Möller *et al.* (2011b). Previous to that study, *Oreocharis* was a genus of ca. 28 species distributed mainly in southern China (Wang *et al.* 1998, Weber 2004). Based on molecular data and a morphological evaluation, Möller *et al.* (2011b) demonstrated that the traditionally defined *Oreocharis* was phylogenetically intertwined with ten small and sometimes monospecific Chinese genera: *Ancylostemon* Craib (1919: 233), *Bournea* Oliver (1894: 2254), *Briggsia* Craib (1919: 236), *Dayaoshania* Wang (1983: 319), *Deinocheilos* Wang (1986: 1), *Isometrum* Craib (1919: 250), *Opithandra* Burt (1956: 162), *Paraisometrum* Wang (1997: 431), *Thamnocharis* Wang (1981: 485) and *Tremacron* Craib (1918: 217). Phylogenetic analyses resulted in a strongly supported monophyletic group including all these genera, and the results suggested that floral characters are highly homoplasious and are thus unsuitable for generic delimitation in Gesneriaceae (as also found in other lineages of the family such as the *Chirita*-alliance (Wang *et al.* 2011) and the genus *Streptocarpus* (Christenhusz 2012)). Möller *et al.* (2011b) expanded the genus *Oreocharis* to include the genera mentioned above, raising the total number of species in this genus to ca. 80 and making the genus one of the most morphologically diverse among Old World Gesneriaceae.

During our floristic surveys of southern Yunnan between 2011 and 2012 some new species were discovered and described (Tan *et al.* 2012), and we also collected a specimen of *Oreocharis* that morphologically did not match any of the known species. This specimen differed in having a corolla that is densely glandular puberulent outside, its limb distinctly two-lipped, stamens included, glabrous anthers connective glabrous and a ring-like entire to subentire disc. Based on a detailed examination of the morphological and anatomical characters of this plant and possible relatives (Li 1983, Pan 1987, Wang *et al.* 1990, 1998, Li & Wang 2004, Liu *et al.* 2012), we conclude that it is a new species which we hereby describe and illustrate.

Taxonomic treatment

Oreocharis glandulosa Y.H.Tan & J.W.Li, *sp. nov.* (Fig. 1–2).

Species Oreocharis bodinieri affinis, sed corolla dense indumento pedunculi obtectae extra, limbo distincte bilobata, adaxial labio bilobata ad prope basim; stamina includitur; antherae connectiva glabro; disco annularis similis, glaber, integris vel subintegro differt.

Type:—CHINA. Yunnan: Lancang, shady humus-rich hillsides and damp rocks under evergreen broad leaved forests, 1600m, 22° 35' 28.17" N, 99° 58' 55.92" E, 7 September 2012, *Yun-Hong Tan 6925* (holotype HITBC!, isotype HITBC!).

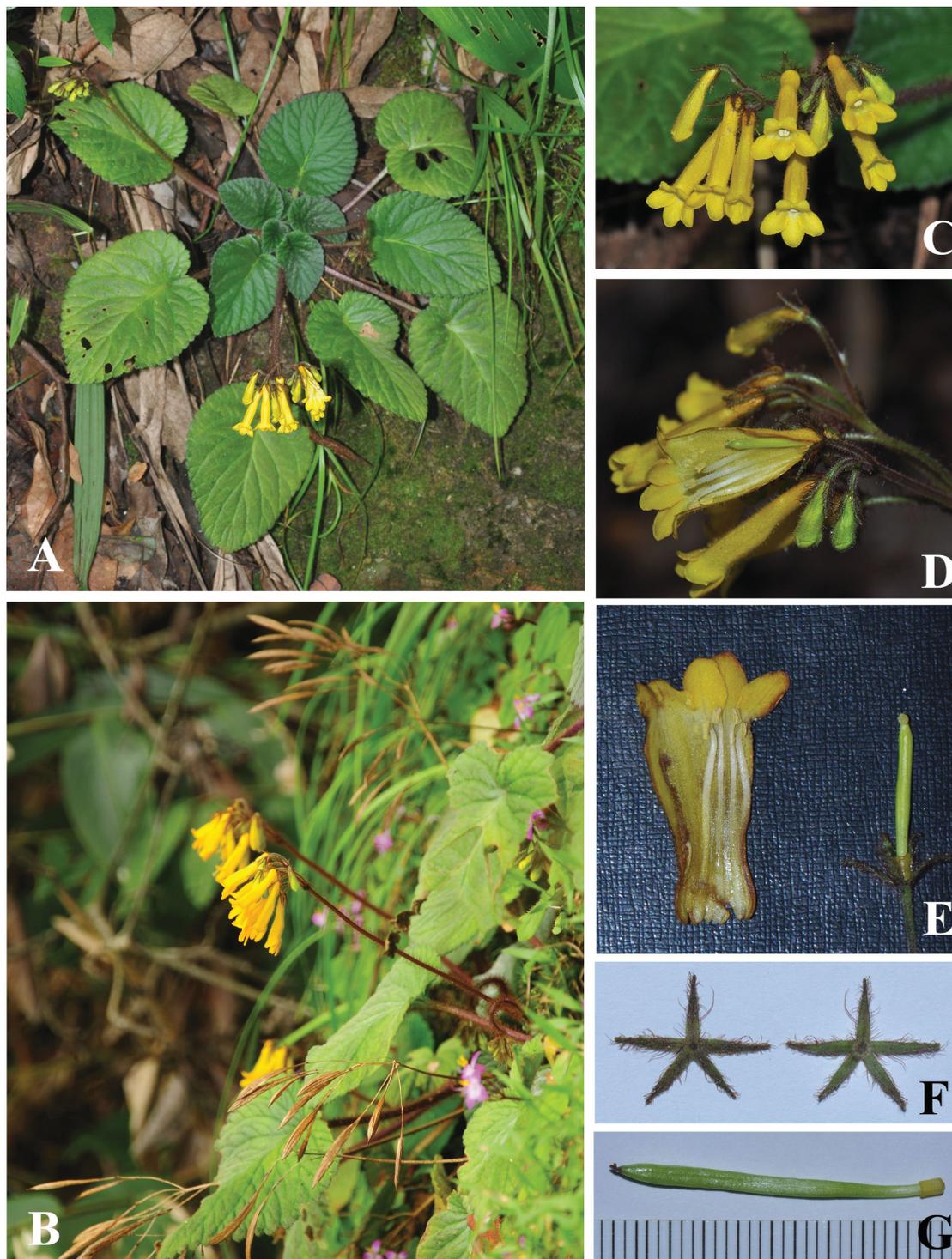


FIGURE 1. *Oreocharis glandulosa* (from the type locality). **A, B.** Habitat. **C.** Flower. **D.** Opened corolla showing stamens. **E.** Opened corolla, calyx and pistil with disc. **F.** Calyx. **G.** Young fruit with disc. Photographs by Yun-Hong Tan & Jian-Wu Li.

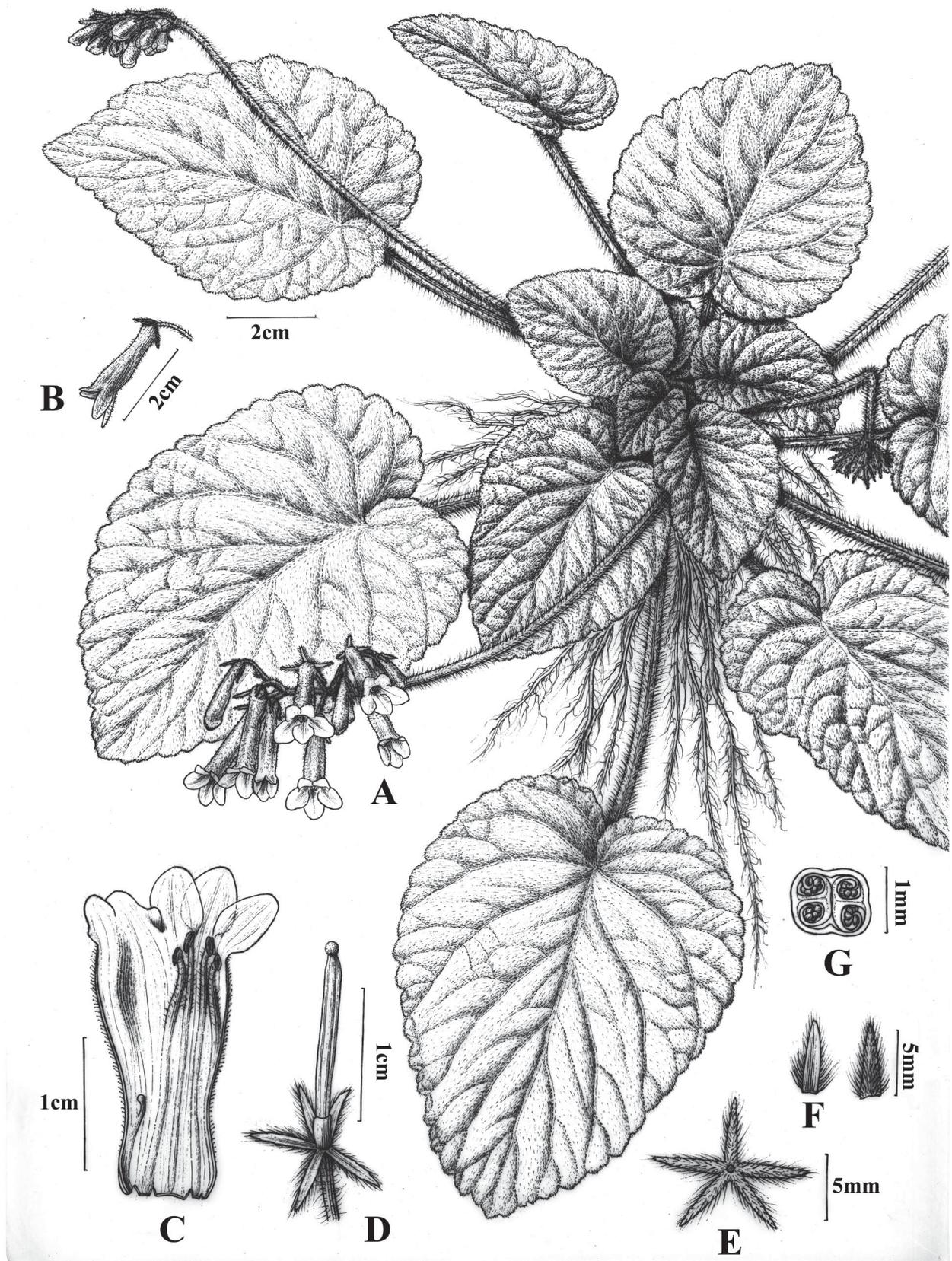


FIGURE 2. *Oreocharis glandulosa*. A. Habitat. B. Flower. C. Opened corolla. D. Calyx and pistil with disc. E. Calyx. F. Bracts. G. Cross section of ovary. Illustration by Yun-Xi Zhu based on the holotype.

Perennial, stemless herbs. Rhizomes subterete, 1.8–2.0 cm long, 1 cm in diameter. Leaves basal, 8–13, petiolate; petioles terete, 3–13 cm long, 2–4 mm in diameter, densely villous with brown segmented hairs, ca. 3–4 mm; leaf blades papery when dry, cordate to broadly ovate, 3.5–11.5 × 2.5–9.0 cm, bases cordate, margins double crenate to serrate, apices acute to rounded, adaxially densely appressed pubescent, abaxially densely brown villous along veins, hairs ca. 3–4 mm; lateral veins 6–7 on each side of midrib, distinct, concave adaxially, prominent abaxially. Inflorescences cymose, axillary, 3–4-branched, 4–16(–20)-flowered; peduncles 7.0–19.5 cm long, ca. 2 mm in diameter, with densely brown segmented hairs, ca. 3–4 mm; bracts 2, ca. 3–5 × 1.0–1.2 mm, narrowly lanceolate to lanceolate, margins entire, with densely brown segmented hairs outside, hairs ca. 2–3 mm; bracteoles similar but smaller; pedicels 0.8–2.3 cm long, ca. 1 mm in diameter, with densely brown segmented hairs, hairs ca. 2–2.5 mm. Calyx actinomorphic, 4.5–6.5 × ca. 1.0 mm, 5-parted nearly to the base, slightly unequal, lobes linear-lanceolate, with densely brown segmented hairs outside and glabrous inside, margins entire or 2–3-denticulate. Corolla yellow 2.0–2.5 cm long, outside densely glandular puberulent and inside glabrous; tube nearly cylindric, gradually slightly ampliate from base to mouth, 1.5–1.8 cm × ca. 4.0–5.5 mm; limb distinctly two-lipped, adaxial lip bilobed to near base, lobes ovate to triangular-ovate, ca. 3.5–4.0 × 3.0–3.5 mm; abaxial lip trilobed to base, lobes ovate, ca. 6.0–6.5 × 4.0–4.5 mm. Stamens 4, adnate to corolla 4.5–5.0 mm above base, included; filaments ca. 13.5–14.5 mm long, slender, sparsely pubescent, free; anthers oblong, ca. 1.5–2.0 × 0.8–1.0 mm, two-loculed, dehiscing longitudinally, connective glabrous; staminode 1, glabrous, ca. 3.0–3.5 mm long, adnate to corolla 4 mm above base. Disc ring like, ca. 2.0–2.5 mm high, glabrous, entire or subentire. Pistil ca. 1.2–1.9 cm, glabrous; ovary ca. 1.2–1.6 cm long, ca. 1 mm in diameter, style ca. 2 mm long; stigma 1, capitate, orbicular, ca. 0.8–1.0 mm in diameter. Capsules 4-angled or subterete, ca. 4 cm long and 3 mm in diameter, glabrous.

Distribution, habitat and ecology:—*Oreocharis glandulosa* is only known from southern Yunnan and grows on shady, humus-rich hillsides and rocks in the understory of evergreen broad leaved forests or on valley cliffs, elevation ca. 1600–1800 m. The main companion species are: *Rhynchanthus beesianus* W.W.Sm., *Hedychium spicatum* Smith, *Peristylus calcaratus* (Rolfe) S.Y.Hu, *Begonia palmata* D.Don, *Sonerila primuloides* C.Y.Wu ex C.Chen, *Anthogonium gracile* Lindl., *Tofieldia thibetica* Franch., *Lobelia angulata* G.Forst.

Phenology:—Flowering from August to October and fruiting from September to November.

Etymology:—The epithet refers to the corolla which is densely glandular puberulent outside.

Relationships:—*Oreocharis glandulosa* is most similar to *Oreocharis bodinieri* Léveillé (1915: 40) distributed in southern Sichuan and northeastern Yunnan, but can be distinguished by its corolla that is densely glandular puberulent outside (vs. pubescent), the distinctly two-lipped limb (vs. slightly 2-lipped), the adaxial lip bilobed to near the base, abaxial lip trilobed to the base (vs. bilobed from near middle), included stamens (vs. slightly exerted), anther connectives glabrous (vs. sparsely pubescent to pubescent), and an entire or subentire disc (vs. deeply pentalobed to pentasect from base). After comparison with specimens and literature of *Oreocharis bodinieri*, we concluded that *O. glandulosa* can be clearly differentiated from *O. bodinieri* by several floral characters as listed in Table 1.

TABLE 1. Morphological comparison between *Oreocharis glandulosa* and *O. bodinieri*

	<i>O. glandulosa</i>	<i>O. bodinieri</i>
Leaves	petiole to 13 cm; leaf blade cordate to broadly ovate, base cordate	petiole to 5 cm; leaf blade broadly ovate to narrowly ovate, base oblique, cordate to rounded
Corolla	glandular puberulent outside	pubescent outside
Limb	distinctly 2-lipped, adaxial lip 2-lobed to near base	slightly 2-lipped; adaxial lip 2-lobed from near middle
Stamens	included; anthers connective glabrous	slightly exerted; anthers connective sparsely pubescent to pubescent
Disc	entire or subentire	deeply 5-lobed to 5-sect from base

Additional specimens examined (paratypes):—CHINA. Yunnan: Lancang County, Fofang, 28 August 2011, *Jian-Wu Li 880* (HITBC); 25 July 2001, *Hong Wang 4914* (HITBC).

Acknowledgements

This study was financially supported by the National Science and Technology Infrastructure Program (08ZK121B02, 08ZK111B02). We thank Yun-Xi Zhu for the illustration. We are grateful to David J. Middleton and Michael Möller (Royal Botanic Garden, Edinburgh) for their suggestions and comments. We are also grateful to Xin Yao for editing the photographs.

References

- Bentham, G. & Hooker, J.D. (1876) *Genera Plantarum ad exemplaria imprimis in herbariis Kewensibus* vol. 2. London, Reeve & Co.
- Burt, B.L. (1956) An independent genus for *Oreocharis primuloides*. *Baileya* 4(4): 160–162, fig. 46.
- Christenhusz, M.J.M. (2012) On African violets and Cape primroses—towards a monophyletic *Streptocarpus* (Gesneriaceae). *Phytotaxa* 46: 3–9.
- Craib, W.G. (1919) Gesneracearum Novitates. *Notes from the Royal Botanic Garden Edinburgh* 11 : 233–254
- Craib, W.G. (1918) Gesneracearum Novitates Nonnullae. *Notes from the Royal Botanic Garden Edinburgh* 10 : 211–219
- Hooker, J.D. (1894) Icones plantarum or figures, with brief descriptive characters and remarks, of new or rare plants, selected from the author's herbarium. London, Longman, Rees, Orme, Brown, Green, & Longman, etc.
<http://dx.doi.org/10.1017/cbo9781139107723>
- Léveillé, H. (1915) Flora missionaria asiatica. *Bulletin de Géographie Botanique*, 25, 37–50.
- Li, H.W. (1983) Notulae de Gesneraceis Yunnanensibus. *Bulletin of Botanical Research* 3(2): 1–55.
- Li, Z.Y. & Wang, Y.Z. (2004) *Plants of Gesneriaceae in China*. Henan Science and Technology Publishing House, Zhengzhou.
- Liu, Y., Xu, W.-B., Huang, Y.S., Peng, C.I., & Chung, K.F. (2012) *Oreocharis dayaoshanioides*, a rare new species of Gesneriaceae from eastern Guangxi, China. *Botanical Studies* 53: 393–399.
- Möller, M., Pfosser, M., Jang, C.G., Mayer, V., Clark, A., Hollingsworth, M.L., Barfuss, M.H.J., Wang, Y.Z., Kiehn, M. & Weber, A. (2009) A preliminary phylogeny of the 'didymocarpoid Gesneriaceae' based on three molecular data sets: Incongruence with available tribal classifications. *American Journal of Botany* 96: 989–1010.
<http://dx.doi.org/10.3732/ajb.0800291>
- Möller, M., Forrest, A., Wei, Y.G. & Weber, A. (2011a) A molecular phylogenetic assessment of the advanced Asiatic and Malesian didymocarpoid Gesneriaceae with focus on non-monophyletic and monotypic genera. *Plant Systematics and Evolution* 292: 223–248.
<http://dx.doi.org/10.1007/s00606-010-0413-z>
- Möller, M., Middleton, D., Nishii, K., Wei, Y.G., Sontag, S. & Weber, A. (2011b) A new delineation for *Oreocharis* incorporating an additional ten genera of Chinese Gesneriaceae. *Phytotaxa* 23: 1–36.
- Pan, K.Y. (1987) Taxonomy of the genus *Oreocharis* (Gesneriaceae). *Acta Phytotaxonomica Sinica* 25: 264–293.
- Puglisi, C., Middleton, D.J., Triboun, P. & Möller, M. (2011) New insights into the relationships between *Paraboea*, *Trisepalum*, and *Phylloboea* (Gesneriaceae) and their taxonomic consequences. *Taxon* 60: 1693–1702.
- Tan, Y.H., Hsu, T.C., Pan, B., Li, J.W., & Liu Q. (2012) *Gastrodia albidoides* (Orchidaceae: Epidendroideae), a new species from Yunnan, China. *Phytotaxa* 66: 38–42.
- Wang, W.C. (1983) Duo genera nova Gesneriacearum e Sina. *Acta Phytotaxonomica Sinica* 21(3): 319–324.
- Wang, W.T. (1981) Genus novum primitivum Gesneriacearum e Sina. *Acta Phytotaxonomica Sinica* 19: 485–489.
- Wang, W.T. (1986) Notulae de Gesneriaceis Sinensibus, VII. *Guihaia* 6: 6–11.
- Wang, W.T. (1990) Gesneriaceae, pp. 141–171, in: Wang, W.T. (ed.), *Flora Reipublicae Popularis Sinicae* 69. Science Press, Beijing.
- Wang, W.T., Pan, K.Y., Li, Z.Y., Weitzman, A.L. & Skog, L.E. (1998) Gesneriaceae, pp. 244–401 in: Wu, Z.Y. & Raven, P.H. (eds.), *Flora of China*, vol. 18. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.
- Wang, Y.Z., Mao, R.B., Liu, Y., Li, J.M., Dong, Y., Li, Z.Y. & Smith, J.F. (2011) Phylogenetic reconstruction of *Chirita* and allies (Gesneriaceae) with taxonomic treatments. *Journal of Systematics & Evolution* 49: 50–64.
<http://dx.doi.org/10.1111/j.1759-6831.2010.00113.x>

- Weber, A. (2004) Gesneriaceae, pp. 63–158, in: Kubitzki, K. & Kadereit, J.W. (eds.), *The Families and Genera of Vascular Plants, Volume VII, Flowering Plants: Dicotyledons; Lamiales (except Acanthaceae including Avicenniaceae)*. Berlin, Springer.
- Weber, A., Middleton, D.J., Forrest, A., Kiew, R., Lim, C.L., Rafidah, A., Sontag, S., Triboun, P., Wei, Y.G. & Yao, T.L. (2011a) Molecular systematics and remodelling of *Chirita* and associated genera (Gesneriaceae). *Taxon* 60: 767–790.
- Weber, A., Wei, Y.G., Sontag, S. & Möller, M. (2011b) Inclusion of *Metabriggsia* into *Hemiboea* (Gesneriaceae). *Phytotaxa* 23: 37–48.
- Weber, A., Wei, Y.G., Puglisi, C., Wen, F., Mayer, V. & Möller, M. (2011c) A new definition of the genus *Petrocodon* (Gesneriaceae). *Phytotaxa* 23: 49–67.
- Weitzman, A.L., Skog, L.E., Wang, W.-T., Pan, K.-Y. & Li, Z.-Y. (1997) New taxa, new combinations, and notes on Chinese Gesneriaceae. *Novon* 7: 423–435.