



Acronema crassifolium sp. nov. (Apiaceae), a distinct new species from Yunnan, southwest China

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Abstract

Acronema crassifolium, a distinct new species endemic to Yunnan province, China, is described and illustrated. It is characterized by its thickly papery, ternate, abaxially dark purple leaves, terminal umbels with 8–13 rays, and absent calyx teeth. The pollen morphology of the new species is also described in this study.

Key words: Endemism, Jiaozishan mountains, micromorphology, palynology, Sino-Himalayan genus, new species

Introduction

Acronema Falc. ex Edgeworth (1846: 51) is a small genus of Apiaceae (Umbelliferae), which consists of about 25 species (Pan *et al.* 2005). *Acronema* comprises biennial and perennial herbs, with tuberous or rhizomatous roots, biternate or pinnately divided leaves, obsolete calyx teeth, and often flat petals with long-linear apex (Pan *et al.* 2005). *Acronema* is a taxonomically difficult genus; the generic boundaries between *Acronema* and closely related genera, such as *Sinocarum* Wolff ex Shan & Pu (in Shan *et al.* 1980: 374) and *Pimpinella* Linnaeus (1753: 263), are particularly difficult to delimit; some species are difficult to identify because of their indistinct species boundaries.

Acronema is considered as a typical Sino-Himalayan genus (Wu *et al.* 2003, Pan *et al.* 2005), occurring in China, India, Bhutan, Nepal and Myanmar, with only one species extending to northern Thailand (Suksathan 2001). The majority of species (ca. 20) is concentrated in southwest China, and most of them are restricted to relatively small geographical areas. Most species of *Acronema* grow in the understory of forests and thickets at high elevations of 3000–5250 m a.s.l.

Here we describe a new species of *Acronema* with distinctive characters from northern Yunnan, southwest China.

Materials and methods

Morphology:—Both living plants and herbarium specimens were studied. The measurements of the morphological features were conducted using a micrometer and a stereomicroscope.

Micromorphology and pollen morphology:—Scanning electron microscope (SEM) micrographs were taken at 25 kV using the QUANTA 200 scanning electron microscope (FEI Co., USA); the gold-palladium plating was performed using the BAL-TEC SCD 005 cool sputter coater (BAL-TEC AG, Liechtenstein) at Yunnan University, Kunming, China. The descriptive terminology for the pollen grains follows that of Punt *et al.* (2007).

Results and taxonomic treatment

Acronema crassifolium Huan C. Wang, X. M. Zhou & Y. H. Wang, *sp. nov.* (Figures 1–3)

Acronema crassifolium differs from congeneric species in having thick papery leaves, which are homomorphic, ternate and abaxially dark purple; terminal umbels with 8–13 rays; and absent calyx teeth.

Type:—CHINA. Yunnan Province: Luquan County, Jiazishan Mountains, on alpine meadow, elev. 3800 m a.s.l., 31 October 1964, *W. M. Zhu & J. L. Wu 2802* (holotype HYU!, isotype HYU!).

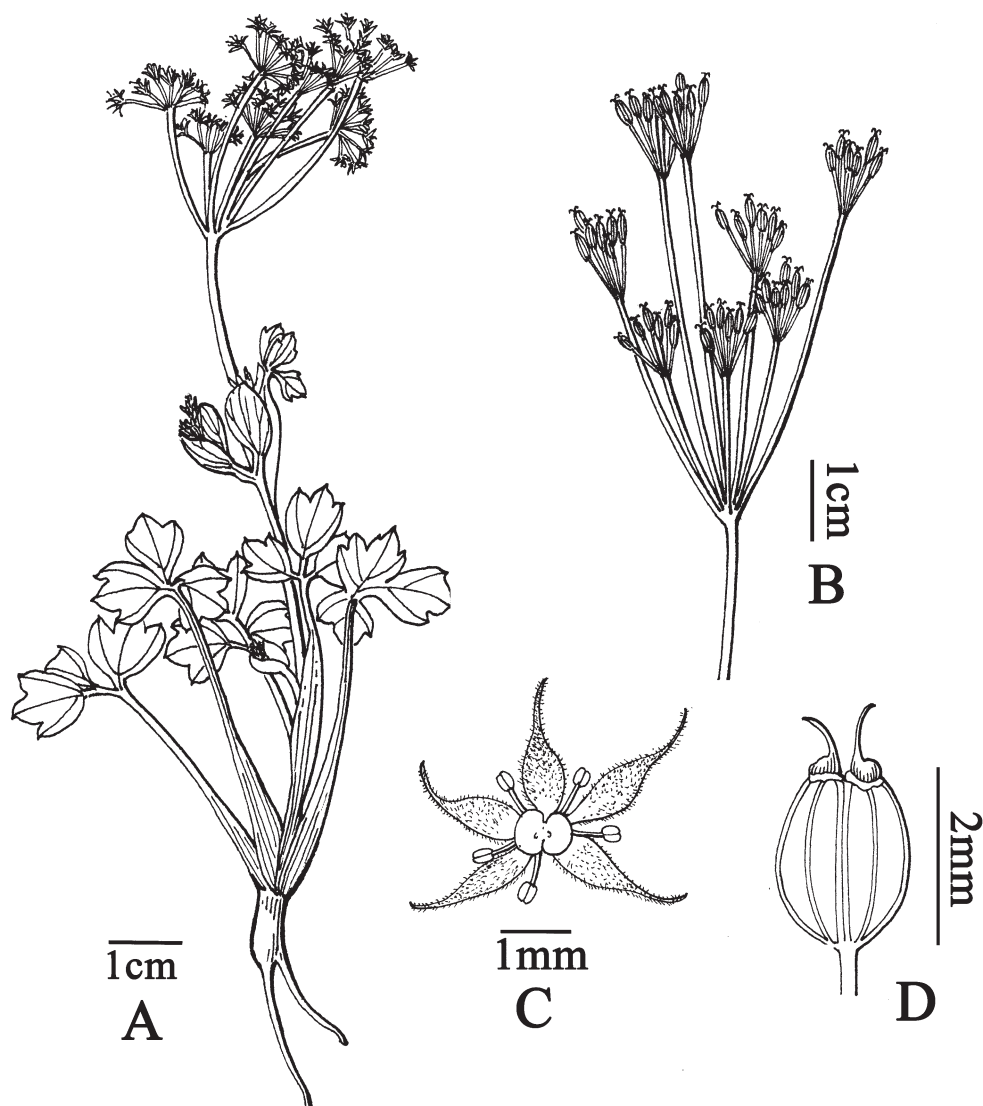


FIGURE 1. *Acronema crassifolium* Huan C. Wang, X.M. Zhou & Y.H. Wang. A. Habit. B. Infructescence. C. Flower. D. Fruit. A and C drawn from Wang *et al.* 1344 (HYU), B and D drawn from Zhu & Wu 2802 (HYU).

Erect herbs, glabrous, 6–15 cm tall in flower, 11–32 cm tall in fruit. Tuberous root napiform to conic, tip branched. Stem solitary, ribbed, unbranched or 1–2 branched. Basal and lower leaves petiolate, petioles 3–9 cm long, sheaths short, narrow; blade thickly papery, cordate to broad-cordate in outline, ternate, rarely trilobed, 1.5–4 × 1.8–3.7 cm; leaflets broad ovate, 0.7–2.5 × 0.8–2.2 cm, adaxially green to purple-green, with dense minute papillae, abaxially dark purple, base broad cuneate to rounded, shallowly to entirely trilobed; ultimate lobes entire or 2–3-crenate; basal leaves withering in fruit. Upper leaves decrescent toward apex,

sheaths well-developed, petioles 0–5 cm long. Umbels terminal and axillary, 3–4.5 cm across in flower; bracts 3 or absent; bracteoles absent, rarely 1–3; peduncles 2–5 cm long; rays of terminal umbel 8–13, ribbed, unequal, 1–2.5 cm long in flower, 1.5–6 cm long in fruit; rays of axillary umbel 5–9. Umbellules 9–12 mm across, 6–13-flowered; pedicels 3–5 mm long in flower, 5–13 mm long in fruit, unequal, ribbed. Rays and pedicels purplish in fruit. Calyx teeth absent. Petals purple, ovate-lanceolate, ca. 2.8×0.5 mm; apex linear, ca. 1.7 mm long, papillate-hairy abaxially. Stamens 5; filaments ca. 0.8 mm long; anthers ca. 0.2 mm long. Fruit broad ovoid to ovoid, ca. $1.5\text{--}2.2 \times 1.5$ mm; ribs 5, filiform.



FIGURE 2. Type specimens (Zhu & Wu 2802) of *Acronema crassifolium* Huan C.Wang, X.M. Zhou & Y.H. Wang. A. Holotype. B. Isotype.

Additional specimens examined (paratypes):—CHINA. Yunnan Province: Luquan County, Jiaozishan Mountains, 3600–3700 m a.s.l., 23 September 2007, *Huan C. Wang, L. F. Shao & K. K. Zhou 1344* (HYU); *ibid.*, Daheiqing to the top of Jiaozishan, 3500 m a.s.l., 3 August 2008, *H. Peng et al. 9312* (KUN); *ibid.*, Shugu village to Mazonglingliangzhi, 3720 m a.s.l., 5 August 2008, *H. Peng et al. 9833* (KUN); Huize County, Dahai, on alpine meadow, *Da-518* (HYU02039174); Dongchuan District, Jiaozishan Mountains, Zhujuanmen Pass, on basalt rocks, 3600–4000 m a.s.l., 13 August 2007, *Huan C. Wang, L. F. Shao & K. K. Zhou 817* (HYU).

Palynology:—Pollen grains prolate, 21.14 ($19.43\text{--}22.62$) $\mu\text{m} \times 13.13$ ($12.33\text{--}14.22$) μm , P/E ratio approx. 1.63 (1.59–1.73), radially symmetrical, isopolar, tricolpate; shape in polar view triangular. Colpi long and narrow, separated. Surface sculpture rugulate. (Figure 4).

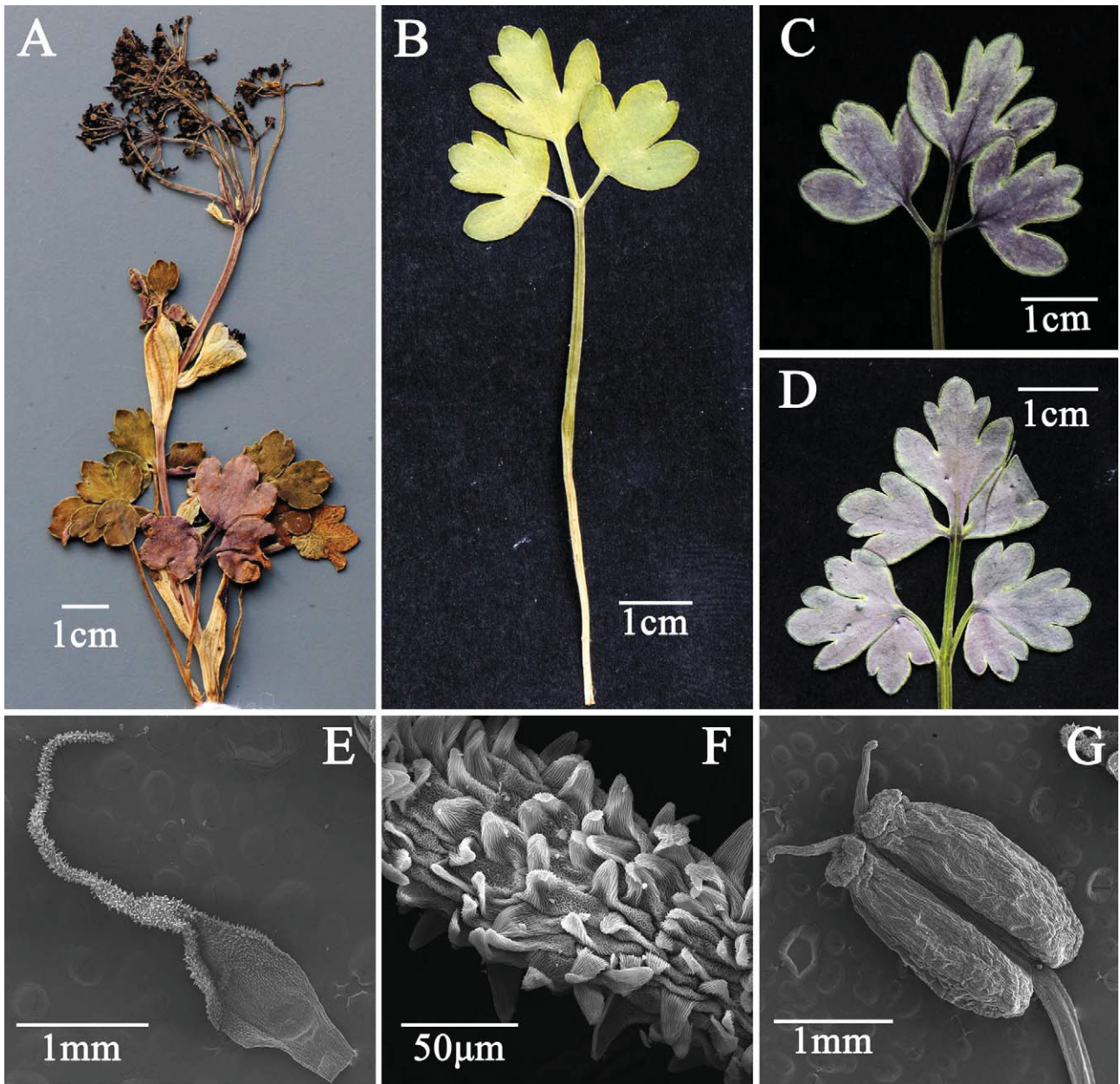


FIGURE 3. Morphology and micromorphology of *Aconema crassifolium* Huan C.Wang, X.M. Zhou & Y.H. Wang. A. Habit. B. Basal leaf. C, D. Adaxial surface of the leaf. E. Petal (SEM). F. Apex of the petal (SEM). G. Fruit (SEM). Voucher specimens: *Wang et al.* 1344 (HYU) for A–F, *Zhu & Wu* 2802 (HYU) for G.

Phenology:—*Aconema crassifolium* starts to grow leaves in May, flowers from July to August and fruits from mid-September to November.

Habitat and distribution:—*Aconema crassifolium* is endemic to northern Yunnan, southwest China; up to now it has only been collected at three localities (Figure 5). The new species usually grows in alpine meadows and the understory of *Abies* forests and *Rhododendron* thickets, at elevations of 3500–4000 m a.s.l.

Etymology:—The specific epithet *crassifolium* is derived from the Latin *crassus*, thick, and *folium*, leaf, referring to the texture of the leaf.

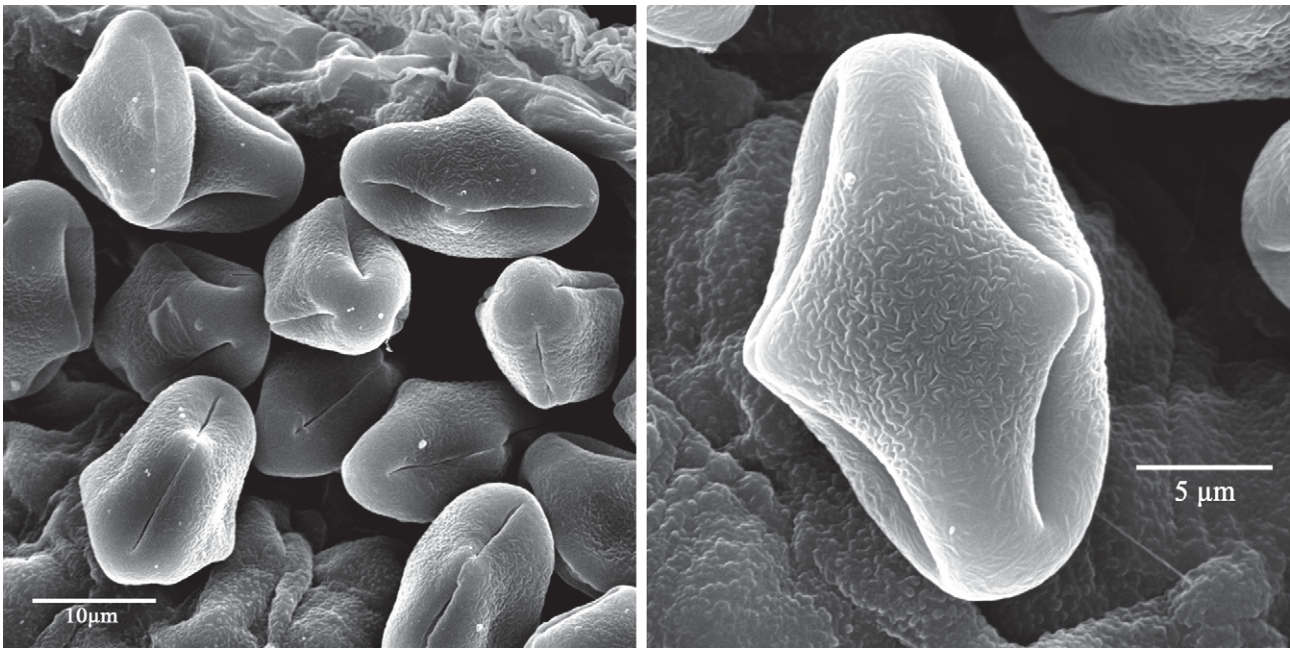


FIGURE 4. Pollen morphology of *Acronema crassifolium* Huan C.Wang, X.M. Zhou & Y.H. Wang. Voucher specimen: *Wang et al. 1344* (HYU).

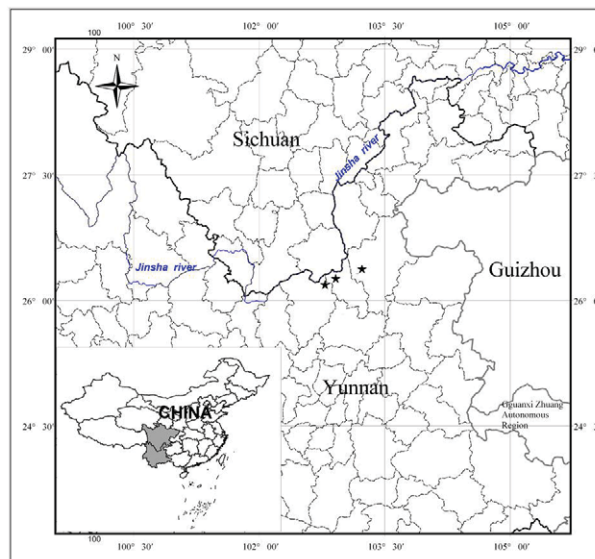


FIGURE 5. Geographical distribution of *Acronema crassifolium* Huan C.Wang, X.M. Zhou & Y.H. Wang (solid stars).

Discussion

Acronema crassifolium is fairly easy to distinguish from congeneric species by the following combination of characteristics: the leaves homomorphic, thickly papery, ternate, abaxially dark purple, terminal umbels with 8–13 rays, and calyx teeth absent. The dwarf *A. crassifolium* plant is morphologically somewhat similar to *A. muscicola* (Handel-Mazzetti 1925: 266) Handel-Mazzetti (1933: 715), but clearly differs from the latter by its abaxial surfaces of leaves dark purple (vs. pale green), terminal umbels with 8–13 rays (vs. 3–6 rays), umbellules 6–13-flowered (vs. 3–7-flowered). *Acronema crassifolium* shares some characters with *A. astantiifolium* Wolff (1929: 192), such as the

abaxial surfaces of leaves dark purple, the numbers of rays on each umbel and flowers on each umbellule, however, it differs from the latter by its leaves homomorphic (vs. heteromorphic), calyx teeth absent (vs. present), peduncles and pedicels relatively thick.

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References

- Edgeworth, M.P. (1846) Descriptions of some unpublished species of plants from North-Western India. *Proceedings of the Linnean Society of London* 20: 23–91.
<http://dx.doi.org/10.1111/j.1096-3642.1846.tb00410.x>
- Handel-Mazzetti, H. (1925) *Plantae novae Sinenses, diagnosibus brevibus descriptae. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, Abteilung 1* 62: 218–226.
- Handel-Mazzetti, H. (1933) *Symbolae Sinicae* 7(3). Julius Springer, Wien, pp. 449–730.
- Linnaeus, C. (1753) *Species plantarum*. Laurentius Salvius, Stockholm, 1200 pp.
- Pan, Z.H., Watson, M.F. & Holmes-Smith, I. (2005) *Acronema* Falconer ex Edgeworth. In: Wu, Z. Y. & Raven, P.H. (eds.) *Flora of China* 14. Science Press, Beijing and Missouri Botanical Garden Press, St. Louis, pp. 105–110.
- Punt, W., Hoen, P.P., Blackmore, S., Nilsson, S. & Thomas, A.L. (2007) Glossary of pollen and spore terminology. *Review of Palaeobotany and Palynology* 143: 1–81.
<http://dx.doi.org/10.1016/j.revpalbo.2006.06.008>
- Shan, R.H., Sheh, M.L., Yuan, C.C., Wang, T.S., Pu, F.T. & Chang, H.T. (1980) New taxa of the Umbelliferae from Xizang (Tibet). *Acta Phytotaxonomica Sinica* 18(3): 374–379.
- Suksathan, P. (2001) *Acronema tenerum* (DC.) Edgew. (Umbelliferae), a new genus for Thailand. *Thai Forest Bulletin (Botany)* 29: 11–16.
- Wolff, H. (1929) Umbelliferae Asiae novae relictiae II. *Repertorium Specierum Novarum Regni Vegetabilis* 27: 179–192.
<http://dx.doi.org/10.1002/fedr.4870270909>
- Wu, Z.Y., Lu, A.M., Tang, Y.C. *et al.* (2003) *The families and genera of angiosperms in China, a comprehensive analysis*. Science Press, Beijing, 1209 pp.