

A NEW *RANUNCULUS* SPECIES (*RANUNCULACEAE*) FROM SHAANXI, CHINA

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Abstract

Ranunculus shanyangensis M.R. Luo & L. Zhao, a new species of Ranunculaceae from Shaanxi, China, is described and illustrated. *Ranunculus shanyangensis* is morphologically similar to *R. repens*, however, it differs from the latter due to the following characters: longer adventitious roots, wholly creeping stems with no branches, longer rachis, fewer floral organs and pollen wall sculpturing. SEM micrography of the pollens for *R. shanyangensis* and *R. repens* are presented along with distribution map.

Introduction

Ranunculus is the largest genus within Ranunculaceae including about 600 species, primarily distributed in temperate to arctic or subantarctic zones, but a few species are also found in high montane regions of the tropics (Tamura, 1995). Wang and Gilbert (2001) revised the genus *Ranunculus* in China and recognized 125 species in China, of which 66 are endemic.

When we were carrying out a fieldwork survey in May 2009 in Shaanxi Province, China, we came across a distinct population of *Ranunculus*. This population grew in slightly moist region in the Qinling Mountains. Notable morphological characteristics that distinguish this population from other species include longer adventitious roots, longer rachis, wholly creeping stems that lack branches and fewer floral organs. Based on literature review (Davis, 1965; Timokhina, 1993; Tutin, 1993; Whittemore, 1997; Wang and Gilbert, 2001; Kadoto, 2006; Tzvelev, 2007) and examination of specimens from several herbaria, we have determined that individuals of this population are similar to *R. repens* L. However, combination of characteristics distinguishes this population as new species, *R. shanyangensis*. Here we describe this new species.

Materials and Methods

The specimens of *Ranunculus repens* from several herbaria (PE, WUK, NAS, IFP, LBG, IBSC, IBK) have been examined representing collections made in China as well as Europe and North America. Flowers and fruits were rehydrated and measurements were taken for each character.

Palynological investigation was conducted to determine whether unique characteristics were present in *R. shanyangensis*. Pollen samples were obtained from dried herbarium specimens and suspended in distilled water, after acetolysis, fixed on SEM specimen holders, which had been cleaned with acetone. The specimens were sputter-coated with gold for 1.5 min and photographed using a Hitachi S-4800 scanning electron microscope. Palynological terminology follows Santisuk (1979).

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Ranunculus shanyangensis M.R. Luo & L. Zhao **sp. nov.**

(Figs 1, 3).

Diagnosis: *Species nova R. repenti* L. similis est, a quo caule toto transversaliter repente, simplice, flaccido, ad nodos radicante, radicibus tenuibus, 5-10 cm longis, pedunculo longiore 13-15 cm longo, staminibus 35-40 per florem, granis pollinis pantocolpatis, carpellis 15-20 differt.

Type: Shanyang County, Shaanxi Province, North-west China; altitude 1100 m; 33°25'20"N, 110°08'00"E, 15 May 2009, Liang Zhao 20090501 (*Holotype*: WUK; *Isotype*: WUK, PE).

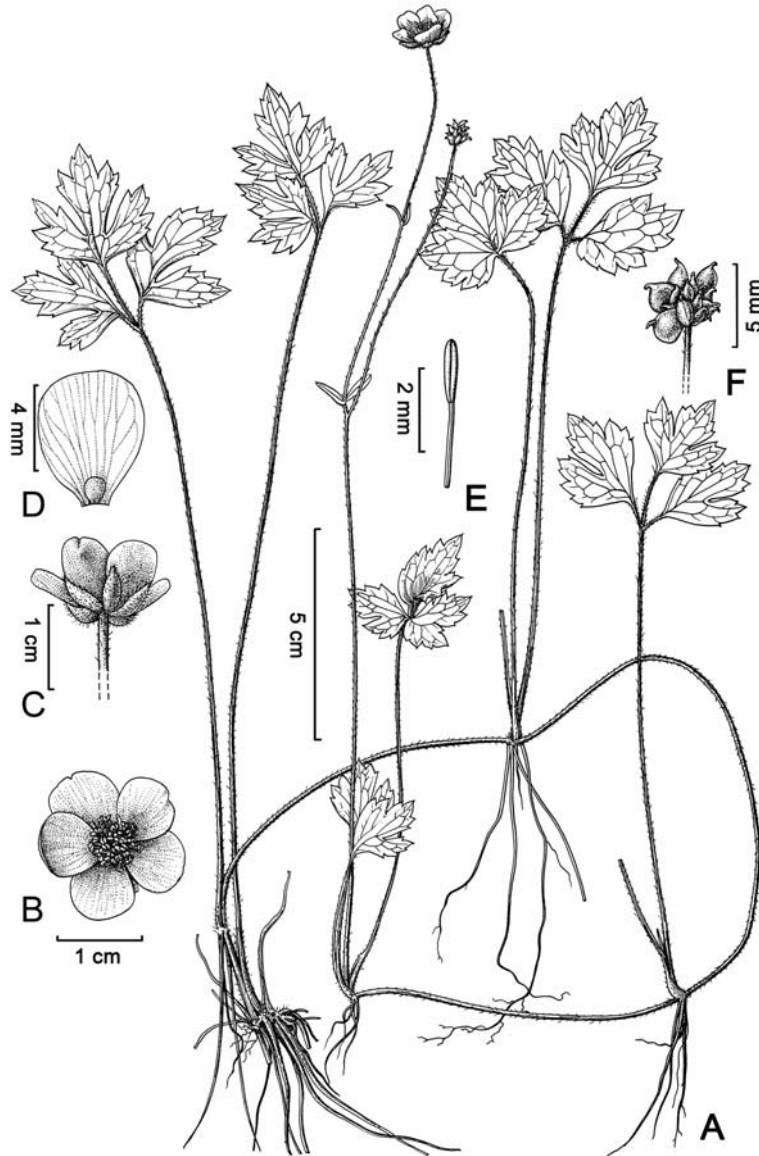


Fig. 1. *Ranunculus shanyangensis* M.R. Luo & L. Zhao **sp. nov.** (A) Habit, (B) Flower - apical view, (C) Flower - lateral view, (D) Petal, (E) Stamen, (F) Fruit.

Perennial herbs. Adventitious roots 5-10 cm long. Stems wholly creeping, 20-50 cm long, slender, c. 1.0-1.2 mm in diameter, hirsute, rooting at the nodes, old petiole persistent on nodes. Leaves mostly basal, or in nodes of stolons (2-4); petiole 5-18 cm long; blade ternate, reniform to pentagonal; both surfaces hirsute; central leaflet broadly rhombic, 2.0-2.6 × 2.0-2.5 cm; base broadly cuneate, secondary lobes lobed or partite; lateral leaflets oblique, unequally 2- or 3-lobed or partite; petiolule 0.5-2.0 cm long. Cauline leaves smaller. Flowers (1-2) in loose cyme, axillary; rachis 13-15 cm long; bracts 3-lobed or undivided, lanceolate to linear. Flowers 1.4-1.7 cm in diameter; pedicels 5-7 cm long, hirsute. Receptacle hirsute. Sepals 5.5-6.0 × 2-4 cm, navicular at anthesis, hirsute on abaxial surface. Petals 5-8 × 4-5 mm, obovate or widely obovate; claw 1 mm long; nectary covered by a scale, c. 1 mm long. Stamens 35-40; anthers c. 1.5 mm long; filaments c. 2.0 mm long. Carpels 15-20. Achene bilaterally compressed, obliquely obovate, c. 2.2×2.0 mm, glabrous, narrowly marginate; beak c. 0.5 mm long.

Phenology: It sprouts in late February, and the aboveground parts die in early November. Flowering occurs in May - August and fruiting in June - September.

Specimens examined: Shaanxi, Shanyang County, in slightly moist areas, 1100 m, 15 May 2009, Liang Zhao 20090502 (SANU); *ibid.*, 1105 m, Liang Zhao 20090503 (SANU), Liang Zhao 20090504 (SANU), Liang Zhao 20090505 (SANU), Liang Zhao 20090506 (SANU), Liang Zhao 20090507 (SANU), Liang Zhao 20090508 (SANU); *ibid.*, Liang Zhao 20090509(PE), Liang Zhao 20090510 (PE).

Distribution: *Ranunculus shanyangensis* is found in the moist area in Shanyang County, Shaanxi Province, North-west China (Fig. 2). Recent observations suggest that the population of this new species has a narrow geographic distribution, and possibly endemic to this site. After intensive field investigation in Qinling Mountains from 2009 to 2010, we only found one population with about 200 individuals.

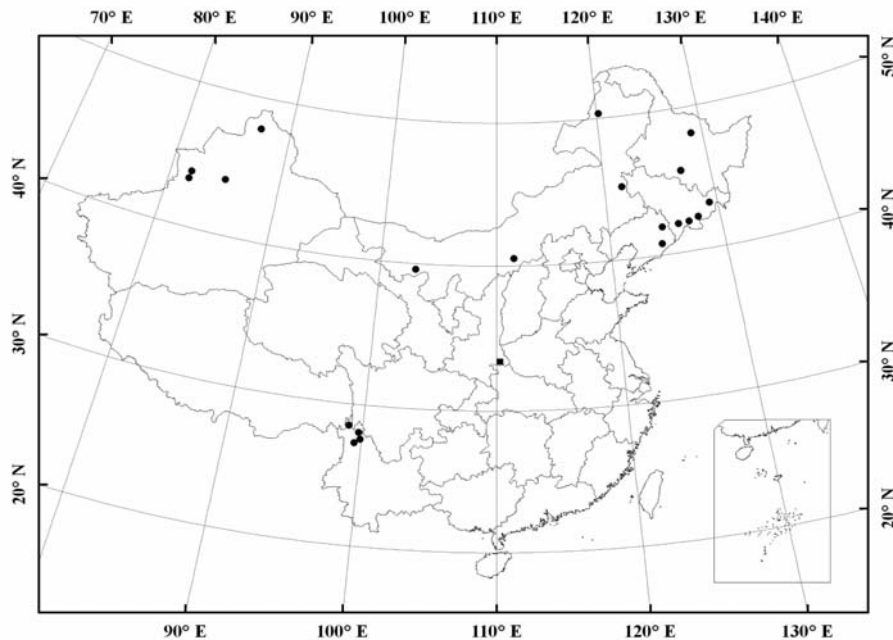


Fig. 2. Distribution of *Ranunculus repens* (●) and *R. shanyangensis* (■) in China.

Conservation status: Using the IUCN categories and criteria (IUCN, 2001), we suggest ranking of *Ranunculus shanyangensis* as ‘Critically Endangered’ (CR), which is based on the size of this population and its close proximity to urban and agricultural areas.

Etymology: The specific epithet refers to Shanyang County where the type collections were made.

Notes: *Ranunculus shanyangensis* is morphologically similar and possibly closely related to *R. repens* L. Both have creeping stems, rooting at the nodes; smooth, bilaterally compressed and narrowly marginate achenes; and the petal nectary pit is covered by a scale. However, *R. shanyangensis* differs from *R. repens* in adventitious root (5-10 cm vs. 1-3 cm), stem (wholly creeping, no branched vs. ascending or suberect, branched above), rachis (13-15 cm vs. 5-8 cm), stamens (35-40 vs. c. 50), carpels (15-20 vs. 30-35) and pollen (stephanocolpate vs. tricolpate) characters.

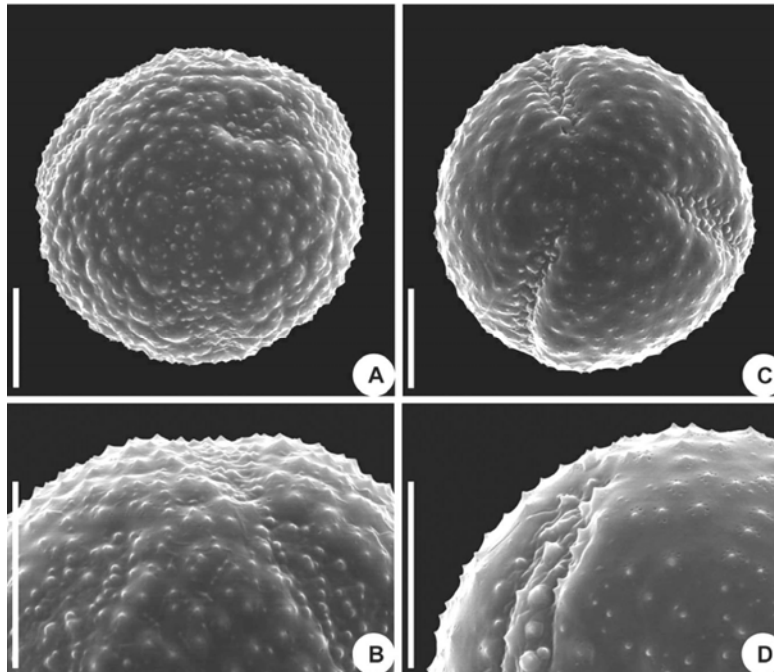


Fig. 3. Pollen morphology under scanning electron microscopy (SEM). (A, B) *Ranunculus shanyangensis*, (C, D) *R. repens*. Scale bar: A, B, C, D = 10 μ m

Pollen morphology:

In our examination of the pollen in *R. repens* from China, Europe and North America, we note that all of them are tricolpate (Fig. 3C) with small and sparsely spaced spinules (Fig. 3D). This character is in accord with the results of Erdtman *et al.* (1961), whose material was collected from Scandinavia. However, the pollen of *Ranunculus shanyangensis* is pantocolpate (Fig. 3A) and bears densely spaced spinules (Fig. 3B).

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