

# *Sinosenecio baojingensis* (Asteraceae), a new species from Hunan, China

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**ABSTRACT.** *Sinosenecio baojingensis* Y. Liu & Q. E. Yang, a new species of Asteraceae from northwestern Hunan, China, is described and illustrated. Its chromosome number ( $2n = 48$ ) is reported here. The new species is similar to *S. euosmus* and *S. denticulatus* in having leafy stems and smooth achenes bearing a pappus. It differs from *S. euosmus* in its much taller stature (75-150 cm vs. 20-75 cm), the ovate-cordate outline of its leaves (vs. ovate to broadly ovate), its denticulate (vs. crenate) margin, and its much larger size (12-20 × 10-18 cm vs. 2-5 × 3-6 cm). From *S. denticulatus* it differs in its sometimes taller stature (75-150 cm vs. 35-140 cm), and ovate-cordate (vs. reniform) leaves, denticulate (vs. dentate) margin, and its larger size (12-20 × 10-18 cm vs. 4-14 × 6-17 cm). From both it differs in having undivided (vs. more or less lobed) leaves and basally expanded but never auriculate (vs. auriculate) petioles. A color plate, line drawings, distribution map, light microscope (LM) photomicrographs of floral characters, and a key to aid in the identification of *S. baojingensis* and its possible relatives are provided.

**Keywords:** Asteraceae; Chromosome number; Floral microcharacters; Senecioneae; *Sinosenecio baojingensis*.

## INTRODUCTION

*Sinosenecio* B. Nord. (Senecioneae-Asteraceae) is a genus of ca. 38 species, all of which occur in China, Indochina, and Korea (Jeffrey and Chen, 1984; Janovec and Barkley, 1996; Chen, 1999; Liu, 2000; Zhang et al., 2008), except for one species, *S. newcombei* (Greene) J. P. Janovec & T. M. Barkley, disjunctly distributed in the Queen Charlotte Islands, British Columbia, Canada (Janovec and Barkley, 1996). The genus is characterized by usually palmately veined, petiolate leaves with the lamina distinct from the petiole, ecalyculate involucre, a campanulate limb of the disc florets, the polarized or radial pattern of the anther endothelial cell thickenings, and a filament collar with uniformly sized cells (Nordenstam, 1978; Jeffrey and Chen, 1984). China, where 37 species have been recorded (Chen, 1999; Liu, 2000; Zhang et al., 2008), is undoubtedly the most important center of differentiation for the genus. It is noteworthy that most species of *Sinosenecio* in China have a rather narrow distribution, and thus, as pointed out by Jeffrey and Chen (1984), discovery of new species is expected as botanical exploration proceeds in this country.

For the first author's Ph.D. project on the systematics and evolution of the genus *Sinosenecio*, we carried out a botanical expedition throughout central and western China from April to July, 2007. In northwestern Hunan, in a valley near Mt. Ludong, Baojing Xian, we collected plants similar to *S. euosmus* (Hand.-Mazz.) B. Nord. and *S. denticulatus* J. Q. Liu, but which differed by having larger, ovate-cordate, undivided leaves and basally expanded but never auriculate petioles. We determined that they represent an undescribed species, which is here described.

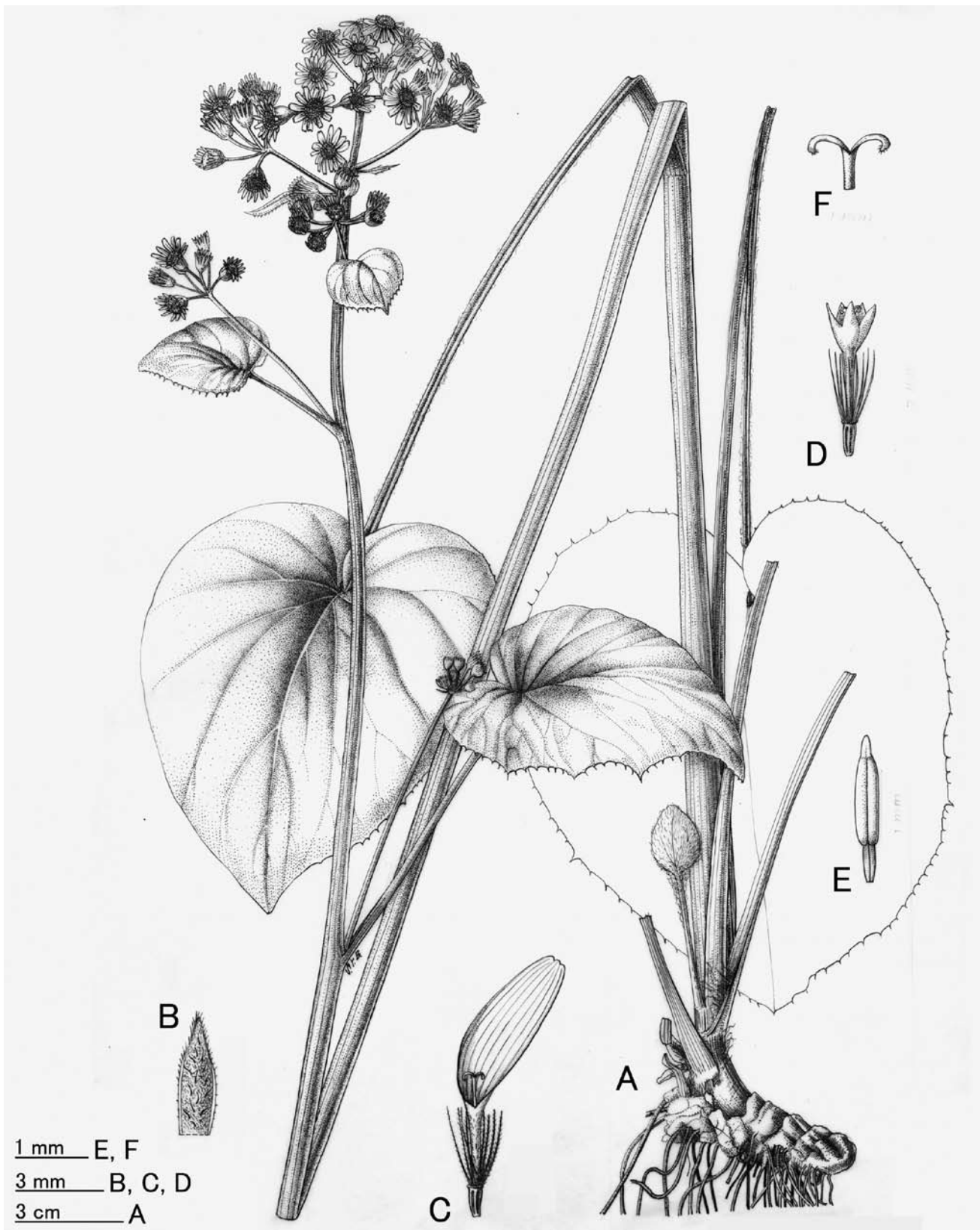
***Sinosenecio baojingensis*** Y. Liu & Q. E. Yang, sp. nov.—

TYPE: CHINA: Hunan, Baojing County, Mt. Ludong, 270 m, grassy places, 3 April 2007, Q. E. Yang, Qiong Yuan & Ying Liu 554 (holotype, PE). 保靖蒲兒根  
Figures 1, 2

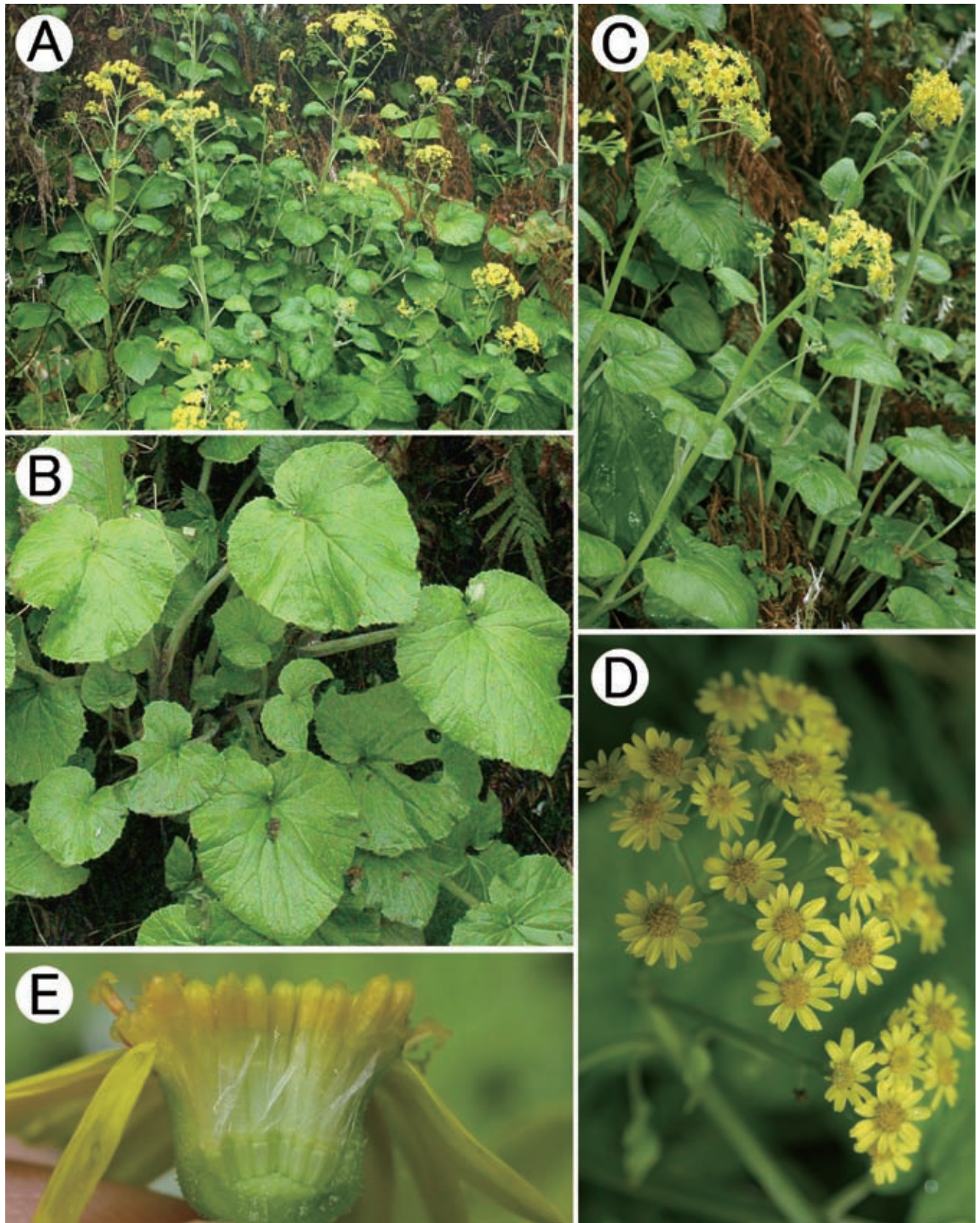
Species nova haec similis *Sinosenecioni euosmo* (Hand.-Mazz.) B. Nord. et *S. denticulato* J. Q. Liu caule foliato, acheniis laevibus pappo praeditis, ab illo planta multo altiore, 75-150 cm alta, foliorum laminis multo majoribus, 12-20 cm longis, 10-18 cm latis, ab hoc planta vulgo altiore, foliorum laminis multo majoribus, ab ambobus foliis indivisis, ambitu ovato-cordatis, petiolis tantum basi dilatatis, haud auriculatis differt.

Herbs, rhizomatous, stolons absent. Stem solitary, erect, 75-150 cm tall, ca. 15-20 mm in diam. at base,

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**Figure 1.** *Sinosenecio baojingensis* Y. Liu & Q. E. Yang. A, Habit; B, Phyllary; C, Ray floret; D, Disc floret; E, Stamen; F, Style-arms. (All from *Qin-er Yang et al.* 554, PE).



**Figure 2.** *Sinosenecio baojingensis* Y. Liu & Q. E. Yang. A, Posture; B, Leaf; C, Inflorescence; D, Capitula; E, Florets. (All from *Qin-er Yang et al.* 554, PE).

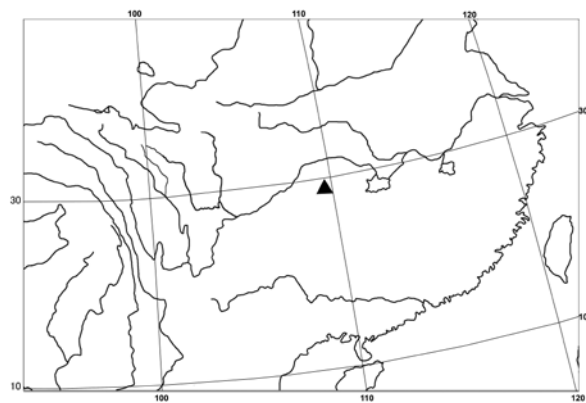
simple, villous or lanate. Leaves radical and cauline. Radical leaves petiolate; petioles 14-28 cm long, sparsely lanate, base expanded; lamina ovate-cordate, 12-20 × 10-18 cm, palmately veined, base cordate, margin denticulate, apex acute, lower surface pale green or whitish lanate, upper surface green and sparsely villous; upper stem leaves smaller, with shorter petioles. Capitula many, in apical compound corymbs; peduncles 1.5-4 cm long, sparsely villous. Involucres campanulate, ecalyculate, 6-7 × 6-9 mm. Phyllaries ca. 13, uniseriate, oblong-lanceolate, 6-7 × 1.5-2 mm, apex acuminate, puberulous, herbaceous, green. Ray florets ca. 13; corolla tube 3 mm long, glabrous; rays yellow, oblong-elliptic, ca. 8 mm × 3-4 mm, apically 3-denticulate, 4-7-veined. Disc florets many; corolla 5 mm long, tube 3 mm long, limb campanulate; lobes ovate-lanceolate. Anthers ca. 1.5 mm long, base obtuse, appendages ovate-oblong. Style arms ca. 1 mm long, apex truncate. Achenes cylindrical, 1.5 mm long, smooth, glabrous. Pappus white, 3 mm long.

*Additional specimens examined.* CHINA. Hunan, Baojing Xian, Mt. Ludong, in valley, 3 April 2007, *Dai-gui Zhang & Liang Xu 070403017* (JIU).

*Etymology.* The specific epithet '*baojingensis*' is derived from the type locality, Baojing County, Hunan Province, China.

*Phenology.* Flowering from March to April; fruiting May.

*Distribution, habitat and status.* *Sinosenecio baojingensis* is known from only one population in a valley in Baojing Xian, Hunan, China (Figure 3), growing in deep grass near paddyfields on an open hillside at an altitude of ca. 270 m. If this is truly the only population, then according to the IUCN red list categories and criteria, version 3.1 (IUCN, 2001), *S. baojingensis* should be categorized as a critically endangered species (CR). Because the site is within an area of human activity, the most serious threat to the species' survival lies in the potential habitat destruction through mining and farming.



**Figure 3.** Distribution of *Sinosenecio baojingensis* (▲) in Hunan Province, China.

**Table 1.** Comparison of *Sinosenecio baojingensis* and related species in subsection *Madarogyne*.

	<i>S. euosmus</i>	<i>S. denticulatus</i>	<i>S. sungpanensis</i>	<i>S. fangianus</i>	<i>S. baojingensis</i>
Height (cm)	20-75	35-140	40-50	30-85	75-150
Leaf shape	Ovate, broadly ovate, shallowly and sometimes deeply 5-8-palmatilobed, margin shallowly to deeply mucronulate-dentate	Reniform, shallowly 5-7-lobed, margin rather regularly mucronulate-denticulate	Reniform, shallowly and sometimes deeply 5-7-palmatilobed, margin mucronulate-dentate	Reniform, 7-9-palmatifid, with the middle lobe 2-3-dentate	Ovate-cordate, undivided, margin denticulate
Leaf size (cm)	2-5 × 3-6	4-14 × 6-17	3-3.5 × 4-4.5	1.5-6 × 1-6	12-20 × 10-18
Base of petioles	Auriculate	Auriculate	Obviously expanded	Slightly expanded	Obviously expanded
Endothelial cell thickenings	Polar and radial	Polar and radial	Polar and radial	Polar and radial	Polar and radial
Epidermis of achenes	Smooth, glabrous	Smooth, glabrous	Papillate, glabrous	Papillate, glabrous	Smooth, glabrous
Pappus	Present	Present	Present	Present	Present
Flowers	June-August	May-June	June-July	June-July	March-April
Chromosome number (2n)	Unknown	Unknown	48	Unknown	48
Habitat	Forest margins, meadows, moist places, 2,400-4,000 m a.s.l	Damp places in valley, 1,500 m a.s.l	Meadows or in woods, 3,300-4,300 m a.s.l	Under shrubs, 2800 m a.s.l	In deep grass on open hillside, ca. 270 m a.s.l
Geographical distribution	Sichuan	Sichuan	Sichuan	Sichuan	Hunan

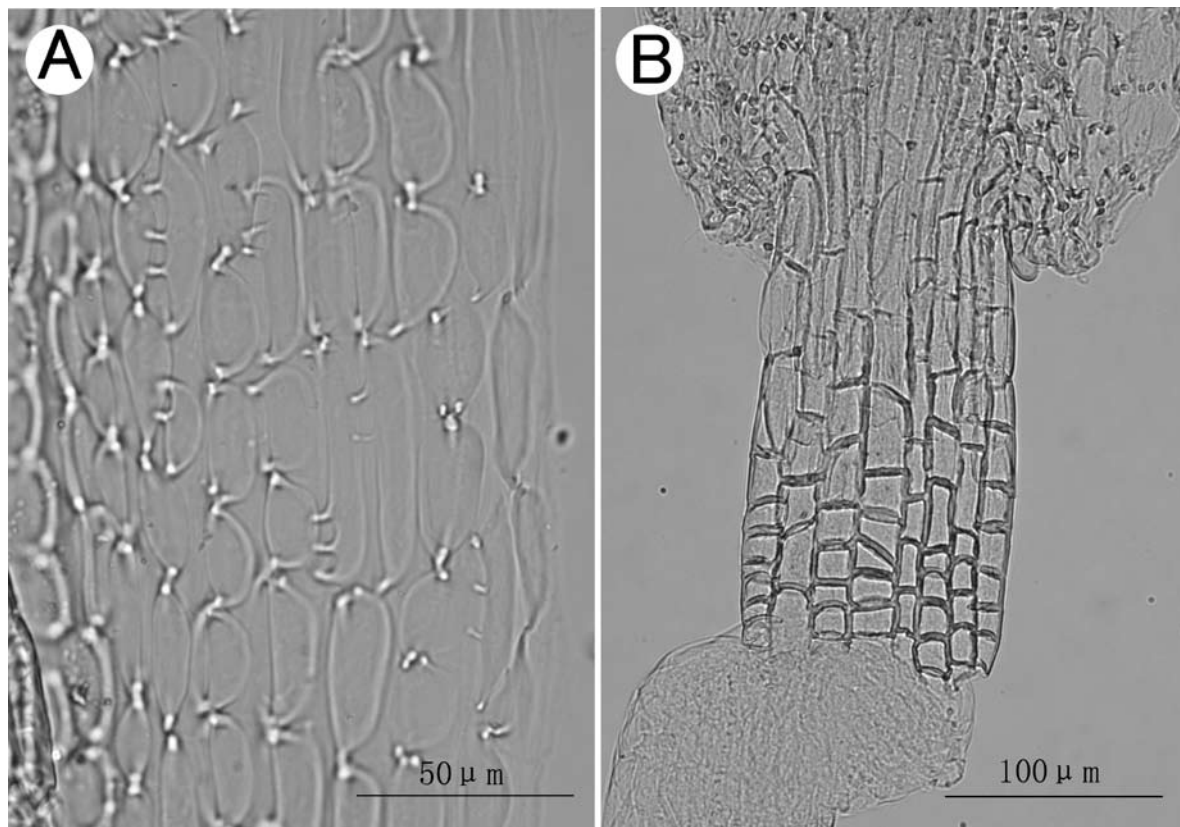
*Floral micromorphological characters.* To observe anther endothelial cell thickenings and the filament collar of *Sinosenecio baojingensis*, we boiled the heads in distilled water for 3 min, and then fixed them in Carnoy's solution (glacial acetic acid : absolute ethanol = 1: 3). Mature disc florets were removed from the fixed heads and transferred to 70% ethanol for 30 min., then to 99% ethanol for 1 h before they were immersed in 5% NaOH for 24 h. 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 200× (filament collar) and 400× (endothelial cell thickenings) magnification by light microscopy and photographed.

The anther endothelial cell thickenings of *Sinosenecio baojingensis* are polar and radial (Figure 4A), conforming to the results reported previously that endothelial cell thickenings are strictly polar, polar and radial or radial in other species of the genus (Jeffrey and Chen, 1984). As shown in Figure 4B, the new species has uniformly sized cells in the filament collar, which is one of the diagnostic features of the genus *Sinosenecio* (Nordenstam, 1978; Jeffrey and Chen, 1984).

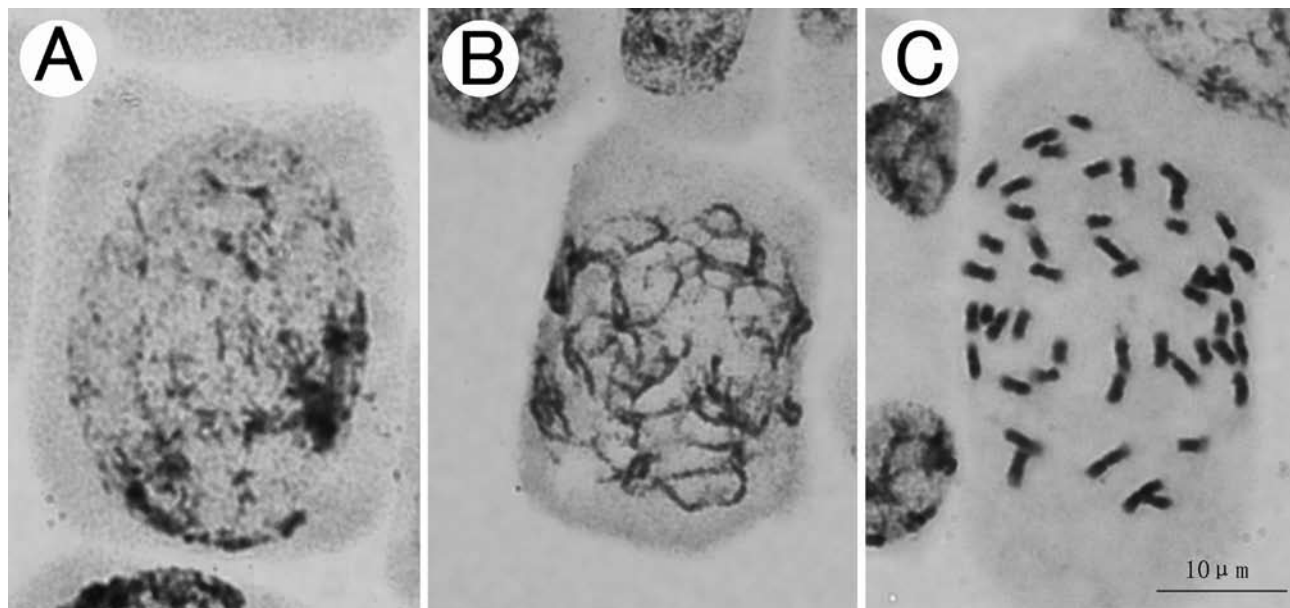
*Chromosome cytology.* For chromosome counts, root tips were pretreated with 0.1% colchicine for 3 h before being fixed in Carnoy solution (glacial acetic acid : absolute ethanol = 1: 3), then macerated in a 1:1 mixture of 45% acetic and 1 N HCl at 60°C for 4 min, stained and squashed in Carbol fuchsin.

The chromosome number of *Sinosenecio baojingensis* was determined to be  $2n = 48$  (Figure 5). Since the basic number of the genus is  $x = 12$  (Liu, 1999; Zhang et al, 2008), *S. baojingensis* is a tetraploid. The chromosome number of one of its possible relatives, *S. sunpanensis*, is  $2n = 48$  (unpublished data).

*Sinosenecio baojingensis* can be readily referred to section *Phyllocaulon* C. Jeffrey & Y. L. Chen subsection *Madarogyne* C. Jeffrey & Y. L. Chen based on the polar and radial pattern of the anther endothelial cell thickenings, the presence of cauline leaves, and the glabrous ovaries and achenes. As shown in Table 1, *S. baojingensis* is similar to *S. euosmus* and *S. denticulatus* within the subsection in having leafy stems and smooth achenes bearing a pappus, but differs from the former in its taller stature (75-150 cm vs. 20-75 cm), leaves ovate-cordate in outline (vs. ovate to broadly ovate), margin denticulate (vs. crenate), and much larger size (12-20 × 10-18 cm vs. 2-5 × 3-6 cm). From *S. denticulatus* it differs in having sometimes taller stature (75-150 cm vs. 35-140 cm), and leaves ovate-cordate in outline (vs. reniform), margin denticulate (vs. dentate), and larger size (12-20 × 10-18 cm vs. 4-14 × 6-17 cm). From both it differs in having undivided (vs. more or less lobed) leaves and basally expanded but never auriculate (vs. auriculate) petioles. *Sinosenecio baojingensis* is also somewhat similar to two additional species in subsection *Madarogyne*, *S. sunpanensis* (Hand.-Mazz.) B. Nord. and



**Figure 4.** Endothelial cell thickenings (A) and filament collars (B) of *Sinosenecio baojingensis*. A. Predominantly polarized thickenings; B, Uniformly sized cells. (All from Qin-er Yang et al. 554, PE).



**Figure 5.** Interphase nuclei (A), mitotic prophase (B), and metaphase (C,  $2n = 48$ ) chromosomes of *Sinosenecio baojingensis*. (All from Qin-er Yang *et al.* 554, PE).

*S. fangianus* Y. L. Chen, in the basally expanded petioles, leafy stems, and achenes bearing a pappus, but differs in leaf shape (ovate-cordate, undivided vs. reniform, lobed), and achene surface (smooth vs. papillate). The five species mentioned above can be distinguished by features in the following key.

#### Key to *Sinosenecio baojingensis* and its related species

1. Base of petioles auriculate.
  2. Leaves ovate to broadly ovate, margin shallowly to deeply mucronulate-dentate .....*S. euosmus*
  2. Leaves reniform, margin rather regularly mucronulate-denticulate .....*S. denticulatus*
1. Base of petioles expanded but never auriculate.
  3. Plants to 150 cm tall; leaves 12-20 × 10-18 cm, ovate-cordate, undivided; achenes smooth.....  
.....*S. baojingensis*
  3. Plants less than 100 cm; leaves less than 7 × 7 cm, reniform, lobed; achenes papillate.
    4. Leaves shallowly 5-7-lobed; base of petioles obviously expanded.....*S. sunpanensis*
    4. Leaves palmately 7-9-fid; base of petioles slightly expanded ..... *S. fangianus*

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## 中國湖南產蒲兒根屬一新種：保靖蒲兒根

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本文描述了中國湖南西北部產蒲兒根屬一新種：保靖蒲兒根 (*Sinosenecio baojingensis* Y. Liu & Q. E. Yang)。本新種與 *S. euosmus*, *S. denticulatus* 相似，但以植株高大，葉卵狀心形不分裂，葉柄基部僅擴大，不成耳狀而與這兩者明顯有別。其體細胞染色體數目為  $2n = 48$ 。本文提供了保靖蒲兒根的彩色圖版、線繪圖、花部微觀性狀的光鏡照片以及地理分佈圖。

**關鍵詞：** 染色體數目；菊科；花部微觀性狀；千里光族；保靖蒲兒根。

