

Notes on the Flora of Taiwan (35) — *Scutellaria taipeiensis* T. C. Huang, A. Hsiao et M. J. Wu sp. nov. (Lamiaceae)

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ABSTRACT: A comparative study of corolla types, pollen features, nutlet coat ornamentation and chromosome numbers of *Scutellaria* (Lamiaceae) species in Taiwan has been conducted. The result reveals that we have a new species so that *Scutellaria taipeiensis* T. C. Huang, A. Hsiao et M. J. Wu sp. nov. is here proposed. A key to the species, species description and illustrations, and other relevant information are provided.

KEY WORDS: *Scutellaria taipeiensis*, Lamiaceae, New species, Taiwan.

INTRODUCTION

Scutellaria, with 425 species (Paton 1990), is a large genus of the Lamiaceae. In Taiwan, it was previously reported by A. Henry (1896), Matsumura and Hayata (1906), Hayata (1911, 1919), Kudo (1929), Ohwi (1934, 1935), Yamazaki (1969, 1992), Li (1977), Huang and Cheng (1978), Ying (1991), Hsieh and Huang (1995), and Huang *et al.* (1998).

Although *Scutellaria* of Taiwan species was critically revised recently (Hsieh & Huang, 1995), new addition to the flora is still inevitable. In April 13, 2003, T.-C., L.-C. and R.-P. Huang collected a plant of *Scutellaria* (Fig. 1) along roadside between Maukong to Chihnan Temple in Mucha, Taipei. More plant specimens were collected in April 16, 2003 by T.-C. Huang and A. Hsiao. These plant materials were used for further studies on external morphology, pollen and nutlet morphology and chromosome counting. According to these studies, it reveals that we find a new species of *Scutellaria* in Taiwan. Therefore, we described a new species, *Scutellaria taipeiensis* T. C. Huang, A. Hsiao et M. J. Wu sp. nov. in this paper. In addition, the comparative studies on floral morphology, pollen grains, and nutlet morphology among Taiwan species (*S. austrotaiwanensis* T. H. Hsieh et T. C. Huang., *S. barbata* D. Don, *S. indica* L., *S. playfairii* Kudo, *S. taipeiensis* T. C. Huang, A. Hsiao et M. J. Wu, *S. taiwanensis* C. Y. Wu, and *S. tashiroi* Hayata) are discussed. Based on these features, a key to the species is also given.

MATERIALS AND METHODS

Fresh plant materials are collected from Chihnan Temple and examined in this study. Specimens are deposited in TAI-herbarium. Pollen grains prepared by the Erdtman method

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Fig. 1. Habit of *Scutellaria taipeiensis* T. C. Huang, A. Hsiao et M. J. Wu.

(1952) were studied with LM and SEM. Somatic Chromosomes were studied in root tips, which had been held in a solution of 0.002 M 8-hydroxyquinoline for 3-4 h at 18-20 °C, and then fixed in 1:3 acetic ethanol over night, hydrolysed in pectinase and squashed in propionic orcein.

RESULTS AND DISCUSSION

Floral morphology

The corolla of *Scutellaria taipeiensis* is 0.8-1.3 cm long and the base of corolla tube shows a curved type. Based on the length of corolla and their geniculate features, Hsieh and Huang (1995) proposed three types of floral morphology of Taiwan's *Scutellaria*. As a result of the present study we revised the corolla tube as having two different types (Table 1). Type I, (*S. austrotaiwanensis*, *S. indica* and *S. playfairii*) has a medium corolla in length (1.5-2.0 cm long) and the corolla tube becomes abruptly vertical at the base (geniculate). Type II, the corolla is curved at the base but never at right angles. Type II has two subtypes based on the length of corolla. Subtype IIA (*S. barbata*, *S. taipeiensis* and *S. taiwanensis*) has a shorter corolla, 0.8-1.5 cm long and the subtype IIB (*S. tashiroi*) has a longer corolla, 2.0-2.5 cm long.

Table 1. Comparison of floral morphology of *Scutellaria* in Taiwan (Revised from Hsieh & Huang, 1995).

Taxon	Character	Color	Size (cm)	Corolla form at base	Voucher specimen	Types of floral morphology
<i>S. austrotaiwanensis</i>		purplish-blue	1.0-1.2	geniculate	<i>Huang et al. 16266</i>	I
<i>S. barbata</i>		purple	0.9-1.3	curved	<i>Hsieh 901</i>	IIA
<i>S. indica</i>		purple, pink, or white	1.5-2.0	geniculate	<i>Hsieh 892</i>	I
<i>S. playfairii</i>		whitish purple	1.5-1.8	geniculate	<i>Hsieh 1146</i>	I
<i>S. taipeiensis</i>		purple to blue	0.8-1.3	curved	<i>Huang et al. 18103; Huang & Hsiao 18104</i>	IIA
<i>S. taiwanensis</i>		white, throat with purple spot	1.0-1.5	curved	<i>Hsieh 1011</i>	IIA
<i>S. tashiroi</i>		dark purple	2.0-2.5	curved	<i>Hsieh 1181, 1320</i>	IIB

Pollen morphology

The pollen grains of *S. taipeiensis* (Fig. 2) is $14.9\text{--}20.4 \times 14.8\text{--}15.3\text{ }\mu\text{m}$ (measured by SEM) or $21\text{--}32 \times 20\text{--}30\text{ }\mu\text{m}$ (measured by LM). The amb is circular-lobate, $15.4\text{--}16.3\text{ }\mu\text{m}$ wide (measured by SEM). The tectum is reticulate surface ornamentation, with microperforation, as the same as the other species (Table 2).

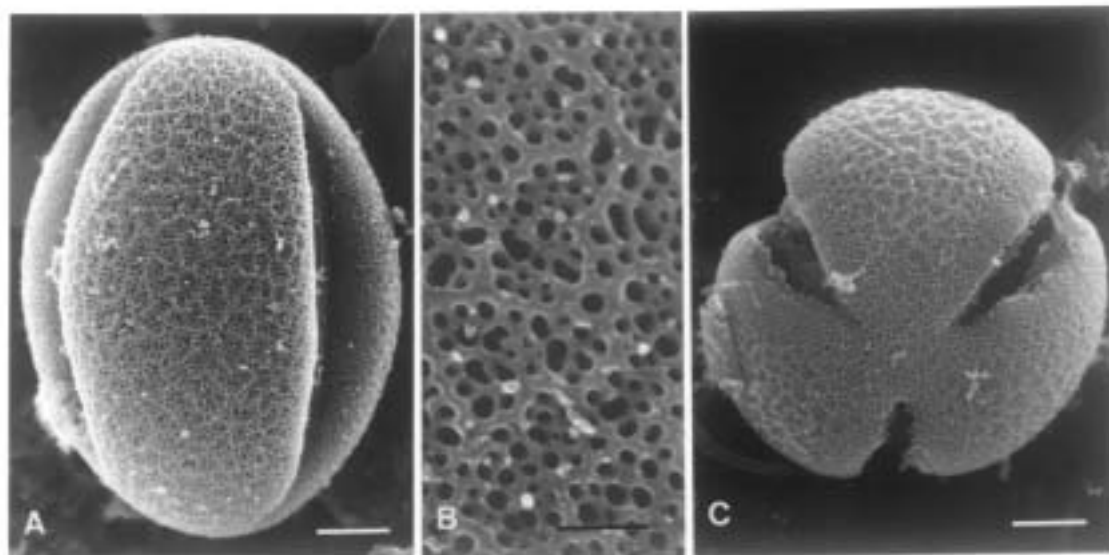


Fig. 2. Micrographs of pollen grains of *Scutellaria taipeiensis* T. C. Huang, A. Hsiao *et* M. J. Wu. A: Equatorial view, bar = $3\text{ }\mu\text{m}$. B: High magnification of mesocolpium area, bar = $1\text{ }\mu\text{m}$. C: Polar view, bar = $3\text{ }\mu\text{m}$.

Nutlet morphology

It is easy to distinguish the Taiwan *Scutellaria* species by the nutlet morphology, especially by the ornamentation of the nutlet coat. The ornamentation of nutlet coat for Taiwan *Scutellaria* is composed chiefly of various arrangements of tuberculae. Based on the

Table 2. Comparison of pollen grains and nutlet morphology of *Scutellaria* in Taiwan (Revised from Hsieh & Huang, 1995).

Taxon	Character	Size of pollen (μm)	Exine pattern	Size of nutlet (mm)	Type of nutlet coat
<i>S. austrotaiwanensis</i>		18-23 $\times$ 12-17	reticulate	1.3 $\times$ 1.0	grappling-hook type (type 1)
<i>S. barbata</i>		20-24 $\times$ 12-16	reticulate	1.1 $\times$ 0.8	radiated umbrella-like type (type 2)
<i>S. indica</i>		18-23 $\times$ 12-17	finely reticulate	1.3 $\times$ 1.0	radiated umbrella-like type (type 2)
<i>S. playfairii</i>		16-20 $\times$ 10-15	loose reticulate to rugulate	1.0 $\times$ 0.8	rounded concentric type (type 3)
<i>S. taipeiensis</i>		14.9-20.4 $\times$ 14.8-15.3 (SEM) 21-32 $\times$ 20-30 (LM)	reticulate	0.9 $\times$ 0.8	rounded concentric type (type 3)
<i>S. taiwanensis</i>		23-30 $\times$ 16-20	irregular rugulate	1.4 $\times$ 1.2	mammillate type (type 4)
<i>S. tashiroi</i>		18-22 $\times$ 14-17	loose reticulate to rugulate	0.9 $\times$ 0.8	grappling-hook type (type 1)

grouping pattern of tuberculae and the shape of elevated tuberculae within the reticulae, four types of ornamentation are proposed (Hsieh & Huang, 1995). The nutlet coat of *S. taipeiensis* is a rounded concentric type (Fig. 3) and has rounded concentric tuberculae. It is similar to *S. playfairii* nutlet (Type 3, Table 2).

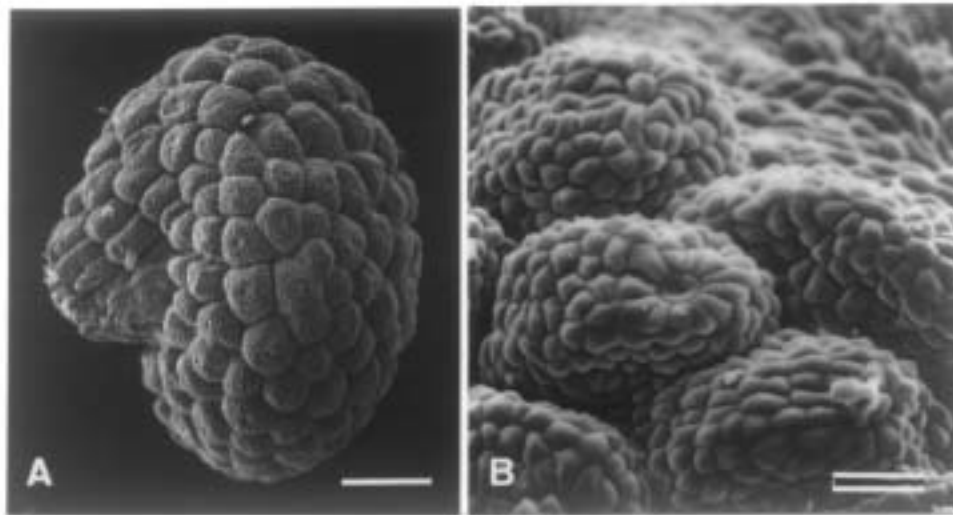


Fig. 3. Nutlets of *Scutellaria taipeiensis* T. C. Huang, A. Hsiao et M. J. Wu. A: Nutlet shape, bar = 200 μm . B: High magnification of nutlet coat ornamentation, bar = 30 μm .

Chromosome count

Chromosome numbers of Subgenus *Scutellaria* have been reported as $2n = 24-34$ (Paton, 1990). In this study, the chromosome number of *S. taipeiensis* is $2n = 26$ (Fig. 4), exactly the same as the others in Taiwan. Besides, the chromosomes of *Scutellaria* in Taiwan are extremely small.

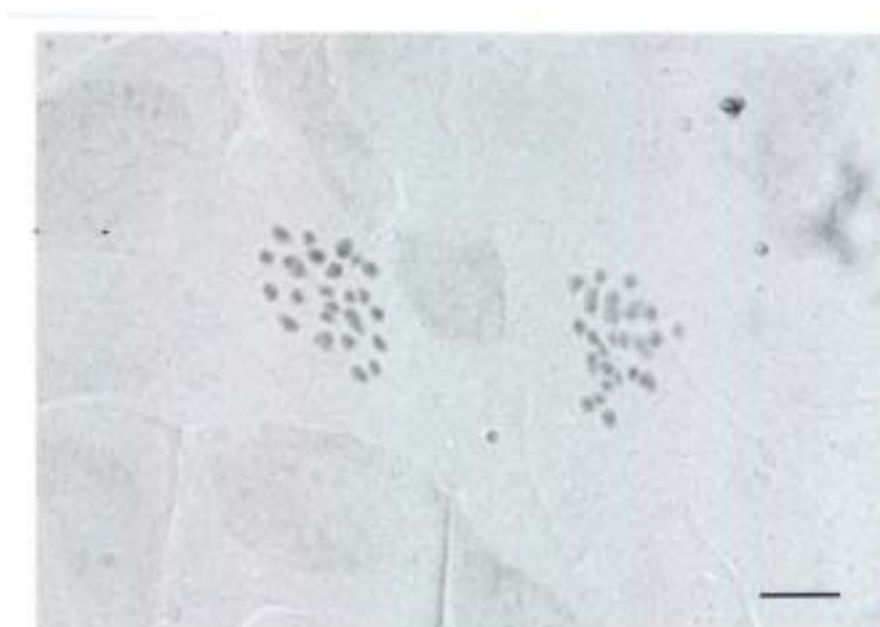


Fig. 4. Somatic chromosomes of *Scutellaria taipeiensis* T. C. Huang, A. Hsiao et M. J. Wu, bar = 5 μ m.

CONCLUSION

After our studies on the floral, pollen and nutlet morphological features, we arrived at the following taxonomic treatment. Seven species in Taiwan are recognized as the following key:

Key to the species

1. Leaves narrowly ovate; nutlet coat radiated umbrella-like type *S. barbata*
1. Leaves ovate to broadly ovate, pubescent at least on the veins of the lower surface
 2. Corolla tube geniculate on the anterior side at base
 3. Corolla tube 1.0-1.2 cm long; nutlet coat grappling-hook type *S. austrotaiwanensis*
 3. Corolla tube 1.5-2.0 cm long
 4. petioles 2-8 mm long; nutlet coat rounded concentric tuberculae type *S. playfairii*
 4. petioles 10-20 mm long; nutlet coat radiated umbrella-like type *S. indica*
 2. Corolla tube curved on the anterior side at base
 5. Petioles 2-8 mm long
 6. corolla tube 2.0-2.5 cm long; nutlet coat grappling-hook type *S. tashiroi*
 6. corolla tube 0.8-1.3 cm long; nutlet coat rounded concentric tuberculae type *S. taipeiensis*
 5. Petioles 10-20 mm long; corolla tube 1.0-1.5 cm long; nutlet coat mammillate type *S. taiwanensis*

Scutellaria taipeiensis T. C. Huang, A. Hsiao et M. J. Wu, *sp. nov.* –Type: **TAIPEI:**
 Growing on exposed rocks or soils adjacent rocks along sunny roadside between Maukong to Chihnan Temple in Mucha, Taipei, about 200 m in elevation. *T.- C. Huang & A. Hsiao 18104* (Holotype and isotypes: TAI). Figs. 1-5

Affine S. barbata D. Don sed folia minus 2 plo longioribus quam latioribus et nucula ornamento rotundo concentrico tuberculato differt.

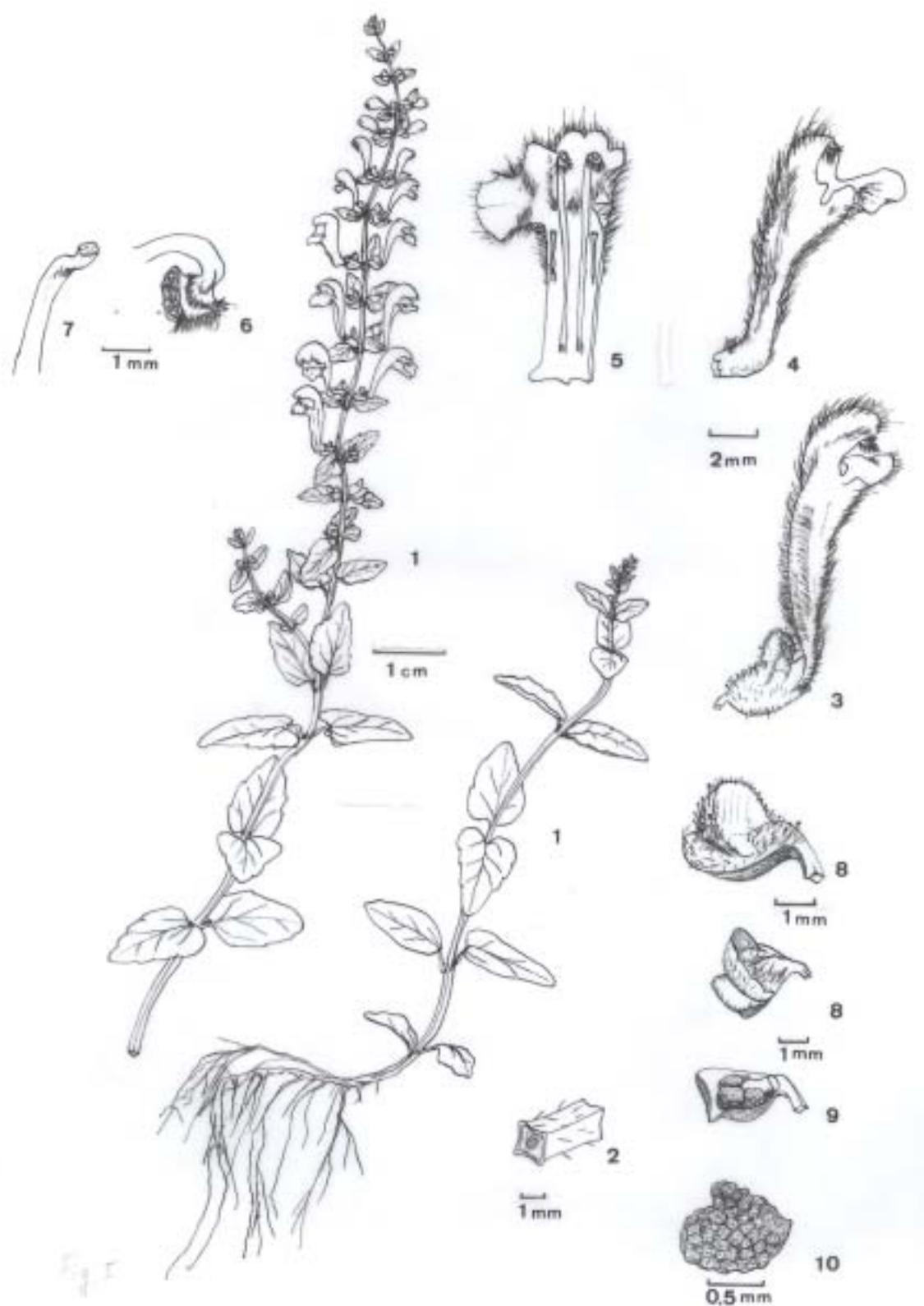


Fig. 5. Illustration of *Scutellaria taipeiensis* T. C. Huang, A. Hsiao et M. J. Wu. 1. habit; 2. part of stem; 3. flower; 4. corolla; 5. dissected corolla with two stamens and the other two removed; 6. anther; 7. stigma, 8. persistent calyx and a scutellum (upper part); 9. nutlets in calyx; 10. nutlet.

An annual herb, up to 45 cm long; stems slender, quadriangular, erect, tufted, herbaceous and pubescent. Leaves opposite, decussate, petiolate; petioles pubescent, 2-5 mm long; blades triangular-ovate or broadly ovate, 0.8-1.5 cm long, 0.5-1.2 cm wide, apex obtuse, base truncate or obtuse, the margins crenate, the upper surface glabrous, the veinlets sunken, the lower surface glabrous or pubescent along veinlets, covered with glandular dots. Inflorescence in terminal raceme, 6-11 cm long; flowers bilabiate, opposite, axillary, spreading, leafy bracteate, the leafy bracts triangular or narrowly ovate, sub-sessile, the pedicels curved, nearly in one plane, up to 3 mm long; calyx two lobes at flower bud and one lobe fallen with scutellum at mature fruits, with a scutellum outside, pubescent and glandular hairy; corolla tubular, hairy, purple to blue, the tube curved at base, 0.8-1.3 cm long; stamens 4, pubescent on anther; pistil curved at base of stigma. Pollen grains 3-colpate, prolate-spheroidal to prolate, isopolar, 14.9-20.4 μm long, 14.8-15.3 μm broad (SEM) or 21-32 μm long, 20-30 μm broad (LM), tectum reticulate. Nutlets orbicular, 0.9 mm long, 0.8 mm broad, with nutlet coat rounded concentric tuberculae ornamentation. Chromosome number $n = 13$.

Flowering and fruiting from March to June.

Additional specimens examined: TAIPEI: Growing on exposed rocks or soils adjacent rocks along sunny roadside between Maukong to Chihnan Temple in Mucha, Taipei, about 200 m in elevation. *T.- C.*, *L.- C.* & *R.- P.* *Huang 18103* (Paratype: TAI).

Notes: This new species is very similar to *S. barbata*, but it differs from the latter by having the blade triangular-ovate to broadly ovate, less than two times longer than broad, and rounded concentric tuberculae type of nutlet coat. This new species is also similar to *S. tashiroi*, but it differs from the latter by having the shorter corolla tubes and rounded concentric tuberculae type of nutlet coat. S.-H. Chen (1990) described a plant, *Scutellaria javanica* Jungh. var. *playfairii* (Rolfe) H. Keng which is very similar to *S. taipeiensis*. But the length of corolla tube is quite different between these two species. The present new species has a shorter corolla tube, 0.8-1.3 cm long, while the corolla tube described by Chen is 2.5-3.5 cm long.

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臺灣植物誌之觀察(35) - 臺北黃芩 (唇形科)

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摘 要

經由研究比較臺灣產黃芩屬植物之花冠型、花粉形態、小堅果表皮微細構造和染色體數目等特徵，本文報導一新種植物 - 臺北黃芩。文中除提供新種臺北黃芩之描述、繪圖及照片外，並提出臺灣產七種黃芩屬植物之檢索表。

關鍵詞：臺北黃芩、唇形科、新種、臺灣。

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