

## A REVISION OF FORMOSAN *SALVIA*<sup>(1)</sup>

TSENG-CHIENG HUANG<sup>(2)</sup> and JUINN-TZONG WU<sup>(3)</sup>

**Abstract:** Based on the conclusion of our biosystematic study (Wu & Huang, 1975), the Formosan *Salvia* have been revised into eleven taxa, i. e., species eight, varieties two, and form one respectively.

### *SALVIA* (Tourn.) L. 鼠尾草屬

Perennial herbs of less than 50 cm tall, glabrous or covered with septate hairs; stems usually erect, rarely decumbent. Leaves cauline or clustered at base of stem as if radical ones, simple or compound, sessile or petiolate. Flowers in verticillate cymes forming terminal racemes or panicles, or on a slender scape; bracteoles ovate to elliptic; calyx green, purple or a mixture of both colors, tubular-campanulate, bilabiate, the upper lip entire or 3-toothed, the lower lip 2-toothed, glabrous or hair inside; corolla yellow, white, reddish-purple, purple or white with purple margins, tubular, bilabiate, the tube glabrous or with a ring of hairs inside, the lower lip 3-lobed, spreading, the central lobe longer than the 2 lateral lobes, the upper lip truncate, emarginate or bi-lobed; stamens included or exerted, the sterile stamens 2, borne on the upper lip, the fertile stamens 2, borne on the lower lip, the filaments short, the connective divided into an upper arm and a lower arm, the upper arm bearing a 1-celled anther, the lower ones being sterile; stigma unequally bifid. Achenes ovoid or ellipsoidal.

About 550 species, distributed in the temperate and warmer regions of the world; eight species, two varieties and one form in Taiwan.

### KEY TO THE SPECIES AND VARIETIES

1. Leaves simple.
  2. Blades hastate; corolla yellow..... 6. *S. nipponica formosana*
  2. Blades oblong-ovate, ovate to broadly ovate; corolla light purple or reddish-purple.
    3. Plants covered with septate hairs; leaves cauline,
      4. Blades ovate to oblong-ovate, brownish beneath, the margin coarsely serrate, the petioles winged; calyx 3-4 mm long; stems pubescent; corolla light purple..... 7. *S. plebeia*
      4. Blades broadly ovate to ovate, greenish beneath, the margin finely serrate, the petioles not winged; calyx 7-8 mm long; stem pilose; corolla reddish-purple..... 3. *S. coccinea*
    3. Plants not covered with septate hairs; leaves not cauline..... 8. *S. scapiformis*
1. Leaves pinnate, bipinnate or tripinnate.
  4. Flowers completely white; calyx minutely hairy inside as in *S. scapiformis*..... 3. *S. hayatae*
  4. Flowers purple (or white with purple margins, as in *S. arisanensis*).
    5. Calyx minutely hairy inside, the hairs less than 1 mm long..... 8. *S. scapiformis*
    5. Calyx pilose inside, the hairs more than 1.5 mm long.

(1) Supported by the grant of NSC to the senior author.

(2) 黃增泉, Professor of Botany, NTU.

(3) 吳俊宗, Graduate student of Botany, NTU.

6. Stamens included ..... 5. *keitaensis*  
 6. Stamens exerted.  
 7. Corolla white with purple margin, the central-lobe of lower corolla lip ascending ..... 1. *S. arisanensis*  
 7. Corolla purple, the central-lobe of lower corolla lip spreading downward.  
 8. Corolla light purple ..... 4. *S. japonica*  
 8. Corolla dark purple.  
 9. Leaves pinnate to bipinnate, the pinnules serrate, sometimes divided as if trifoliate ..... 4. *S. japonica taipingshanensis*  
 9. Leaves bipinnate to tripinnate, the pinnules cleft or irregularly parted ..... 4. *S. japonica taipingshanensis filicifolia*

1. *Salvia arisanensis* Hayata, Icon. Pl. Form. 8: 97. 1919. 高山繸瓣花花草鼠尾草 Pl. 1.

*Salvia scapiformis* Hance var. *pinnata* Hayata f. *hirsuta* Hayata, in Journ. Coll. Sci. Univ. Tokyo 25(11): 182. 1908 (Fl. Mont. Form.).

*Salvia scapiformis* Hance var. *pinnata* Hayata f. *gracilis* Hayata l. c. 183.

*Salvia scapiformis* Hance var. *arisanensis* (Hayata) Kudo in Mem. Fac. Sci. Agr. Taihoku Imp. Uni. 2: 175. 1929.

*Salvia muratae* Yamazaki in Journ. Jap. 44(12): 316. 1969, *pro parte*.

Herbs, up to 40 cm high, covered with septate hairs; stems short. Leaves radical, pinnately or bipinnately compound; petioles puberulent, the hairs 2-8 mm long; pinnules petiolulate or sessile; petioles up to 1 cm long; blades ovate to broadly ovate, the base cuneate to obtuse, sometimes oblique, the apex acute to acuminate, the upper surface sparsely puberulent, the lower surfaces glabrous or minutely hairy on veinlets, glandularly dotted, the margins serrate, the terminal pinnules the largest, 1.5-3 cm long, 1-2.5 cm wide, the lateral pinnules 0.5-1.5 cm long, 0.3-1 cm wide. Inflorescences puberulent and glandularly hairy, up to 30 cm long; calyx green or purple, minutely hairy and sometimes with glandular hairs of 0.5-1.5 mm long outside, puberulent or villous inside, 2 mm or more long; corolla white, with purplish margins, puberulent, the upper lip 3-5 mm long, 3-5.5 mm wide, the lower lip undulate, 2.5-4 mm long, 2-4.5 mm wide; fertile stamens exerted; connectives with an upper arm 3.5-5.5 mm long and a lower arm ca 1 mm long; anthers purple; style 10-15 mm long. Achenes ovoidal, 1.3-1.7 mm long.

Endemic, growing on frequently at altitudes of over 1,500 m high throughout the island.

ILAN: Nanhutashan, Yamazaki *et al.* s. n. 1969, *Kao 5203*, *Hsu 5902*. Tayenshan, *Kao s. n.* Aug. 3, 1958; Chienting, *Huang 7801*, *Hsu 5902*. HSINCHU: Tapachienshan, *Sasaki s. n.* July 18, 1932; Izawashan, *Sasaki s. n.* July 18, 1932. TAICHUNG: Taikan-Rakuraku, *Suzuki 13251*; Hohanashan to Tayilin, *Huang 4651*; Hohanashan to Lishan, *Huang 4667*; Noko to onoe, *Suzuki 2617*; Shanluan, *Huang & Hsieh 7298*; Chika, *Huang 7060*. NANTOU: Chitso, *Huang 1143*; Nenkaoshan, *Suzuki 2572*; Hohanashan, *Wu 36*; Yinhai to Tienchu, *Hsieh 5754*; Chitso to Chiti, *Kao 7210*. CHIAYI: Mt. Alishan, *Kudo & Suzuki s. n.* Dec. 24, 1928, *Ishigaki s. n.* June 3, 1925, *Hashioka s. n.* Nov. 5, 1932, *Yamamoto & Mori s. n.* Nov. 5, 1932. KAOSHISUNG: Tashu-lienshan, *Wu 33*; Mihala, *Yamamoto 604*; S. E-W. cross highway, *Huang s. n.* 1972, *Hsieh 10285*; Daijulinshan, *Hsieh s. n.* Jan. 12, 1972, *Shimizu 3697*. TAITUNG: Asahi-Deguma, *Yamamoto & Mori 383*; Seikaoshan, *Yamamoto s. n.* Aug. 1, 1931. HUALIEN: Chingshuishan, *Shimizu & Kao 11974*; Tailukotashan, *Sasaki s. n.* June 15, 1933; Luanshan, *Huang 4199*, *4221*, *Hsu 3526*, *3608*, *Huang & Kao 6910*; Tienchang, *Suzuki 1817*; Mukkushan, *Kao 4147*; Noko, *Sasaki s. n.* Aug. 22, 1929, *Hibin et al. s. n.* July 4, 1938, *s. n.* July 10, 1939, *Saito & Kikuchi s. n.* Nov. 14, 1925, *Suzuki s. n.* Aug. 3, 1926, *Suzuki 2572*; Nenka, *Huang & Kao 6172*; Tayilin, *Kao 7834*.



Pl. 1. *Salvia arisanensis* Hayata

This species differs from *S. keitaoensis* by its unevenly distributed purplish color of corolla, and also can be distinguished from *S. japonica* var. *taipingshanensis* by having lighter purplish color and shorter pilose hairs on its corolla and the round shape of its lower lip although the calyx and leaves of both species are rather similar.

**2. *Salvia coccinea* Juss. ex Murr. in Comm. Gotting, 1: 86. Pl. 1. 1778.**

紫紅花鼠尾草

Pl. 2.

*Salvia rosea* Vahl, Enum. 1: 244. 1806-8.

Herbs, up to 80 cm high, covered with septate hairs; stems erect, slender, square, angle obtuse, puberulent and villous. Leaves petiolate; petioles slender, 1-3 cm long, puberulent; blades ovate to very broadly ovate, 2-4 cm long, 1.5-3 cm wide, the base truncate or subcordate, the apex acute or obtuse, both surfaces minutely hairy, the margins serrulate. Flowers in verticillate cymes forming terminal raceme; bracteoles 4-5 mm long, narrowly ovate, acuminate, minutely hairy, longer than pedicels; pedicels minutely hairy, 2-3 mm long; calyx tubular-campanulate, bilabiate, minutely hairy, outside and inside, 7-8 mm long, the upper lip broadly ovate, acute, 2.5-3 mm long, ca 2 mm wide, the lower lip 2-toothed, teeth triangular, ca 2 mm long; corolla reddish-purple, tubular, minutely hairy outside of limb, a ring of hairs on inside of tube, 8-10 mm long; fertile stamens 2, the filament ca 3 mm long, the upper arm ca 3 mm long, the lower arm ca 1 mm long; anthers ca 1.5 mm long; stigma bifid unequally. Achenes ellipsoidal, smooth, ca 1.5 mm long.

TAIPEI: Chushanyen, *Shimoda* s. n. Oct. 1914. NANTOU: Chunyang, *Cheng 1561\**; Wushe, *Huang* s. n. Aug. 13, 1971. PINGTUNG: Kurau, *Matuda 519*. HUALIEN: Tongmen, *Suzuki 1359*.

This species is characterized by having very broadly-ovate blades and being minutely hairy on its calyx. Flowering time from August to September. This species has often escaped from cultivation.

**3. *Salvia hayatana* Makino ex Hayata, Icon. Pl. Form. 8: 96. f. 34. d-h. 1919.**

白花鼠尾草

Pl. 3.

*Salvia scapiformis* Hance var. *pinnata* Hayata in Matsum. & Hayata in Journ. Coll. Sci. Univ. Tokyo 22: 312. pl. 17. 1906 (Enum. Pl. Form.).

*Salvia murata* Yamazaki in Journ. Jap. Bot. 44: 366. 1969, *pro parte*.

*Salvia formosana* (Murata) Yamazaki in Journ. Jap. Bot. 44: 319. 1969, *pro parte*.

*Salvia ranzaniana* Makino var. *formosana* Murata in Acta Phytotax. Geobot. 14: 188. 1952, *pro parte*.

Herbs, up to 40 cm high, glabrous or covered with septate hairs. Leaves radical, pinnately or bipinnately compound; petioles minutely hairy; petioles slender, 1-12 cm long, sparsely villous; pinnules sessile or petiolate; petiolules up to 0.8 cm long, blades ovate to broadly ovate, the base round, obtuse to cordate, sometimes oblique, the apex acute, both surfaces glabrous or very sparsely minutely hairy, the margins serrate to coarsely serrate, the terminal pinnules 1.5-4 cm long, 1-2.5 cm wide, the lateral pinnules 0.5-1.5 cm long, 0.3-1 cm wide. Inflorescences sometimes branched, minutely hairy or glandularly hairy; calyx minutely hairy or glandularly hairy outside, pubescent inside; corolla white, minutely hairy outside, villous inside the tube, the upper lip 2-4 mm long, 2-4 mm wide, the lower lip ovate or undulate, 3 mm

Pl. 2. *Salvia coccinea* Juss.

Pl. 3. *Salvia huysmansii* Makino

long or less than 3 mm long, 2.5 mm wide; fertile stamens exerted, the connectives with an upper arm 3.5 mm long or less than 3.5 mm long, the lower arm ca 1 mm long. Achenes ellipsoidal, 1.5-2 mm long.

Endemic. Growing on lowlands, at altitudes of below 1,500 m high throughout the island.

TAIPEI: Bata to Riyokan, *Suzuki* 7522; Shuting, *Wu* 41; Kankou, *Hsu* 5215, 5470, *Chuang* 3042, 2569; Wulai, *Suzuki* 6397, s.n. 1928, *Konehira & Sasaki* s.n. Aug. 1919, *Wu* 34; Kueishan, *Simada* 992, *Huang* 4612, *Hsu* 3452; Pishan, *Cheng* 1003; Pitang, *Kao* 5470; Kuaishan, *Suzuki* s.n. Oct. 1, 1930; Wantang, *Simizu* 2283, 3288; Hokuseikeo, *Suzuki* 8375. ILAN: Pailien, *Cheng*, 1274. TAOYUAN: Hushainshan, *Wu* 42. Kaopo to Kaoyi, *Cheng* s.n. 1966, 1282, *Wu* 28. NANTOU: Kuantaochi, *Wu* 21. KAOHSIUNG: Shaping, *Wu* 23, *Huang* 4882.

Hybrids of *Salvia* × *arisanensis*:

HSINCHU: Tapochienshan, *Wu* 20, *Huang* 5959. TAICHUNG: Tachien, *Wu* 29. NANTOU: Chanyang, *Cheng* 1557, *Wu* 37. CHIAYI: Mt. Alishan, *Huang* 1604, *Wu* 38. HUALIEN: Fuhsinshan to Loushan, *Wu* 8; Fuhsinshan, *Hsieh* 10472.

Hybrids of *Salvia* × *keitaoensis*:

TAITUNG: Chingsbuliyang, *Wu* 27. HUALIEN: Loushan, *Wu* 7; Hsienbaiyang, *Wu* 6. Hybrids of uncertain origin.

MIAOLI: Luchangtashan, *Fukuyama* s.n. July 8, 1932. TAICHUNG: Pabsienshan, *Huang* 1302; Hottukan, *Suzuki* 13279. KAOHSIUNG: S. East-West Cross Highway, *Hsieh* 10198; Liukuei-Peinanchushan, *Yamazaki, Mambo & Yamazaki* 966; Nanfongshan, *Chuang & Kao* 3375. PINGTUNG: Machia, *Huang & Kao* 7354, 7342, 7498. HUALIEN: Luanshan, *Hsu* 3526, 3608.

Differs from *S. arisanensis* by its pure white color of corolla and short pubescent hairs on the inside surface of calyx.

#### 4. *Salvia japonica* Thunb., Fl. Jap. 22. Pl. 5. 1784.

##### 4a. *Salvia japonica japonica*. 弧曲擬鼠尾草

*Salvia japonica* f. *albiflora* Hiyama in Journ. Jap. Bot. 17: 319. 1941.

*Salvia muratae* Yamazaki in Journ. Jap. 44(12): 366. 1969, *pro parte*.

Herbs, up to 60 cm high, covered with septate hairs; stems branched, minutely hairy. Leaves radical and cauline, pinnately compound, sometimes bipinnately compound; petioles up to 10 cm long, 2-grooved, puberulent; pinnules sessile or petiolate; petioles up to 0.5 cm long; blades ovate, elliptic or obovate, the base cuneate, the apex acute or acuminate, the both surfaces puberulent on the veinlets, sometimes very sparsely villous, the margins serrate, cleft, or irregularly divided, sometimes as if trifoliate, the terminal pinnules larger, 1-6 cm long, 0.8-1.5 cm wide, the lateral pinnules 1-3 cm long, 0.4-1 cm wide. Inflorescences dichotomously branched, puberulent and glandularly hairy; bracteoles ovate to elliptic, both surfaces puberulent, the margins entire; calyx puberulent and glandularly hairy outside, villous at the throat inside, the hairs over 3 mm long; corolla light purple, nearly twice as long as the calyx, puberulent on the outside of the limb, nearly glabrous on the tube, the lower lip spreading 3-lobed, the central lobe very broadly obovate, emarginate at the apex, undulate, ca 1.2 mm long, 2 mm wide, the 2 lateral lobes broadly ovate, 0.5 mm long, 0.5 mm wide, the upper lip oblong, emarginate, 2-4.5 mm long, 4-5.5 mm wide; fertile stamens exerted, the filaments ca 1.2 mm long, the connectives with an upper arm 4.5-5.5 mm long and a lower arm ca 1.2 mm long. Achenes ellipsoidal, 1.2-1.6 mm long.

Japan. Taiwan, found only in the vicinity of Taipei.

TAIPEI: Tatumshan, Wu 24, Huang 3408, 3411\*, 3412, 3413, Chuang et al. 4658, Nakamura 192, Shimada 764, Hsu 5556, 5557.

Some individuals with white flowers were noted in the following population: TAIPEI; Tatumshan, Wu 25.

**4b. *Salvia japonica* Thunb. var. *taipingshanensis* (Wu & Huang) Huang & Wu, comb. nov. 深紫花鼠尾草 Pl. 4.**

*Salvia ranzanensis* Makino var. *formosana* Murata in Acta Phytotax. Geobot. 14: 188. 1952, pro parte.

*Salvia formosana* (Murata) Yamazaki in Journ. Jap. Bot. 44: 319. 1968, pro parte.

*Salvia japonica* Thunb. subsp. *taipingshanensis* Wu & Huang in Taiwania 20 (1): 77-97. 1975.

Herbs, up to 50 cm high, covered with septate hairs; stems branched, minutely hairy. Leaves radical and cauline, bipinnately compound; petioles with 2-grooves, minutely hairy, ca. 10 cm long; pinnules petiolate, the petiolules 5 mm long; blades elliptic or obovate, the base cuneate, the apex acute or acuminate, the upper surface puberulent, the lower surface minutely hairy along veinlets, sometimes, very sparsely villous, the margins serrate, cleft or irregularly divided. Scape dichotomously branched, puberulent, or glandular hairy; calyx minutely hairy and glandularly hairy outside, puberulent inside; corolla nearly twice as long as the calyx, minutely hairy outside, the upper lip 2.5-4 mm long, 3-5 mm wide, the lower lip broadly obovate, undulate, 2.5-4 mm long, 4.5-5.5 mm wide; fertile stamens exserted; connective 4-5 mm long in upper arm, 1.2 mm long in lower arm. Achenes ellipsoidal, 1.2-1.6 mm long.

Endemic, only found in the northern part of the island.

ILAN: Nanshan, Hsu s.n. Aug., 1969; Taipingshan, Cheng 1588, Suzuki 1044, s.n. Aug. 1, 1927, s.n. Aug. 2, 1928, s.n. Aug. 3, 1928, s.n. Aug. 7, 1928, s.n. Aug. 10, 1929, Wu 13, 14, Suyuan, Huang 7317\*, 7331, 7325; Nanhutashan, Yamazaki, Namba & Tani 964; Nanshan, Yamazaki, Namba & Tani 1211; Sikikun & Piyamanambu, Hoshizawa 2412; Tayenshan, Kuo s.n. Aug. 3, 1968; Taipingshan, Chuang, Chao & Kuo 4658.

**4ba. *Salvia japonica* var. *taipingshanensis* f. *filicifolia* (Merr.) Huang & Wu, trans. nov. 三筒葉鼠尾草**

*Salvia mtsudae* Kudo in Journ. Soc. Trop. Agric. 3: 226. 1931.

*Salvia filicifolia* Merr. in Lingn. Soc. Trop. Agric. 3: 226. 1931.

*Salvia japonica* var. *filicifolia* (Merr.) Metcalf & Stibal in Lingn. Sci. Journ. 16: 155. 1931.

*Salvia japonica* Thunb. var. *formosana* Murata in Acta Phytotax. Geobot. 14: 189. 1952.

*Salvia japonica* Thunb. subsp. *taipingshanensis* Wu & Huang var. *filicifolia* (Merr.) Wu & Huang in Taiwania 20 (1): 77-97. 1975.

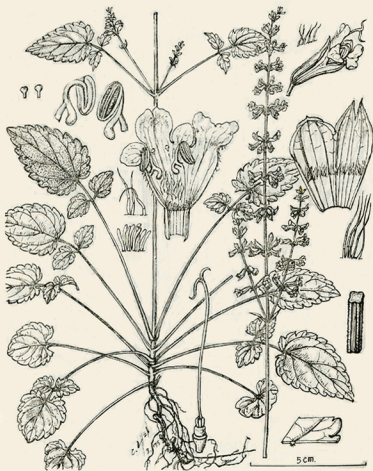
Herbs, up to 60 cm high. Leaves bipinnately to tripinnately compound; pinnules cleft, irregularly parted. Bracteoles linear-lanceolate, puberulent, 6 mm long; calyx 5-7 mm long; corolla 9-10 mm long.

Endemic, only found in the northern part of island.

ILAN: Huarosshu to Kyarawa, Suzuki 7172; Toto, Hibino et al. s.n. July 1, 1938; Soulanshan, Kuo 7081; Taipingshan, Suzuki 228, 484, s.n. July 14, 1929; Nanhutashan, Kuo s.n. Feb. 10, 1973; Wu 15. HSINCHU: Sotenshan, Suzuki 4706; Kuanwu, Huang 6655, 6662, 6656, 6657. TAOYUAN: Peichatsienshan, Wu 14-F.



Pl. 4. *Salvia japonica* Thunb. var. *taipingshanensis* (Wu & Huang) Huang & Wu

Pl. 5. *Salvia acutaensis* Hoya

5. *Salvia keitaensis* Hayata, Icon. Pl. Form. 8: 96, f. 34: a-d. 1919. 禮樂花鼠尾草 Pl. 5.

*Salvia scapiformis* Hance var. *pinnata* Hayata in Matsum. & Hayata in Journ. Coll. Sci. Univ. Tokyo 22: 312, pl. 7. 1906.

*Salvia scapiformis* Hance f. *keitaensis* (Hayata) Kudo in Mem. Fac. Sci. Agri. Taihoku Imp. Univ. 2: 175. 1929.

*Salvia hualliensis* Wu & Huang in Taiwania 20(1): 77-97. 1975, nom. nud.

*Salvia keitaensis sensu* Wu & Huang (*Salvia* × *arisanensis*) in l. c., non Hayata.

Herbs, up to 40 cm high; stems glabrous. Leaves radical, rarely cauline, pinnately compound; petioles minutely hairy, villous, 2-8 cm long; pinnules petiolulate; petiolules 2-5 mm long; blades ovate, the base cordate, the apex acute, both surfaces glabrous, or the lower surface minutely hairy at veinlets, glandularly dotted, the margins serrate, the terminal pinnules 3-5.5 cm long, 2-3 cm wide, the lateral pinnules 1.5 cm long, 1.2-1.5 cm wide. Inflorescences often branched, minutely hairy, without glandular hairs, up to 40 cm long; calyx glabrous or minutely hairy outside, villous inside, more than 3 mm long; corolla light purple, minutely hairy outside, the upper lip 2-4 mm long, 2-6 mm wide, the lower lip broadly oblong, bilobed, 2-3.5 mm long, 2.5-6 mm wide; fertile stamens included, or nearly slightly exerted, the filaments 1.5-2.5 mm long, the connectives with an upper arm about 1.5 mm long and a lower arm ca 1 mm long. Achenes ellipsoidal, 1.5-2 mm long.

Endemic, growing on altitudes from 1,000 to 1,500 m high in the eastern and western parts of island.

TAITUNG: Chippongou, *Sasaki* s. n. Oct. 1934; chuifen to Chienching, *Hosokawa* 5201; Booranshan, *Yamamoto* s. n. Dec. 1928; Taitoshan, *Yamamoto* 1079, 1080, 1089, 1102. HUALIEN: Chinsuhsan, *Shimizu* & *Kao* 11893; Fanben to Tenchang, *Suzuki* 1752; Tailuko, *Hosokawa* 1564, *Suzuki* s. n. Oct. 1931; *Mori* s. n. Nov. 1914; Tienhsiang, *Huang* 4311, *Wu* 31, 32; Lozhou, *Wu* 9, 10, 30; Tungmen to Wumau, *Suzuki* 1384; Lunchien *Wu* 11, 12\*. KAOSHIUNG: Oloozan, *Yamada* 26. HUALIEN: Liwushan, *Hsieh* s. n. Feb. 13, 1972; Talieshan, *Hsieh* s. n. Dec. 13, 1972; Fangmen of Wumau, *Suzuki* 1392, 1430; Lunchien, *Suzuki* 1500; Chingshuhsan, *Shimizu* & *Kao* 11974.

Some hybrids (*Salvia* × *arisanensis* = *S. keitaensis sensu* Wu & Huang) were observed in the following collections: NANTOU: Chitou, *Wu* 26. Pingtung: Wutai *Cheng* s. n. Mar. 29, 1971; Chishan, *Yamamoto* & *Mori* 604.

6. *Salvia nipponica* Miq. var. *formosana* (Hayata) Kudo in Mem. Fac. Sci. Agr. Taihoku Imp. Univ. 2: 157. 1929. 黃花鼠尾草 Pl. 6.

*Salvia nipponica* Miq. ex Matsum. & Hayata in Journ. Coll. Sci. Univ. Tokyo 22: 312. 1906 (Enum Pl. Form).

*Salvia formosana* Hayata. Icon. Pl. Form. 8: 99. 1919.

Herbs, up to 60 cm high, covered with septate hairs; stems square, decumbent or ascending from base, puberulent, the angles obtuse minutely hairy. Leaves cauline, petiolate; petioles slender, up to 10 cm long, minutely hairy; blades hastate, 3-8 cm long, 2-4 cm wide, the base with triangular lobes, the apex acute to acuminate, the margins serrate-dentate, the upper surfaces minutely hairy, the lower surfaces glabrous or minutely hairy on the veinlets, glandularly dotted. Flowers in verticillate cymes forming loose terminal racemes, up to 15 cm long; bracteoles ovate, 5-10 mm long; pedicels minutely hairy, 4-6 mm long; calyx tubular-campanulate, minutely hairy, bilabiate, 7-8 mm long, the upper lip entire, acute, the lower lip 2-toothed, the teeth



Pl. 6. *Salvia nipponica* Miq. var. *formosana* (Hayata) Kudo

narrowly triangular, 1.5–2 mm long; corolla yellow, campanulate, bilabiate, glandular-dotted, with a ring of hairs inside near the base of the tube, 2–3.5 cm long, the upper lip oblong, bilobed, 4–6 mm long, the lower lip 3-lobed, the central lobe very broadly ovate, 2–4 mm long, 5–6 mm wide, the 2 lateral lobes broadly ovate, 2 mm wide; stamens 2, inserted on the inside of the corolla tube, the filaments 4–5 mm long, the connectives with an upper arm 5–6 mm long and a lower arm ca 3 mm long. Achenes obovoidal-orbicular, obtusely 3-angled, slightly flattened, smooth, ca 2 mm long.

Endemic, growing on lowlands in the northwestern part of the island.

TAIPEI: Horanshan, *Shimoda* s. n. Mar. 8, 1908; Kabasan, *Suzuki* 12756; Karason, *Suzuki* s. n. Sept. 27, 1930; Rimogan, *Kanohira* s. n. Sept. 23, 1922; Sandianulien, *Masamune* 2645; Saukan, *Suzuki* 7034; Sehting, *Tin & Kao* 4960; Sitselgun, *Murakami* 179; Taikusiko, *Nakamura* 768, *Shimoda* 761, s. n. July 1918. ILAN: Ritoshan, *Kawakami* s. n. Aug. 1913; Soutanshan, *Chuang & Kao* 7079; Taipingshan, *Chuang et al.* 4633. HSINCHU: Kuanwu, *Huang* 4174\*.

7. *Salvia plebeia* R. Br. Prodr. 501. 1810. 節毛鼠尾草

Pl. 7.

*Ocimum virgatum* Thunb., Fl. Jap. 250. 1784.

*Salvia brachiata* Roxb., Hort. Eng. 4. 1814.

*Salvia minutiflora* Bunge, Mem. Sav. Etr. Peters. 2: 124. 1835

Herbs, up to 70 cm high, covered with septate hairs; stems erect, square, the angles obtuse, minutely hairy downward. Leaves cauline, sessile or petiolate; petioles puberulent, with a groove above, up to 3 cm long; blades ovate to oblong-ovate, the upper surfaces sparsely minutely hairy, the lower surfaces glabrous, or minutely hairy along veinlets, 4–10 cm long, 2–5 cm wide, the margins obtusely serrate to serrate. Flowers in verticillate cymes, often six-flowered, forming terminal racemes or panicles, 10–25 cm long; bracteoles elliptic, the upper surfaces sparsely minutely hairy, the lower surfaces densely minutely hairy ca 1.5 mm long; pedicels short, densely hairy on the nerves; calyx bilabiate, the upper lip 5-nerved, the central 3 nerves longer than lateral 2, the lower lip 2-toothed, the teeth triangular, acute 3–4 mm long; corolla light purple, tubular, bilabiate, the upper lip ovate, emarginate, minutely hairy outside, folded, ca 1.8 mm long, 1 mm wide, the lower lip minutely hairy outside, ca 1.7 mm long, 3-lobed, the central lobe larger, broadly obovate, emarginate or undulate, the 2 lateral lobes broadly ovate, the corolla tube with a ring of hairs inside; fertile stamens 2, inserted at the base of lower lip; anthers borne on upper arm; style gynobasic; stigma unequally bifid, the upper lobe shorter than the lower, Achenes obovoidal, smooth, ca 1 mm wide.

Distributed in Japan, Korea, mainland China, Taiwan, the Philippines, Malaysia and Australia. In Taiwan, growing on lowlands throughout the island.

TAIPEI: Swigenchi, *Suzuki* s. n. Apr. 13, 1929; Keelung, *Sasaki* s. n. May 20, 1933. NANTOU: Sun Moon Lake, *Cheng* 770. CHIAYI: *Kao* 7879\*. TAINAN: Wushantou, *Morimoto* s. n. May 9, 1943. TAITUNG: Taitoshan, *Yamamoto* s. n. Mar. 27, 1930.

This species is characterized by having an elliptic to ovate leaf-blade and a folded upper corolla-lip. Flowering time from April to July.

8. *Salvia scapiformis* Hance in Journ. Bot. 23: 368. 1885. 廣卵葉鼠尾草

Pl. 8.

*Salvia delavayi* Lévl. in Fedde, Rep. Sp. Nov. 9: 220. 1901.

Pl. 7. *Salvia plebeia* R. Br.



Pl. 8. *Salvia scapiformis* Hance

Herbs, up to 40 cm high, glabrous or puberulent; stems erect, short, square, the angles prominent, minutely hairy. Leaves radical, petiolate; petioles slender, flattened, densely minutely hairy, up to 12 cm long; blades broadly ovate or slightly lobed, 3-6 cm long, 2-4 cm wide, both surfaces glabrous, glandular-dotted. Inflorescence minutely hairy in loose verticillate cymes, forming racemes or panicles; bracteoles elliptic, 2-5 mm long, the base cuneate, the apex acute, the margins entire, both surfaces glabrous; calyx tubular, bilabiate, the upper lip broadly ovate, entire, the lower lip 2-toothed, the teeth triangular, 4-7 mm long; corolla light purple, tubular, bilabiate, with a ring of hairs inside, 8-10 mm long, the upper lip erect, emarginate, ca 3 mm long, 2.5 mm wide, the lower lip 3-lobed, the central lobe larger, distinctly obovate, emarginate, ca 2 mm long, 2.5 mm wide, the 2 lateral lobes spreading, broadly ovate ca 1 mm long, the connectives ca 4 mm long, the upper arm ca 3 mm long, glabrous, the lower arm ca 1 mm long, small and curved; style as long as the corolla; stigma equally bifid or nearly so. Achenes cylindrical, smooth, ca 1 mm long, 0.2 mm wide.

Distributed in mainland China, and the northern Taiwan.

TAIPEI: Keelung, *Suzuki* 6683, *Tanaka & Shimoda* s. n. May 20, 1934, *Yamamoto* s. n. Apr. 24, 1929. Hsientungshu, *Cheng* 873\*, *Wu* 17; Kinpori, *Kawamaki & Sasaki* s. n. Apr. 20, 1910; Oyayubishan, *Shimoda* 126; Ensorei, *Sasaki* s. n. Apr. 14, 1929, Mururoahu, *Suzuki* 7142.

This species is characterized by having radical leaves with broadly ovate blades. Flowering time from April to December.

#### UNCERTAIN SPECIES

9. *Salvia tashiroi* Hayata, Icon. Pl. Form. 8: 98, 1917.

#### LITERATURE CITED

Wu, Jiunn-Tzong, & Tseng-Chieng Huang, 1975. Biosystematic studies of Formosan *Salvia*. *Taiwania* 20(1): 77-97.