

The Genus of *Acanthephippium* Blume (Orchidaceae) in Taiwan

Shih-Wen Chung^(1,5), Tien-Chuan Hsu⁽²⁾, Ling-Ya Hung⁽³⁾ and Chih-Kai Yang⁽⁴⁾

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ABSTRACT: Three species of *Acanthephippium* (Orchidaceae) are recognized from Taiwan: *Acanthephippium pictum* Fukuyama, *A. striatum* Lindley and *A. sylhetense* Lindley. According to previous reports, *A. pictum* is a synonymy of *A. sylhetense*, although *A. pictum* can be distinguished from *A. sylhetense* by the shape and color of the flowers, and the structures of the lips. The distribution pattern of these two species are also different. *A. pictum* occurs only on Iriomote island, Japan and Lanyu island, Taiwan. A taxonomic treatment and line drawings of *A. pictum* in Taiwan are provided. A somatic chromosome counts of $2n = 48$ are reported for *A. pictum* from Lanyu island and for *A. striatum* and *A. sylhetense* from Taiwan island.

KEY WORDS: *Acanthephippium striatum*, *A. pictum*, *A. sylhetense*, Orchidaceae, Taxonomy, Chromosome number, Taiwan.

INTRODUCTION

The genus *Acanthephippium* has twelve species distributed in Southeast Asia from Sri Lanka, Nepal and north to Japan, all over the Malesian Archipelago and in many islands of the Pacific. *Acanthephippium* is easily distinguished from all other genera by its characteristic jug-shaped flowers, hence the common name 'jug orchids' which is often applied to species of *Acanthephippium*.

Acanthephippium pictum Fukuyama (1935) was first described from a collection made by Fukuyama in 1934 on Lanyu island. No further collections have been made since then, although some population of *Acanthephippium* was observed near the type locality. In Taiwan, *A. pictum* has never been thoroughly examined morphologically, nor has it been sufficiently compared with other species of the same genus.

The habit is fairly uniform throughout the genus, and most of the diagnostic features are present in the flowers. However, flowers of *Acanthephippium* are very fleshy and do not preserve well as herbarium specimens. In addition, the distribution of *Acanthephippium pictum* is very restricted, collected only once from Lanyu island, in a rain forests from a altitude of 350-400 m. For this reason, previous researchers (Lin, 1977; Ying, 1977; Thomas, 1997; Su, 2000) reported *A. pictum* as a synonymy of *A. sylhetense*. During the summer of 2003, the first author (SWC) found *Acanthephippium* flowering at one locality (Tienchih, Chung 6592) on Lanyu island but was not able to draw line document and make observations of the floral structures due to the late flowering stage. On August 8, 2004, the present authors

1. Division of Forestry Biology, Taiwan Forestry Research Institute, 53 Nanhai Road, Taipei 100, Taiwan.

2. Department of Life Science, National Taiwan University, 1 Roosevelt Road, Sec. 4, Taipei 106, Taiwan.

3. Department of Life Science, National Taiwan Normal University, 88 Ting-Chow Road, Sec 4, Taipei 116, Taiwan.

4. Department of Biological Sciences, National Sun Yat-sen University, 70 Lien-Hai Road, Kaohsiung 804, Taiwan.

5. Corresponding author. Email: wenwen.9@yahoo.com.tw

found another locality on Mt. Hongtou (*Chung & Hsu 7500*). The 2004 specimens are in agreement with the type description, which was also collected from Mt. Hongtou (Kyto-san) of Lanyu and are considered to be *A. pictum*.

Acanthephippium Blume

Terrestrial herbs. Pseudobulbs closely approximate conical to cylindrical with few internodes and few leaves, more or less covered by persistent sheath fibers, upper half covered by leaf-sheaths. Leaf articulate, plicate, ovate to lanceolate-ovate to obovate. Inflorescence few-flowered, perianth not widely spreading; pedicel thickened after anthesis. Dorsal sepal oblong to obovate, concave; apex rounded to obtuse. Lateral sepals obliquely oblong; apex recurved and obtuse. Petals elliptic to spatulate, free, appressed to the sepaline tube. Lip enclosed in mentum, stipitate at apex of column foot, mobile, 3-lobed, lateral lobes, erect, disc with a few longitudinal ridges. Column with a long recurved foot. Stigma broadly obovate to obovate; anther 2-celled, often with a rounded elevation, front margin drawn out on a flap, margin often erose, truncate or apiculate. Pollinia 8, ellipsoid, in two groups of 4, two of these larger, and two smaller. Ovary grooved, often sparsely and finely pubescent. Fruit held on long, erect stalks, ellipsoid, ridged.

Distribution: India, Sri Lanka, Nepal, Bangladesh, Burma, southern China, Taiwan, southern Japan, the Ryukyu Islands, Hong Kong, Thailand, Vietnam, Malay Peninsula, Sumatra, Java, Lesser Sunda Islands, Borneo, Celebes, the Philippines, New Guinea, Solomon Islands, Vanuatu, Fiji, Tonga, Horne Islands, and New Caledonia (Thomas, 1997).

Key to the species of *Acanthephippium* in Taiwan

1. Pseudobulb with 2 or more leaves; flower yellowish or yellowish-red without reddish-violet veins; mentum not spur-like; lip with 3 to 5 longitudinal ridges.
 2. Flower with reddish spots at tip outside; callus on disc consisting of 3 lamellate keels 3. *A. sylhetense*
 2. Flower with yellow or red veins at tip outside; callus on disc consisting of 2 thicker ridges beside and 3 lamellate keels centered 1. *A. pictum*
1. Pseudobulb usually with solitary leaf; flower whitish, striated with longitudinal reddish-violet veins; mentum spur-like; lip with 1 longitudinal ridges 2. *A. striatum*

1. *Acanthephippium pictum* Fukuy., Bot. Mag. Tokyo 40: 666. 1935; Hsieh, Quart. J. Taiwan Mus. 8: 213. 1955; Masam., Sc. Rep. Kanazawa Univ. 9: 135. 1964; Hatusima & Amano, Fl. Okinawa rev. ed. 163. 1967; Masam., Illust. Fl. Nippon 8: 238. 1969; Hu, Quart. J. Taiwan Mus. 25: 41. 1972; Garay & Sweet, Orch. South. Ryukyu Is. 130. 1974; Walker, Fl. Okinawa & South. Ryukyu Is. 367. 1976; Liu & Su, Fl. Taiwan 5(1st ed.): 867. 1978.
—Type: Lanyu island, July 1934, Fukuyama 4679. 延齡蟬花蘭 Figs. 1 & 2

Acanthephippium sylhetense Lindl. var. *pictum* (Fukuy.) Hashim., Ann. Tsukuba Bot. Gard. 3: 11. 1985.

Acanthephippium sylhetense auct. non Lindl.: Nakejima, Enum. Orch. Ryukyu 1: 47. 1971; Lin, Native Orchids of Taiwan 3: 26-28. 1987; Su, Flora of Taiwan 5, 2nd. ed.: 739.

Terrestrial herb. Root about 3 mm in diameter. Pseudobulb fleshy, elongate clavate, about 13 cm long, 2.2-4 cm across. Leaves usually 3, stalk about 14 cm long, blade elliptic, about 20-50 cm long, 7-10 cm wide, lower leaf usually smaller, mainly 5-9-veins. Scape lateral from the new year's growth, arising from the base of middle nodes of the pseudobulb, about 18 cm long. Inflorescence of raceme, flowers 3-5, dense, flowers whitish yellow and flushed

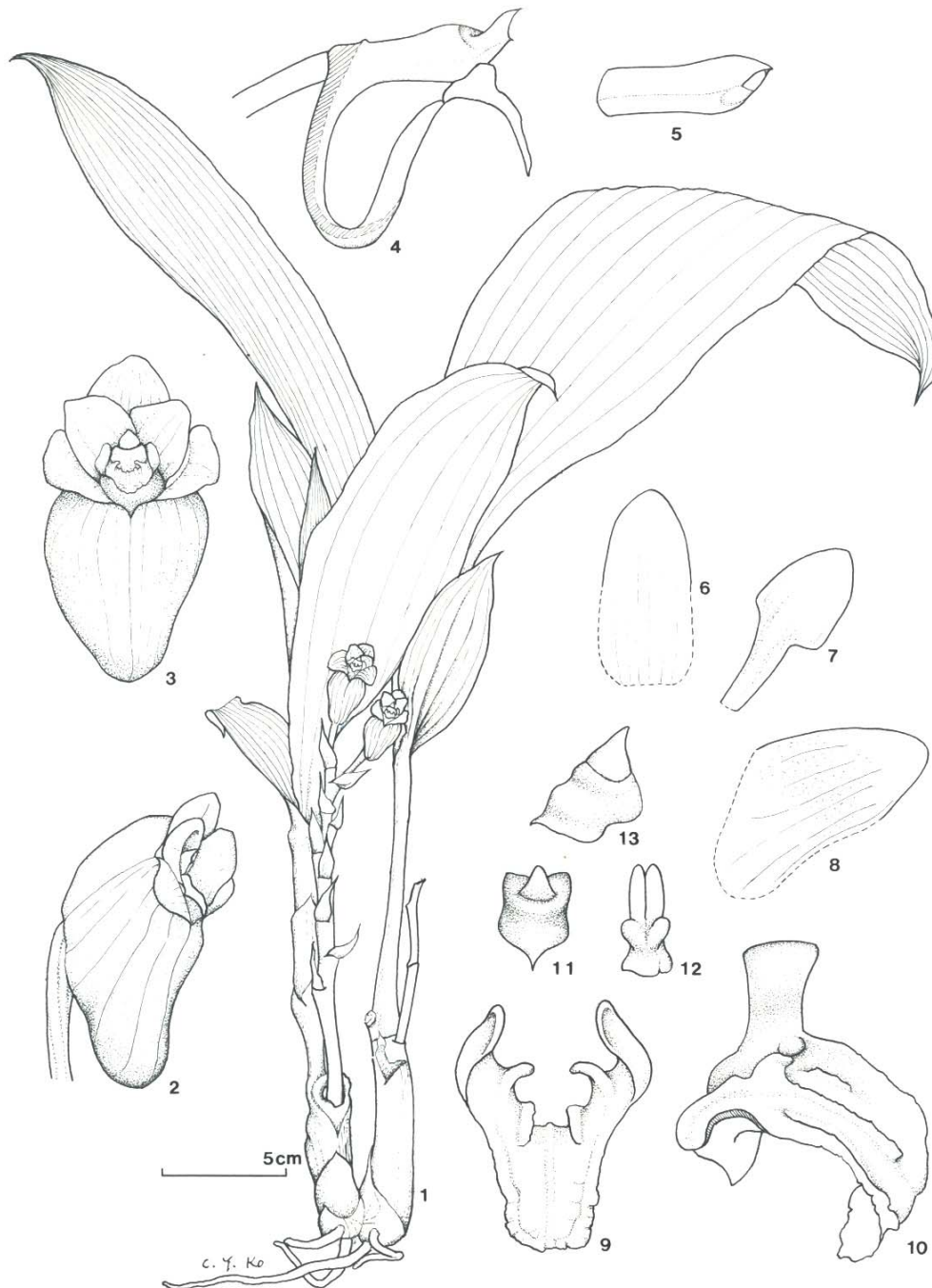


Fig. 1. *Acanthephippium pictum* Fukuyama. 1: Habit. 2, 3: Different views of flower. 4: Lip and column. 5: Column with anther removed. 6: Dorsal sepal. 7: Petal. 8: Lateral sepal. 9: Lip, front view. 10: Lip, side view, one side-lobe removed. 11: Anther-cap, front view. 12: Anther-cap, side view. 13: Pollinia.

with dark purple on the upper part of inner side, with yellow or red veins at apical outside, veins many; bract ovate, about 3 cm long, 2.5 cm wide; pedicel and ovary about 4 cm long; all sepals united into a swollen tube; dorsal sepals about 3.5 cm long, 1.3 cm wide; lateral sepals about 4 cm long, 2 cm wide; petals oblanceolate, about 3 cm long, 1.5 cm wide; lip 3 lobed, with a very narrow claw about 2.2 cm long and 6 mm wide; lateral lobes upward, about 5 mm long, with 2 irregular ridges and 3 keels with unequal length between them; midlobe

tongue-shaped, about 1 cm long; column about 7 mm long; foot about 1.3 cm long, base adnated into a sac with lip and lateral sepals, pollinia 8, ellipsoid, in two groups of 4, two of these larger, and two smaller, yellow, with caudicle, no viscidium. Fruit held on long, erect stalks, ellipsoid, ridged.

Flowering season: June to August.

Distribution: Taiwan, Lanyu island and the Ryukyus, Japan.

Chromosome number: $2n = 48$ (Fig. 5A).

Specimen examined: Taitung: Lanyu island, Jul. 16. 1934. *Fukuyama* (TAI); *Fukuyama s. n.* Jul. 1934 (TAIF), Tienchih, *Chung* 6592 (TAIF). Mt. Hongtou, elev. ca. 300-400 m, quite shade forest where the soil is reasonably fertile, *Chung & Hsu* 7500 (TAIF).

Notes:

1. Lip with a callus of 5 unequal in length, raised, irregularly toothed keels is the distinctive feature of the flowers of *A. pictum*. We compared the descriptions of other 11 *Acanthephippium* species and found *A. pictum* is the only one with this unique floral character.
2. Recent reports of *A. pictum* as a synonymy of *A. sylhetense* or variety of *A. sylhetense* (Hashimoto, 1985) may not be correct. The two taxa can be distinguished mainly by floral structures, and color. These variations are not continuous and may be involved with different reproductive strategies; we thus treated these taxa as different species as Fukuyama (1935) did.

2. *Acanthephippium striatum* Lindl., Bot. Reg. 24: 41. Misc 1838; Hook. F., Fl. Brit. India 5: 816. 1890; Ann. Roy. Bot. Gard. Calc. 5: 22. 1895; King & Pantl., Ann. Roy. Bot. Gard. Calc. 8: 122. pl. 155. 1898; Prain, Bengal Plants 762. 1903; J. J. Smith, Bull. Jard. Bot. Buitenzorg II, 9: 33. 1913; Schltr., Die Orchideen, ed. 1: 302 1915; Ridley, J. Nat. Hist. Soc. Siam 4, 3: 17. 1921; J. J. Smith, Bull. Jard. Bot. Buitenzorg III, 6. 1924; Holttum, Orch. Malaya 148. 1957; Tiwari & Mahesh., Ind. For. 89: 427. 1963; Seidenf. & Smitinand, Orch. Thailand 792. pl. 37 1965; Backer & Bakh. F., Fl. Fava 3: 331.1968; Mehra & Vij, Taxon 19: 106. 1970; Tuyama, Univ. Mus. Tokyo Bull. 2: 176. 1971; Pradhan, Amer. Orch. Soc. Bull. 41: 511 1972; Phamk., I11. Fl. S. Vietnam 2: 1040. f. 5091. 1972; Orch. Digest 37, 4: 133. 1973; Seidenf., Contr. Rev. Orch. Fl. Camb., Laos & Vietnam 5: 5. 1975; Pradhan, Florida Orch. 19: 28. 1976; Ying, Col. Ill. Ind. Orch. Taiwan 1: 417. 1977; Pradhan, Indian Orch. 2: 246. 1979; Bose & Bhattacharjee, Orch. India 52. 1980; Pradhan, Orch. Rev. 89, 1057: 360. 1981; Senghas in Schltr., Die Orchideen, ed. 3: 867. 1984; Lin, Nat. Orch. Taiwan 24. 1987; Comber, Orch. Java 90. 1990; Aver., Ident. Guide Vietn. Orch. 112. 1994. Fl. Reipubl. Popul. Sin. 18: 322. 1999. Su, Fl. Taiwan 5(2nd ed.): 737. 2000. 一葉蟬花蘭 Fig. 3

Acanthephippium unguiculatum (Hayata) Fukuy., Bot. Mag. Tokyo 48: 301. 1934; Hsieh, Quart. J. Taiwan Mus. 8: 213. 1955; Hu, Quart. J. Taiwan Mus. 25: 41. 1972; Su, Nat. Orch. Taiwan 97. 1974; Maekawa, J. Jap. Bot. 50: 256. 1975. Cheng, Formosan Orch. 6. 1979; Isaac-Williams, Intr. Orch. Asia 11. 1988.

Terrestrial herb. Root 3 mm in diameter. Pseudobulb fleshy, obclavate, about 7 cm long, base 1-2 cm. Across, with 3 bract-like leaflets. Leaves solitary, rarely 2, petiole about 7-10 cm long, blade elliptic, about 25-30 cm long, 10.5-12.5 cm wide, mainly 7 veins, plicate. Scape lateral, arising from the base or near base, about 9-12 cm long, glabrous. Inflorescence of racemes about 3 cm long; flowers less than 5, densely on the ape; bracts membranous, ovate,

about 2.5-3.2 cm long, 1.7 cm wide, slightly greenish yellow with 5-7 red-purple veins; pedicel and ovary, glabrous, about 2.7 cm long, with purplish grooves; flowers white with red-purple striations; sepals connate into a swollen tube, dorsal sepal about 2.2 cm long by 1.1 cm wide, lateral sepals about 3 cm long by 1.8 cm wide; petals oblanceolate, about 2.2 cm long, 8 mm wide; lip without striations, 3 lobes, with slender claw, purplish, about 1.5 cm long, 4 mm wide; lateral lobes about 9 mm long 8 mm wide, upward and incurved, with a large ridge between them; midlobe triangular, about 4 mm long, 5 mm wide, with dark purple striations; column white with purple-flushed apex, about 1 cm. Long; foot purplish, about 1.8 cm long, base with lip and lateral sepals adnated into a short spur or saccate; rostellum tongue-shaped; anther 2-celled; pollinia of 4+4, yellow, with caudicle, no viscidia.

Flowering season: March to April.

Distribution: India, China, Thailand, Vietnam, Malaya, Java, Lesser Sunda islands, Taiwan.

Chromosome number: A somatic chromosome count of $2n = 48$ (Fig. 5B) for a plant collected from Pinglin, Taipei Hsien, Taiwan.

Specimen examined: Taipei: Pinglin, *Chung 7502* (TAIF), Fushan, *P. F. Lu 7813* (TAIF). Lopeishan, *Cheng & Hsieh, 1207* (TAI). Pingtung: *Mastuda s. n.* 1917 (TAIF). Taitung: *Sasaki s. n.* 1925 (TAIF), Tulanshan, *Chung 5245* (TAIF).

Notes:

1. This is a species with highly variable characters, especially the floral size (Thomas, 1997). We also found that the midlobe is described as either triangular or ovate in various original documents. This is a very common species in Taiwan, it differs from other species by its one single leaf, spur-like mentum and the small-sized midlobe of the lip.
2. *Acanthephippium unguiculatum* was treated as the synonymy by Ying.
3. *Acanthephippium sylhetense* Lindl., Gen. & Sp. Orch. 177. 1833; J. Linn. Soc. 3: 21. 1859; Hook. F., Fl. Br. India. 5: 815. 1890; King & Pantl., Ann. Roy. Bot. Gard. Calc. 8:111. *pl.* 154. 1898; Haniff, Gard. Bull. Str. Settl. 6: 197. 1913; Schltr., Die Orchideen. Ed. 1: 302. 1915; Burkill, Gard. Bull. Str. Settl. 2: 443. 1921; Rec. Bot. Surv. India. 2: 377. 1925; Gagnep. In Lecomte, Fl. Gén. Indochina. 6: 334. *f.* 29. 1934; Holttum, Orch. Malaya. 148. 1957; Seidenf. & Smitinand, Orch. Thailand. 327. 1961; Mehra & Vij, Taxon 19: 106. 1970; Nackej., Enum. Orch. Ryukyus. 2: 114. *pl.* 45. 1971; Pradhan, Amer. Orch. Soc. Bull. 42: 879. 1973; Orch. Digest. 4: 133. 1973; Ying, Col. Ill. Ind. Orch. Taiwan. 1: 417 1977; Liu & Su, Fl. Taiwan. 5 (1st ed.): 867. 1978; Pradhan, Indian Orch. 2: 246. 1979; Misua, Bull. Bot. Surv. India 22: 149. 1980; Seidenf., Opera Bot. 89: 52. 1986. Fl. Reipubl. Popul. Sin. 18: 323. 1999. Su, Fl. Taiwan 5 (2nd ed.): 739. 2000. 台灣鱉花蘭 Fig. 4.

Acanthephippium yamamotoi Hayata, Icon. Pl. Formosa 6: 73. 1917; Schltr. In Fedde, Rep. 4: 229. 1919; Hsieh, Quart. J. Taiwan Mus. 8: 213. 1955; Nackej., Enum. Orch. Ryukyus 1: 47. 1971; Hu, Quart. J. Taiwan Mus. 25: 41. 1972.

Acanthephippium mantinianum acut. non Linden & Cogn. 1896; Nackej., Enum. Orch. Ryukyus 1: 114. 1971; Ying, Col. Ill. Indig. Orch. Taiwan 1: 417. 1977.

Terrestrial herbs. Root 3 mm in diameter. Pseudobulb fleshy, obclavate, about 6-10 cm long, base about 2.2-4 cm across. Leaves 2-4, usually 3, stalk about 8-13 cm long, blade elliptic, about 24-35 cm long, 7-13 cm wide, lower leaf usually smaller, mainly 5-9 veins. Scape lateral, arising from the base of pseudobulb, about 5-10 cm long. Inflorescence of a



Fig. 2. *Acanthephippium pictum* Fukuy.



Fig. 4. *Acanthephippium sylhetense* Lindl.



Fig. 3. *Acanthephippium striatum* Lindl.

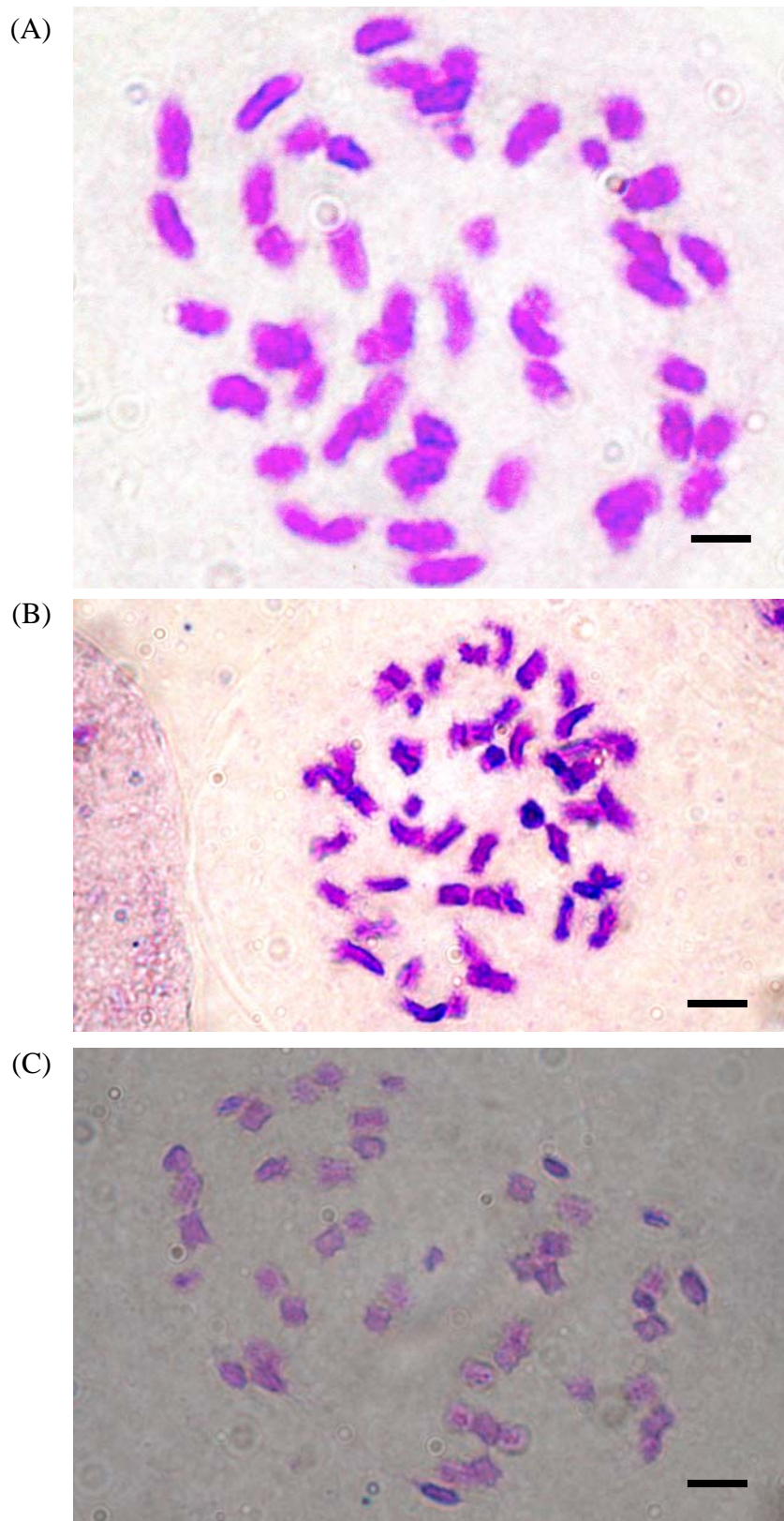


Fig. 5. Somatic chromosome spreads of *Acanthephippium* in Taiwan. A: *A. pictum*, $2n = 48$, (Chung 7500); B: *A. sylhetense*, $2n = 48$, (Chung 7501); C: *A. striatum*, $2n = 48$, (Chung 7502). Bar = 10 μm .

raceme, flowers 3-5, whitish yellow, with red-purple spots on the upper part of inner side; bracts ovate, brownish yellow and flushed with purple, about 2.2 cm long by 1.4 cm wide, ovary and pedicel about 3 cm long; veins many; all sepals united into a swollen tube, upper sepals about 2.8 cm long by 1.3 cm wide, lateral sepals about 4 cm long, 1.4 cm wide; petals oblanceolate, about 2.8 cm long, 1.2 cm wide; lip 4.2 cm long, 3 lobed, with a very narrow claw, about 2.3 cm long, 5 mm wide; lateral lobes upward, about 8 mm long; with 3 keels between them; midlobes obspathalate, about 1.1 cm long, 6 mm wide; column about 1.3 cm long, 6-7 cm wide; foot about 1.8 cm long base with lip and lateral sepals adnated into a sac; pollinia of 4+4, with caudicle, no viscidium.

Flowering season: June to July.

Distribution: India, Bangladesh, Burma, Thailand, China, Taiwan, Japan.

Chromosome number: A somatic chromosome count of $2n = 48$ (Fig. 5C) for a plant collected from Wulai, Taipei Hsien, Taiwan.

Specimen examined: Taipei: Wulai, *Chung 7501* (TAIF); *Yamanoto s. n.* Sep, 6. 1931 (TAI). Taichung: Mt. Tahsuehshan, *Lin 48* (TAIF).

Notes: Flowers yellow, with reddish spots at the apical, adaxial side of the sepals, and the lip bright yellow are diagnostic characters. *Acanthephippium yamamotoi* was treated as the synonym by Nackejima (1971).

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台灣產蘭科罈花蘭屬植物之分類訂正

鐘詩文^(1,5)、許天銓⁽²⁾、洪玲雅⁽³⁾、楊智凱⁽⁴⁾

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摘 要

本研究進行台灣產蘭科罈花蘭屬 (*Acanthephippium*) 植物之分類訂正，台灣共有三種蘭科罈花蘭屬植物，其分別為延齡罈花蘭 (*Acanthephippium pictum* Fukuyama)，台灣罈花蘭 (*A. sylhetense* Lindley) 及一葉罈花蘭 (*A. striatum* Lindley)。過往的文獻錯誤報導延齡罈花蘭為台灣罈花蘭的同物異名。延齡罈花蘭僅分佈在日本的琉球島及蘭嶼。由花朵形狀、顏色，與唇瓣結構的差異，延齡罈花蘭與台灣罈花蘭是可以區別的。本文確定延齡罈花蘭的存在，並針對以上三種罈花蘭屬植物進行分類訂正，提供植物繪圖及在台灣的分佈圖；另報導台灣的三種本屬植物的染色體數為 $2n = 48$ 。

關鍵詞：罈花蘭屬、台灣罈花蘭、延齡罈花蘭、一葉罈花蘭、蘭科、植物分類、染色體數、台灣。

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1. 行政院農業委員會林業試驗所生物組，台北市 100 南海路 53 號，台灣。
 2. 國立台灣大學生命科學系，台北市 106 羅斯福路 4 段 1 號，台灣。
 3. 國立師範大學生命科學系，台北市 116 汀洲路 4 段 88 號，台灣。
 4. 國立中山大學生物科學系，高雄市 804 鼓山區蓮海路 70 號，台灣。
 5. 通信作者。Email:wenwen.9@yahoo.com.tw