

THE GENUS *THRIXSPERMUM* LOUR. OF TAIWAN (ORCHIDACEAE)

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Abstract: This is a revision of the genus *Thrixspermum* (Subtribe *Sarcanthea*) and in the course of the revision of the Taiwan species, we found there are two species which are clearly outside the range of this genus. In this paper we treat them as a *Sarcophilus*. There is a new species, *Thrixspermum devolium* is proposed.

Dr. P. Vermeulen has been of much help to us and we are grateful for his assistance.

There are about 20 genera of native Taiwan orchids belonging to the subtribe *Sarcanthea*. Most of these have only one or a few species within each genus. Among these the largest genus is *Thrixspermum*. Up to the present twelve specific epithets of this genus have been recognized. By 1976, we had collected all of these that had been recorded and also found one new taxon. So now it is possible for us to make a comprehensive revision of the genus *Thrixspermum*.

In 1790 Loureiro established the genus *Thrixspermum*, describing one species: *T. centipeda*, which is the type species of the genus. Working on the native orchids of Java, Blume established a genus *Dendrocolla* in 1825, and it included the three sections: *Cuculla*, *Tubera* and *Fornicaria*.

Ridley working on the native orchids of the Malaya Peninsula in 1896 recognized that the section *Cuculla* was congeneric with the original species of *Thrixspermum*. H. G. Reichenbach created another genus *Orsidice* in 1854, based on *Dendrocolla amplexicaulis* Bl. Later in 1905, J. J. Smith used the name *Orsidice* as a sectional name in *Thrixspermum*. And most publications since then have used the name *Orsidice* as a section of *Thrixspermum* which include the type species. According to the International Code of Botanical Nomenclature, Art. 22, it is obvious that section including the type species of the genus *Thrixspermum* to which it is assigned bears the name section *Thrixspermum*. This makes it clear that Smith's name *Orsidice* is nomenclaturally illegitimate and therefore is to be disregarded, as was suggested by R. E. Holttum (1960).

The second section of *Dendrocolla* is known as *Tubera*. The species in this section are now usually put in another distinct genus, *Pteroceras*.

The third section *Fornicaria* is equivalent to the *Thrixspermum* sect. *Dendrocolla* of the present time. Ridley (1896) was the first one who regarded the third section as a distinct genus and restricted the name *Dendrocolla* Bl. to represent it. After studying many living plants, J. J. Smith (1905) considered that the species belonging to section *Fornicaria* had the same type of floral structure as *Thrixspermum*, so he ranked the section *Fornicaria* as a second section of *Thrixspermum*, using the name *Dendrocolla* for this section.

J. J. Smith (1905) was the first one, in his study on the orchids of Java, to divide *Thrixspermum* into two sections *Orsidice* and *Dendrocolla*. This treatment has been followed by later authors (Schlechter, 1914; Holttum, 1957; Seidenfaden & Smitinand, 1965 and Dockrill, 1969).

In his study on *Thrixspermum*, Schlechter (1911) divided the genus into three sections,

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they are *Orsidice* and *Dendrocolla* and a newly established section *Katocolla* which has quite different vegetative parts from the above two sections.

It seems that either the name *Fornicaria* or *Dendrocolla* is more suitable for these plants that are now being put in the section *Katocolla*. The reason is because in 1825, when Blume established his third section *Fornicaria*, he listed four species: *Dendrocolla angustifolia*, *D. subulata*, *D. histrix* and *D. anceps*. Except for the third one, *D. histrix*, which really "has a thickened terete rachis with persistent quaquaversal ovate acute bracts" (Ridley, 1896), the other three belong to Schlechter's section *Katocolla*.

The important characters of the three sections of *Thrixspermum* are as follows:

Section 1 *Thrixspermum* (syn: *Dendrocolla* sect. *Cuculla*; *Orsidice*)

These plants have their bracts closely alternating and flowers 2-ranked; petals short or long and slender. In Taiwan, we do not have any representative of this section.

Section 2 *Dendrocolla* (Bl.) J. J. Smith (syn: *Dendrocolla* sect. *Fornicaria*)

These plants have small, narrow bracts; flowers facing in all directions and congesting around a very short rachis and sepals and petals never attenuate. Most Taiwan species belong in this section.

Section 3 *Katocolla* Schltr.

These plants have a long, soft pendent stem and a very short inflorescence. We have two species in this section.

In the course of revising the genus *Thrixspermum*, we have found two species namely: *T. saruwatarii* (Hay.) Schltr. and *T. laurisilvaticum* (Fuk.) Garay whose characters are outside the genus range of *Thrixspermum*.

In general appearance as well as in the floral structure the characters of these two species appear to be similar to those of the genus *Thrixspermum*. However, the flowers are arranged on a long and somewhat zigzag rachis, opening simultaneously (Fig. 1) and lasting about one week, their pollinia are attached to a broad and not elongated stipe (Fig. 2) and the lip is distinctly jointed to the column-foot (Fig. 3), these characters amply differentiate these two



Fig. 1. *Sarcophilus saruwatarii* Hay.

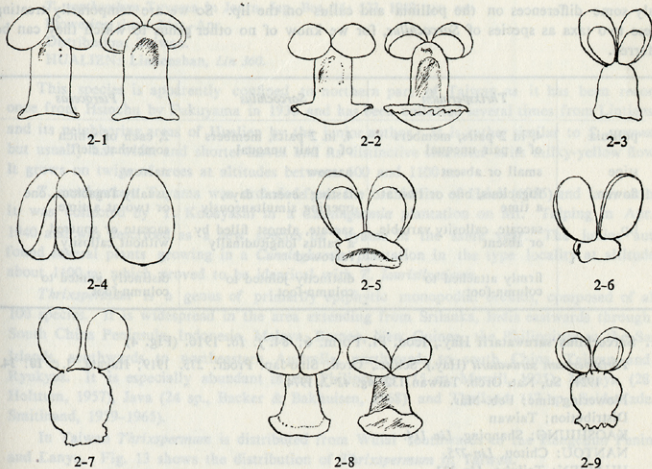


Fig. 2. Pollinia of native Taiwan *Sarcophilus* and *Thrixspermum*

- 2-1. *Sarcophilus saruwatarii*; 2-2. *Sarcophilus laurisilvaticus*;
 2-3. *Thrixspermum pendulicaule*; 2-4. *Thrixspermum subulatum*;
 2-5. *Thrixspermum formosanum*; 2-6. *Thrixspermum eximium*;
 2-7. *Thrixspermum fantasticum*; 2-8. *Thrixspermum devolium*;
 2-9. *Thrixspermum kusukusense*.

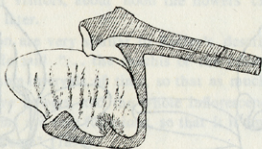


Fig. 3. Medium longitudinal section of column and lip of *Sarcophilus saruwatarii* Hay.

species from the genus *Thrixspermum*.

In the original description, these were put in *Sarcophilus*. True *Sarcophilus* known to us at the present time is a genus almost exclusively Australian. Most species of *Sarcophilus* sensu J. J. Smith of Malaya have been transferred to a distinct genus *Pteroceres* by Holttum (1960). This was adopted by Garay (1972).

The following chart shows the distinguishing characters between *Thrixspermum*, *Sarcophilus* and *Pteroceres*. *T. saruwatarii* and *T. laurisilvaticum* are very closely related to *Sarcophilus*, with

only some differences on the pollinia and callus on the lip. So we are temporarily treating these two taxa as species of *Sarcochilus*, for we know of no other genus to which they can be referred.

	<i>Thrixspermum</i>	<i>Sarcochilus</i>	<i>Pteroceras</i>
pollinia	4, in 2 pairs, members of a pair unequal	4, in 2 pairs, members of a pair unequal	2, each of which somewhat cleft
stipe	small or absent	narrow	narrow
flower	fugacious, one or two at a time	lasting several days, opening simultaneously	usually fugacious, one or two at a time
lip	saccate, callosity variable or absent	saccate, almost filled by a callus longitudinally furrowed	saccate or spurred without callosity
	firmly attached to column-foot	distinctly jointed to column-foot	distinctly jointed to column-foot

1. *Sarcochilus saruwatarii* Hay., Icon. Pl. Form. 6: 84. f. 18. 1916. (Fig. 4)

Thrixspermum saruwatarii (Hay.) Schltr., Orch. Sino-Jap. Prodr. 275. 1919; Hayata, l. c. 10: 34. 1921; Su, Nat. Orch. Taiwan 132. fig. 42-2. 1974.

Flowering time: Feb.-Mar.

Distribution: Taiwan

KAOSHIUNG: Shanping, *Lin* 114.

NANTOU: Chitou, *Lin* 275.

HUALIEN: Tailuko, *Lin* 302.

This species was collected first in Chitou in Nantou County by Prof. Hayata in April 1916. In fact, as far as the authors know, Chitou is the place where this species occurs most frequently. The plants collected from Tailuko are somewhat different from typical form of *S. saruwatarii*, having plants and flowers that are a little smaller and an inflorescence which bears 2-3 white flowers, and the leaf and scape being marked with red-brown spots.

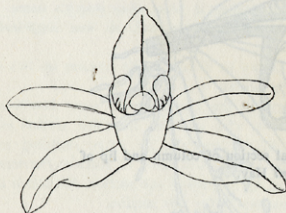


Fig. 4. *Sarcochilus saruwatarii*.

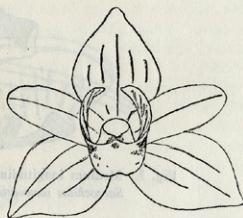


Fig. 5. *Sarcochilus laurisilvaticus*.

2. *Sarcochilus laurisilvaticus* Fuk. in Bot. Mag. Tokyo 52: 246. 1938. (Fig. 5)

Thrixspermum laurisilvaticum (Fuk.) Garay in Bot. Mus. Leaf. Harv. Univ. 23(4): 207. 1972 (Jun.).

T. laurisilvaticum (Fuk.) Liu & Su in Chung-San Encycl. Nat. Sci. 8. Bot. 898. 1972 (Oct.).

T. laurisilvaticum (Fuk.) S. Y. Hu in Quart. Journ. Taiwan Mus. 28(1-2): 171. 1975.

T. xanthanthum Tuyama in Journ. Jap. Bot. 16: 523. 1940. *syn. nov.*

Flowering time: Mar.-Apr.

Distribution: Taiwan.

HUALIEN: Lintienshan, Lin 360.

This species is apparently confined to northern part of Taiwan as it has been recorded once from Hsinchu by Fukuyama in 1936 and has been collected several times from Lintienshan and its neighboring areas of Hualien by the junior author. It is rather similar to *S. saruwatarii* but usually has wider and shorter leaves and its distinctive character is its milky-yellow flowers. It grows on twigs of trees at altitudes between 600 and 1100 m.

T. xanthanthum Tuyama was excluded from the orchid list of Hsieh (1955) and later authors. It was collected by Y. Kobayashi in a *Cunninghamia* plantation on Mt. Taiping in Apr. 2, 1940 and was described as a new species by Tuyama in the same year. The junior author found several plants growing in a *Cunninghamia* plantation in the type locality at altitude of about 1100 m, which proved to be identical with *T. laurissilvaticum*.

Thrixspermum is a genus of primarily epiphytic monopodial orchids, composed of about 100 species. It is widespread in the area extending from Srilanka, India eastwards through the South China Peninsula, Indonesia, Malaya, Borneo, New Guinea, the Philippines to the Samoa Islands, southwards to northeastern Australia, northwards to south China, Taiwan and the Ryukyus. It is especially abundant in the Philippines (15 sp. Merrill, 1925), Malaya (28 sp., Holttum, 1957), Java (24 sp., Backer & Bakhuizen, 1968) and Thailand (17 sp., Seidenfaden & Smitinand, 1959-1965).

In Taiwan *Thrixspermum* is distributed from Wulai southwards to the Hengchun Peninsula and Lanyu. Fig. 13 shows the distribution of *Thrixspermum* in Taiwan.

Chiloschista is in many ways much closer to the genus *Sarcophilus* than to *Thrixspermum*, but the saccate clinandrium, the shape of anther-cap and its petals and lateral sepals inserted on the column-foot sufficiently deeps them apart.

It is interesting to note that the floral buds of *Thrixspermum* grow slowly and the same species collected from widely different localities, flowers at a same time in our experimental garden. They open together around 7:30 am, fill the morning air with their perfume, which brings to them many insect visitors, about noon the flowers close and fade. The next flower will open about one week later.

We find our observation are very similar to Ridley's description for the section *Fornicaria* of the Malay Peninsula. He said "... the rhachis of the inflorescence grows very slowly, the flowers opening at considerable intervals of time, so that as much as a week may elapse between the opening of 2 consecutive flowers, and the whole inflorescence may take months to develop all its flowers. The blossoms are very fugacious, so that it is impossible for one to be fertilized by another on the same raceme" (1896).

The flowering time and distribution of Taiwan species have been checked in the field, and also by studying herbarium specimens, and by the references made to them by different authors. (Hayata 1911, 1914, 1916, 1921; Masamune 1934; Fukuyama 1938, 1942, 1952; Liu & Su 1975; Lin & Hu 1976) (Table 1).

Key to the Taiwan species of *Thrixspermum*

Plants pendent; stems long; inflorescence very short (Section *Katocolla*)

Leaves thin, apex obtuse 1. *T. pendulicaule*

Leaves very thick, apex cuspidate 2. *T. subulatum*

Plants erect; stem short; inflorescence long (Section *Dendrocolla*)

Sac of lip cylindrical, about 1 cm long; leaves 3-10 mm wide 3. *T. formosanum*

Table 1. Flowering time and distribution

species	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
<i>Sarochilus saruwatarii</i>												
<i>S. lanriviaticum</i>				XXXXXXXXXXXXXX								
<i>Thrixpernum pendulicaule</i>			XXXXXXXXXXXXXX									
<i>T. subulatum</i>			XXXXXXXXXXXXXX									
<i>T. formosanum</i>			XXXXXXXXXXXXXX									
<i>T. eximium</i>												
<i>T. fantasticum</i>			XXXXXXXXXX									
<i>T. devolium</i>			XXX									
<i>T. kasukense</i>			XXXX									

altitude (m) (XXXXXXXXX) flowering time (—)

0 500 1000 1500 2000 2500 3000

- Sac of lip rounded, about 4 mm long
 Leaves flat, 8–10 mm wide
 Callus of lip Y-shaped.....4. *T. eximium*
 Callus of lip not Y-shaped.....5. *T. fantasticum*
 Leaves fleshy, 3–5 mm wide
 Flowers white.....6 *T. devolium*
 Flowers bright yellow.....7. *T. kusukusense*

1. *Thrixspermum pendulicaule* (Hay.) Schltr., Orch. Sino-Jap. Prodr. 274. 1919; Hayata, Icon. Pl. Form. 10: 34. 1921. (Fig. 6)

Dendrobium pendulicaule Hay., Icon. Pl. Form. 4: 44. fig. 16. 1914.

Aporum pendulicaule Hay., l. c. 4: 44. 1914.

Distribution: Taiwan.

Flowering time: Mar.–May; Sept.–Nov.

NANTOU: *F. S. Ho s.n.*, Sept. 25, 1976. PINGTUNG: *Matuda-E. s.n.* Jan. 1919; *Soma T. s.n.* Jan. 3. 1912; *Kato s.n.*, Jan. 1912.

This species has previously been recorded from Hengchun Peninsula, recently it was found at Chushan in Nantou Co. in central Taiwan. It grows on the higher branches of trees in tropical forests at moderately low altitudes. *T. pendulicaule* is characterized by a long and pendent stem and the thin texture of leaves with an obtuse or rounded apex which easily separates this species from *T. subulatum*.



Fig. 6. *Thrixspermum pendulicaule*.



Fig. 7. *Thrixspermum subulatum*.

2. *Thrixspermum subulatum* Rehb. f., Xenia Orch. 2: 122. 1867; J. J. Smith, Fl. Buitenz. 6: 578. fig. 434. 1905, Orchid. Ambon 97. 1905; Schlechter in Orchis 5: 57. 1911; Ames, Orch. 7: 134. 1922; Back. & Bakhf., Fl. Java 3: 407. 1968; Liu & Su in Quart. Journ. Taiwan Mus. 28(1–2): 270. 1975. (Fig. 7)

Distribution: Taiwan, Java, the Philippines, Sumatra, Amboina.

Flowering time: Apr.–Jun.

TAITUNG: Ta-wu-chi, *Su* 143, 224, 229, 1037.

TAINAN: Nan-chi, *Lin* 407.

This rather rare species occurs in central and southern Taiwan. It grows on the trunks of large trees at altitudes usually below 700 m.

3. *Thrixspermum formosanum* (Hay.) Schltr., Orch. Sino-Jap. Prodr. 237. 1919; Hayata, l. c. 10: 34. 1921; Masamune, Journ. Geobot. 20(3): fig. 181. 1972; Su, Nat. Orch. Taiwan 132. fig. 42–1. 1974. (Fig. 8)

Sarcochilus formosana Hay., Mater. Fl. Form. 336. 1911.

Dendrocolla pricei Rolfe in Kew Bull. 1913: 144. 1913. *syn. nov.*

Thrixspermum pricei (Rolfe) Schltr., l.c. 274. 1919.

T. sasaoi Masam. in Trans. Nat. Hist. Soc. Form. 24: 280. 1934. *syn. nov.*

Distribution: Taiwan.

Flowering time: Jan.-Mar.

TAIPEI: Pinlin, *Lin* 278.

NANTOU: Chingshuikou, *S. Sasaki s.n.*, Apr. 1920; Sun Moon Lake, *Kudo & Sasaki* 15538;

Lien-hua-chi, *Yamamoto & Mori s.n.*, Nov. 2, 1932; Puli, *Masamune s.n.*, Jan. 22, 1934 (Type of *T. sasaoi* Masam.).

PINGTUNG: Kaoshihfo, *Soma s.n.* Jan. 3, 1912.

This is probably the most popular species among all the Taiwan *Thrixspermum* occurring in the central and southern part of Taiwan. It grows where it gets plenty of light on small branches of trees or shrubs. It usually forms a large population and grows into densely packed tufts at an elevation around 700 m.

The plants collected from the Hengchun Peninsula are like the plants from central Taiwan, but the leaves are green throught and flatter and broader gradually tapering to both ends, the flowering time is earlier for about two months and start from January.

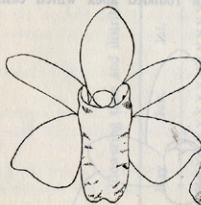


Fig. 8. *Thrixspermum formosanum*.

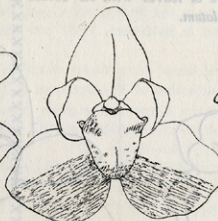


Fig. 9. *Thrixspermum eximium*.



Fig. 10. *Thrixspermum kusukusense*.

4. *Thrixspermum eximium* L. O. Wms. in Bot. Mus. Leaflet. Harv. Univ. 6: 87. 1938; Lin & Hu in Quart. Journ. Chinese For. 9(1): 54. pl. 4. 1976. (Fig. 9)

Distribution: Taiwan, the Philippines.

Flowering time: Feb. -Apr.

PINGTUNG: Lilungshan, *Lin* 188.

As far as can be ascertained, this species has only been found in one locality as cited above. It looks like *Sarcochilus laurilsilvaticus* but differs in having stiff leaves and flowers of a different shape and color.

5. *Thrixspermum fantasticum* L. O. Wms. in Bot. Mus. Leaflet. Harv. Univ. 6: 82. 1938; Garay & Sweet, Orch. Southern Ryukyu Isl. 148. 1974; Walker, Fl. Okinawa 373. 1976. (Fig. 11)

T. neglectum Fuk. in Trans. Nat. Hist. Soc. Form. 32: 269. 1942; Bot. Mag. Tokyo 56: 461. 1942;

Act. Phytotax. Geobot. 14: 133. 1952; Masamune in Sci. Rep. Kanazawa Univ. 9: 139. 1964;

Journ. Geobot. 18(2): fig. 162. 1970; Nackejima, Enum. Orch. Ryukyus 2: 97 & 118. fig. 179.

1971; Hatusima, Fl. Ryukyus 816. 1971.

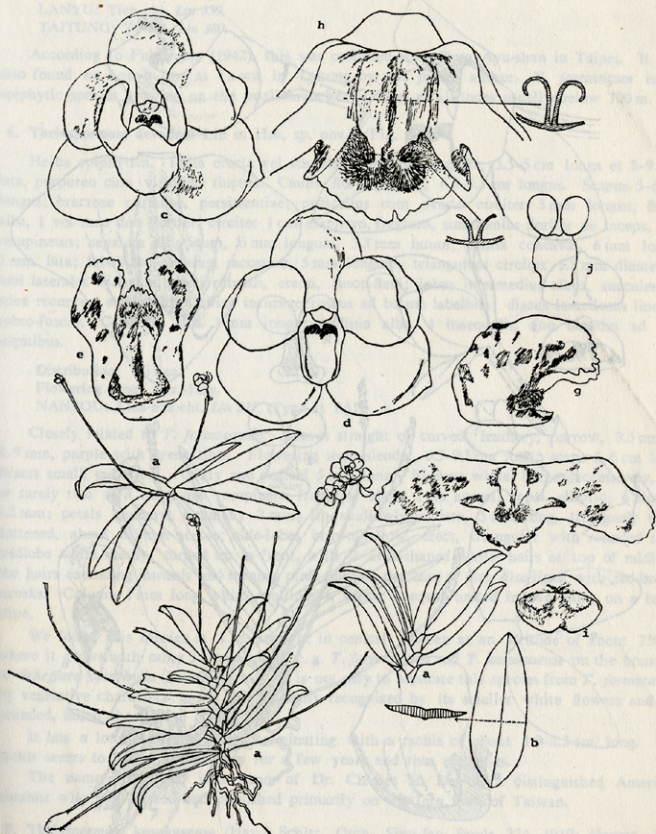


Fig. 11. *Thrixspermum fantasticum*: a. plant, b. leaf, c. front view of flower, d. flower removing [the lip, e. top view of lip, f. flattened lip, g. side view of lip, h. base of lip from above, i. anther cap, j. pollinia.

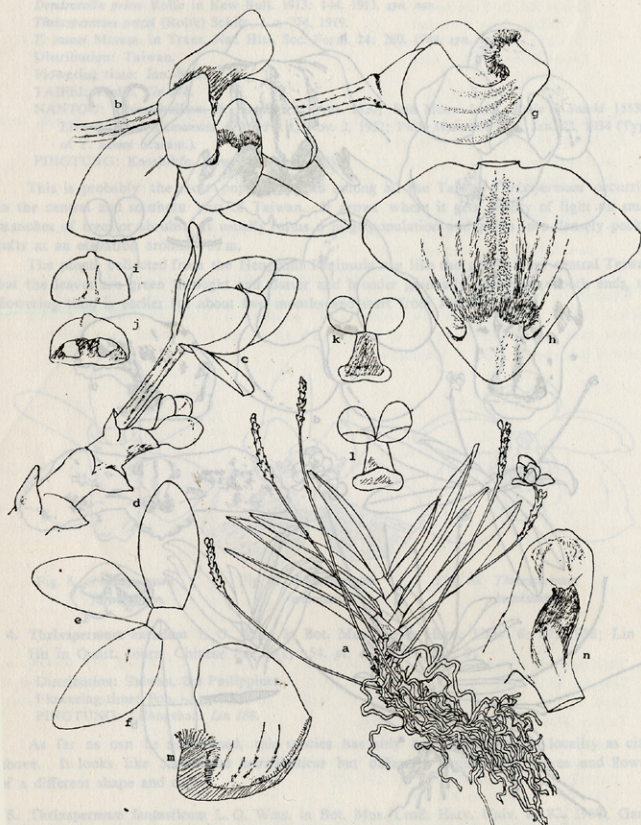


Fig. 12. *Thrixspermeum devolium*: a. plant, b. front view of flower, c. inflorescence, d. upper sepal, e. petal, f. lateral sepal, g. side view of lip and column, h. flattened lip, i. dorsal view of anther cap, j. ventral view of anther cap, k. and l. pollinia, m. medium longitudinal section of lip, n. column.

Distribution: Taiwan, the Ryukyus and the Philippines.

Flowering time: Jun.-Aug.

LANYU: Tien-chi, *Lin* 350.

TAITUNG: Ta-wu, *Lin* 380.

According to Fukuyama (1942), this was collected once from Ayu-shan in Taipei. It was also found on Lanyu and at Ta-wu in Taitung by the junior author. *T. fantasticum* is an epiphytic species growing on the small branches of trees at altitudes usually below 700 m.

6. *Thrixspermum devolium* Lin et Hsu, sp. nov. (Fig. 12)

Herba epiphytica. Folia erecta vel curvata, coriaceous, angusta, 3.5-5 cm longa et 8-9 mm lata, purpureo cum viridibus tinctus. Caulis floris gracilis, 6.5-9.5 cm longus. Scapus 5-6 cm longus; bractea parvulae, persistentiae; pedicellus cum ovario circiter 5 mm longus; flores alba, 1 vel raro duo florifer, circiter 1 cm diametro, fragrans, simultaneus florifer de inceptis, non resupinatus; sepalum ellipticum, 6 mm longum, 3.3 mm latum; petala concava, 6 mm longa, 3 mm lata; labellum vadosum saccatum, 5 mm longum, triangulum circiter 6.5 mm diametro; lobi laterales triangula, apici rotundi, erecti, fusco-flavi; lobus intermedius albus, succulentus, apex recurvus, et biciliatus, ciliae incurvae, roseae ad basum labellum; discus lamellosus linearis rubro-fuscus. Columna alba 1 mm longa; pollinia alba, 4 inaequalis, duo binatim ad lata stipitibus.

Distribution: Taiwan.

Flowering time: Apr.-May.

NANTOU: Lien-hua-chi, *Lin* 325. (Type at TAI)

Closely related to *T. formosanum*. Leaves straight or curved, leathery, narrow, 3.5 cm by 8-9 mm, purple with green tints. Flowering stem slender, 6.5-9.5 cm long; scape 5-6 cm long. Bracts small, persistent. Ovary and pedicel 5 mm long. Flowers white, borne successively, one or rarely two at a time, not resupinate, fragrant, about 1 cm across; sepal elliptic, 6 mm by 3.3 mm; petals concave, 6 mm by 3 mm; lip shallowly saccate, 5 mm long, triangular when flattened, about 6.5 mm across; side-lobes brown-yellow, erect, triangular with rounded tips; midlobe white, fleshy, turned up in front, with 2 club-shaped white hairs at top of midlobe, the hairs extending inwards and turning pink towards the base of lip; disc lined with red-brown streaks. Column 1 mm long, white; pollinia 4, white, unequal, united in two pairs, on a broad stipe,

We found this species at Lien-hua-chi in central Taiwan at an altitude of about 750 m, where it grows with other *Thrixspermum*, e. g. *T. formosanum* and *T. kusukusense* on the branches of *Schefflera octophylla* (Lour.) Harms. It is not easy to separate this species from *T. formosanum* by vegetative characters but it can be easily recognized by its smaller white flowers and the rounded, much shorter sac of the lip.

It has a long flowering stem, terminating with a rachis of about 1.5-2.5 cm long. The rachis seems to flower successively for a few years and thus elongates.

The name "*devolium*" is in honor of Dr. Charles E. DeVol, a distinguished American botanist who has worked and published primarily on the fern flora of Taiwan.

7. *Thrixspermum kusukusense* (Hay.) Schltr., Orch. Sino-Jap. Prodr. 274. 1919; Hayata, l. c., 10: 34. 1921; *Auct. non* Hayata, Masamune in Journ. Geobot. 15(1-3): fig. 127. 1966.

(Fig. 10)

Sarcochilus kusukusense Hay., l. c., 6: 83. 1916.

Distribution: Taiwan.

Flowering time: Jun.-Nov.

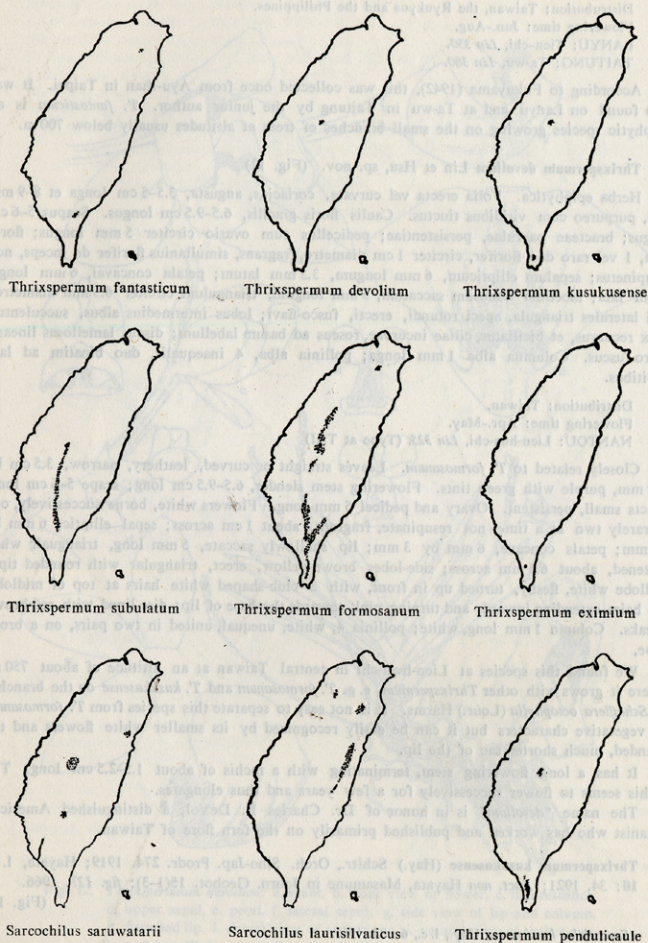


Fig. 13. Distribution of *Sarcochilus* and *Thrixspermum* in Taiwan.

NANTOU: Lien-hwa-chi, *Lin* 377.

TAITUNG: Ta-wu, *Lin* 388.

This species was originally found by Hayata on the Hengchun Peninsula. The new localities cited above extends its range to central Taiwan. The junior author found it as an epiphyte on branches of *Schefflera octophylla* at Lien-hwa-chi in Nantou County at altitudes about 700 m. It is the only species of *Thrixspermum* of Taiwan with bright yellow tepals.

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