NOTE

Remusatia yunnanensis (Araceae): a Newly Recorded Species in Taiwan

Chi-Tung Huang [(1)], Chang-Fu Hsieh [(1)] and Chun-Neng Wang [(1,2*)]

1. Institute of Ecology and Evolutionary Biology, National Taiwan University. No. 1, Sect. 4, Roosevelt Rd., Taipei 106, Taiwan.
2. Department of Life Science, National Taiwan University. No. 1, Sect. 4, Roosevelt Rd., Taipei 106, Taiwan.
** Corresponding author. Tel: 886-2-33664537; Email: botwang@ntu.edu.tw*

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ABSTRACT: *Remusatia yunnanensis* (H. Li & A. Hay) A. Hay is a herbaceous species which has thus far been considered endemic to Yunnan, China. In this study, we document the discovery of this species in Nantou County, Taiwan. *R. yunnanensis* is similar to *Remusatia vivipara* (Lodd.) Schott and only distinguishable by the difference in spathe limb color. *R. yunnanensis* exhibits a distinct purple red spathe limb color while that of *R. vivipara* is yellow. The description and illustration of *R. yunnanensis*, including a dichotomous key description for *Remusatia* in Taiwan are provided in the present study.

KEY WORDS: Araceae, *Remusatia yunnanensis*, new record, taxonomy.

INTRODUCTION

The family Araceae consists of 105 genera and more than 3,300 species distributed across tropical regions of all continents, including Australia and Madagascar (Grayum 1990; Mayo et al., 1997). The genus *Remusatia* is the only group that produces asexual scaly bulbils borne on a special stem/stolon. Previous phylogenetic analysis shows that the four *Remusatia* species with this characteristic are nested within the *Colocasia* clade (Cusimano et al., 2011). *Remusatia vivipara* (Lodd.) Schott is widely distributed in tropical Asia (Taiwan, China), tropical Africa (Zambia, Madagascar) and Australia (northern Queensland, Northern Territory), but *Remusatia yunnanensis* (H. Li & A. Hay) A. Hay is endemic to West Yunnan, China. The only diagnostic characters to distinguish *R. yunnanensis* from *R. vivipara* are: (1) whether the bulbiferous shoot/stolon is creeping or erect (2) whether flowers develop before or after leaf initiation (3) whether placentation type is basal or parietal and (4) whether spathe limb color is purple red or yellow (Li and Hay, 1992a; 1992b). According to the description of the Flora of China, *R. yunnanensis* has creeping bulbiferous stolons while *R. vivipara* always maintains erect bulbiferous stolons (Li and Boyce, 2010). Li and Boyce (2010) reported *R. yunnanensis* flowers when leaves develop comparing to that *R. vivipara* flowers before leaf initiation. Previously, *R. yunnanensis* was thought to distinguishe itself from *R. vivipara* by having basal placentation, rather than parietal placentation (Li and Hay, 1992a). However when *R. yunnanensis* was grown in the Royal Botanical Gardens, Sydney, unilocular ovaries with parietal placentation were in fact observed (Li and Hay, 1992b). Therefore, placentation type is not a reliable taxonomic character as different types can be found within the same species (e.g. *Pistia stratiotes*) (Li and Hay, 1992b). The only diagnostic characters known to separate *R. yunnanensis* from *R. vivipara* include having creeping bulbiferous stolons, flowering after new leaf initiation and the purple red color of the spathe limb.

Key characters to distinguish these two species of *Remusatia* are provided as follows:

1a. Spathe limb yellow on both surfaces .....…… ***R. vivipara***
1b. Spathe limb light purple red within and dull purple red beneath, spathe base yellow on both surfaces ……..... ***R. yunnanensis***

The new record of *R. yunnanensis* in Taiwan came from the Shuanglong logging tract, Nantou County, Taiwan on November 2010 (Fig. 1). After recovering some samples, we planted the tubers of this population in pots filled with a peat : pearlite (1:1 v/v) potting mix in April of year 2011. These pots were later placed in the greenhouse in Yangmingshan until August 2011 and the flowers all generated purple red spathes limbs almost identical to the descriptions of *R. yunnanensis* flowers (Fig. 2). The chromosome squashes examined in these individuals revealed a chromosome number of 2n = 28, which is different from that of *R. vivipara* (2n = 3X = 42) (Long et al., 1989).

TAXONOMIC TREATMENT

Remusatia yunnanensis (H. Li & A. Hay) A. Hay, World Checkl. & Bibliogr. Araceae, 442. 2002.

雲南岩芋 Figs. 2 & 3

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Gonatanthus yunnanensis H. Li & A. Hay, Acta Bot.Yunnan. 14 (4): 375. 1992. —Type: China, Yingjiang County, Li 9107 (type. KUM)

Seasonally dormant monoecious herbs forming bulbils or tubers, epiphytes; tubers red outside, white inside, globose, *ca.* 3–8 cm in diam. Bulbiferous stolons 1–3, creeping or pendulous, *ca.* 500 × 8 mm, internodes 3–6 cm long. Bulbils ellipsoid, 1–5 mm in diam., enclosed by 8–15 hooked scales. Leaves 2–3, ovate, 15–45 cm long, 10–25 cm broad, apex acuminate, base cordate, margin entire, leaf blade pale green abaxially, green adaxially; base peltate and cordate, petioles cylindrical, 20–60 cm long; primary veins 4 or 5 radiating from the petioles, secondary venation arching. Inflorescences 1–3, flowering with leaves; peduncle green, cylindrical, 11–17 cm long. Spathe leathery, spathe tube green, ovate-elliptic, *ca.* 3 × 1.2 cm, apex strongly constricted; spathe limb initially erect, later spreading and soon reflexed, light purple red within and dull purple red beneath, base yellow on both surfaces, obovate-oblong, *ca.* 8.5 × 3 cm. Spadix: female zone subcylindric, *ca.* 15 × 6 mm, densely flowered; stigma sessile, circular; female flowers 4-carpellate; ovary 1-loculed, green, ovoid, *ca.* 2 mm; ovules many, basal, suberect; sterile zone yellow, *ca.* 14 mm, slender; male zone yellow, broadly cylindrical, *ca.* 17 × 4 mm, attenuate toward base, apex obtuse; synandria of 4 or 5 fused stamens, filament obconic, apex truncate; thecae 8–10, obovoid, adnate to outside of filament and opening by a terminal pore. Fl. Aug–Oct. 2n = 28.

Specimens examined: TAIWAN, Nantou County, Shuanglong logging tract, *ca.* 1250–1300 m in elevation, *C. T. Huang 1183* (TAI).

Phenology: Bloom period from August to October.

Distribution: Taiwan (Shuanglong logging tract) and China (Tongbiguan, Yingjiang co., Yunnan).

Ecology: Moss-laden boughs, growing on tree trunks in rain forests, mountain slopes at elevation *ca.* 1200–1300 m, mixed evergreen forests, semi-open environment, often cloudy in the afternoon.

DISCUSSION

One diagnostic character used for distinguishing *R. yunnanensis* from *R. vivipara* has relied on the observation that the former has creeping bulbiferous stolons whereas the latter seems to always have erect bulbiferous stolens. However, after careful examination of herbarium records and living plants of *R. vivipara* in the field, both creeping and erected bulbiferous stolons have been found (Fig. 4). Li and Boyce (2010) reported *R. yunnanensis* flowers during leaf development while *R. vivipara* flowers before leaf initiation. Contrary to this, herbarium specimens of *R. vivipara* examined in this study show that flowers may develop before or during leaf development (specimen examined, KUM Tao 16931). Moreover, their flowering time overlaps according to the Flora of China (i.e. August to September in *R. yunnanensis* and April to September in *R. vivipara* flowers) (Li and Boyce, 2010). An updated, detailed comparison of the morphological characters of *R. vivipara* and *R. yunnanensis* is shown in Table 1.

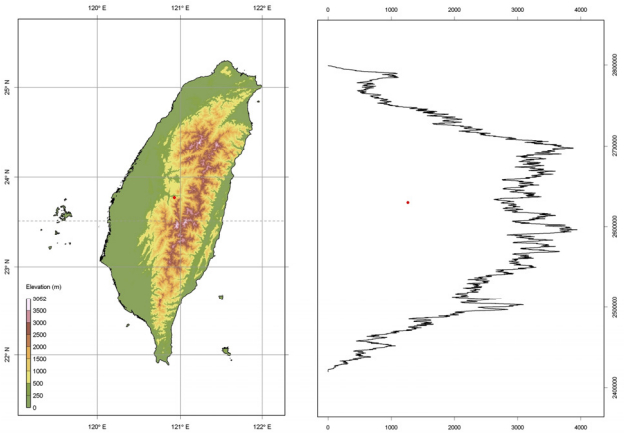


Fig. 1. Distribution map of *Remusatia yunnanensis* in Taiwan.

Our discovery of *R. yunnanensis* based on its purple red spathe reveals a disjunct distribution between Yunnan and Taiwan. *R. vivipara* rarely produces flowers in the field and no fruits with fertile seeds were found in any herbarium record. In order to induce flowering during cultivation, we raised the tubers collected from Shuangling logging tract. Intriguingly, two individual tubers had flower coloration showing purple red spathe limbs instead of yellow, as observed from the other tubers we raised. After performing a preliminary cytology check (2n = 28, see introduction), we suspect *R. yunnanensis* is a diploid form of *R. vivipara*. In support of this hypothesis, the phylogeny of *Remusatia* has revealed that *R. vivipara* and *R. yunnanensis* were clustered in the same group, with identical chloroplast region sequences (Li et al., 2012). Taken together, it is quite likely that *R. yunnanensis* is a diploid parent of the triploid *R. vivipara*.

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Fig. 2. Inflorescences of *Remusatia yunnanensis*. A: Purple red colored spathe limb is evident and is almost identical as type specimen of *Gonatanthus yunannensis*. B: Spathe limb later reflexed. Inset on top right is *Remusatia vivipara* with distinctly yellow colored spathe limb. Scale bar = 3 cm.

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Table 1. Comparison of morphological characters of *R. vivipara* and *R. yunnanensis*.

	R. vivipara	*R. yunnanensis*
Bulbiferous stolon	erected and creeping	creeping
Flower	flowers before or with leaf development	flowers with leaf development
Bloom period	April to September	August to October
Type of placentation	parietal	basal or parietal
Spathe limb color	yellow	purple red
Chromosome numbers 2n	42, 28 (SW India)	28

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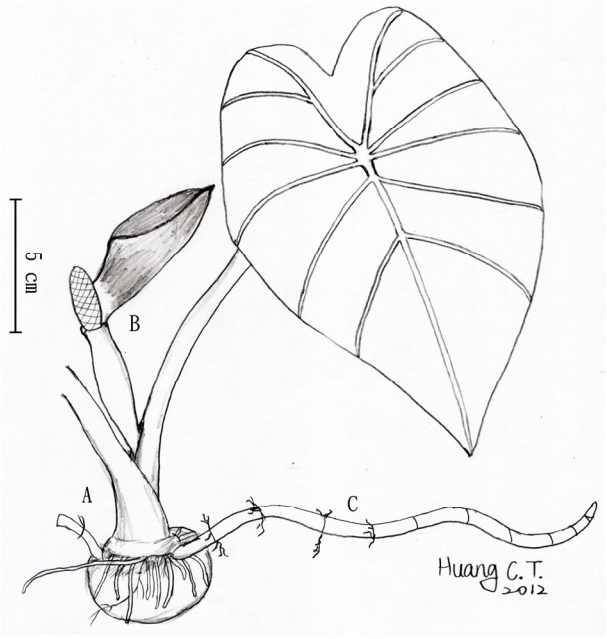


Fig. 3. *Remusatia yunnanensis* (H. Li & A. Hay) A. Hay. A: Plant body. B: Inflorescence. C: Bulbiferous stolon (creeping).

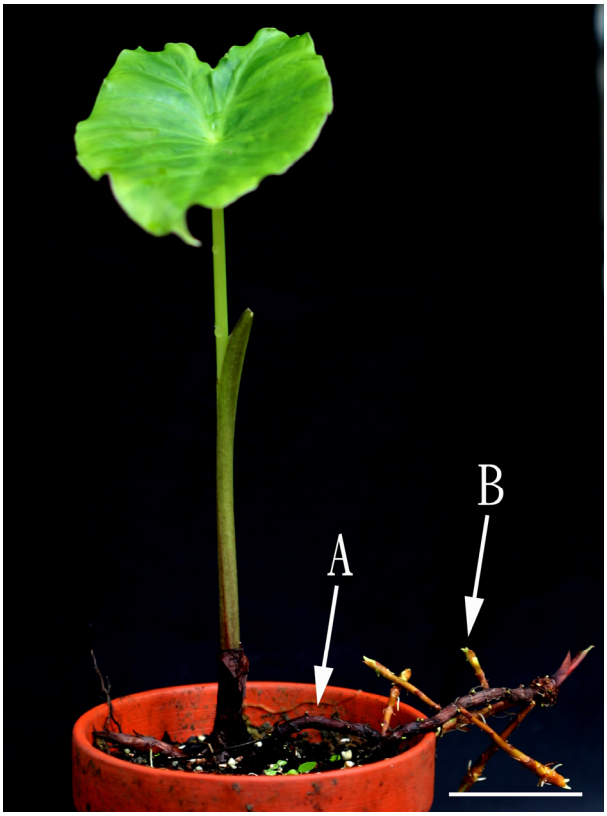


Fig. 4. Bulbiferous stolon of *Remusatia vivipara*. A: Creeping stolon; B: Erect stolon. Scale bar = 3 cm.

臺灣天南星科新記錄種雲南岩芋

黃啟東[(1)]、謝長富[(1)]、王俊能[(1,2*)]

1. 國立台灣大學生態學與演化生物學研究所，106 台北市羅斯福路四段 1 號，臺灣。
2. 國立臺灣大學生命科學系，106 台北市羅斯福路 4 段 1 號，臺灣。
* 通信作者。*Tel: 886-2-33664537; Email: botwang@ntu.edu.tw*

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摘要：中國特有植物雲南岩芋新紀錄於臺灣南投縣。雲南岩芋與臺灣目賊芋極為相似，兩者只有在佛焰苞檐部顏色的不同，雲南岩芋的佛焰苞檐部為紫紅色，而臺灣目賊芋的佛焰苞檐部為黃色。本文並提供雲南岩芋描述、圖片與目賊芋屬之檢索表。

關鍵詞：天南星科、雲南岩芋、新記錄、分類學。

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