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Erythrodes triantherae C. L. Yeh *et* C. S. Leou (Orchidaceae), a New Species Bearing 1-3 Anthers

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ABSTRACT: A new species of *Erythrodes* Blume (*Orchidaceae*), *E. triantherae* C. L. Yeh *et* C. S. Leou, from Lanyu of Taiwan is described and illustrated. It is characterized by the column which is adorned with 1-3 anthers, i.e. additional 2 or 1 stamens often present on the ventral side of column and in the lip which is much shorter (4.5-5.5 mm long) and only saccate at base, not long spurred. Results of a preliminary observation on the variation of anther number, and on the development of fruits have also been noted. We also provide a new key to the species of *Erythrodes* in Taiwan.

KEY WORDS: Orchidaceae, Erythrodes triantherae, Morphology, Taxanomy, Pollination, Taiwan.

INTRODUCTION

The genus *Erythrodes* Blum is represented by about 60 species in the world (Schuiteman and Vogel, 2000) and about 20 species in Asia (Pridgeon, 2003). The genus *Erythrodes* is distributed in Central and South America, Sri Lanka, tropical continental Asia, Malaysia, Indonesia, the Philippines, Taiwan, Papua New Guinea, Pacific islands, east to Tonga. In Taiwan, only one species, *Erythrodes blumei* (Lindl.) Schltr (Su, 2000) is recorded.

Recently a new species of *Erythrodes* was found at Isl. Lanyu, Taitung. According to the very special characteristics of its three anthers, we named this plant *Erythrodes triantherae*. This study provides the description, information on the habitat, photos of *E. triantherae* and new key to the species.

key to the species

1. Labellum base spurred, spur extends beyond the bases of lateral sepals, about 3 mm long; anther 1 ……. *E. blumei*
1. Labellum base saccate, extending beyond the bases of lateral sepals, about 1 mm long; anthers 1-3 ……..…. *E. triantherae*

In order to learn more about the proper generic treatment and for the further study in the future, results of a preliminary observation on the variation in the number of the anther, and on the development of the fruit have also been noted in this study.

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MATERIALS AND METHODS

The fresh materials were collected from Isl. Lanyu on 2 February 2006. In order to verify and obtain more information on the very typical columnal structure of the present species, a second collecting trip was taken by the 3rd author and 10 sample plants have been transplanted. Among them 8 inflorescences kept healthy after transportation. A preliminary observation has been made with special attention on the number of anthers, the variation in lip shape and fruiting. In order to obtain a clear figure of the pollinia and stigma, some flowers have been cut down and studied at the early stage of opening. Each coronescent flower on the developing ovaries has been carefully examined before the sample plant was pressed and dried to prepare a specimen. A total of 62 flowers were used to examined the number of anthers.

TAXONOMIC TREATMENT

Erythrodes triantherae C. L. Yeh *et* C. S. Leou, *sp. nov.* 三藥細筆蘭 Figs. 1 & 2

Herba erecta. Laminis ellipticis-ovatis, 5-7 cm longis, 2.6-3.1 cm latis, apice et basi acutus. Pedunculus 15-24 cm longus. Flos inversus. Sepals discretus, inaequilaterus. Anthera 1-3; hypochilo labelii saccato.

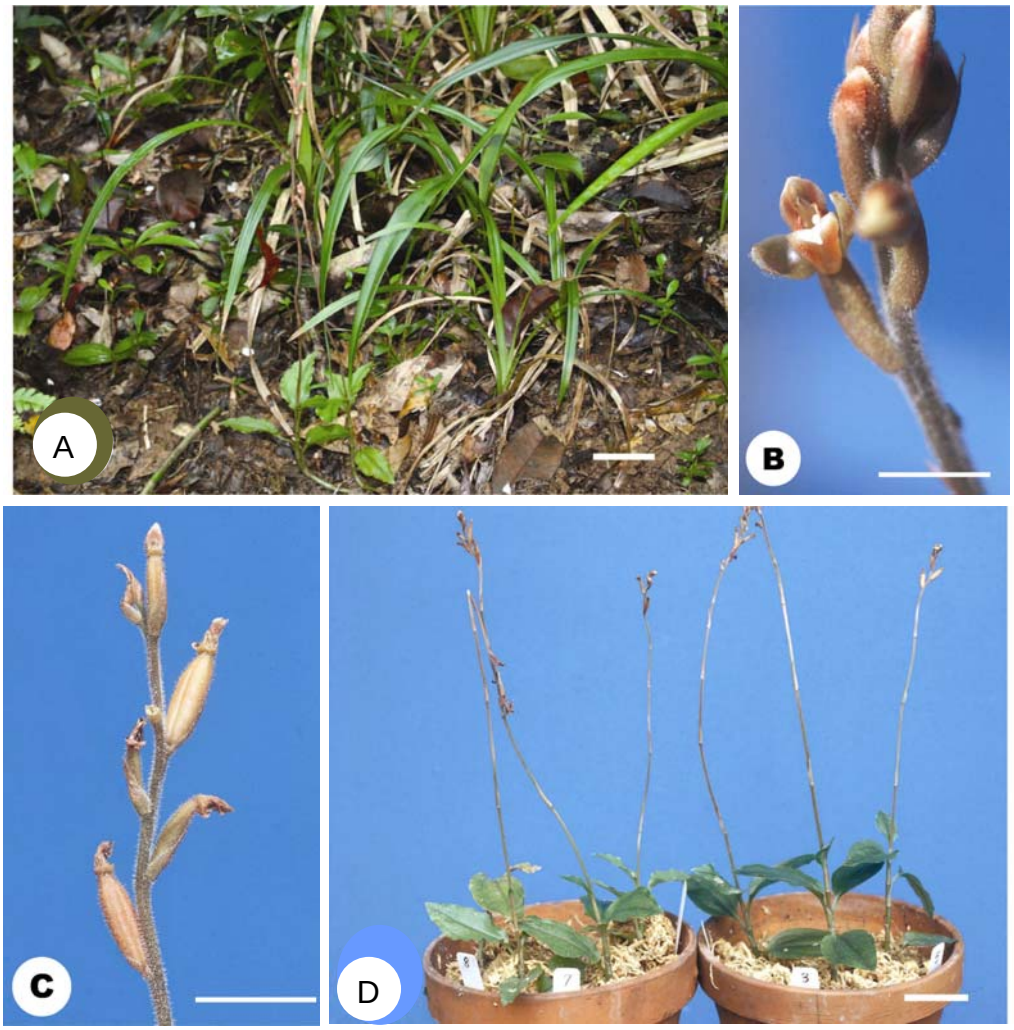

Fig. 1. *Erythrodes triantherae* C. L. Yeh *et* C. S. Leou. A: Habitat. B: A flower on the raceme. C: Developing fruits on the raceme. D: A portion of the studied materials, showing the habit. bar A = 5 cm; bar B, C = 5 mm; bar D = 5 cm.

Terrestrial herbs. Rhizome short creeping at base, ascending at top and forming a stem 10-15 cm tall, 0.4-0.5 cm in diameter. Leaves 3-6, spiral, distant, long petiolated; blade elliptic-ovate, 5-7 cm long, 2.6-3.1 cm wide, acute at both ends, entire but with a few waves at margins, light green, glabrous, 3-nerved, veinlets reticulated; petioles 2.9-3.5 cm long, sheathed at base. Inflorescence terminal; peduncle 15-24 cm long, nearly glabrous at base, hairy toward apex, with 4-5 sheathed bracts, lower bracts glabrous, upper ones with short hairs at back, ciliate at margins, 3-nerved; raceme bearing few to 14 flowers, 4-8 cm long, elongating during anthesis, rachis hairy, floral bracts up to 10 mm long, hairy outside, ciliate at margins. Flowers resupinate, half-opened; ovary hairy, 5-7 mm long; sepals free, unequal, hairy outside, red light brown below, turning white near apex, the dorsal one oblong, boat-shaped, 4.5-5.2 mm long, the lateral ones elliptic-ovate, oblique, 4.7-5.3 mm long; petals oppressed to the dorsal sepal and with it forming a hood, the inner margins jointed together at upper part or free from each other, falcate after flattened, 4.5-5.2 mm long, white; lip free from the column, 4.5-5.5 mm long, oblong in outline when flattened, light red-brown and saccate at base, bearing a short central keel and 2 continuous lateral keels or 2-6 discontinuous protruding within, 3-lobed and white at apex, the lateral lobes thickened, smooth inside, bearing short and erect prickles or reflexed stout hairs at outer surfaces, the middle lobe reflexed, triangular-semicircular, acute at apex; column erect, 3.3-3.8 mm long, adorned with 1-3 anthers, i.e., additional two or one stamens often present on the ventral side, rarely absent; dorsal anther lying on the clinandrium and sessile, larger, ca. 2.5 mm long,

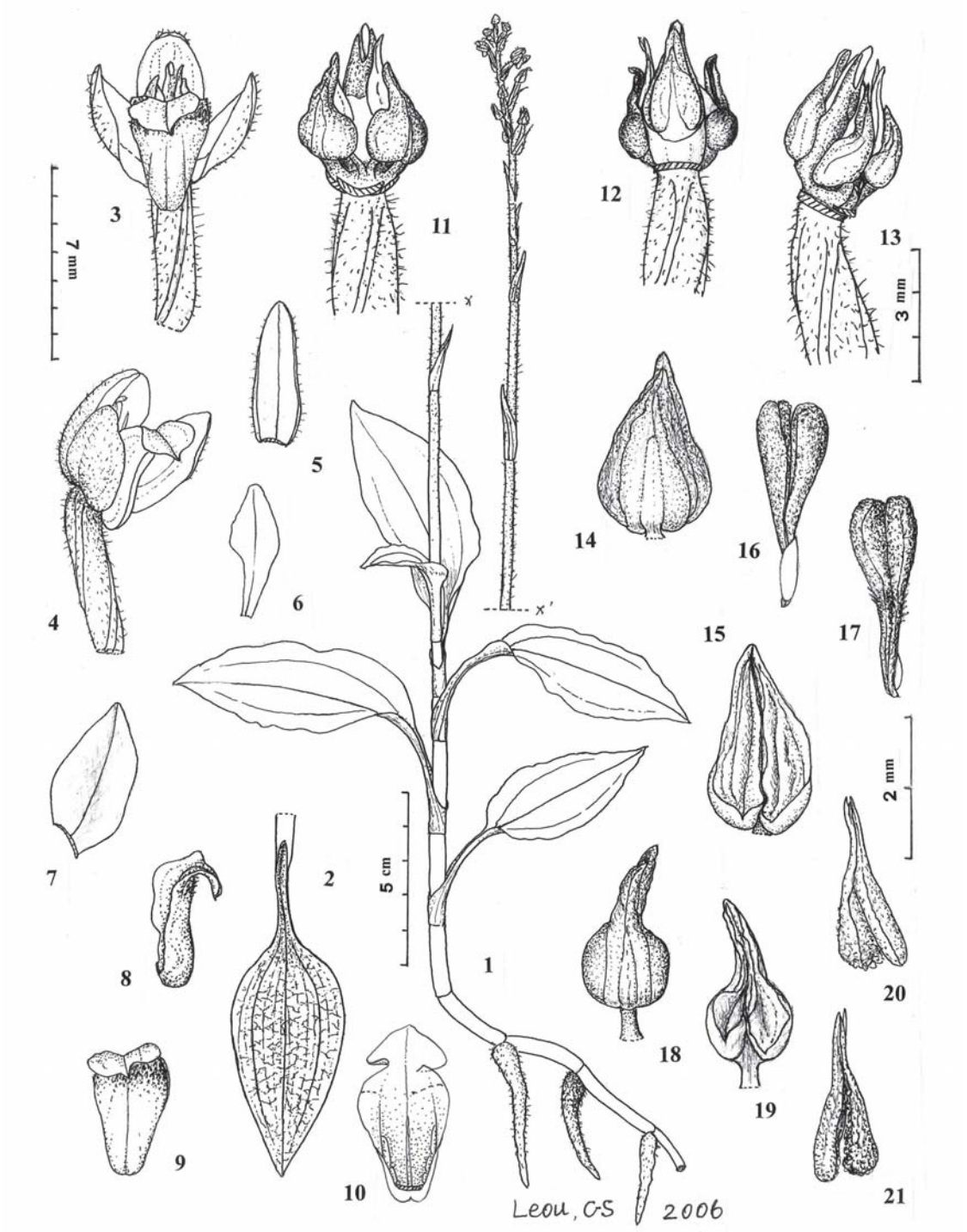

Fig. 2. *Erythrodes triantherae* C. L. Yeh *et* C. S. Leou. 1: Habit. 2: Leaf, showing the venation. 3: Flower, face view. 4: Flower, side view. 5: Dorsal sepal, side view. 6: Petal, flattened. 7: Lateral sepal, inside. 8: Lip, side view. 9: Lip, outside. 10: Lip, inside. 11: Column, ventral view. 12: Column, dorsal view. 13: Column, side view. 14: Dorsal anther, outside. 15: Dorsal anther, inside. 16 & 17: Pollinia from dorsal anther. 18: Ventral anther, outside. 19: Ventral anther, inside. 20 & 21: Pollinia from ventral anther. (drawn from fresh materials).

anthers on ventral side independent and distinctly stalked, smaller, ca. 2.2 mm long; pollinia from the dorsal anther 2, each in 2-partite, 3mm long, the tapered apex often attached to the viscidium, pollinia from ventral stamens smaller, 2.5 mm long; stigma single, on ventral side of column; rostellum straight; viscidium small, oblong.

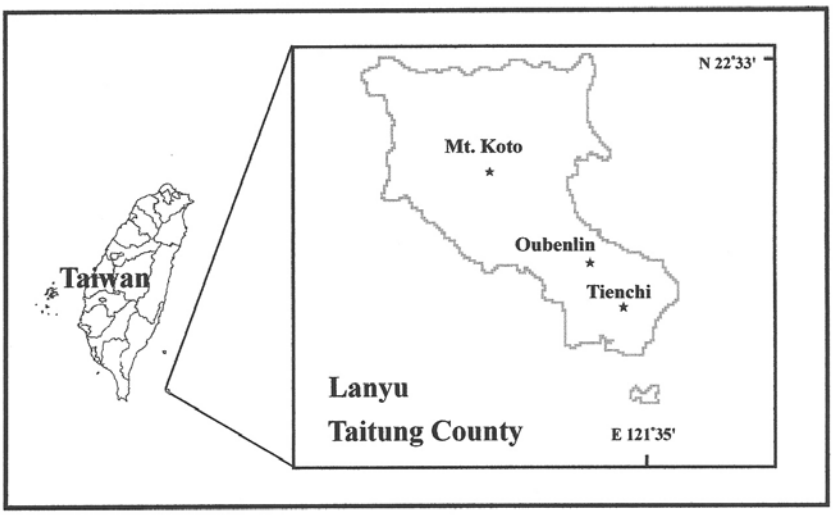

Fig. 3. Distribution of *Erythrodes triantherae* in Taiwan.

The present species is typically characterized by the column which is adorned with 1-3 anthers, i.e., additional two or one stamens often present on the ventral side of column, and in the lip which is much shorter (4.5-5.5 mm long) and only saccate at base, not long spurred.

Distribution: in forest around Mt. Koto, Tienchi and Oubenlin, Lanyu (Orchid Island, Botel Tabago, Fig. 3), Taitung, Taiwan.

Flowering period: February to March.

Specimen examined: Taitung Co.: Mt. Koto, *C. R. Yeh* 4068 (PPI) 2 Feb 2006 (HoloTYPE), Tienchi, *C. R. Yeh* 4069 (PPI) 22 Feb 2006, Oubenlin, 4070 (PPI) 2 Feb 2006. The holotype is deposited in the herbarium PPI.

In Lanyu, the species was now found in three locations: Mt. Koto, Tienchi and Oubenlin, on slope at elevations about 200-500 m, and in the understory of the rainforests. We first found this orchid in Tienchi's rainforest, which has two canopy strata. The upper canopy was dominated by *Formosia benthamiana*, *Freycinetia formosana*, and *Planchonella obovata*, accompanied by *Buxus liukiuensis*, *Cinnamomum tenuifolium*, *Daphniphyllum glaucescens* var. *lanyuense*, *Dendrobium victoriae-reginae* var. *miyakei*, *Dendrochilum uncatum*, *Melastoma candidum*, *Diospyros ferrea*, *Distylium racemosum*, *Dracaena angustifolia*, *Glochidion rubrum*, *Neolitsea sericea* var. *aurata*, *Podocarpus macrophyllus*, *Tuberolabium kotoense.* The understory was dominated by *Cephalantheropsis gracilis* var. *calanthoides*, *Ilex integra* and *Tapeinidium pinnatum*, accompanied by *Calanthe formosana*, *Dianella ensifolia*, *Garcinia linii*, *Memecylon lanceolatum*, *Microtropis japonica* and *Tricalysia dubia*.

FLORAL VARIATION AND FRUITING

Gross morphology of the flowers of the present species is stable in most floral parts, but variation in the number of anthers occurred among populations and even within a single inflorescence. Most of the studied flowers had three anthers (ca. 54.8%), i.e., one anther of a common Erythrodes type lied on the clinandrium on the dorsal side of column, and two anthers with distinct stalks (a stamen ?) presented on the ventral side at the base of column. About one-fourth (ca. 24.2%) of the flowers had only one anther, and the rest of them (ca. 21.0%) had one dorsal and one ventral anthers.

There is a tendency that the flower with only one anther bears larger middle lobe and narrower lateral lobes in lip, while the flower with more than two anthers bears smaller middle lobe and broader lateral lobes.

DISCUSSION

There are now only two genus of Orchidaceae with three fertile anthers being recorded (Pridgeon, 1999; Comber, 2001). One is *Neuwiedia* Blume (eight species) and the other is *Erythrodes* .

We don't know much about pollination in the genus of *Erythrodes*. Kores noted that the "abnormally developed column…allows the base of the pollinia to come into contact with the surface of the stigma, and pollination occurs in bud as soon as the sigma becomes receptive" (Pridgeon, 2003). According to our observation, the flowers of *Erythrodes triantherae* bearing 1-2 additional ventral anthers are found to be self - pollinated. The

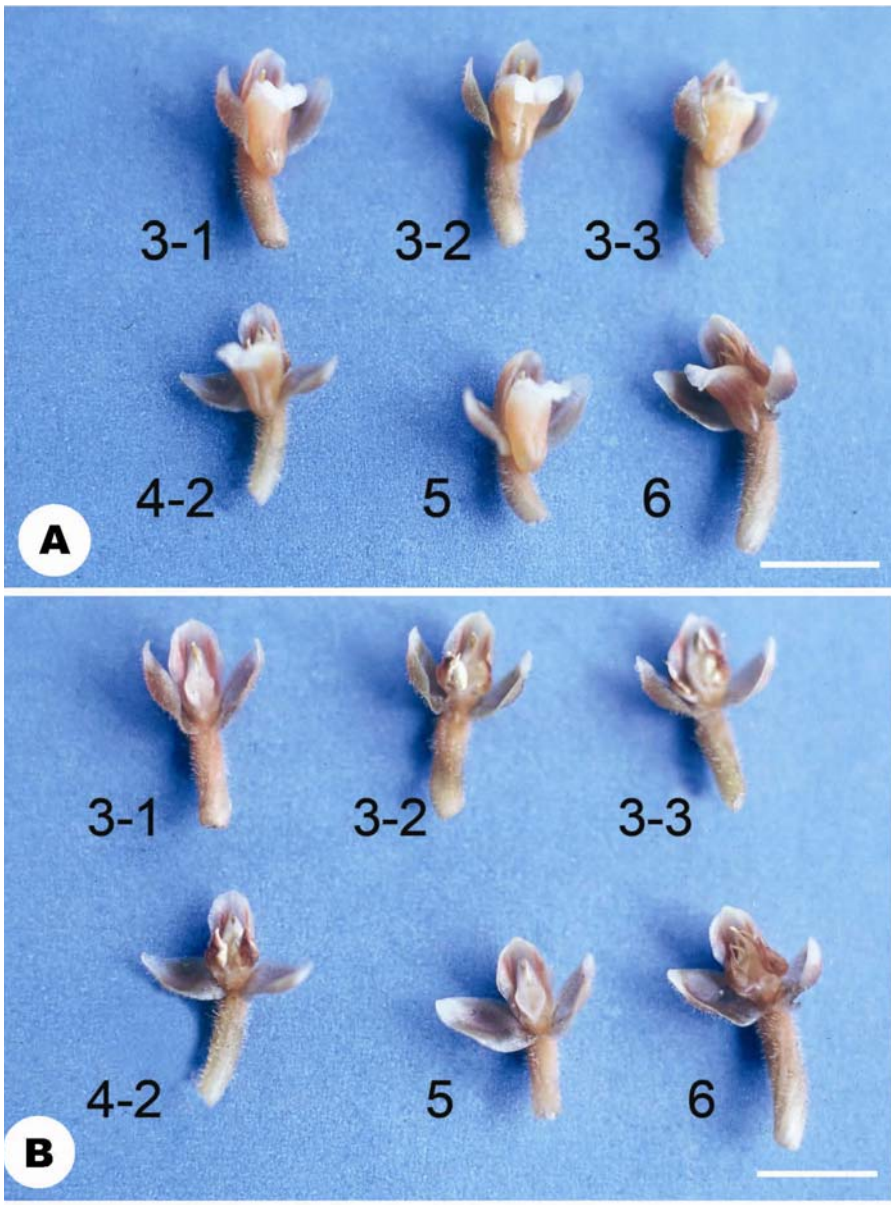

Fig. 4. *Erythrodes triantherae* C. L.Yeh *et* C. S. Leou. A: Flowers in face view, showing the variation in lip shape. B: Flowers in face view with lip removed, showing the variation in column. bar A, B = 5 mm.

pollinia and stigma have fussed together soon after the flower opened. In the field, insects or wind might cause vibration of the flower, thereby induced releasing the pollen from the anthers. Most flowers of this kind developed into a fruit successfully, while those with only one dorsal anther failed in fruiting, and this indicated that a pollinator might be needed (Figs. 4 & 5). There has been a nuclear waste deposition site nearby the study area for years. We were not certain whether or not the anatomical structures of this species were linked to the radiation activity of the waste deposition.

Due to the above observations, we propose that *E. triantherae* is under its process of speciation, but further study and generic treatment is necessary.

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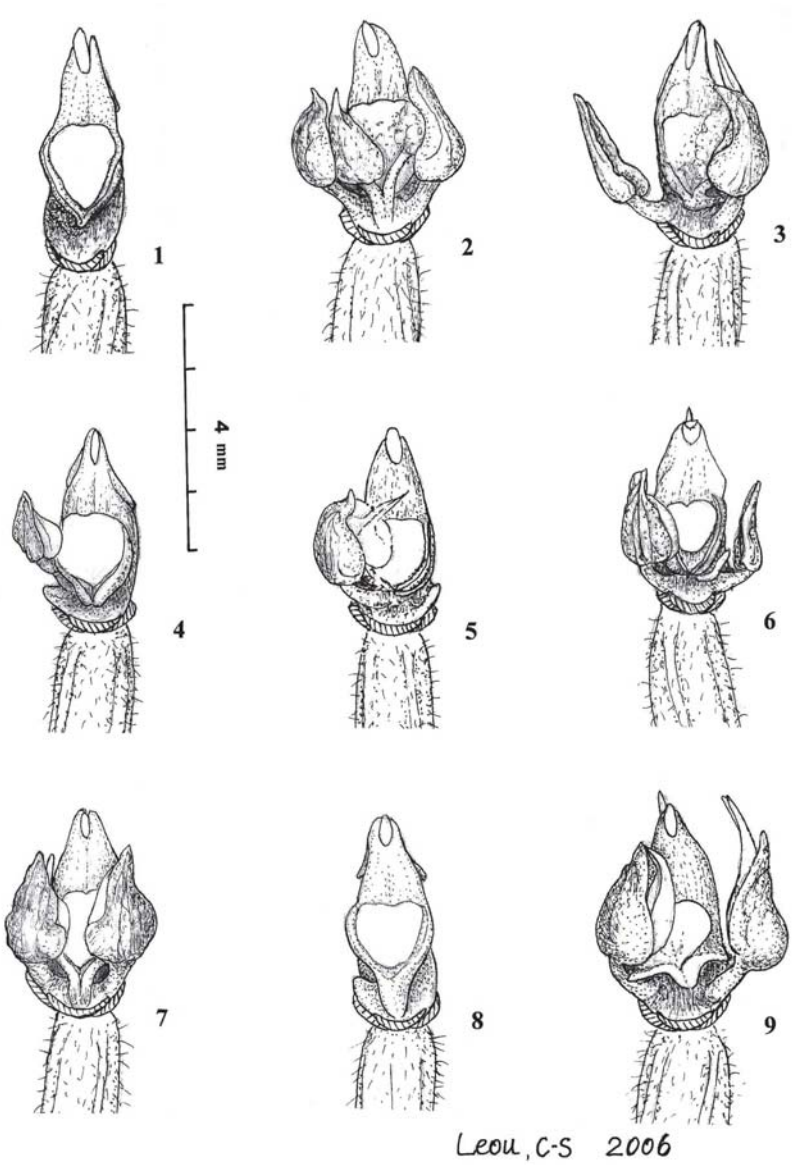

Fig. 5. *Erythredes triantherae* C. L. Yeh *et* C. S. Leou, showing the variation of column in ventral views. 1: Column with only one dorsal anther (on the back side, cannot be seen). 2: Column with 3 anthers, 1 dorsal and 2 ventral (no. 3-2, Fig. 4B). 3: The left ventral anther lacking pollinia (no. 3-3, Fig. 4B). 4 & 5: Column with 2 anther, 1 dorsal and 1 ventral. 6: An additional protuberance present between the stigma lobe and the right ventral anther. 7: Three anthers (no. 4-2, Fig. 4B). 8: One anther (no. 5, Fig. 4B). 9: A typical stigma lobe (no. 6, Fig 4B).

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具有 1～3 枚花藥之新種蘭科植物：三藥細筆蘭

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摘　　要

本文記述產自臺灣蘭嶼之新種蘭科植物「三藥細筆蘭」之學名、形態特徵、產地、花期及標本等資料。本種之主要特徵為花之蕊柱具有 1~3 枚花藥，即有 1 或 2 枚雄蕊常在蕊柱腹面出現，唇瓣較小，長 4.5～5.5 mm，基部囊狀而無長距。對於本種之花藥數目之變異情形及對於果實發育之初步觀察結果亦加以註記。並提供臺灣 *Erythrodes* 屬之新檢索表。

關鍵詞：蘭科、三藥細筆蘭、形態學、分類學、傳粉(受粉、授粉)、臺灣。

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