

## TAXONOMIC STUDY ON EIGHT SELECTED SPECIES OF FAMILY ORCHIDACEAE IN SOUTHERN PART OF KALAMA TAUNG RESERVED FOREST, PAUNG TOWNSHIP, MON STATE

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### Abstract

The present research deals with a taxonomic study on family Orchidaceae in Southern part of Kalama Taung Reserved Forest, Paung Township, Mon State. This study feature was represented by eight species belong to eight genera of family Orchidaceae. There were two terrestrials and six epiphytic species. *Eulophia zollingeri* (Rchb. f.) J.J. Sm. and *Malaxis versicolor* Abeyw. are terrestrial and *Coelogyne schilleriana* Rchb. f., *Bulbophyllum crassipes* Hook. f., *Dendrobium fimbriatum* Hook., *Liparis viridiflora* (Blume) Lindl., *Renanthera coccinea* Lour. and *Rhynchostylis retusa* Blume are epiphytes. The collected eight species were identified and classified. Morphological characters, common names, flowering periods and Global Positioning System (GPS) were also presented.

**Key words:** Orchidaceae, Southern part of Kalama Taung Reserved Forest

### Introduction

Myanmar occupies an area of 678,033 sq km in Southeast Asia. Mon State extends 12,155 sq km at the southeast of Myanmar. Southern part of Kalama Taung Reserved Forest covers 101.79 sq km in Paung Township, Mon State. It is situated between North-latitude 16° 36' and 16° 50' and East-longitude 97° 25' and 97° 33' (Fig. 2).

Up to 1000 genera and 15-20,000 species; some estimates run as high as 30,000 species (Cronquist, 1981). According to Kress *et al.* (2003), 131 genera and 738 species were recorded in checklist of Myanmar.

The family has a cosmopolitan distribution, and orchids may be found under nearly all conditions-as understory plants in dark, tropical lowland forests; at the top of all trees in the rain forest, where they are intermittently baked by the sun and then showered by torrential rain; in grassy and marshy

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areas; along the sides of the street; and as pioneering plants on landslides. They are only absent from extreme environments, such as the sea, the driest deserts, and the tops of the coldest mountains. The terrestrial habit prevails in temperate regions, but in the tropics most species are epiphytes (Heywood *et al.*, 2007).

Some of the characters which support this family are: (1) Zygomorphy of flowers accompanied with different type of labellum formation and spur, (2) epigynous flowers, epigyny provides greater protection to the ovary, (3) majority of the plants are herbs, which may be epiphytes or saprophytes, (4) Constant reduction and suppression of the members of androecium and formation of pollinium, (5) Reduction in the stigmatic lobes which often develop into rostellum. Formation of gynostemium facilitates insect pollination, (6) Pollen is often sticky where there is no need of a thick sculptured exine and (7) Diversity in shape and size of flowers which may be of various types (Verma, 2011).

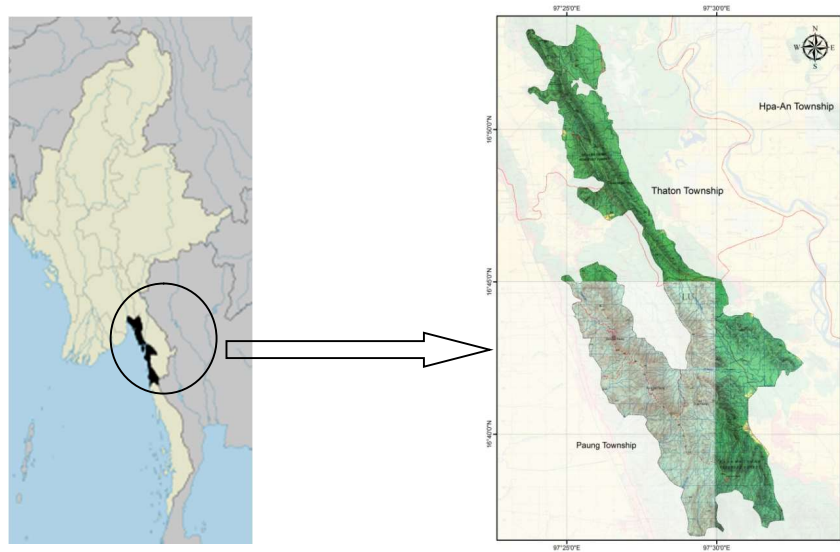
Orchids are never wind-pollinated. External agents such as ants, bees, wasps, flies and butterflies are responsible for the transfer of pollinia on to the stigmas in their search for nectar. Seeds of orchids are duct-like, exalbuminous and they are dispersed by the wind. The family is characterized by the absence of a root in the embryo. Hence, it is dependent on a symbiotic relationship with certain mycorrhizal fungi for its early supply of food during germination. In nature the environment plays an important part in the struggle for existence of this family (Jayaweera, 1981).

Orchid is suffering from an uncertain future through over exploitation, habitat loss due to human activities and impact of climate change. The future of orchid population is disturbing and the world will face the extinction of many species. In Asia, climate change occurs rapidly due to compound pressure on natural resources and the environment associated with rapid urbanization, industrialization and economic development (Barman and Devadas, 2013).

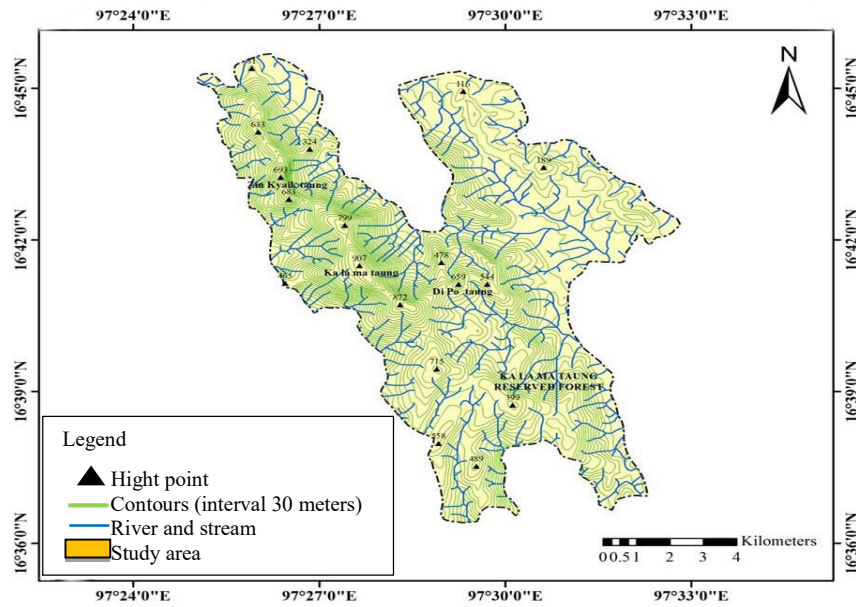
The aim of this research is to identify the morphological characters of collected species and to describe the outstanding characters of orchid species.

## Materials and Methods

The specimens were collected from Southern part of Kalama Taung, Paung Township, Mon State during 2013-2016. The morphological characters of vegetative and reproductive parts and Global Positioning System (GPS) were recorded. The specimens were prepared and preserved based on the herbarium techniques of Lawrence (1964). Then, the herbarium specimens were deposited in Herbarium of Yangon University for references and other researchers. The collected plant specimens were identified based on Bartle (1966), Chen *et al.* (2009), Jayaweera (1981) and Seidenfaden (1992).



**Figure 1.** Map of Kalama Taung Reserved Forest in Thaton and Paung Township, Mon State in Myanmar



Source : UTM

**Figure 2.** Location Map of Southern part of Kalama Taung Reserved Forest

## Results

The collected eight species belong to eight genera, five tribes, two subfamilies of family Orchidaceae were classified according to Dressler (1981).

Family	Subfamily	Tribe	Scientific Name
Orchidaceae	Epidendroideae	Coelogyneae	(1) <i>Coelogyne schilleriana</i> Rchb. f.
		Epidendreae	(2) <i>Bulbophyllum crassipes</i> Hook. f.
			(3) <i>Dendrobium fimbriatum</i> Hook.
	Malaxideae		(4) <i>Liparis viridiflora</i> (Blume) Lindl.
			(5) <i>Malaxis versicolor</i> Abeyw.
Vandoideae	Cymbidieae		(6) <i>Eulophia zollingeri</i> (Rchb. f.) J.J. Sm.
		Vandaeae	(7) <i>Renanthera coccinea</i> Lour.
			(8) <i>Rhynchostylis retusa</i> Blume

**Key to the studied genera:**

- 1. Plant terrestrial -----2
- 1. Plant epiphyte or lithophyte -----4
  - 2. Pseudobulb present; inflorescence with lax and medium flower --- 4.
- Eulophia*
- 2. Pseudobulb absent; inflorescence with crowded and small flower ----- 3
- 3. Column short; lip non-resupinate ----- 6. *Malaxis*
- 3. Column long; lip resupinate ----- 5. *Liparis*
- 4. Pseudobulb absent ----- 5
- 4. Pseudobulb present ----- 6
- 5. Inflorescence erect, spreading; flowers lax -----7. *Renanthera*
- 5. Inflorescence pendent; flowers densely crowded -----8. *Rhynchostylis*
- 6. Leaves solitary; inflorescence appear from the base of the pseudobulb ---  
-----1. *Bulbophyllum*
- 6. Leaves two or more; inflorescence axillary or terminal ----- 7
- 7. Pseudobulb various shape; inflorescence pendent; flowers large and small--  
3. *Dendrobium*
- 7. Pseudobulb ovoid; inflorescence erect; flowers medium ----- 2. *Coelogyne*

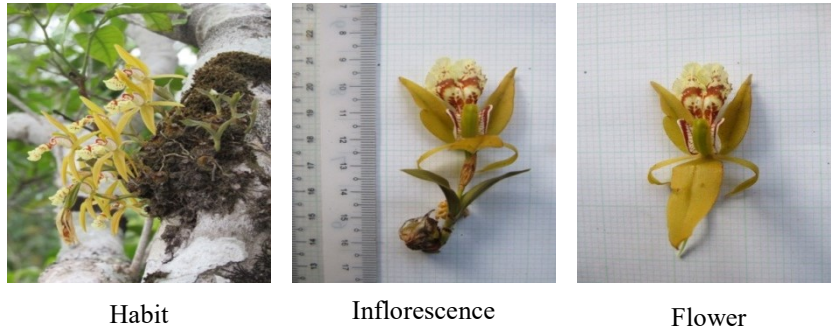
**1. *Coelogyne schilleriana* Rchb. f., Allg. Gartenz. 26: 189. 1858.**

Epiphytic and lithophytic herb; pseudobulbs globosely ovoid, 1-2 cm, covered with leathery sheath. Leaves 2, at the end of undeveloped pseudobulb; leaf blade elliptic-lanceolate, 4.0-7.0 x 0.6-1.5 cm, margin entire, apex acuminate, coriaceous. Flowers solitary from between the leaves, 3-4 cm in diameter, tawny yellow; bracts sheathing imbricate, 1.0-1.5 x 0.4-0.7 cm, deciduous; peduncle 3-4 cm long. Dorsal sepal oblong-elliptic, 3.0-3.5 x 1.0-1.3 cm, apex acute; lateral sepals lanceolate, 2.8-3.3 x 0.6-0.8 cm, acuminate, deflexed. Petals linear, 2.8-3.3 x 2.0-4.0 mm, 1-veined. Lip erect, embracing the column, 3-lobed, 2.3-3.0 x 3.0-4.0 cm; lateral lobes oblong, apex rounded, parallel with the column; middle lobe very broad, wavy, crisped, notched at the tip, pale yellow with dark reddish blotches. Column concave, 1.5-1.8 cm long, winged on both sides, tip rounded. Anthers 2-celled; pollinia 4, in 2 pairs, waxy. Capsule obovate, 2.0-3.0 x 1.0-1.5 cm, pendulous, with narrowly winged.

Common name: Not known (Fig. 3)

Ecology : N Lat.- 16° 44' 10.8", E Long.- 097° 25' 56.6", Altitude- 608 m; Flowering and Fruiting period: February to May; epiphytic on *Artocarpus heterophyllus* Lam. and rocks.

Specimen examined: Min-taya-tapar Taung, Paung Township; 22 April, 2015; Thant Zaw Win, Coll. no. 004 (RGN-20037).



**Figure 3.** *Coelogyne schilleriana* Rchb. f.

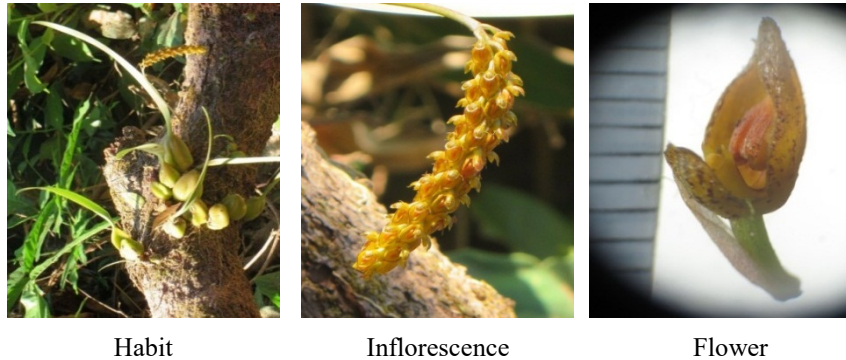
**2. *Bulbophyllum crassipes* Hook. f., Fl. Brit. Ind. 5 (16): 760.1890.**

Epiphytes with a creeping rootstock; pseudobulbs ovate, 2.0-4.0 x 1.5-2.5 cm. Leaf one, appear from each pseudobulb; petioles 1-2 cm long; leaf blade oblong, 10-19 x 2-3 cm, strap-shaped, apex obtuse and emarginate, thickly leathery. Scape arching, from the base of pseudobulb; raceme 2-7 cm long, densely many-flowered; floral bracts longer than pedicel with ovary, ovate-lanceolate, 5-8 x 2-4 mm, apex acute, pale brown. Flowers yellow, dense cylindrical spike; bracts 4-7 x 2-3 mm. Dorsal sepal oblong, concave, 4-6 x 2-3 mm, apex obtuse; lateral sepals ovate-lanceolate, 6.0-8.0 x 2.0-3.5 mm, much longer than dorsal sepal, apex acute, lower edges connate. Petals triangular, 2.0-3.0 x 0.5-1.0 mm, base oblique and decurrent to column foot, apex caudate. Lip ligulate, 2.5-3.5 x 1.5-2.0 mm, longer than petals, fleshy, margin finely papillate, grooved at adaxial base, with 2 auricles on both basal sides; auricles subsquare, about 1 mm long, apex truncate and slightly retuse. Column with deltoid teeth, 2.5-3.0 x 1.3-1.7 mm; foot about 2 mm long; anther cap glabrous; pollinia 4, cohering in pairs, oblong, the two inner pollinia smaller.

Common name: Not known (Fig. 4)

Ecology: N Lat.- 16° 35' 51.0", E Long.- 097° 29' 09.0", Altitude- 25 m; Flowering and Fruiting period: January to April.

Specimen examined: Mu-kyi Taung, Paung Township; 24 January, 2015; Thant Zaw Win, Coll. no. 002 (RGN-20036).



Habit

Inflorescence

Flower

Figure 4. *Bulbophyllum crassipes* Hook. f.

**3. *Dendrobium fimbriatum*** Hooker, Exot. Fl. 1: ad t. 71. 1823.

(Syn.: *Callista fimbriata* (Hook.) Kuntze, *C. oculata* (Hook.) Kuntze, *Dendrobium fimbriatum* var. *occulatum* Hook. f., *D. fimbriatum* var. *occulatum* Hook., *D. paxtoni* Paxton)

Epiphytic herb, 40-90 cm high, pendulous; internodes 1.5-4.0 cm long, longitudinally grooved. Leaves distichous along the stem; leaf blades oblong-lanceolate, 7-15 x 1-3 cm, base tightly clasping sheaths, apex acute, slightly bilobed, leathery. Inflorescences racemes, 5-15 cm long, laxly 6-15 flowered, pendulous; peduncle 2-4 cm long; rachis thin, curved; basal sheaths tubular, 3-10 mm, overlapping, membranous. Flowers golden yellow, fragrant, 3.5-4.5 cm wide, spreading, thinly textured; bracts ovate-triangular, 3-5 mm long, apex acute, membranous; pedicels and ovary 2.5-3.0 cm long. Dorsal sepal oblong, 1.3-2.5 x 0.6-1.1 cm, 5-veined, apex obtuse; lateral sepals ovate-lanceolate, as long as dorsal, 5-veined, base oblique, apex obtuse; mentum rotund, 2-5 mm long. Petals oblong-elliptic, 1.2-2.5 x 0.7-1.5 cm, margin erose, apex obtuse, 5-veined. Lip suborbicular, 1.5-2.5 x 2.0-3.0 cm, base narrowed into a claw about 3 mm long, margin compound fimbriate, adaxially densely pubescent, transversely lunate deep purple spot, with purplish red stripes on either side at base. Column about 2 mm; foot 4-6 mm long; anther cap conic, glabrous, front margin denticulate.

Common name: Ar-me-let-tan-shae (Fig. 5)

Ecology : N Lat.- 16° 44' 10.0", E Long.- 097° 24' 59.4", Altitude-74 m; Flowering and Fruiting period: February to May.

Specimen examined: Min-taya-tapar Taung, Paung Township; 14 March, 2016; Thant Zaw Win, Coll. no. 008 (RGN-20038).

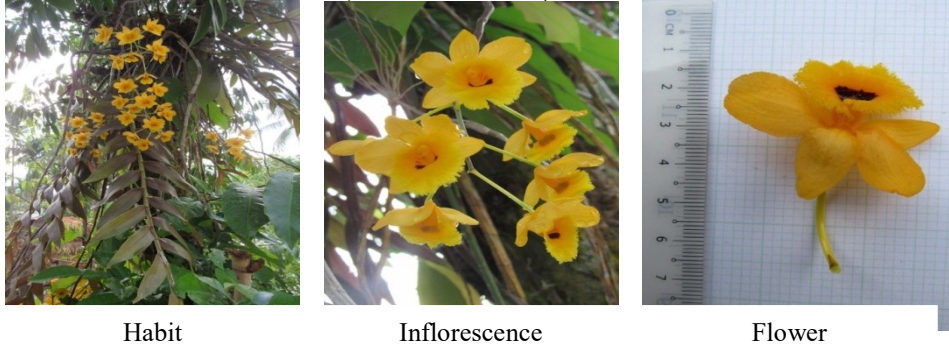


Figure 5. *Dendrobium fimbriatum* Dalzell

**4. *Liparis viridiflora* (Blume) Lindl., Gen. Sp. Orch. Pl. 31. 1830.**

(Syn.: *Cestichis longipes* (Lindl.) Ames, *Leptorkis longipes* (Lindl.) Kuntze, *L. viridiflora* (Blume) Kuntze, *Liparis longipes* Lindl., *L. pendula* Lindl., *L. pleistantha* Schltr., *L. simondii* Gagnep., *L. spathulata* Lindl., *Malaxis viridiflora* Blume, *Sturmia longipes* (Lindl.) Rchb. f.).

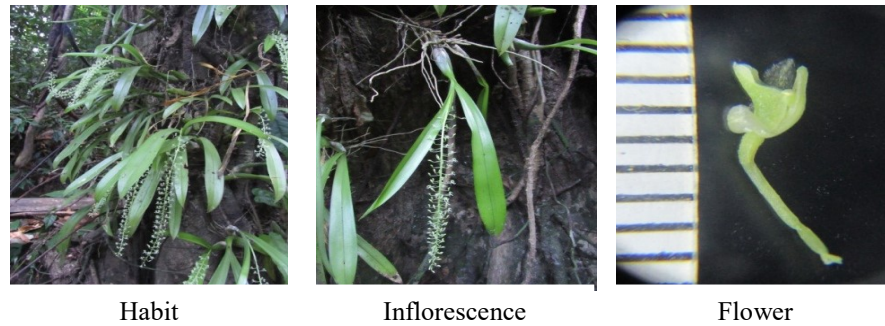
Tufted epiphyte; pseudobulbs densely arranged, ovoid, 1.0-6.0 x 0.8-2.0 cm, attenuate to apex, clothed in papery sheaths. Leaves 2, sessile, jointed continuing with pseudobulb; leaf blade oblanceolate, 4-24 x 1-3 cm, apex acuminate, drooping, subcoriaceous, 5-7 veined. Inflorescence terminal, dense-flowered raceme, longer than leaves, 14-18 cm long, pendulous; rachis terete, 5-130 cm long. Flowers greenish white, 2.0-3.5 mm in diameter; floral bracts narrowly lanceolate, 2.0-6.0 x 0.5-1.5 mm, apex acuminate, 1-veined, membranous; pedicels and ovary 4-7 mm long. Dorsal sepal oblong, 2-5 x 1-2 mm, margin revolute, apex obtuse; lateral sepals ovate-elliptic, recurved and reflexed, 1-veined, slightly wider than dorsal. Petals narrowly linear, 2-6 x 0.4-1.0 mm, margin revolute, apex rounded, 1-veined. Lip inferior, ovate-oblong, 2.0-3.5 x 1.5-2.0 mm, margin undulate, apex subacute, recurved about the middle, thickened, adnate to the base of the column. Column slender, incurved, 1.5-2.5 x 0.5-0.7 mm, base slightly enlarged. Anther terminal, 2-loculed; pollinia 4, waxy in two pairs, spindle-shaped. Capsule obovoid-ellipsoid, 4-6 x 3-4 mm, fruiting pedicel 3-6 mm long.



Common name: Tha-zin-bo (Fig. 6)

Ecology : N Lat.- 16° 36' 20", E Long.- 097° 28' 30.", Altitude- 300 m; Flowering and Fruiting period: December to March; epiphytes on *Dipterocarpus costatus* Gaertn.

Specimen examined: near Ah-me Stream, Mu-Kyi Taung, Paung Township; 3 January, 2016; Thant Zaw Win, Coll. no. 007 (RGN-20040).



**Figure 6.** *Liparis viridiflora* (Blume) Lindl.

**5. *Malaxis versicolor* Abeyw., Ceylon J. Sci., Biol. Sci. 2: 147. 1959.**

Terrestrial herb, 20-40 cm high; pseudobulbous annulate. Leaves sessile; leaf blade ovate, 10-16 x 5-8 cm, base continuous with the sheath, margin wavy, apex acuminate, plicate, membranous. Inflorescence terminal, cylindrical racemose, flowering bearing portion 10-17 cm long; peduncle 5-10 cm long. Flowers small, pink; floral bracts ovate, 3-6 x 1-3 mm, 1-veined; pedicels 0.7-1.0 cm long. Dorsal sepal ovate-subulate, 4-7 x 2-4 mm, apex acute, 3-veined; lateral sepals obliquely oblong, apex obtuse, deflexed, 3-veined. Petals lanceolate, 4.0-6.0 x 0.5-1.0 mm, apex truncate, 1-veined. Lip superior, subquadrate, 1.6-2.0 x 2-3 mm, base hollowed and adnate to the base of the column, with two large auricles close to the sides of the column; apex pectinate, 9-13 toothed, mid-tooth short, blunt and trifid at the apex. Column 2 suberect horns at the apex, 1.0-1.3 x 0.5-0.8 mm, narrowing towards the middle and again broadening towards the base. Anther terminal, 2-loculed; pollinia 4, cohering in two pairs, obovoid.

Common name: Not known (Fig. 7)

Ecology : N Lat.- 16° 36' 33.7", E Long.- 097° 29' 02.0", Altitude- 28 m; Flowering and Fruiting period: April to July; terrestrial at shady and humid places.

Specimen examined: Oak-ta-tar Taung, Paung Township; 28 May, 2015; Thant Zaw Win, Coll. no. 005 (RGN-20041).

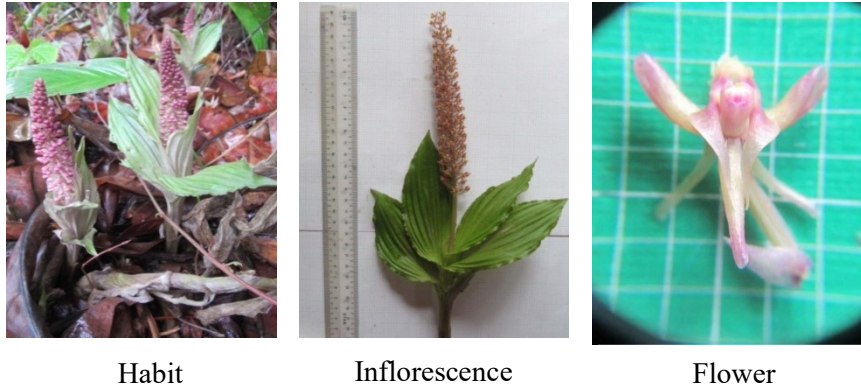


Figure 7. *Malaxis versicolor* Abeyw.

**6. *Eulophia zollingeri*** (Rchb. f.) J.J. Sm., Fl. Buitenz. 6: 228. 1905.

(Syn.: *Cyrtopera formosana* Rolfe, *C. papuana* Ridl., *C. rufa* Thw., *C. sanguine* Lindl., *C. zollingeri* Rchb. f., *C. rufum* (Thw.) Trimen, *C. sanguineum* (Lindl.) N.E. Br., *Eulophia carrii* C.T. White, *E. formosana* (Rolfe) Rolfe, *E. macrorhiza* Blume, *E. ochobiensis* Hayata, *E. papuana* (Ridl.) J.J. Sm., *E. sanguine* (Lindl.) Hook. f., *E. yushuiana* S.Y. Hu, *Graphorkis macrorhiza* (Blume) Kuntze, *G. papuana* (Ridl.) Kuntze, *G. rufa* (Thw.) Kuntze, *G. sanguine* (Lindl.) Kuntze)

Plants terrestrial herb with horizontal tuberous rootstock, 3-12 x 2-4 cm, with vermiform roots. Leaves produced after flowering. Inflorescence racemose, 40-80 cm long; peduncles 30-50 cm long, with several scattered and clasping sheaths. Flowers spreading, dull purple-red, 2.0-3.7 cm in diameter; bracts lanceolate, 1-2 cm long, persistent; pedicel and ovary 1.0-2.5 cm long. Dorsal sepals elliptic-oblong, 1.5-2.5 x 0.7-1.3 cm, apex acuminate; lateral sepals oblong, base oblique, acuminate, longer than the dorsal, inserted on the foot of the column, spreading; mentum short, about 5 mm long, conical and incurved. Petals oblanceolate, 1.5-1.8 x 0.7-1.0 cm, spreading, apex

mucronate. Lip inferior, 3-lobed, middle lobe broadly ovate, apex apiculate and recurved; lateral lobes obtuse, embracing to the column. Column 1.0-1.4 cm long, base produced into a foot. Anther terminal, umbonate, 2-loculed, pollinia 2, ovoid on a short strap.

Common name: Myae-thit-kwa (Fig. 8)

Ecology : N Lat.- 16° 41' 39.4", E Long.- 097° 27' 37.4", Altitude- 862 m; Flowering and Fruiting period: April to July; terrestrial at humid places.

Specimen examined: Kalama Taung, Paung Township; 30 May, 2015; Thant Zaw Win, Coll. no. 006 (RGN-20039).

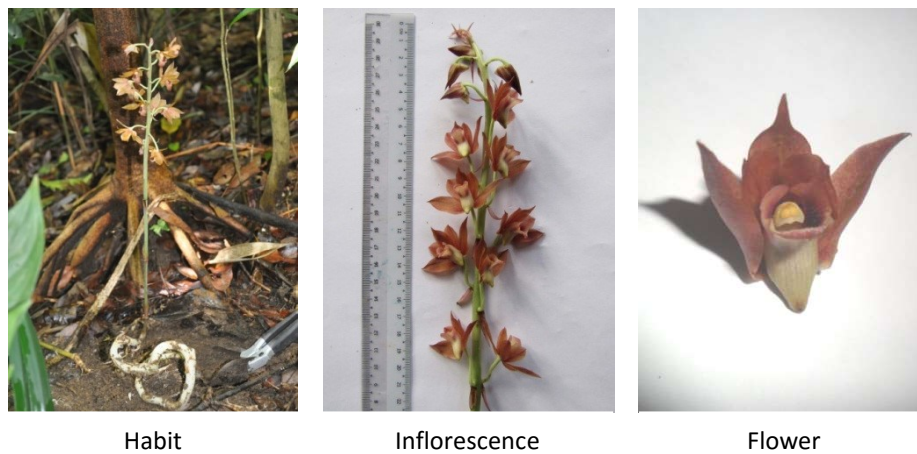


Figure 8. *Eulophia zollingeri* (Rchb. f.) J.J. Sm.

**7. *Renanthera coccinea* Lour., Fl. Cochinch. 2. 521. 1790.**

Epiphytic herbs; stem elongate, 30-90 cm high, sending out long wiry roots. Leaves 2-rank; leaf blade oblong, 7-20 x 2-3 cm, margin entire, apex 2 lobed, rigid, thick and fleshy, veins parallel. Inflorescence borne opposite leaves, spreading panicles, lax-flowered; peduncle erect, 50-90 cm long. Flower medium-sized, scarlet color. Dorsal sepal erect, narrowly spatulate, 3-4 x 0.3-0.5 cm, margin conspicuous undulate, apex obtuse; lateral sepals 3.5-4.5 x 0.7-1.3 cm, margin conspicuous undulate, apex obtuse, deflexed, much longer than dorsal, widely spreading. Petals narrowly linear, 2.5-3.0 x 0.2-0.4 cm. Lip jointed on the base of the column, 3-lobed; lateral lobes of lip

subquadrate to orbicular. Column truncate, about 8 x 4 cm. Pollinia 4, in 2 pairs, reniform, slightly unequal, 2-grooved.

Common name: Pinle-thit-kwa-ni (Fig. 9)

Ecology : N Lat.- 16° 39' 29.0", E Long.- 097° 27' 15.0", Altitude- 30 m; Flowering and Fruiting period: April to July; epiphytic on *Mangifera longipes* Griff.

Specimen examined: Oak-ta-tar Taung, Paung Township; 20-April-2015; Thant Zaw Win, Coll. no. 003 (RGN-20042).

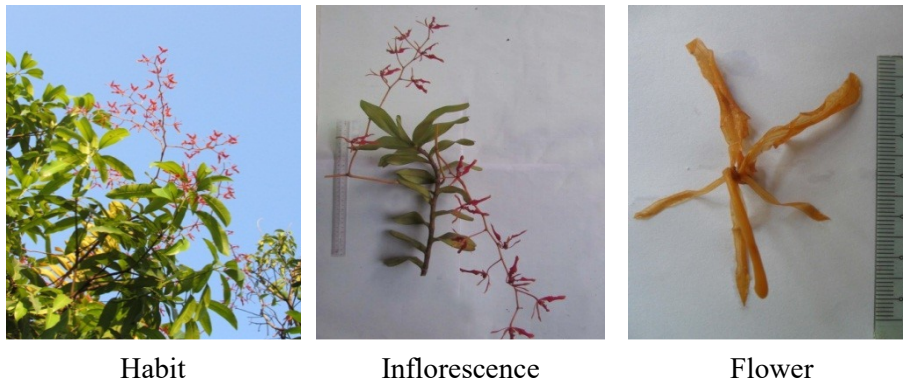


Figure 9. *Renanthera coccinea* Lour.

**8. *Rhynchostylis retusa*** Blume, Bijdr. 286, pl. 49. 1825.

(Syn.: *Aerides retusa* (L.) Sw., *Epidendrum retusum* L.; *Gastrochilus retusus* (L.) Kuntze, *Limodorum retusum* (L.) Sw., *Saccolabium retusum* (L.) Voigt.)

Epiphytic herbs, about 20 cm high; stems stout and thick, non-pseudobulbs, roots aerial. Leaves distichous, sessile; leaf blade strap-shaped, 15.0-40.0 x 1.5-2.5 cm, base sheathing grooved, margin entire, apex unequally lobed, veins parallel, coriaceous. Inflorescence axillary, racemes, 15-30 cm long, drooping; peduncle 9-15 cm long, drooping. Flowers densely crowded into long cylindrical racemes, tinged violet; bracts acute, 3-5 mm long, around the pedicel. Dorsal sepal ovate, about 11 x 6 mm; lateral sepals broadly ovate, about 12 x 8 mm. Petals oblong-ovate, about 11.5 x 5 mm. Lip conduplicate, 3-lobed, apex slightly retuse, clawed, with a saccate spur. Column prolonged into distinct foot, about 5 x 2.5 mm; rostellum shortly beaked. Anthers

terminal, 2-locule; pollinia 2, globose, waxy; caudicle slender, apex slightly dilated.

Common name: Kyauk-mi-tu (Fig. 10)

Ecology : N Lat.- 16° 35' 50.1", E Long.- 097° 29' 05.6"; Altitude- 26 m; Flowering and Fruiting period: June to September; epiphytic on *Bouea burmanica* Griff. species.

Specimen examined: Mu-kyi Taung, Paung Township; 7 July, 2014; Thant Zaw Win, Coll. no. 001 (RGN-20043).

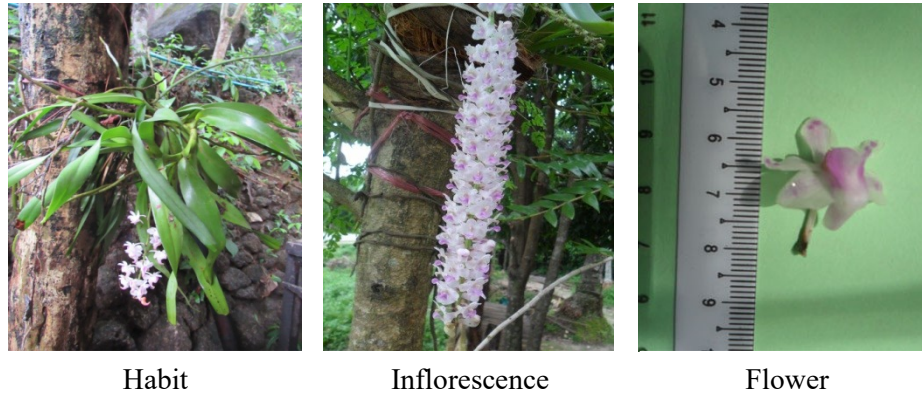


Figure 10. *Rhynchostylis retusa* Blume

### Discussion and Conclusion

According to Arthur Cronquist (1981), Orchidaceae family included up to 1000 genera and 15-20,000 species, some estimates run as high as 30,000 species. In China, about 800 genera and ca. 25,000 species (some estimates as high as 30,000 species): worldwide, except for Antarctica, most numerous in the humid tropics and subtropics; 194 genera and 1,388 species in five subfamilies (Chen *et al.* 2009). According to Kress *et al.* (2003), 131 genera and 738 species were recorded in checklist of Myanmar. In this study area, eight species that is possessed of one species in each genus were recorded.

According to Seidenfaden (1992), there are six subfamilies under family Orchidaceae, namely Apostasioideae, Cyripedioideae, Neottioideae, Orchidoideae, Epidendoideae and Vandoideae. Eight species, eight genera, five tribes under two subfamilies were collected. These collected species are

two terrestrial and six epiphytic orchid species (*Coelogyne schillerina* is both epiphytic and lithophytes).

The subfamily Epidendroideae includes three tribes (Coelogyneae, Epidendreae and Malaxideae) and five genera (*Coelogyne*, *Bulbophyllum*, *Dendrobium*, *Liparis* and *Malaxis*). The outstanding characters of *Coelogyne schillerina* are leaves 2, at the end of the undeveloped pseudobulb; flower solitary, with imbricated bracts at the base. This results were agreed with Bartle (1966). The outstanding characters of *Bulbophyllum crassipes* are densely-flowered racemes; basal auricles of lip subsquare on both sides, apex slightly retuse; floral bracts longer than pedicel with ovary; column with deltoid teeth. Those findings were agreed with Chen *et al.* (2009) and Seidenfaden (1992). The outstanding characters of *Dendrobium fimbriatum* are lip rounded, margin compound fimbriate, with 1 transversely lunate deep purple spot. These characters were agreed with Chen *et al.* (2009), Seidenfaden (1992) and Bartle (1996). The outstanding characters of *Liparis viridiflora* are epiphyte; pseudobulbs ovoid; leaves jointed on the sheath; racemes longer than leaves; flowers greenish white. These characters were agreed with Jayaweera (1981) and Seidenfaden (1992). The outstanding characters of *Malaxis versicolor* are leaves ovate; petals lanceolate, 1-veined; lip pectinate, subquadrate. This results were agreed with Jayaweera (1981).

The subfamily Vandoideae includes two tribes (Cymbidieae and Vandae ) and three genera (*Eulophia*, *Renanthera* and *Rhynchostylis*). The outstanding characters of *Eulophia zollingeri* are leafless at the time of flowering period; flowers are dull purplish-red; column produced into a foot. These findings were agreed with Jayaweera (1981). The outstanding characters of *Renanthera coccinea* are inflorescences borne opposite leaves; flowers scarlet color; lateral lobes of lip subquadrate to orbicular. This results were in agreement with Chen *et al.* (2009) and Seidenfaden (1992). *Rhynchostylis retusa* possess dense drooping racemes of pinkish-white flowers; apex of lip retuse with a saccate spur; column foot distinct. Those results were agreed with Chen *et al.* (2009), Jayaweera (1981) and Seidenfaden (1992).

This research paper is dedicated to help partially for publish of the Orchids of Myanmar.

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### References

- Barman, D. and Devadas, R., (2013) *Climate change on orchid population and conservation strategies: A review*. Journal of Crop and Weed, Vol-9, part-2: Pp:1-12.
- Bartle, G., (1966), *The Orchids of Burma (Including the Andaman Islands)*, Central press, Rangoon.
- Chen X., Z. Liu, G. Zhu, K. Lang, Z. Ji, Y. Luo, X. Jin, P. J. Cribb, J. J. Wood, S. W. Gale, P. Ormerod, J. J. Vermeulen, H. P. Wood, D. Clayton and A. Bell, (2009), *Orchidaceae. In Flora of China*, Vol- 25. Wu, Z. Y. and P. H. Raven (Eds.), Science Press, Beijing and Missouri Botanical Garden, St. Louis. Pp. 1-506.
- Cronquist, A., (1981), *An Integrated system of classification of flowering plants*. New York: Columbia University Press.
- Dressler, R. L., (1981), *The Orchids*, Cambridge, Massachusetts.
- Heywood, V. H., R. K. Brummitt, A. Culham and O. Seberg, (2007), *Flowering Plant Families of the World*, Ontario: Canada.
- Jayaweera, D. M. A., (1981), *Orchidaceae. In A Revised Handbook to the Flora of Ceylon*, Vol-2. Dassanayake, M. D. and F. R. Fosberg (Eds.). Amerind Publishing Co. Pvt. Ltd., New Delhi. Pp. 4-386.
- Kress, W. J., A. D. Robert, E. Farr & Yin Yin Kyi, (2003), *A Checklist of the trees, shrubs, herbs, and climbers of Myanmar*, Vol 45:1-590, Department of Systematic Biology-Botany, National, Museum of Natural History, Washington. DC, USA.
- Lawrence, G. H. M., (1964), *Taxonomy of Vascular Plants*, 9<sup>th</sup> printing. The Macmillan Company, New York, USA.
- Reveal, J. L. and M. W. Chase, (2011), *APG III: Bibliographical Information and Synonymy of Magnoliidae*, Phytotaxa 19: 71-134, Magnolia Press.
- Seidenfaden, G., (1992), *The Orchids of Indochina*, Opera Bot. 114: 1-502. Botanical Museum, University of Copenhagen, Gothersgade 130, DK-1123 Copenhagen K, Denmark.
- Verma, B. K., (2011), *Introduction to Taxonomy of Angiosperms*, Published by PHI Learning Private Limited, New Delhi and Printed by Rajkamal Electric Press.

