

A PRELIMINARY LIST OF THE ORCHIDS
OF KHAO YAI NATIONAL PARK

by

P.F. CUMBERLEGE AND V.M.S. CUMBERLEGE

Introduction

Khao Yai National Park lies in the Provinces of Nakorn Nayok, Prachinburi, Sraburi and Korat, roughly between latitude 14°5' and 14°15' North and longitude 101°5' and 101°50' East. The total area is about 2,085 square kilometres. The Park is very roughly a rectangle 80 kms long and 40 kms at the widest part, enclosed by the Korat-Kabinburi Road on the East, the Korat/Prachinburi Changwad border on the North, the Huay Yai and Huay Muak Lek Rivers on the West and the line of rising ground north of the Hin Kong-Kabinburi Road on the South.

The Park consists of forested hills and valleys, from about 450-1400 metres high, with many old clearings at its lower-middle altitudes, i.e. from about 650-850 m. Most of that part of the Park which is normally used by visitors lies in the central Khao Yai *massif* of rolling forest and grassland on either side of the Lam Takrong river. The latter flows across the park from West to East, turning Northwards in a big loop and flowing out of the Park in the direction of Pakchong, to the North-East. The river flows sluggishly for much of its way through the area, but has several waterfalls where the drop is anything up to 50 m.

There are three highish hills at the sides of the Park, namely Khao Laem to the North-East, Khao Khieow to the South-East, and Khao Sam Yod to the West. To the North the country falls gradually to the Friendship Highway between Pakchong and Korat, while to the West and South there is an abrupt drop to the rice plains East of the Chao Phya river. This escarpment facing West and South must account for the unusually mild climate of Khao Yai, as it attracts rain from those directions for as much as two to three months before the South-West monsoon breaks over Bangkok. (As the crow flies Bangkok is 120 kilometres South-West of Khao Yai). Also, the area seems to take the full force of the

North-Easterly storms which sweep down towards Bangkok at intervals in the "dry season".

The annual rainfall is about 400 cms (perhaps as much as 600 cms at the top of Khao Khieow, and though no records exist the shade temperature probably ranges from 30°C in April and May (between days of rain) to 6°C in December and January (in cold spells from the North). The weather is generally dry from November to March, with early thunderstorms in April and May, followed by monsoon rain from June to October.

Two of the climatic factors which we believe particularly to affect the life of the orchids of Khao Yai are the long cold dry period which many species require if they are later to flower well, and the sudden drops of temperature when storms blow up in the hotter months which provide the stimulus which other species need to prompt them to flower.

Virtually no attention was paid to Khao Yai as a collecting ground until 1962, the year in which the National Park was made easily accessible by the opening of a road from the Friendship Highway near Pakchong. Before that Khao Laem had been visited, and the Southern side of the escarpment which rises above the well known waterfalls of Nang Rong and Salika near Nakorn Nayok.

The vegetation of the area falls roughly into the following types:—

1. Lower deciduous and bamboo jungle with limestone outcrops, containing *Azelia zylocarpa*, *Pterocarpus macrocarpus*, *Lagerstoemia calyculata*, *Dipterocarpus* species and some bananas.
2. Old clearings, covered with *Imperata cylindrica* grass and having a few isolated trees. The grasslands are the relic of about 80 years' slash-and-burn cultivation and grazing by villagers, who were cleared out by the Police some 3 years ago because they were considered a threat to the security of residents and travellers at the foot of the hills. Much of the grassy area is burnt every year in February and March, both spontaneously and by intent, and the resultant growth of young grass attracts a number of bison and deer.

3. Lower hill evergreen jungle with sandy loam and sandstone outcrops, containing lianas and ferns and some bamboo, *Dipterocarpus gracilis*, *Dipterocarpus turbinatus*, *Shorea sericeiflora*, *Hopea odorata*, *Cedrela toona* and *Aguilaria agallocha*.
4. Upper evergreen jungle containing some conifers: *Dacrydium elatum* and *Podocarpus neriifolia*, *P. imbricatus* and *P. blumei*, some oak and chestnut, mosses and lichens.

The approximate ranges of these four types, in the context of these notes, are :—

1. 450-650 m.
2. 650-850 m.
3. 650-900 m.
4. 900-1400 m.

Orchids (*Orchidaceae*) are to be seen throughout the area, and in some localities so many exist that whole rocks, and branches of large trees, are quite hidden by them. It is too early to say how the genera found there fit in to the general pattern of orchids in Thailand, but a preliminary analysis points to the area as a bridge between the patterns existing in North Thailand, South Thailand and Indo-China (in the old non-political sense). Of particular interest has been the discovery not only of a few species believed to be new to science, but also of some not previously recorded North of Malaya, and in one case never before outside Indonesia.

The authors of these notes have spent altogether some 75 days in the National Park between February 1962 and August 1963; these 75 days were spread roughly over all seasons, but there was a gap in September, October and November 1962 during which no visit was made. In February and March 1963 both authors spent 14 consecutive days there and one of us spent two periods of 7 days consecutively in April and in August 1963.

In the list which follows, lengthy descriptions have been purposely avoided. We have throughout based our studies on two works, "The Orchids of Thailand, A Preliminary List" by Gunnar Seidenfaden and Tem Smitinand (and where necessary consulting the works quoted as references against each species) and "Flora of Malaya Vol. 1 Orchids" by R.E. Holttum (1957 edition). Where the species does not appear in either of these two works, we have quoted the other source.

No claim is made that the list is complete, and in fact we have ourselves seen more species than appear in the list but have not been able to include some of them because we have not seen them in flower and cannot identify them from their vegetative structure. A fairly intense search has been made of the valley of the Lam Takrong river, the grassland and the forest areas which surround it, the area on both sides of the road up Khao Khieow, and the whole length of the crest of the ridge of Khao Khieow running South-East from its central *col*.

Our list does not include plants found by other collectors in the Nakorn Nayok and Salika areas. At a future date it may be interesting to make a complete work of orchids from that area as well as the Khao Yai camp area and the area to the West of the road from Korat to Kabin-buri which is now under construction.

We have been greatly encouraged by Khun *Tem Smitinand*, Forest Botanist of the Royal Forest Department and co-author of "The Orchids of Thailand" referred to above. To him we are indebted for much advice, help and scientific discrimination, and through him to Mr. *Seidenfaden*, his co-author, who has identified some of our specimens which have been sent to Denmark.

Our list at present contains 121 species, belonging to 54 genera of the family *Orchidaceae*. There are also 3 species which have been tentatively included as new species. 18 of the entries in the list are new records for Thailand.

We have followed the taxonomical order and nomenclature of "The Orchids of Thailand" (*Seidenfaden & smitinand*) the final volumes of which will be published probably at about the same time as this paper.

Against each plant we have indicated occurrence as follows:—

Rare: we have found only one plant or one small clump of plants.

Fairly common: we have found several plants but usually only in one locality.

Common: we have found many plants, usually at the same altitude.

Very common: we have found many plants at different altitudes.

By courtesy of H.E. The Danish Ambassador a set of the volumes of "The Orchids of Thailand" published so far is kept for the use of visitors in the Camp Office at Khao Yai.

LIST OF ORCHIDS

Apostasia nuda, R. Br. Holttum p. 66.

C. 897 (1300 m). Rare.

This plant was not flowering but had green fruits in July.

Habenaria rhodocheila, Hance O. of T. p. 22.

C. 509, C.509a (700 m). Flowers in August, September. Common at waterfalls. The scarlet lip is distinctive.

Habenaria garrettii, Rolfe ex Downie O. of T. p. 28.

C. 610 (1200m). Flowers in August. Rare.

Peristylus chloranthus, Ldl. O. of T. p. 47.

C. 978, C. 978a (750). Flowers in September. Rare.

Epipogium roseum, (Don) Ldl. O. of T. p. 65.

C. 774 (625m). Flowers in April. Rare.

Didymoplexis pallens, Griff. O. of T. p. 73.

C. 785, C. 785a (700m). Flowers in May. Rare. See Fig. 1.

Corymborchis veratrifolia, Bl. O. of T. p. 96.

C. 733 (650m). Rare.

Tropidia angulosa, Bl. O. of T. p. 96.

C. 806 (600m). Rare.

Tropidia pedunculata, Bl. O. of T. p. 98.

C. 875 (1300m), C. 874 (1400m). Flowers July. Rare.

The flower is white, the downturned tip of the lip orange.

Tainia wrayana, (Hk. f.) J.J.Sm. Holttum p. 183.

C. 943, C. 944, C. 945 (700m). Fairly common. New to Thailand.

Nephelaphyllum tenuiflorum, Bl. O. of T. p. 105.

C. 838, C. 839, C. 840 (1400m). Flowers in June. Fairly common.

See Fig. 2.

Nephelaphyllum latilabre, Ridl. Holttum p. 180.

C. 963 (700m). Flowers August. Rare. New to Thailand.

Illustrated in Holttum Fig. 30. Leaves brownish purple; sepals and petals green and purple stripes, lip white with yellow papillose ridge down centre, spur bright pink.

Chrysoglossum erraticum, Hk. f. Hooker, Fl. Brit. Ind. V. p. 784.
C. 764, C. 764a, C. 764b, C. 765, C. 880, (1300m), C. 879 (1400m).

Flowers in April-May. Fairly common. New to Thailand.

This species is similar to *C. ornatum* Bl., but is not exactly like *C. erraticum* or *C. ornatum*. In vegetative structure, our pseudobulbs being larger and leaves smaller than those described. The flowers are purple with pale green edges and median lines on the sepals and petals. See Fig. 3.

Chrysoglossum sp.

C. 507, C. 787 (700m). Flowers August. Fairly common.

The measurements of C. 787 are: Pseudobulbs 3cm, petiole 5mm, plicate leaf green marbled with purple, 11cm x 5cm; inflorescence 7cm, 5 flowers. Sepals and petals green, lip white with purple markings column white, twisted, length of side sepal and spur 15mm; lip 10 mm x 10 mm. Fig. 25.

Coelogyne ovalis, Ldl. O. of T. p. 109.

C. 605, C. 606 (800m). Flowers August & Sept. Very common.

Coelogyne graminifolia, Par. & Rchb. f. O. of T. p. 112.

C. 661, C. 662, C. 663 (700m). Flowers December. Very common.

Coelogyne trinervis, Ldl. O. of T. p. 115.

C. 618, C. 619, C. 620 (700m). Flowers September. Very common.

Coelogyne cumingii, Ldl. O. of T. p. 118.

C. 734, C. 734a, C. 762, C. 762a (1000m). Flowers in May. Fairly common. This flower has a musty fragrance. The flowers are white with a deep yellow patch at the base of the midlobe and tips of sidelobes of lip.

Coelogyne aff. siamensis, Rolfe. O. of T. p. 124.

C. 555, C. 736, C. 736a (700m). Flowers in January. Common by river. This orchid is believed to be *C. siamensis* but has different markings on the lip. The Sepals are transparent pale green, the lip white with a brown line down the outer edge of the sidelobes and an inverted brown "Y" on the midlobe. Column yellow. See Fig. 4.

Coelogyne prolifera, Rolfe. O. of T. p. 128.

C. 829, C. 841, C. 841a C. 842 (1400m). Flowers June. Very common at 1400m. Comparison between this and the following species leads to the

following distinctive features: *C. prolifera* is generally larger, the flower predominantly brown. The erect sidelobes are longer than the column. The column is winged for the upper $\frac{2}{3}$ of its length. *C. flavida* is generally smaller (pseudobulbs up to 7cm, leaves up to 11cm) and flower predominantly pale cream. The erect sidelobes are shorter than the column. The column is winged for the upper $\frac{1}{2}$ of its length. See Fig. 5.

Coelogyne flavida, Wall. O. of T. p. 129.

C. 849 (1400m). Flowers June. Fairly common at 1400m.

See notes above and Fig. 5.

Panisea uniflora, Ldl. O. of T. p. 134.

C. 957 (850m), C. 935 (1300m). Flowers August-September. Fairly Common.

Pholidota convallariae, (Rchb. f.) Hk. f. O. of T. p. 137.

C. 684, (1200m). Flowers in March. Very common above 800m.

Pholidota pallida, Ldl. O. of T. p. 137.

C. 545, C. 546, (750m). Flowers in August. Very common.

Pholidota recurva, Ldl. Hooker, Fl. Brit. Ind. V. p. 844.

C. 599 (850m) C. 598 (900m), C. 893 (1200m), C. 831 (1400m).

Flowers July-August. Common on Khao Khieow. New to Thailand.

The broad short bracts are brown and papery, the flowers peachy pink. Fig. 6.

Otochilus fusca, Ldl. O. of T. p. 145.

C. 706, C. 707 (1400m). Flowers in February. Common at 1400m.

The flowers are fragrant.

Malaxis carnosula, (Rolfe) Seidenf. & Smitin. O. of T. p. 146.

C. 891 (1200m), C. 837 (1400m). Flowers June-July. Rare.

A very small plant, the leaves streaked with purple. Dorsal sepal and petals purple with green median line and tips; laterals green with 4 purple stripes; lip green with 6 purple stripes; arms on column green.

See Fig. 19.

Malaxis latifolia, Sm. O. of T. p. 146.

C. 905, C. 906 (650m). Flowers July. Rare?

Flowers dark red. Very large plants, to 65 cm tall, with heavy leaves at base of stem (more like *Holttum's* Fig. 34 than *O.* of *T.*'s Fig. 112).

***Oberonia anthropophora*, Ldl.** Holttum p. 221.

C. 722 (700m). Flowers in February. Rare. New to Thailand.

The flowers are dark tan, the lip darker. See Fig. 11a.

***Oberonia caudata*, King & Pantl.** *O.* of *T.* p. 157.

C. 608, C. 609, C. 868, C. 868a (700m). Flowers July-August. Fairly common.

Sepals & petals pink; lip brown. See Fig. 11c.

***Oberonia pendula*, Ridl.** Holttum p. 219.

C. 909, (650m), C. 915 (700m). Flowers August. Distribution uncertain. New to Thailand.

Sepals & petals pink; lip brownish at base, paler at apex. See Fig. 11b.

***Oberonia* sp.**

C. 807 (700m). Flowers June-July. Distribution uncertain.

Same colouring as *O. pendula*. See Fig. 11d.

***Oberonia* sp.**

C. 914 (700m). Flowers June-July. Distribution uncertain.

Similar to *O. pendula* but leaves wider, being 5-6mm wide. Sepals and Petals pale yellow-green. Lip brown. See Fig. 11g.

***Oberonia* sp.**

C. 899, C. 900 (1200m), C. 949 (1400m). Flowers August. Distribution uncertain. Flowers translucent lime green, column and base of lip greener; pollinia yellow. This species is distinguished by very long bracts. Leaves up to 12cm x 13mm. Rachis up to 18cm long. See Fig. 11f.

***Oberonia* sp.**

C. 832, C. 833, C. 950 (1400m), C. 895 (1200m). Flowers July-August. Distribution uncertain.

Flowers pale greenish yellow, golden when older, column green. Growth like *O. caudata*, with wider inflorescence. Flowers spirally in bud, in whorls when open. See Fig. 11e. C. 895 (Fig. 11h) may be a different sp.

***Oberonia dubia*, J.J. Sm.** *O.* of *T.* p. 158.

C. 865 (700m). Distribution uncertain. Flowers not seen.

- Liparis macrantha**, Rolfe. O. of T. p. 167.
C. 786, C. 848 (700m). Flowers May-July. Rare.
Sepals & petals light green flushed purple; the column white with bright green anther cap, the large circular lip purple.
- Liparis cf. longiscapa**, (Rolfe) Gagnepain. O. of T. p. 170.
C. 901, C. 902 (750m). Flowers July-August. Fairly common in swamp at foot of Khao Khiew.
Our plants are too different from Gagnepain's description to be sure that they are *L. longiscapa*. Our plants seem to lie between Gagnepain's description and Fig. 137 in O. of T. However our bracts are 1cm plus, not 4mm long. Perhaps the plants identified in O. of T. as *L. longiscapa* "all very similar in the vegetative parts" are the same as our plants, i. e. a local variety of *L. longiscapa* which may prove to be a separate species. Flowers green with purple markings. See Fig. 21.
- Liparis bootanensia**, Griff. O. of T. p. 175.
C. 843, C. 844, C. 896 (1400m). Flowers June-July. Fairly common.
Whole flower light brown, lip with green veins at base and dark green calli. Holttum says the column is green: ours is white with green anther cap. Holttum does not mention the conspicuous arms on the column. See Fig. 16.
- Liparis sp. GT3700**. O. of T. p. 180.
C. 686, C. 687, C. 688, C. 808, C. 808a (700m), C. 918 (750m).
Flowers January. Fairly common.
The flower is pale yellowish-green with a darker green patch at the base of the midlobe.
- Liparis caespitosa**, (Thouars) Ldl. O. of T. p. 181.
C. 549, C. 550 (700m), C. 550a (850m). Flowers June-July. Common.
C. 550a was var. flushed orange.
- Liparis parviflora**, (Bl.) Ldl. O. of T. p. 182.
C. 601 (850m). Flowers July-August. Rare.
Sepals and petals pale green, lip reddish-salmon.
- Thunia alba**, Rehb. f. O. of T. p. 185.
C. 827 (700m). Rare.
Plant found at Pha Kluy Mai, identified from vegetative structure only.

Ephemerantha fimbriata, (Bl.) Hunt & Summerhayes O. of T. p. 186 (*Dendrobium plicatile*).

C. 717 (650m). Flowers February-June. Common by the river.

Petals and sepals light red, lip pink at base with yellow midlobe.

The Khao Yai variety most resembles *D. plicatile* in Fig. 151 of O. of T.

Dendrobium heterocarpum, Ldl. O. of T. p. 199.

C. 567 (1400m) C. 615 (750m). Flowers December-January. Common.

Dendrobium crystallinum, Rchb. f. O. of T. p. 209.

C. 565, C. 566 (750m) Flowers May-June. Common around Camp.

Dendrobium scabrilingue, Ldl. O. of T. p. 227.

C. 690 (1400m). Flowers December. Fairly common above 1200m.

Sepals and petals pure white. Lip with yellow warty tip of midlobe, sidelobes turned up, white with green stripes, base of lip green. Column green.

Dendrobium draconis, Rchb. f. O. of T. p. 228.

Not collected, but seen commonly at 800m. Flowers May-June.

Dendrobium sp. GT 1551. O. of T. p. 233.

C. 789 (600m). Flowers September. Rare.

Flowers white with pale green markings and a trace of mauve on keels and column.

Dendrobium bicameratum, Ldl. O. of T. p. 233.

C. 613, C. 614 (1300m), C. 858 (1400m). Flowers July-August. Common.

Flowers cream with red spots; lip yellow with purple sidelobes.

Dendrobium sanguinolentum, Ldl. O. of T. p. 248.

C. 569 (850m). Flowers August. Fairly common above 850m.

Flowers in pairs, sepals and petals pale pink, the petals darker. Lip pale with pink tip and dark green base. Anther cap dark red.

Dendrobium revolutum, Ldl. O. of T. p. 248.

C. 562 (900m). Flowers February to August. Very common.

Flowers pale greeny-cream, lip honey coloured with 3 dark brown keels.

Dendrobium crumenatum, Sw. O. of T. p. 259.

C. 822 (750m). Flowers June. Common.

This species not previously found north of Nakorn Nayok. See Fig. 12.

Dendrobium acinaciforme, Roxb. O. of T. p. 263.

C. 561 (750m). Flowers May-June. Very common.

Dendrobium anceps, Sw. O. of T. 267.

C. 710 (650m) Flowers February. Very common by river.

Since there seems to be some confusion over *D. grande* and *D. anceps*, we give detailed measurements of the Khao Yai species: Dor. sep. 4 × 3 mm; lat. sep. 8mm longest edge × 5mm widest. Petals 4 × 1mm; lip 8 × 4mm. Sidelobes erect, midlobe bilobed. No transversal wall on lip, but lip has double longitudinal callus. Flower cream with reddish-purple spots at base of sepals & petals, also across midlobe; spots more noticeable outside than inside flowers.

Dendrobium salaccense, (Bl.) Ldl. O. of T. p. 279.

C. 716 (600m) Flowers Feb. March. Common by river.

Flowers pale green, lip dark yellow with dark red U-shaped patch on lower half. Our lip is slightly different from O. of T. Fig. 209. See Fig. 13.

Eria dasyphylla, Par. & Rchb. f. O. of T. p. 285.

C. 510, C. 511 (850m) Flowers. June-July. C. 766 (1400m) Flowers. April. Common above 850m.

Eria microphylla, (Bl.) Bl. Holttum p. 360.

C. 512, C. 513 (850m), C. 835, C. 836 (900m), C. 892 (1200m). Flowers June-July. Rare. This species is new to Thailand.

Flowers Yellow. See Fig. 14.

Eria rufinula, Rchb. f. O. of T. 287.

C. 556, (750m), C. 559 (850m). Flowers July-August. Very common. Sepals white hairy, petals white hairless. Lip creamy white, purple edges to narrow base then spatulate tip papillose orange.

Eria albidotomentosa, (Bl.) Ldl. O. of T, p. 290.

C. 664 (700m). C. 558 (750m). Flowers December. Very common.

Eria stricta, Ldl. O. of T. p. 297.

C. 665, C. 666 (1400m). Flowers December. Very common above 900m.

Sepals and petals cream, lip pale mauve, anther cap dark mauve.

Eria biflora, Griff. O. of T. p. 300.

C. 560 (850m). Flowers December. Rare.

Flowers very pale yellow, prominent bracts dark yellow.

Eria floribunda, Ldl. O. of T. p. 303.

C. 855, C. 856 (1200m). C. 912 (1400m) Flowers July. Common.

Flowers white, the sepals covered with fine brown hairs. Top of column and stigma purple.

Eria spicata, (D. Don) Hand.-Mazz. O. of T. p. 306.

C. 876 (1400m). Flowers July-August. Common above 1200m.

Large pinkish bracts. Flowers white veined with pink, the turned-down tip of midlobe bright yellow.

Eria amica, Rchb. f. O. of T. p. 308.

C. 782 (1100m), C. 781 (1250m). Flowers May. Fairly common.

Sepals and petals pale pink with darker stripes. Lip: midlobe cream, side-lobes pink with dark tips. Our specimens have more pointed sidelobes than in Fig. 231 of O. of T.

Eria alba, Ldl. Hooker, Fl. Brit. Ind. V. page 795.

C. 625, C. 626 (850m). Flowers Oct.-Nov. Rare.

This identification still uncertain. If confirmed then new to Thailand.

Eria microchilos, Ldl. Journ. Bombay Nat. Hist. Soc. Vol. 58 (3) p. 602.

C. 878, C. 923 (1200m). Flowers July-August. Rare. New to Thailand. Measurements: leaves 3cm × 6mm; inflorescence 3cm; flowers 4-5, white; bracts 2mm, pedicel 2mm, dorsal sepal 6 × 1mm, lateral sepals 5 × 2 mm, petals 5 × 1mm, lip 2 × 1mm. See Fig. 20.

Agrostophyllum callosum, Rchb. f. O. of T. p. 318.

C. 768 (1000m), C. 854, C. 898 (1200m), also seen 1250m. Flowers June-July. Fairly common.

Sepals & petals broad, veined, pink. Lip trilobed with transverse callus at base (yellow) and 2 small calli towards ends of sidelobes. See Fig. 18.

Agrostophyllum longifolium, (Bl.) Rchb. f. O. of T. 319.

C. 516 (850 m) C. 913 (1200 m). Flowers July-August. Very common. Flowers white, petals very narrow.

Podochilus microphyllus, Ldl. O. of T.p. 322.

C. 531 (700 m). Flowers June. Very common.

Flowers white with a purple spot on each petal.

Appendicula cornuta, Bl. O. of T. p. 324.

C. 535 (700m), C. 536 (850m). Flowers July. Very common.

Polystachya flavescens, (Bl.) J.J.Sm. O. of T. p. 326.

C. 540 (750m). Flowers June. Fairly common.

Acanthephippium parviflorum, Hassk. J.J. Smith, Die Orchideen von Java, 1905.

C. 731 (650m). Flowers March-April. Fairly common near Heo Suwat. New to Thailand. Flowers creamy white with red spots inside tips of sepals and petals. Midlobe of lip dark yellow. See Fig. 22.

Phaius longipes, (Hk. f.) Holtt. O. of T. p. 329.

C. 739, C. 740 (1400m). Flowers March. Common at 1400m in dense forest.

Sepals greenish yellow, petals bright yellow, lip white with yellow markings. Lip like Kerr 0269 in Fig. 251 of O. of T.

Calanthe triplicatis, (Willemet) Ames O. of T. p. 337.

C. 769 (750m), also seen at 1400m. Flowers May-June. Fairly common. Flowers white with very pale green tips to sepals. Lip white with 3 orange keels at the base.

Pachystoma senile, (Ldl.) Rchb. f. O. of T. p. 346.

C. 719 (750m). Flowers Feb.-March after burning of grassland. Common there.

Sepals and petals pink with darker tips. Lip bright green with white and pink streaked sidelobes and tip of midlobe.

Bulbophyllum refractum, Rchb. f. O. of T. p. 363.

C. 730 (1000m). Flowers February-March. Rare.

Lateral sepals bright orange-yellow, lip yellow with purple markings.

Bulbophyllum blepharistes, Rchb. f. O. of T. p. 364.

C. 542 (700m), C. 931, C. 932 (900m). Common.

Flowers not seen.

Bulbophyllum pumilio, Par. & Rchb. f. O. of T. p. 366.

B. 924, C. 924a (1200m) Flowers August. Rare.

Lateral sepals yellow, dorsal sepal & petals yellow with 3 maroon lines, lip fleshy, yellow.

Bulbophyllum lobbii, Ldl. O. of T. p. 378.

C. 683 (1200m), C. 685 (750m). Flowers December. Very common.

Bulbophyllum abbrevilabium, Carr. Holttum p. 428.

C. 805, C. 805a (700m). Flowers May-June. Rare. New to Thailand. This species in Khao Yai has 5 appendages on each lip, 2 on each lobe and 1 in the sinus. The appendages are as long as the sepals. The end of the lip is rounded, the tip being bent down. See Fig 15.

Bulbophyllum mouiliforme, Par. & Rehb. f. O. of T. 383.

C. 695 (1375m). Flowers December. Rare.

Our plant had a leaf 8mm long. Lateral sepals yellow with orange stripes, dorsal sepal orange, lip orange. The petals appear purple.

Bulbophyllum sessile, (Koen.) J.J.S. O. of T. p. 396.

C. 541 (750m). Flowers June. Fairly common.

Bulbophyllum clarkeanum, King & Pantl. O. of T. p. 399.

C. 534 (750m). Flowers June-July. Common by river.

Flowers yellow, lip orange.

Bulbophyllum longipes, Rehb. f. O. of T. p. 407.

C. 692 (1200m), C. 691, C. 691a (1400m). Flowers December. Rare. The flowers have a foetid smell. Our plants and flowers follow the description of Hooker (V p. 768) but the flower differs from O. of T. Fig. 308 in that the petals are at least 3mm long, fringed on both sides and attached to the column outside the wings. These petals are very slender and it seems possible that in the single specimen available to the authors of O. of T. they may have been broken. Alternatively Kerr 406 may be another species. See Fig. 8.

Bulbophyllum suavissimum, Rolfe. O. of T. p. 407.

C. 678, C. 679, C. 679a, b, c, (1400m). Flowers December. Common at 1400m.

Flowers yellow, with darker yellow lip.

Ione fusco-purpurea, Ldl. Hk. f., Fl. brit. Ind. V. p. 769 (*Bulbophyllum mishmeense*).

C. 693, C. 694, C. 694a (1400m). Flowers January. Fairly common at 1400m. New to Thailand.

A further plant C. 708 (1400m) was found with different colouring and larger flowers. Normal colouring appears to be pink sepals with dark

pink stripes, pale cream petals, lip pink at base, bright green apex. See Fig. 17.

Thelasis triptera, Rchb. f. O. of T. p. 458.

C. 788, C. 788a, C. 788b, (650m). Flowers May. Fairly common.
Bracts purple, the minute flowers yellow.

Eulophia macrobulbon, Par. & Rchb. f. O. of T. p. 484.

C. 748 (750m). Flowers March. Fairly common.

The whole plant has a purple appearance, even the scape and young leaves which come after the flowers. Column pale green, lip pale yellow with purple markings, all other parts purple-red.

Cymbidium pubescens, Ldl. O. of T. p. 507.

C. 705 (700m). Flowers February. Common.

Cymbidium lancifolium, Hk. O. of T. p. 512.

C. 772 (1400m). Flowers June-July. Rare.

We identify this plant as *C. lancifolium* as it has 4 leaves, a short inflorescence and sidelobes to the lip. (According to Gagnepain p. 413, *C. kerrii* has 7 leaves and no sidelobes). In other respects the plant is similar to *C. kerrii* with a very short inflorescence (2cm) and smaller flowers than *C. lancifolium*. Perhaps our plant resembles Ploenchit 161, and may be a separate Thai species. Our flower is somewhat mutilated so we illustrate only the plant. The unspoilt parts of our flower give measurements: pedicel 13mm, sepal 15 × 2mm, lateral sepals longer, petals 18 × 5mm, lip 15mm long, column bent, winged, 11mm. See Fig. 10.

Acriopsis indica, Wight. O. of T. p. 515.

C. 826 (700m). Rare.

Identified from vegetative structure only.

Thrixspermum arachnites, (Bl.) Rchb. f. O. of T. p. 519. *In press.*

C. 521, C. 525, (750m) C. 820 (700m), C. 819, C. 819a, b (1400m).

Flowers May to August. Very common.

The following chart shows the differences between the two varieties according to altitude;—

	C819	C819a	C819b	C525	C820
Height	1400m	1400m	1400m	750m	700m
Interval between bracts	8mm	9mm	9mm	8mm	5mm
Width of bract at base	5mm	6mm	6mm	5mm	5mm
Rachis across bracts, width	12mm	10mm	12mm	7mm	9mm
Length of scape	11cm	6cm	13cm	5cm	6cm
Length of lip	13mm	13mm	15mm	8mm	9mm
Colour of sepals & petals	orange	orange	orange	cream	cream

The lip is always white with red spots; the spots vary considerably but not apparently to any pattern connected with height.

Thrixspermum sp. O. of T. p. 526. *In press.*

C. 529 (700m), C. 791, C. 816, C. 830 (750m). Flowers June-August. Fairly common.

Believed to be sp. nov.

Thrixspermum aff. hystrix, Rchb. f. O. of T. p. 528. *In press.*

C. 862 (600m). Flowers July. Rare.

Midlobe has a fringe of white hairs. See Fig. 26.

Pteroceras suaveolens, (Roxb.) Holtt. O. of T. p. 533. *In press.*

C. 616, C. 617 (700m), C. 523, C. 523a (750m). Flowers July-October. Very common.

Pteroceras appendiculatum, (Bl.) Holtt. O. of T. p. 535. *In press.*

C. 790 (600m), C. 600 (700m). Flowers May to August. Common.

Chiloschista lunifera, Rchb. f. O. of T. p. 539. *In press.*

S.N. (700m) Rare. Plant not yet flowered.

Phalaenopsis cornu-cervi, (Breda) Bl. & Rchb. f. O. of T. p. 542. *In press.*

C. 720 (650m). Flowers February-March. Rare.

Phalaenopsis decumbens, (Griff.) Holtt. O. of T. p. 544. *In press.*

C. 861 (650m). Flowers July. Fairly common.

Ornithochilus fuscus, Wall. O. of T. 545. *In press.*

C. 584 (700m), C. 780 (1100m), C. 743 (1000m). Flowers May-August.

Fairly common.

Sepals & petals bright yellow with purple stripes, lip paler yellow completely covered with purple blotches, fringes also purple. Base of lip pink with small purple flecks. Spur yellow.

- Diploprora championi**, (Ldl.) Hk. f. O. of T. p. 573. *In press.*
C. 956, C. 956a (850m). Flowers August. Rare.
- Aerides falcatum**, Ldl. O. of T. p. 553 *In press.*
C. 737 (750m). Flowers May-June. Common.
- Rhyncostylis retusa**, Bl. *Holttum* p. 703. O. of T. p. 555 *In press.*
S.N. (750m). Flowers May-June. Fairly common.
- Ascocentrum miniatum**, (Ldl.) Schltr. *Holttum* p. 735. O. of T. p. 598. *In press.*
C. 575 (700m). Flowers February. Rare.
- Pomatocalpa spicatum**, Breda O. of T. p. *In press.*
C. 752 (800m) Flowers March. Rare.
Flower pale orange with red spots at base of sepals & petals.
Illustrated in *Holttum* p. 629.
- Sarcanthus birmanicus**, (Schltr.) Seid. & Smit. O. of T. fig. 492.
In press.
C. 590, C. 761, C. 742 (1400m). Flowers March to May. Fairly common from 1200m upwards.
Sepals bright green with purple spots, petals bright green with 2 purple stripes; lip almost white, midlobe ending in a forked "tongue". Anther cap purple with 2 large yellow "eyes". The whole flower thus has the appearance of a wasp or bee.
- Sarcanthus carinatus**, Rolfe. O. of T. fig. 494. *In press.*
C. 585 (850m). Flowers August. Rare.
Sepals & petals maroon with pale green edges & median lines. Lip yellow, sidelobes with red spots.
- Sarcanthus rostellatus**, Ridl. O. of T. fig. 495. *In press.*
C. 596 (850m), C. 928 (900m). Flowers August-September. Fairly common.
Sepals and petals greenish yellow with 2 purple stripes, lip cream.
These plants have branched inflorescences.
- Sarcanthus subulatus**, (Bl.) Rchb. f. O. of T. fig. 498. *In press.*
C. 911 (650m), C. 597, C. 597a (700m). Fairly common by river.
Plants not yet flowered.
- Sarcanthus termissus**, Rchb. f. O. of T. fig. 504. *In press.*
C. 753, C. 628 (700m), C. 738 (750m), C. 792 (1200m). Flowers April-May. Common.
Sepals & petals pale green with 1 mauve stripe; lip pale pink with darker markings.

Camarotis thailandica, Seid. & Smit. O. of T. Fig. 528. *In press.*
C. 703, C. 704 (700m). Flowers March. Fairly common.

Taeniophyllum obtusum, Bl. O. of T. Fig. 535. *In press.*
C. 725, C. 726 (700m). Flowers February. Fairly common.

Taeniophyllum filiforme, J.J.Sm. O. of T. Fig. 534. *In press.*
C. 732 (700m). Rare.

We have not seen the flowers.

Schoenorchis gemmata, (Ldl.) J.J.Sm. O. of T. Fig. 461. *In press.*
C. 942 (700m). Flowers August. Rare.

Saccolabium humile, Ridl. O. of T. Fig. 465. *In press.*
C. 583 (700m), C. 803, C. 804, C. 804a (600m). Flowers June-July.
Fairly common.

Inflorescence branched, sepals and petals greenish yellow, lip white.
See Fig. 24.

Gastrochilus sp. Kerr 0215 O. of T. Fig. 471. *In press.*
C. 672, C. 673, C. 674 C. 741 (1400m), C. 795, C. 795a (1200m).
Flowers Dec. March.

Fairly common at 1400m.

Flowers pale cream with purple spots. The hairy midlobe is white with
a central patch of orange. See Fig. 9.

Pennilabium struthio, Carr. Holttum p. 706. O. of T. *In press.*
C. 867 (600m), C. 860 (700m). Flowers July. Fairly common.
See Fig. 7.

Malleola dentifera, J.J.Sm. O. of T. Fig. 478. *In press.*
C. 802, C. 802a, C. 863, C. 863a, C. 802b (700m). Flowers July.
Fairly common.
See Fig. 23.

Malleola sp. Cumberlege 537. O. of T. Fig. 479. *In press.*
C. 537 (800m). Flowers July. Rare.
This plant is fully described in Part IV of Orchids of Thailand.

Robiquetia spathulata, (Bl.) J.J.Sm. O. of T. Fig. 485. *In press.*
C. 721 (650m), C. 776, C. 972 (700m). Flowers April-June. Fairly
common.

Key to Illustrations

- Fig. 1. *Didymoplexis pallens*, a) Whole plant, b) Flower with lateral sepals pressed down, c) Side view of lip.
- Fig. 2. *Nephelaphyllum tenuiflorum*, a) Leaf, b) Flower, c) Lip, d) Column.
- Fig. 3. *Chrysoglossum erraticum*, a) Column in relation to lateral sepals, b) Side view of column.
- Fig. 4. *Coelogyne* aff. *siamensis*, lip.
- Fig. 5. a) *Coelogyne prolifera* and b) its column, c) *Coelogyne flavida* and d) its column.
- Fig. 6. *Pholidota recurva*, a) Whole plant, b) Flower, c) Bract, d) Lip.
- Fig. 7. *Pennilabium struthio*, a) Lip and spur, b) Entrance to spur, c) Column.
- Fig. 8. *Bulbophyllum longipes* showing petal outside wing on column.
- Fig. 9. *Gastrochilus* sp. Kerr 0215.
- Fig. 10. *Cymbidium lancifolium*, plant.
- Fig. 11. *Oberonia*, a) *O. anthropophora* and its flower, b) *O. pendula* and its flower flattened and profile, c) *O. caudata* and its flower, d) *O. sp. C. 807* flower, e) *O. sp. C. 950* flower, f) *O. sp. C. 900* plant and flower, g) *O. sp. C. 914* flower, h) *O. sp. C. 895* flower.
- Fig. 12. *Dendrobium crumenatum*, lip.
- Fig. 13. *Dendrobium salaccense*, lip.
- Fig. 14. *Eria microphylla*, plant and flower.
- Fig. 15. *Bulbophyllum abbrevilabium*, a) Whole flower, b) Column, petal, lip.
- Fig. 16. *Liparis bootanensis*, a) Flower, b) Lip, c) Side of column, d) Column.
- Fig. 17. *Ione fusco-purpurea*, a) Plant, b) Flower, c) Lip, d) Flower opened, without Lip.

- Fig. 18. *Agrostophyllum callosum*, a) Flowering head, b) Petal, c) Lip.
- Fig. 19. *Malaxis carnosula*, a) Plant, b) Flower, c) Column and Lip.
- Fig. 20. *Eria microchilos*, a) Plant, b) Bud, c) Flower, d) Lip, e) Column.
- Fig. 21. *Liparis cf. longiscapa*, a) Plant, b) Lip, c) Lateral sepal, d) Bract.
- Fig. 22. *Acanthephippium parviflorum*, a) Side of flower, b) Inside showing shape of petal, c) Flower cut in half, d) Flower from beneath, e) Column and lip straightened out, f) Pollinia.
- Fig. 23. *Malleola dentifera*, showing sidelobe.
- Fig. 24. *Saccolabium humile*, a) Stem, leaf sheaths and inflorescence, b) Flower.
- Fig. 25. *Chrysoglossum* sp., a) Whole plant, b) Flower, c) Lip, d) Column and spur, e) Side view of lip in natural position, f) Flower from beneath, g) Bract, h) Pollinia.
- Fig. 26. *Thrixspermum* aff. *hystrix* C. 862, a) Flower, b) Lip, c) Cross section of leaf.

Fig 1

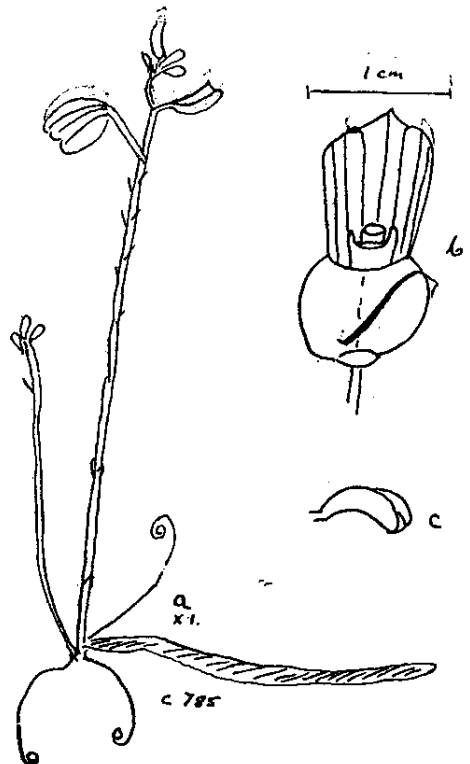


Fig 2.

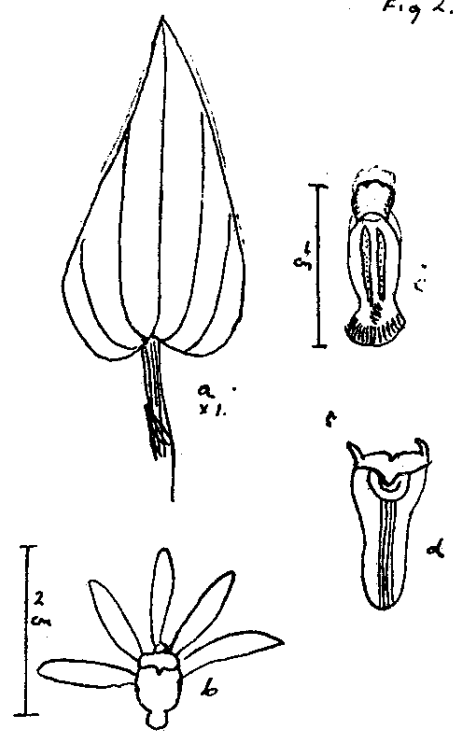


Fig 3

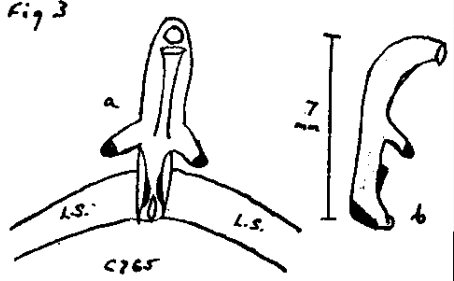


Fig 5.

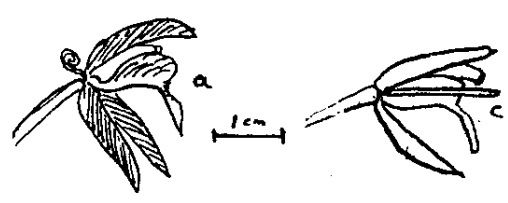


Fig 4.

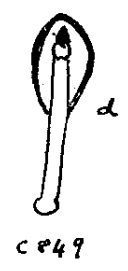
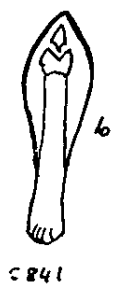
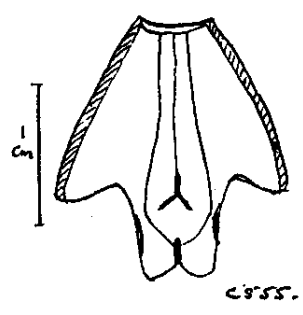


Fig 6

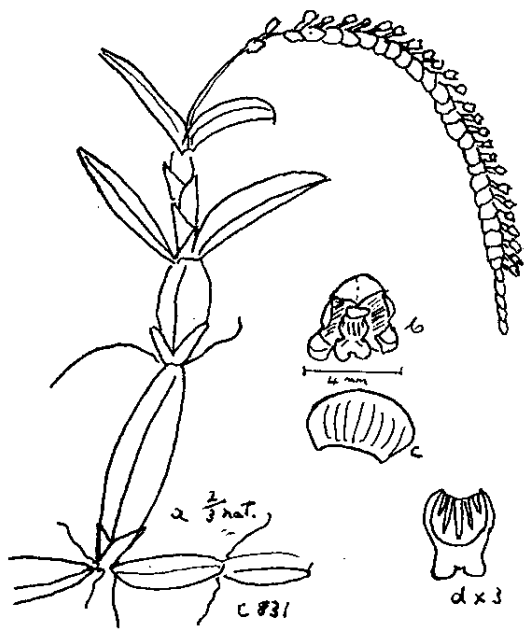


Fig 7

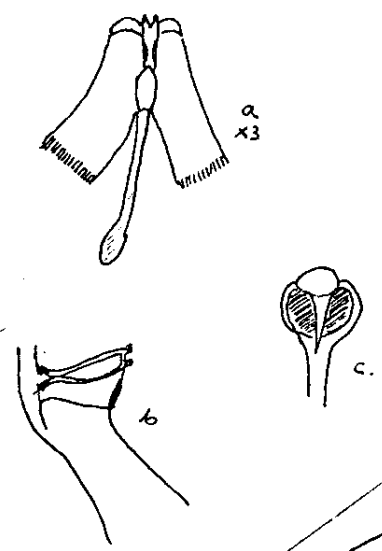


Fig 8

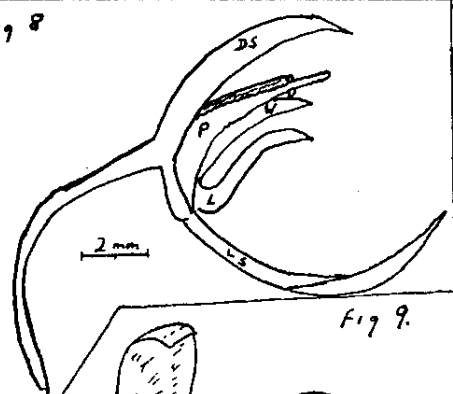


Fig 9

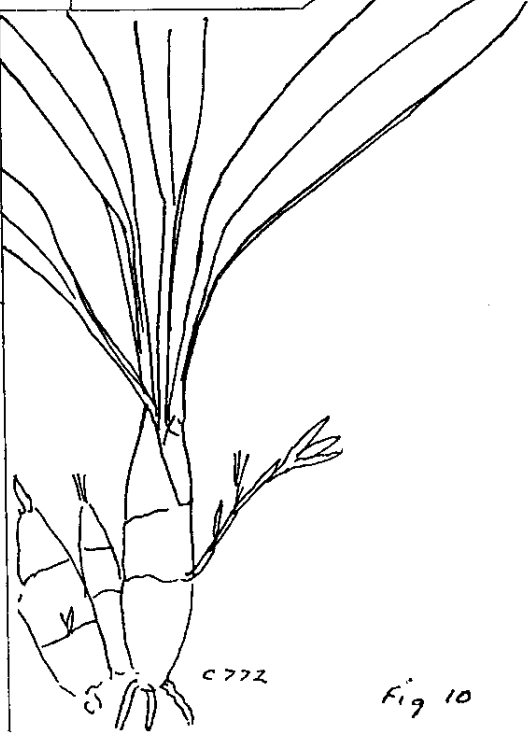
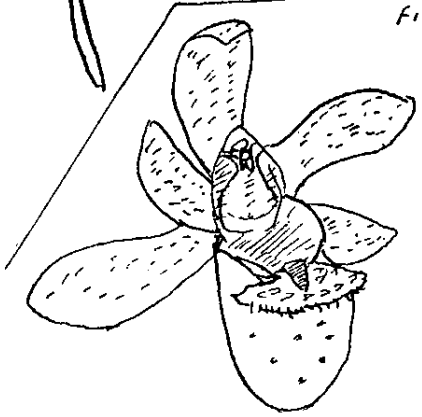


Fig 10

Fig. 11.



Fig 12.

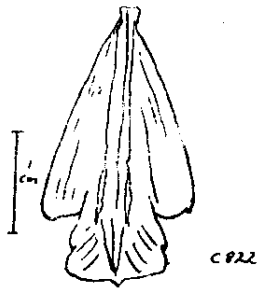


Fig 13

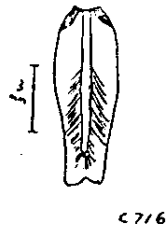


Fig 14.



Fig 15

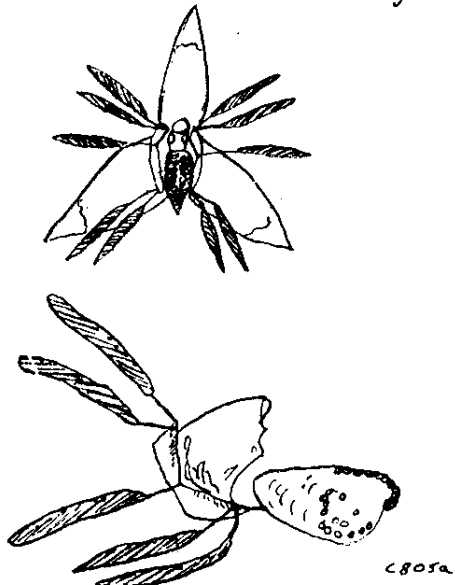


Fig 16

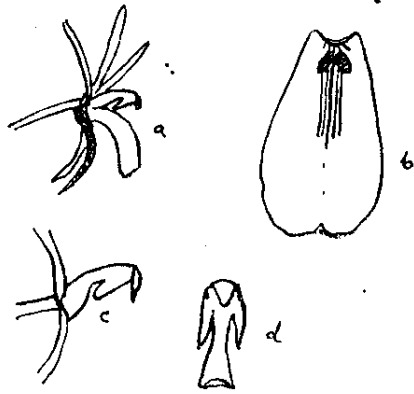
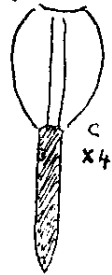
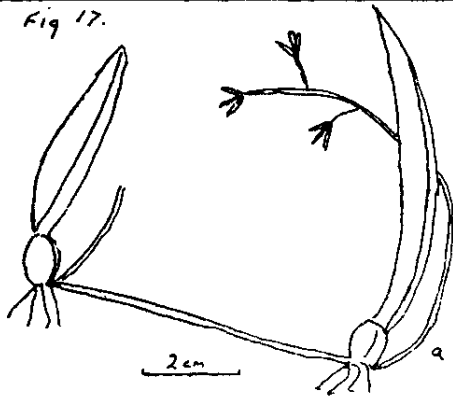
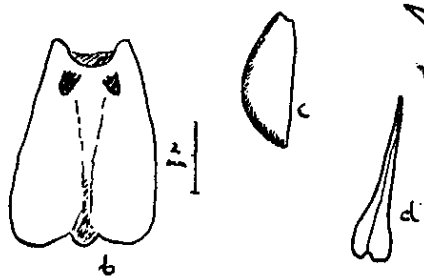
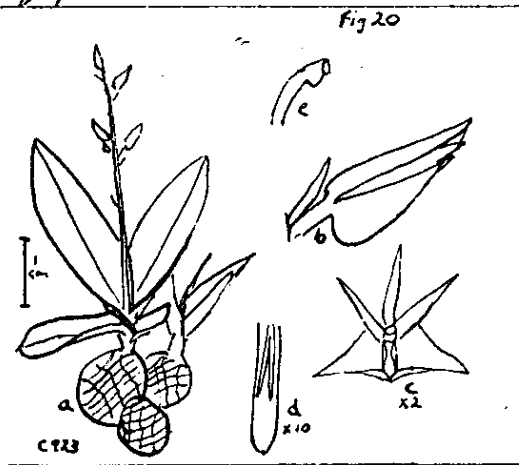
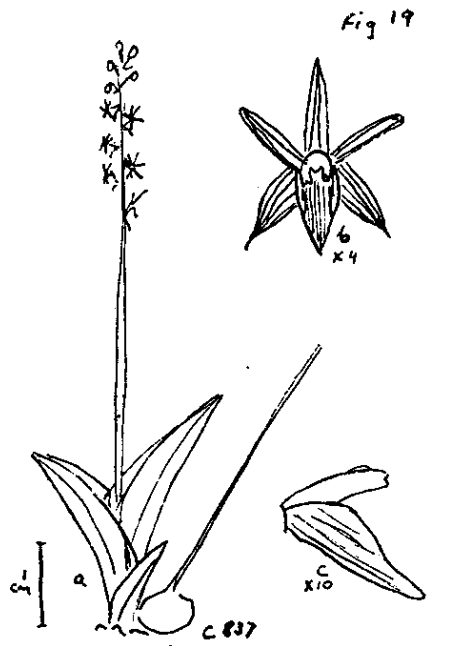
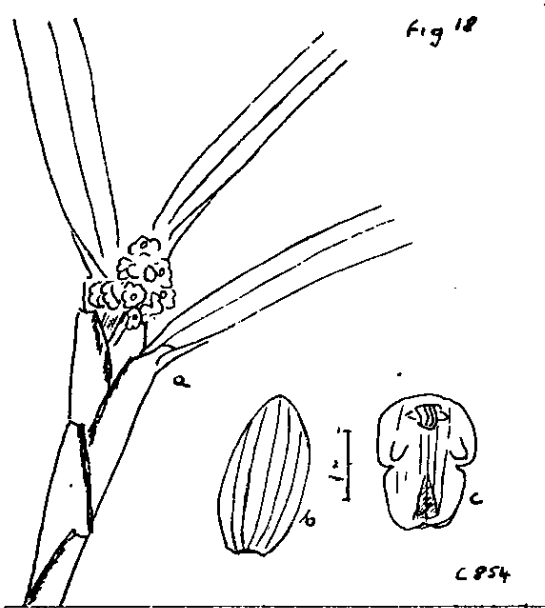


Fig 17.





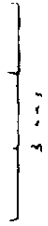
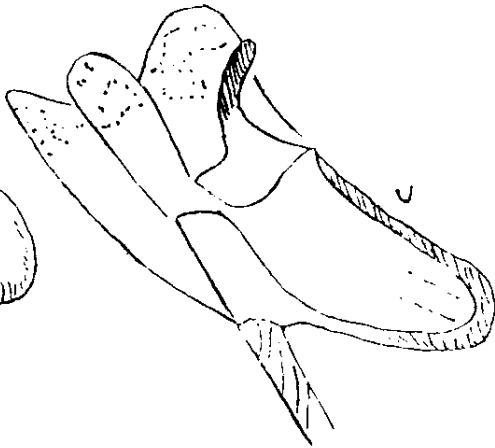
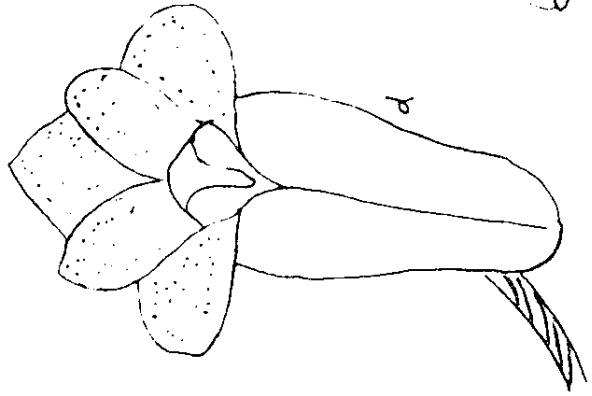
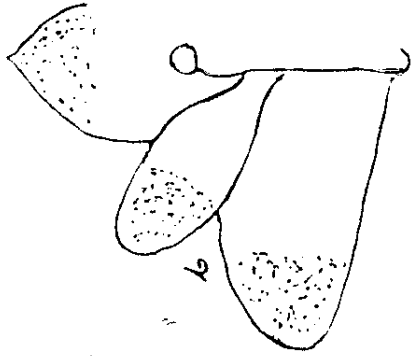
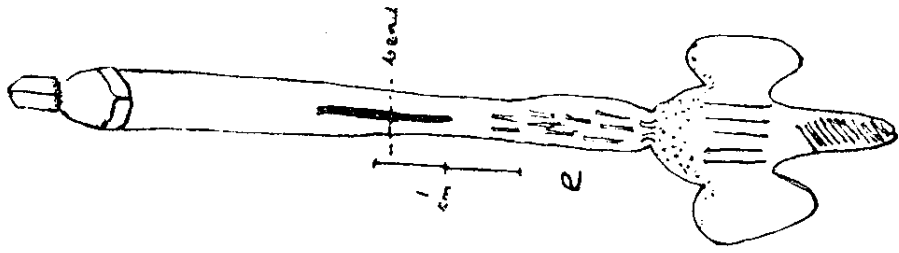


Fig 23

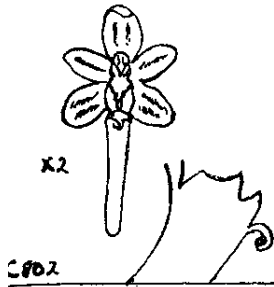


Fig 25



Fig 24

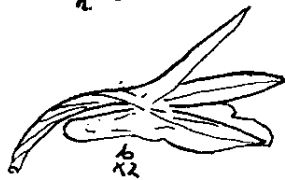
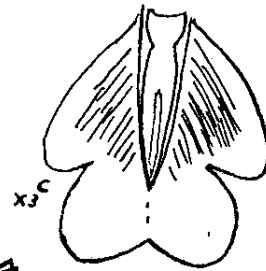
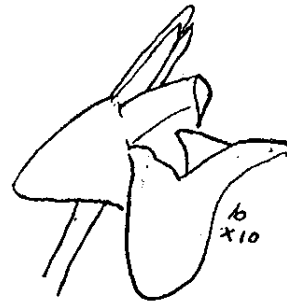
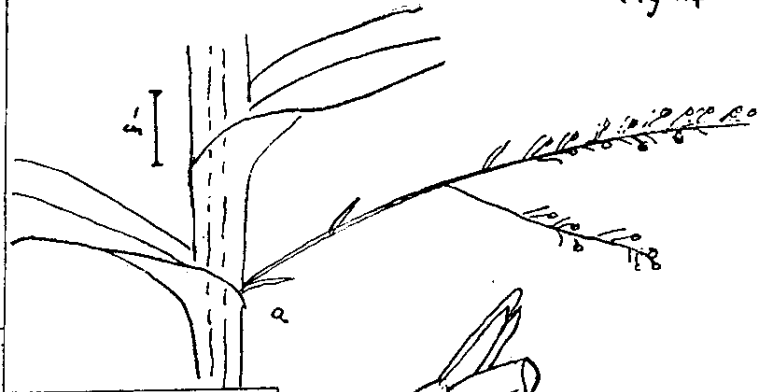


Fig 26

