

Orchids of Papua New Guinea

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Orchids of Papua New Guinea

an introduction

André Millar

Photographs by Roy and Margaret Mackay

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Dedication

This book is for the people of Papua New Guinea who have gone with me down through the wonderful years to every Province in their beautiful country; up the highest mountain and through the thickest forest; up the longest river and on the widest lake; and especially to the small children on coral islands, mountain hamlets and coastal villages, who have climbed up trees and coconut palms, happily collecting and giving to me the magnificently large and exquisitely small orchids of their native land that I love so dearly; and to Sir John Gunther, first Vice-Chancellor of the University of Papua New Guinea, who made it all possible.



This picture was taken in 1955, almost at the end of my first long patrol on top of the Wahgi-Sepik Divide. I saw the beauty and variety of this country's orchids for the first time and I fell completely under their spell, forever.

Acknowledgments

I would like to acknowledge my debt to the people who gave me so much encouragement, and without whose faith this book could not have been written.

The Orchid Research Council of America who provided the financial assistance to study the orchids of the Sepik and Oriomo Rivers.

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National Mapping Bureau.

Stella Johns of Lae and Port Moresby and Frank Ginate, my loyal assistant and successor.

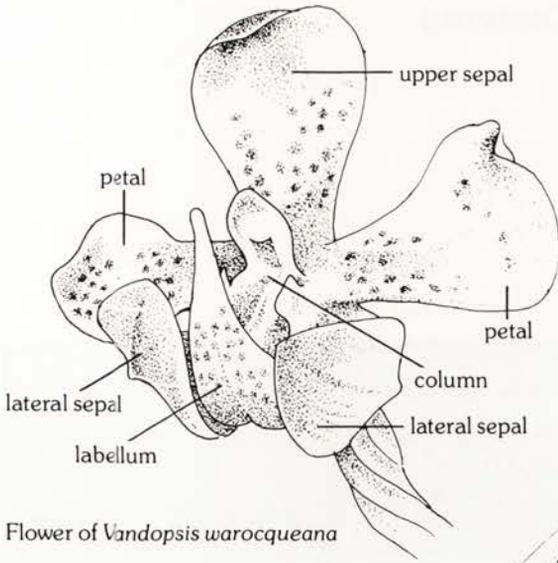


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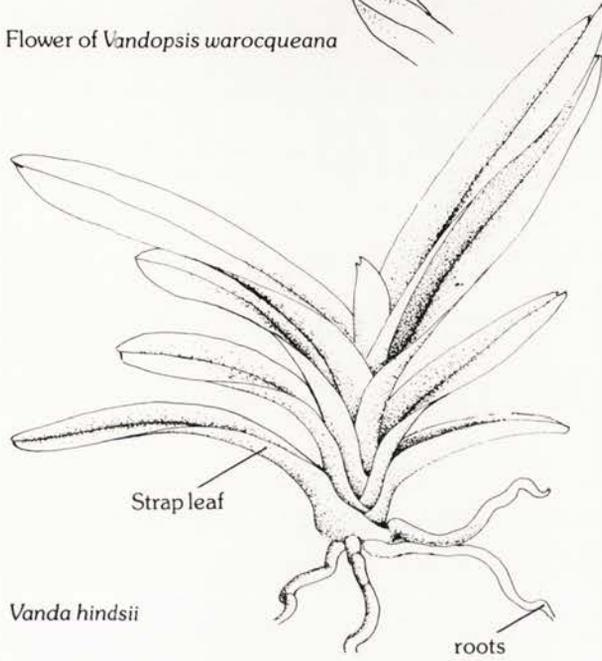
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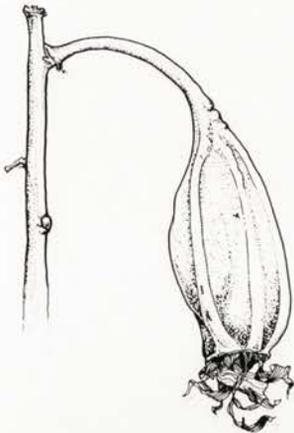
the author and Ombas Omucan; collecting
in an old rubber plantation.



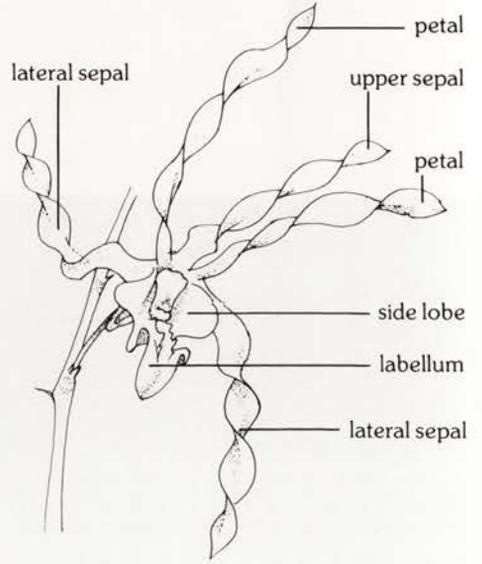
Flower of *Vandopsis warocqueana*



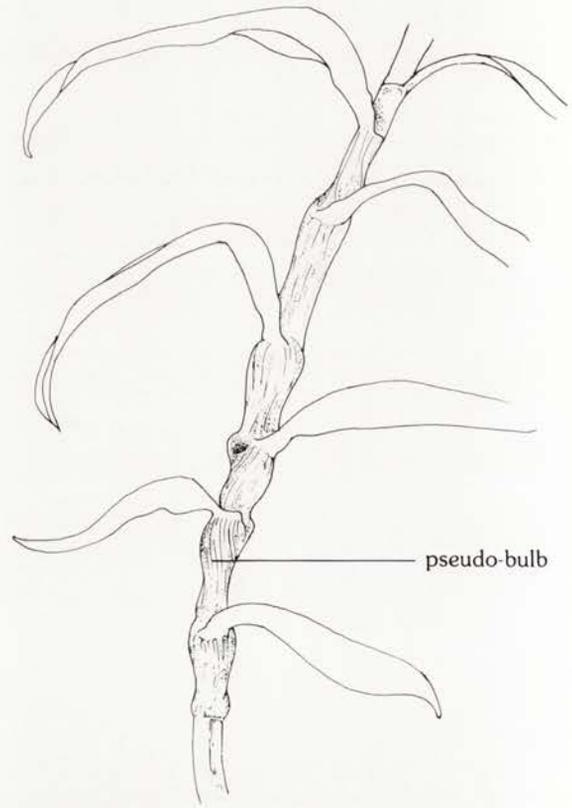
Vanda hindsii



Dendrobium discolor seed pod



Flower of *Dendrobium lasianthera*



Stem of cane-type *Dendrobium*

Where Orchids Grow

Papua New Guinea has many variations in climate and habitat, ranging from the dry savannah and grasslands to high mist and moss forest, from the lush wet coast to small islands encircled by reefs. Each distinct area very often has its own types of orchids and as well other interesting plants which flourish in the same conditions.

The savannah and grasslands near Port Moresby and Cape Rodney have very marked climatic conditions: a long dry period followed by a very short wet season (see the climatic chart). *Dendrobium williamsianum*, our only orchid of the section Phalananthe, grows in the small *Antidesma ghaesambilia* trees and the grasses grow up to 1 m all around the trees. This produces growing conditions in which this beautiful orchid grows by the hundred. Fortunately, many of the areas where *D. williamsianum* grows are protected by swamps, mosquitoes, leeches and crocodiles in the wet season.

It was thought at one time that the orchid population of the savannahs was very small but systematic collecting, mainly with a camera and note-book, has proved otherwise. *D. discolor*, *D. musciferum* and *D. bifalce* are very common, in addition to a host of small 'botanicals' such as *Oberonia*, *Cadetia*, *Ephemerantha*, *Acriopsis* etc. *Grammatophyllum papuanum*, *Vandopsis warocqueanum*, *Vanda hindsii* and several other Vandaceous types are in the small trees and in the large trees of the gallery forest on the watercourses which criss-cross the grasslands and flow only during the wet season.

Bulbophyllums, *Erias* and *Spathoglottis* are plentiful and in some areas *Phaius tancarvilleae* is common. Small terrestrials such as *Nervilia discolor*, *Geodorum densiflorum* and *Dipodium punctatum* appear with each wet. Most of these species also grow in other parts of the islands, and in other climatic and geographical conditions. *Dendrobium bifalce* and *Acriopsis javanica* will grow anywhere up to 1,000 m.

In the lowland rain forest, especially around Lae, there are hundreds of species, especially *Bulbophyllums*, *Dendrobiums* and ground orchids. Such terrestrials as *Acanthephippium papuanum*, several *Calanthe*, *Malaxis*, *Habernaria*, *Corymborkis* and *Plocoglottis* are some of the species which grow in deep litter on the forest floor in many parts of the country and at different altitudes to 1,000 m, sometimes higher, and are common in the Morobe lowland forests.

Many of these lowland species are pioneer plants and soon establish themselves in large trees in the coastal towns. In Lae, Madang and Kieta there are very good examples of self-sown plants. In Lae, in the large rain trees on Markham Road, the trees are full of epiphytic growth, ferns, hoyas, scheffleras, among them, and many orchids. One of the most beautiful is *Dendrobium anosmum*, which hangs out from the high branches, with up to twenty flowers, 10 to 12 cm across. *Vanda hindsii*, *Ascoglossum calopteryum*, are showy plants among the *Erias*, *Bulbophyllums*, *Cadetias*, *Luisias*, *Sarcochilus moorei* and small *Dendrobiums*.

The orchids of the high moss forest are still not fully known but some of the better species are already world favourites. *Dendrobium sophronites* is perhaps the most popular. It has a very small plant and large psychedelic coloured flowers, from 3 to 4 cm across, and there are red, pink, purple, cream, yellow and orange forms, and many bi-colours such as orange/yellow and pink/red. It is common to see several colours on the one branch. They are very long-lasting and will always be a collector's gem.

Dendrobium sophronites and the other beautiful mountain orchids of the section *Oxyglossum* (*D. quinquecostatum*, *D. frigidum*, *D. alatum* etc.) grow in specialised conditions between 1,800-2,400 m. The temperature drops sharply at night but the middle of the day is fiercely hot.

The orchids grow on moss-covered branches or peaty ridges, and in the late afternoon it nearly always rains, the amount varying with the time of year. The low-lying clouds and mists descend almost to the ground, and the air is moist until about 9 a.m. The plants then get daily precipitation and dry out at midday.

There are hundreds of species growing in the cloud forest, moss forest and sub-alpine areas and at this stage many of them are unnamed. Schlechter did not collect in the Highlands of Papua New Guinea at all and there has not been any expedition organised solely for the collection of orchids.

An effort is now being made to establish a collection at Laigam in the Southern Highlands, as the nucleus of a high altitude botanic garden. This will also incorporate the unique flora of this part of the country, a project which is vital and urgent in the light of rural development, especially where large areas are being cleared for animal husbandry and for cash cropping such as tea, coffee, pyrethrum and other land-absorbing projects.

The forest floor in the high altitude country is covered with moss (including sphagnum), roots and a host of small plants. Many of the orchids will grow on this medium as well as epiphytically on the trees. On the tall trees, the orchids grow in the topmost branches where there is sufficient light and air-movement for their well-being. Such genera as the following grow in this area: *Aglossorhyncha*, *Bulbophyllum*, *Ceratostylis*, *Dendrochilum*, *Dendrobium* (especially of the brightly-coloured, long-lasting *Oxyglossum* and *Pedilonum* sections), *Diplocaulobium*, *Epiblastus*, *Eria*, *Giulianettia*, *Glomera*, *Glossorhyncha*, *Liparis*, *Mediocalcar*, *Oberonia*, *Pedilochilus*, *Phreatia* and *Taeniophyllum* grow in their thousands. When, on patrol in this mountain country, saplings are cut for tent poles

or other shelters, it would be extraordinary not to see one or two tiny orchids on each piece of wood.

One of the orchid groups with the largest potential is the *Ceratobium* group of *Dendrobium*. With the exception of one or two highland species such as *Dendrobium antelope*, they are all lowland dwellers, particularly favouring river edges, coastal and forest habitats and the trees overhanging the beach on the numerous off-shore islands. Some favour a particular area and altitude; *Dendrobium strebloscera* (commonly known as *D. tangerine*) is found in a relatively small area between the Snake River and the Leron River and is a lowland species found nowhere else. *Dendrobium lineale* grows from the coast to about 600 m, always epiphytic on the high branches of big trees. *Dendrobium discolor* and its varieties are found in two areas of Papua: from Port Moresby to the Sogeri Plateau at 600 m and in the lowlands of Central Province, especially in swamp trees. In Western Province from Daru to the border with Indonesia it is thick in all the swamps and river banks.

However, only a fool would be didactic about the full extent of a particular species habitat while so much of the country is still virgin forest. We were considerably surprised to find *D. lasianthera* as far down as the Gogol in Madang Province. We were even more so, in October of 1970, to learn that two plants of *D. discolor* had been found in the same area.

On the islands of Milne Bay and down to the tip of Papua at Rossel Island, there are a host of orchids which flourish in their special habitat. Big trees leaning over the sea are continually splashed with salt water as the waves break on the reef below, but this does not worry the lowland species which grow as well as they do in the lowlands of both sides of the mountains in Papua New Guinea.

Climatic Chart

	Altitude m	Temperature °C		Relative Humidity		Rainfall mm (Annual)	Wet Season
		Maximum	Minimum	Maximum	Minimum		
Port Moresby	S/L	33	16	100	60	1000	Dec.-Mar.
Lae	S/L	32	23	86	68	4400	May-Aug.
Mt Kaindi	2400	28	15	82	58	3000	Jan.-Apr.
Rabaul	S/L	33	23	80	65	2200	Jan.-Apr.
Goroka	1800	26	13	82	50	2000	Jan.-Apr.
Daru	S/L	32	23	85	75	2000	Jan.-Apr.
Kikori	S/L	34	22	96	-1	5800	May.-Aug.
Kiunga	100	-	-	-	-	4700	Sept.-Apr.
Madang	S/L	33	18	84	75	3500	Jan.-Apr.
Mt Hagen	1800	31	2	83	66	2600	Dec.-Apr.
Arawa	S/L	-	-	-	-	3000	no high point
Kavieng	S/L	37	15	80	75	3200	no high point

Orchidaceae of Papua New Guinea

The following list of genera and number of species in each was compiled by Alick Dockrill for the *Encyclopedia of Papua New Guinea* in 1972.

Impressive though the total is, there are undoubtedly many more species. In the last six years I have found several species not recorded and other people have certainly done so. We are only now discovering the wealth of material in

our highland moss, cloud and sub-alpine areas. Last year, on a trawler patrol of the rivers in Western Province, I found *Dendrobium bigibbum*, for the first time although early botanists had credited it to Papua New Guinea many years ago. On the same patrol I found *D. trilamellatum*, also for the first time. Future collectors will assuredly find a wealth of species not so far recorded.

List of genera with number of species

Acanthephippium 3	Cyphochilus 6	Kuhlhasseltia 1	Pristiglottis 1
Acianthus 2	Cystorchis 5	Lecanorchis 5	Pseuderia 4
Acriopsis 1	Dactylorhynchus 1	Lepidogyne 3	Pterostylis 13
Adenoncos 1	Dendrobium 512	Liparis 87	Renanthera 4
Aglossorhyncha 11	Dendrochilum 2	Luisia 2	Ridleyella 1
Agrostophyllum 46	Didymophexis 3	Macodes 4	Robiquetia (including
Aphyllorchis 5	Dilochia 1	Malaxis 89	Malleola) 8
Apostasia 1	Diplocaulobium 71	Malleola (see Robiquetia)	Saccoglossum 4
Appendicula 43	Dipodium 3	Mediocalcar 38	Saccolabiopsis 5
Arachnis 3	Disperis 1	Microtatorchis 35	Saccolabium 5
Ascoglossum 1	Dryadorchis 2	Mischobulbum 2	Sarcanthus 7
Bogoria 1	Ephemerantha 9	Moerenhoutia 4	Sarcochilus 3
Bromheadia 2	Epiblastus 14	Monesepalum 2	Schoenorchis 3
Bulbophyllum 569	Epigeneium 2	Nervilia 11	Sepalosiphon 1
Cadetia 66	Eria 45	Neuwiedia 1	Spathoglottis 20
Calanthe 41	Erythrodes 10	Oberonia 86	Spiculaea 1
Calochilus 1	Eucosia 1	Octarrhena 17	Spiranthes 3
Calymonathera 5	Eulophia 7	Ornithochilus 1	Stereosandra 1
Camarotis 1	Eurycentrum 8	Oryanthera 2	Taeniophyllum 89
Ceratostylis 64	Galeola 4	Pachystoma 3	Tainia 2
Chamaeanthus 3	Gastrodia 1	Paphiopedilum 7	Tapeinoglossum 1
Cheirostylis 2	Geodorum 2	Papuaea 1	Thelasis 9
Chilopogon 1	Giulianettia 15	Pedilochilus 24	Thelymitra 2
Chitonanthera 22	Glomera 40	Phaius 4	Thrixspermum 12
Chitonochilus 1	Glossorhyncha 61	Phalaenopsis 1	Trichoglottis 4
Chrysoglossum 3	Goodyera 16	Pholidota 4	Trichotosia 29
Cirrhopetalum 9	Grammatophyllum 2	Phreatia 126	Tropidia 10
Claderia 1	Habenaria (including	Physurus 1	Vanda 1
Codonosiphon 2	Peristylus) 35	Platanthera 2	Vandopsis 4
Coelogyne 7	Hetaeria 7	Plocoglottis 22	Vanilla 4
Corybas 25	Hippeophyllum 4	Poaephyllum 4	Vrydagzenia 12
Corymborkis 4	Hyllophila 2	Podochilus 16	Zeuxine 15
Cryptostylis 13	Hymenorchis 7	Pomatocalpa 5	
Cymbidium 1	Ichnocentrum 2	Porphyrodesme 1	

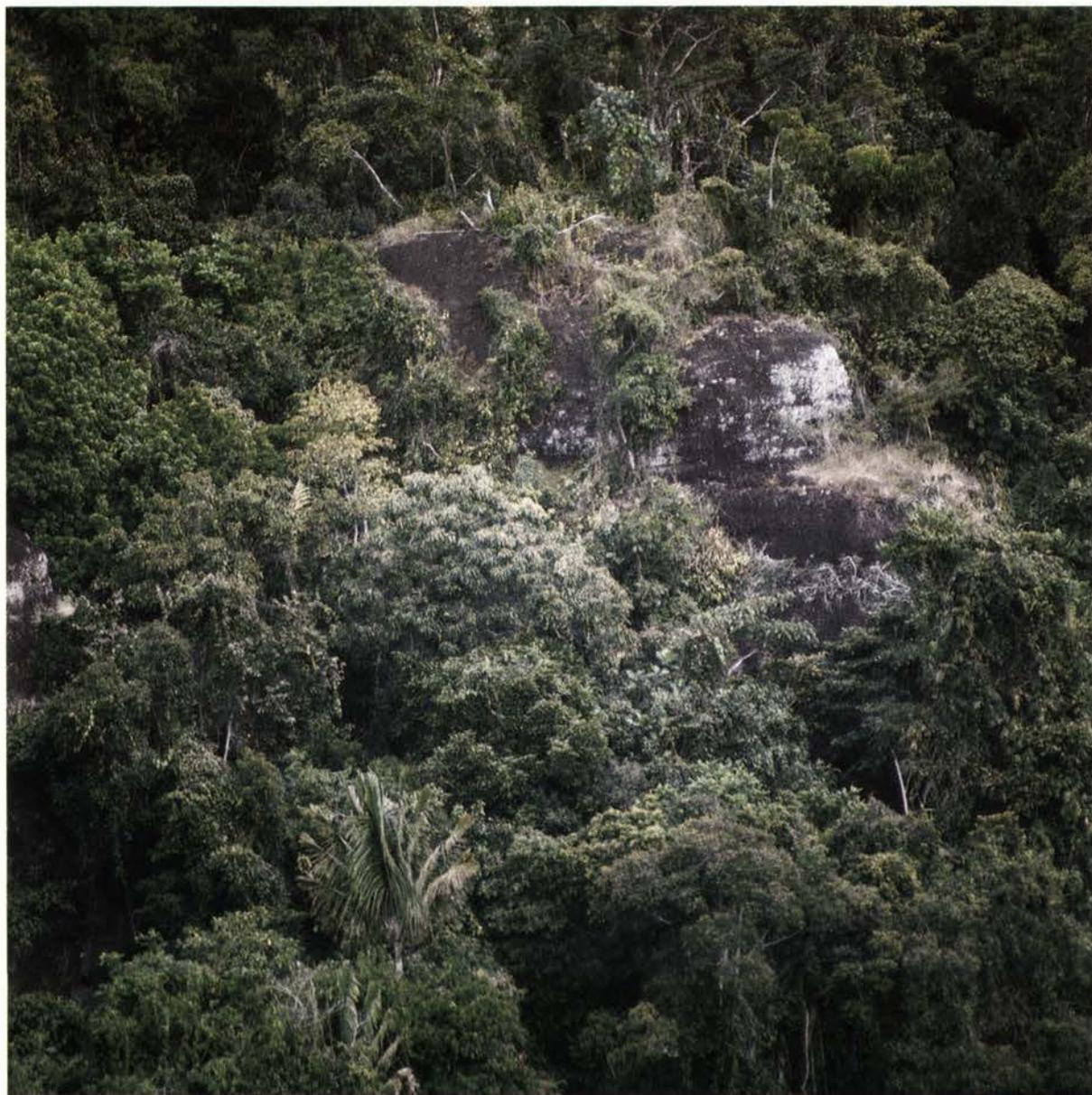


The Savannah

A typical savannah scene, where the trees are scattered throughout the long grass. Eucalypts are the predominant trees but there are also several orchid hosts, notably *Antidesma*, *Nauclea*, *Melaleuca*, all medium size trees with open crowns. Palms, cycads, pandanus, and exotic plant such as *Nepenthes mirabilis* and *Platynerium superbum reginae* all help to make the savannah a botanical wonderland. They certainly compensate for the snakes, mosquitoes, mites and similar hazards which one encounters on an orchid collecting safari.

The orchids in these areas must stand up to the long dry season and the equally harsh wet season, when almost all of the year's rainfall comes down in less than four months.

Dendrobium williamsianum, *D. discolor*, *Saccolobium rhopalorrhachis*, *Vanda hindsii* and a host of botanicals thrive in these conditions.



Rain Forest

This is the beautiful rain forest; tall trees, short trees, palms and pandanus in every shade of green and leaves in every size and shape imaginable. This is part of the Varirata National Park.

In the high branches grow the orchids—*Dendrobium cochliodes*, *D. johnsoniae*, *D. bracteosum*, and the huge *Grammatophyllum papuanum*. A very fine form of *D. spectabile* grows in the trees on the forest edge. There are *Bul-*

bophyllum, *Eria*, a score of Vandaceous species, and *Dendrobiums* in their thousands on these ranges—and all beautifully safe from collection in this National Park, 20 to 30 km from Port Moresby, the National Capital City.

On the rocky outcrop in the centre of the picture *Bulbophyllum fletcherianum* grows along with *Vandopsis warocqueana*, and *D. capituliflorum*.



Swamp

This is Chambri Lake, where the first 'Sepik Blues' were found. The grass begins here and runs back to the mountains, and as the water gets shallower and the grass gets thicker, the swamp trees appear and it is in these trees that *Dendrobium lasianthera* is found.

The small canoes belong to the sago collectors, sago being one of the staple foods in this area. We get into the

swamp in these canoes: when the grass becomes too thick to navigate, we get out and walk, testing each footstep before putting any pressure on it. It is considered 'dry ground' if the mud and water is no more than 15 cm deep. However, one keeps a wary eye out for the permanent residents—the crocodiles.

Dendrobiums

Dendrobium lineale Rolfe

This orchid was one of the earliest of Papua New Guinea orchids to be taken overseas and used in hybridising, under the name of *Dendrobium veratrifolium*. It was not until many many hybrids had been made that Alex Hawkes published a paper detailing its correct lineage, and its rightful name of *D. lineale*.

Botanists are often notorious splitters and lumpers, and the tendency lately has been to lump anything resembling *D. lineale* into that species. At one stage a published note included the bright yellow brown-tipped petals and sepals of *D. gouldii* Rchb.f. and, that being the older name, the writer re-christened the lot as *D. gouldii*. I cannot reconcile that with so many physical differences so I am still using *D. lineale* and *D. gouldii* as they were.

The white forms of Ceratobiums are common in many areas of lowland New Guinea and New Britain, New Ireland and the North Solomons (formerly Bougainville Island). On the New Guinea side, the beech trees in many areas are festooned with the form with the pristine white sepals and petals and the purple labellum: the purple in some plants varies from the palest mauve to a rich vivid purple. On the Sepik River and its tributaries such as the Karawari River and the May River, and down to the Murik Lakes, the plants are very sturdy and the flowers slightly smaller and with very little colour in the lip. On the coast and the islands off Madang, the plants are often between 1.5 and 2 m tall, the flower is more lax, petals and sepals a uniform white and the labellum very variable.

Another form is locally known as 'Wulai Island White' because it is on all the trees and rocky cliffs of Wulai Island in Kimbe Bay, New Britain. The physical differences in these flowers is very marked. The flowers are smaller and present a round appearance and are bunched together on the top half of the stem. The petals and sepals are creamy white, thick and shiny, where the type is thin textured and white.

The inflorescence is less than half the length of the mainland species. An identical form to this is on Long Island in Morobe Province and every flower is cleistogomatic. They remain open for less than three days and then die off as the seed pod grows.

The 'Bougainville White' is not so variable in colour as its counterparts in other areas of Papua New Guinea. It grows by the thousand in the beech trees, especially *Calophyllum inophyllum*, and on the coconut trees in the older plantations. It is also on the off-shore islands and in the Buka Passage. The plant is identical with the Morobe form; long sturdy canes, long inflorescence and many flowers. The colour is papery white, occasionally creamy to light yellow, thin textured and equally long lasting. A comparison of the photographs illustrates the physical differences.

A lot of interest was revived at the Sixth World Orchid Conference in Sydney when we showed a slide of the blue *Dendrobium lineale* which we called 'Kui Blue' after the area in which we found it. Other colour variations which we showed at the ninth W.O.C. at Frankfurt brought a flood of requests. In 1976 I organised a trawler patrol to the Longuerue Chain and the Luard Islands in the Huon Gulf (Morobe) to make a complete record and collection of the colour variations and what other species could be involved in natural hybrids.

The islands in these chains are rocky outcrops rising 50 to 100 m above the encircling reef. The bigger ones had typical coastal rain forest but the centres of most of them have been used for subsistence gardening for generations and are now grass into which pioneer plants such as ground orchids, *Nepenthes mirabilis* and *Casuarina* trees have colonised and are now protecting the emerging secondary growth.

The cliffs are still ringed with the old trees and these host the wealth of orchids. The first objective on this patrol was to collect all species of *Ceratobium Dendrobiums* because I suspected these colour forms were natural hybrids. I found three: *D. lineale*, *D. mirbelianum* and *D. warianum*. I suspect these lovely collectors' items to be natural hybrids within these three species and the clarity of some of the colours suggests that cross-pollination is a continuous process.

An observation worthy of comment but which has no scientific validity is that the most attractive colour combinations are found on plants growing on trees on the cliff faces or on the rocks themselves, leaning out over the reef, where all plants are lashed with salt spray.

Another fact which excites a little speculation is that colour combinations tend to vary from island to island. On the Longuerue group there are two species, *D. mirbelianum* and *D. lineale* and the natural hybrids have well shaped and well balanced petals and sepals, long inflorescences with the flowers evenly spaced, and the colour combinations very striking.

The canes on these plants are up to 2 m long and make several aerals. In plants on the cliff faces these canes hang down and the aerals often produce an aerial themselves. One rocky outcrop raised up from the reef to about 6 m above the sea, and 12 m away from the cliff, had the orchids growing close together like grass with only one scruffy little tree about 7 m tall. The grass growing with them is the only protection they have and the rock is a complete lesson in propagation and survival of the species. In addition to adult plants and dozens of aerals, the rock had seedlings growing on it from a few centimetres high to flowering size—dozens and dozens of them, and the whole rock is lashed by the sea spray.

Further down the bay on the Stragging Islands group,

the third *Ceratobium*, *D. warianum* comes in with only an odd plant of *D. mirbelianum* here and there. The physical shape and colour variations indicate that *D. warianum* is the other parent. The petals and sepals have the characteristic even, longitudinal light brown lines and the incidence of yellow petals is very marked. The labellum of these plants has more the shape of *D. warianum* than of *D. mirbelianum*, the flowers are rounder and the presentation on the stem is similar to that of *D. warianum*.

The colour variations are delightful, and make these plants a collector's item. They vary from a beautiful overall blue flushed with purple to vivid yellow petals, greenish sepals and a pinkish fawn lip.

The number of colour combinations is endless, each plant differing from the next. On this patrol I selected 100 plants from the pure type (white petals and sepals and deep purple lip) to one with bright green petals, yellowish sepals and yellow labellum.

It remains to be seen if our seedlings which we are flasking from each plant come true to the parent, or as I suspect, they show innumerable variations.

Next page: A plant of *Dendrobium lineale* in full flower in the National Capital Botanic Gardens



Dendrobium lineale 'Morobe Shower'

Habitat. Epiphytic on trees in the lowland forest and in coastal trees, up to 700 m. This form is found in Morobe, Madang and Sepik Provinces.

Plant. The pseudo-bulbs average 150 cm tall. The leaves are dark green and to 70 to 80 mm long.

Flowers. Inflorescence to 75 cm long and with 30 or more flowers. The petals are obliquely erect, narrow at the base and only slightly twisted. The upper sepal is rolled back and under; the lateral sepals are usually turned under and back, edges crisped and the tips half curled at the top. Petals and sepals are clear glistening white. The labellum has 5 raised keels, white and dark purple on top. The side lobes are white, closely veined with dark purple.



Dendrobium lineale 'Wulai Island White'

Habitat. Wulai Island is a small island in Kimbe Bay, West New Britain. The plants grow thickly on the rocky cliffs above the sea, and also in the trees on the beach.

Plant. Similar to the typical form, but usually smaller due to exposure to the sea and wind; the leaves are leathery and especially tough.

Flowers. The inflorescence is bunched together on the top of the stem. The sepals and petals are a creamy white, thicker than those in other varieties. The petals are narrow, oblique and slightly twisted. The petals stand out around the labellum, with the tips curled backwards. The side-lobes are large and, like the labellum, beautifully marked in vivid purple.



Dendrobium lineale 'Bougainville White'

Habitat. Common in the coastal trees on the islands of North Solomons and New Ireland.

Plant. The plant is a good medium size up to 100 cm long. The canes are usually slender and the leaves a little wider, often with purple suffusions.

Flowers. The flowering stems are among the longest and most graceful in the species. The colour is a clear white with a translucent sheen, sometimes suffused with pale mauve. The sepals are obliquely erect, two and a half times twisted. The upper sepal is upright above the column and curls over. The lateral sepals stand out for half their length and the narrowed tip curls in almost a full circle. There is a faint flush of purple in the labellum.

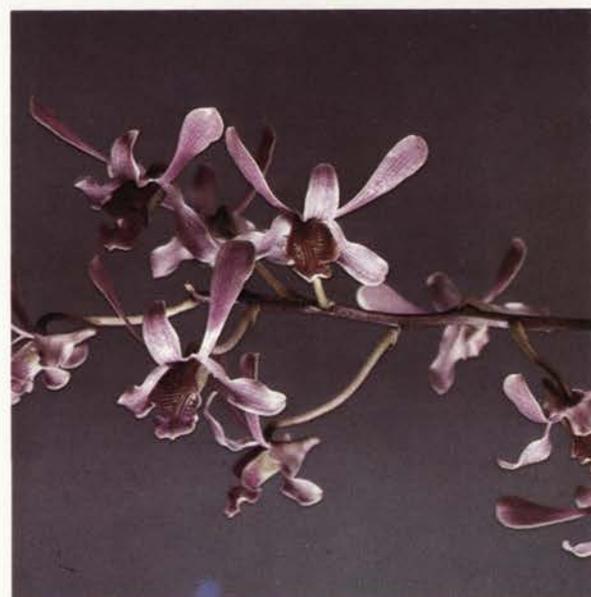


Dendrobium lineale 'Jawani Island Yellow'

Habitat. Jawani Island is a small island in a reef off the Morobe coast. The sheer cliffs are about 20 m high and the island is circled by large trees. The centre is tall grass, where food gardens have been made.

Plant. Plants growing on the trees on the edge of the grass are about 1 m tall.

Flowers. The inflorescence is similar in shape and size to the 'Kui Blue', and the many flowers stand out symmetrically from the stem on straight yellow pedicels. The petals are strong, yellow shading to buff near the apex with some purple staining near the mentum. The sepals are white, flushed with mauve and purple veined. The labellum is a strong orange buff, with purple veining on the lateral lobes and purpled-stained on the mid-lobe.



Dendrobium lineale 'Kui Blue'

Habitat. Epiphytic on large *Calophyllum* trees, on a cliff about 20 m above the sea. The branches of the trees lean well out over the sea and the surf, breaking on the rocks below, continually splashes the plant.

Plant. This plant was distinguished by canes over 5 m long, not straight but bent by the elements.

Flowers. The inflorescence is long and usually gracefully arched up to 75 to 85 cm long and many-flowered. The colour is blue with a pinkish sheen. The petals are rounded at the tip, narrowest at the base and the sepals narrow at the tip. They have undulated edges and are slightly reflexed. The side-lobes are large, erect, greenish outside and heavily veined with dark violet inside. The lip has 5 raised and flattened violet keels and the whole labellum is suffused with blue.



Dendrobium lineale 'Kakare Island Pink'

Habitat. Kakare Island is in the Luard group, small coral-fringed islands in the middle of Huon Gulf. The centre of the island is mostly bamboo and coconut palms, and strewn with large boulders on which several Vandaceous orchids flourish.

Plant. These plants grow on tall *Calophyllum* trees on the cliff edge. The canes are often 2 m long, and a feature of this form is the large number of aerial plants produced on the leafless canes.

Flowers. The flowers on the plants in this area are more pink than mauve and the labellum is very often deep yellow. The side-lobes vary and are usually veined with purple on pink or green or yellow. No two plants in the area are exactly the same.

Dendrobium streblosceras Rchb. f.

Habitat. Epiphytic on trees in the Markham Valley and cliff faces above the Snake River.

Plant. The pseudo-bulbs are up to 100 cm long and are very distinctive, with a dark ring around each internode. The stems taper rather abruptly, and the leaves are short, thick and dark green. The plants tend to produce aerial plants with great frequency and this may be compensation for the harsh, hot conditions under which they live.

Flowers. About 10 flowers, delightfully fragrant. Sepals and petals are a burnished tangerine-orange colour with dull dark brown-purple veins. The sepals are curved back, twisted and with wavy edges; petals are stiffly erect, much twisted and about 4 cm long. The lip has 5 white, violet veins, the mid-lobe widens from a narrow base and is abruptly pointed.



Dendrobium mirbelianum Gaud.

Habitat. Distributed from Papua New Guinea to the neighbouring Moluccas and close-by islands. It is epiphytic on trees in all kinds of lowland forest.

Plant. The canes vary from about 20 to 40 cm, are sturdy, yellowish and with fine papery bracts at each node. The leaves are dark green, thick and leathery.

Flowers. The forms of *D. mirbelianum* are very variable, and self pollinating. The flowers usually fade within 2 or 3 days and each one sets seed. The inflorescence has flower stems, about 350 mm long, of from 12 to 15 flowers. The sepals are light yellow-green not twisted and the petals are similar, very finely spotted with violet-brown. The lip has 5 keels and all lobes are greenish, veined with purplish brown.



Dendrobium nindii W. Hill

Habitat. Known from Cape York Peninsula, Australia, it is distributed sporadically in many parts of Papua. It is common on trees in Western Province and on trees in swamp areas or rain forest.

Plant. This is one of the largest of the *Ceratobium Dendrobiums*; the usual height is around 1 m, but they do grow as high as 3 m. The leaves are firm, alternate, dark green and the canes almost black.

Flowers. A well grown plant has between 18 and 25 flowers beautifully arranged on all sides of the top third of 10 to 12 cm stem. A good flower measures 4 cm across, not stretched, sepals and petals variable, white, pale mauve or with pale lilac veins. The beautiful labellum has dark violet veins on a rich mauve base.



Dendrobium sophronites Schltr.

Habitat. *Dendrobium sophronites* is one of the most coveted orchids in the world. It is found only in the moss and cloud forests above 2,000 m. It is collected on small trees near ridge tops and sometimes on moss-covered rocks. It is essentially a plant of the mist and moss forest, used to almost daily rain, periods of bright, hot sunshine during the day and a sharp drop in temperature at night.

Years ago, *D. sophronites* was common on the cliff sides of the Edie Creek road, above 2,000 m. Unfortunately progress involved a road to the repeater station at Mt Kaindi. The sides of the road above the deep gorge were cut back.



Plant. The pseudo-bulbs are small, about 1.5 cm tall, less than 10 mm thick. The bottom of the pseudo-bulb is bright green, sheathed in light brown papery bracts. They are curiously constricted in the middle and the top half is closely ridged, greyish-green in colour.

The leaves, usually at an angle just above the ground and beneath the flowers, are very dark green, channelled in the centre by the mid-rib and pitted on the surface. Very often they are suffused with dark purple and remnants of the light brown papery bracts on the base of the pseudo-bulbs are persistent. The leaves are about 1.75 cm long and less than 40 mm across the middle.

Plants are usually found growing in small colonies.

Flowers. Nobody describing the flowers of *D. sophronites* can fail to go into raptures. They are so beautiful, such a large flower on so small a plant.

The pedicel is about 45 mm long, pinkish-cream and densely covered in tiny white hairs. The sepals and petals are about equal in size: sepals are rounded at the top, and petals pointed. The flower is between 30 and 35 mm across. Labellum is scoop shaped, and the outer edge in all colours is marked with dark brown lines and a fine yellow margin. The lateral sepals unite to form the long mentum.

The flowers are in many colours, red, white, yellow, orange, purple. Three variations are shown here.

The psychedelic colours of the orchids of the high mountains: *Dendrobium sophronites*



Dendrobium pseudo-conanthurum J. J. Sm.

Habitat. Epiphytic in lowland forest and on big trees lining wet-season creeks in the savannah. It is not common but widespread where it occurs.

Plant. The canes are very long and slender, to 500 cm tall, narrowest at the apex. The leaves are thick, dark green, and decrease in size as they go up the cane.

Flowers. The inflorescence is very short for such a large plant—about 25 to 30 cm. The flowers are about half the size of the normal *D. conanthurum*, lacking the bright golden colour. *D. pseudo-conanthurum* is greenish-yellow, with regular longitudinal brown lines on the petals and darker brownish-purple veins on the side-lobes and the mid-lobe. The white keels on the labellum are very conspicuous, ending in a raised tooth in the middle.



Dendrobium cochliodes Schltr.

Habitat. Although found in many widely separated areas between 200 and 400 m, it is not commonly collected and more study is needed on growth, habitat and effects of temperature in both flowering and setting seed. Epiphytic on the high branches of exposed trees.

Plant. The pseudo-bulbs are sturdy and relatively small for the section. There are 4 to 6 dark green leaves near the top of the forward growth.

Flowers. The inflorescence is up to 250 mm long with a few typical *Ceratobium* type flowers crowded at the top. The petals are erect, 3 times twisted dark bronze-brown with a thin yellow margin; petals are similar, the tip of the labellum curls down and under in a complete circle.



Dendrobium schulleri J. J. Sm.

Habitat. This is a very common orchid growing in the same conditions as *D. lasianthera* and *D. smilliae*, and most often on trees in swamp edges or along creeks and lagoons. It is always epiphytic and usually found growing in very strong light.

Plant. The pseudo-bulbs are very sturdy and plump, up to 100 cm long and the leaves are dark green, fleshy and up to 17 cm long. The plants flower at a very small size.

Flowers. The inflorescences are between 30 and 50 cm long with up to 30 flowers. The petals and sepals are about 6 cm across, usually yellowish-green although there are some very fine lemon yellow forms. The petals are only slightly twisted, and the sepals less so. The lip has 5 slightly wavy keels, greenish-white with violet markings. The side-lobes are beautifully shaped, firm and slightly flared; green with brownish veins.



Dendrobium discolor Ldl.

Dendrobium discolor is the commonest, and certainly the most numerous, of any species in Papua New Guinea. It is a lowland species, common on the Papuan side of the mainland. The Central Province, Gulf Province and Western Province are the main centres of distribution, and these areas have a climate and terrain very similar to Cape York Peninsula in Australia and the Torres Strait islands.

In Central Province it is referred to as 'Moresby Gold'. There are several forms and colour combinations each in its own colony, less than 30 km from the heart of the national capital. Every second house has a plant (or several) tied to the coconut palms, rain trees and other garden hosts.

The colour variations are seemingly endless. In a search of the country outside Port Moresby for good breeding plants, we finished up with 60 plants, all with distinct differences in colour and shape. Later on, in two patrols to Western District, we found so many beautiful colour combinations we ran out of space on the trawler. Many of these plants are beautiful enough to rank with any man-made hybrid. The interesting point is, will seedings come true to the parent plant or will we get a series of variations indicating insect pollination of various plants?

The form we call 'Moresby Gold' is found very close to the heart of the city, epiphytic on trees, but also on the rock faces near Rouna Falls, on the cliffs above the Sogeri Road, and on the rocky outcrops such as those in Varirata National Park. These plants are mostly short and stout, with canes to 40 cm—usually less—and are exposed to direct sunlight and every vagary of the elements.

An interesting point about these rock dwellers is the clarity of the colours. The sepals are usually dark brown, the petals a clear gold with a yellow margin and the labellum is darker yellow with 5 raised keels in a contrasting lighter colour. The rocks are on the grassy slopes below Mt

Varirata with only scattered *Eucalyptus*, some *Antidesma* trees and *Cycas circinalis*. Fortunately for the survival of the species, a large part of the area is National Park—it is also noted for snakes.

On the tall trees on the banks of the Laloki River and the surrounding flat country the plants vary from 30 to 50 cm in length. The plants that have to reach for the sun have the longest canes, and are often misshapen, the flowers are paler than those growing in optimum light.

Two of the recognised varieties are frequently found in this part of Papua New Guinea: var. *broomfieldii* is a clear yellow and the only other colour in the flower is the white keels on the labellum. The yellow form varies from pale yellow to a deep shining gold.

The other common form is the variety *fuscum*, which is very often brought in from the Brown River area. The flowers are smaller, never more than 4 cm in diameter. The sepals and petals are reddish-brown and less twisted than the common type.

The most interesting form of *D. discolor* in this area is the one called the 'Rigo Twist'—named for the area in which we found the first plants. This is completely different in shape and size, both plant and flower being smaller and more compact than the other varieties. It also comes in a variety of yellow and brown shadings from the almost bronze flower shown here to a pure yellow and all with the distinct purple labellum.

The three main varieties we recognise in the National Capital Botanic Gardens are: var. *discolor*, var. *fuscum* and the 'Rigo Twist', which has been described as var. *d'albertisii*. They flower at different periods of the year, and unless they suffer mechanical damage they will last for 12 to 14 weeks in bloom. We find post culture, such as that shown here, provides the best display although they grow equally well on Calabash trees (*Crescentia cujete*). The flowers have

Previous page: *Dendrobium discolor* Lindl. flowering on a teak post in the National Capital Botanic Gardens

a spicy-honey scent when they first open, and several hundred plants in full bloom are something to remember.

The Trans-Fly country is very like parts of Northern Australia, vegetation, many orchids, trees, shrubs and vines growing in both areas. In the endless swamps, the commonest tree is *Melaleuca* and on these grow *D. discolor*, *D. johannis*, *D. smilliae* and *D. canaliculatum*. There are several other species formerly known from Northern Australia which grow in the trees along the rivers and in the swamps of the Trans-Fly in Western Province. Transport difficulties have prevented thorough investigation and I believe there are many more orchids yet to be found which belong to both Australia and Papua New Guinea.

Dendrobium discolor on the Fly River and the Oriomo River is almost identical with the Australian type. There are minor variations in colour and size but it is not until you get to the Morehead and Bensbach rivers that the finer forms become the rule rather than the exception. On the left bank at the mouth of the Bensbach River there is a concrete marker indicating the border with Irian Jaya, and the border continues veering inland and away from the river. This is very good from our point of view as it is in this area that the orchids begin to lead into the Indo-Malaysian area. I think, too, that many of the orchids named by Schlechter in the then German New Guinea will prove identical with those named by J. J. Smith, who worked in what was then Dutch New Guinea.

I also believe that in this area we will find many of the orchids that have been described but not often seen. Such is the case of *D. trilamellatum*, which we found for the first time on a patrol to Western Province.

There were two plants, growing on a fallen tree with half of the branches above the water. This means that in the next flood time (in the wet season) the broken tree will be

swept away. Literally thousands of orchids growing on the trees near the water's edge are lost every year.

The *D. discolors* on the Morehead and Bensbach rivers are the most beautiful I have ever seen. The flowers are in the loveliest of colour combinations. One of our most cherished plants has pinkish-orange petals and sepals, wide bright yellow side-lobes, a light brown lip with a touch of mauve. The inflorescences are up to 1 m long with 30 to 40 flowers on them, and the plants are very free flowering.

Most of the plants from these two rivers are collectors' items and rank with any hybrid ever produced. This suggests that finer forms and natural hybrids are in the swamp country on both sides of the border, and beyond the reach of any ordinary botanical patrol.



Dendrobium discolor Lindl. 'Trans-Fly Form'

The outstanding Trans-Fly varieties are the ones with the large flaring side-lobes which stand out instead of encircling the column. The flower photographed here came from a plant from the Bensbach River, and has canes 2 m tall. The inflorescence is 50 cm long with 36 flowers; at the time of flowering there were 18 flowering stems.

The petals stand out at an angle of 45° to the column, and are pinkish-brown in colour with faint purple veining. The edges are crimped and one and a half times twisted. The sepals are creamy brown with darker veins; the side-lobes are bright yellow, the keels are pale pink and the rest of the labellum brownish-purple.



Dendrobium discolor Lindl. 'Rigo Twist'

The picture here shows clearly why this plant is called Rigo Twist. Rigo is about 100 km from Port Moresby.

Everything about this variety is smaller than the type. Plants rarely reach more than 50 cm tall and the individual flower is only two-thirds of the size of what is considered the type.

The colour is bronze, with lighter and darker shades in different plants. The petals and sepals are the same colour, with a fine yellow margin. The petals are three times twisted, erect and touching at the tips. The upper sepal twists into almost a full circle in front of the petals; the lateral sepals stand out horizontally from base of the column, much twisted, and the mid-lobe is purple.



Dendrobium discolor Lindl. 'Moresby Gold'

This is a good example of the type of *D. discolor* collected in the Port Moresby area. Rouna Falls, Sogeri Plateau and Brown River.

The flowers are crisp and firm textured with up to 40 or more on the raceme which is between 20 and 60 cm long. The flowers are from 2.5 to 4 cm in diameter, petals are more or less erect, twisted, golden brown with a yellow margin. The sepals are similar, margins yellow and undulate and the tips curl over and back; they are yellow on the reverse side.

The side-lobes almost meet over the column, are greenish-yellow outside with purple veins inside. The keels are white, the mid-lobe is purplish and the tip turns down and under.

Right: Rouna Falls—home of *Arachnis muellerii*, *Renanthera edelfeldti*, *Pomatocalpa marsupiale* and many others





Dendrobium lasianthera J. J. Sm.

The 'Sepik Blue' has long been considered one of Papua New Guinea's best and most beautiful orchids. It has a romantic history in that it was found in the Ymas Lakes by Captain Blood during his courageous escape from Japanese soldiers in the 1939-45 war. When he saw it, Captain Blood did not stay upon his going, but grabbed one and made his escape. This plant was named *D. ostrinoglossum* by the Reverend Rupp, an Australian botanist and orchid lover. In an article in *The Australian Orchid Review*, Alick Dockrill wrote: 'Unfortunately, Rupp, when describing his species, made no comparison with *Dendrobium lasianthera* J. J. Sm. and he was obviously unaware of this species which was described from West Irian material in Fedde Rep. Spec. Nor. 31 (1932) 78 and not in the various issues of Nova Guinea where J. J. Sm. published most of his descriptions of New Guinea species.'

When the war was over, the Australian administration began extending the area under their jurisdiction, patrol officers discovered thousands of plants in the May River swamps and this they called the May River Red. At the same time, the Division of Botany obtained plants of *D. lasianthera* from across the land border in Irian Jaya. Dr Van Bodegom, who was the resident botanist at Manokwari before Indonesia included the former Dutch colony in the republic, felt that *D. lasianthera* and *D. ostrinoglossum* were one and the same and this view was supported by the Division of Botany in Lae. It seems incredible that so beautiful an orchid could remain undiscovered for so long; especially as a specimen had been sent to Australia from Madang in the early 1930s. The Chief of the Division of Botany, Lae, Mr J. Womersley, when checking through material at the Adelaide (South Australia) Herbarium, collected by R. S. Roger (1862-1942), found the specimen. Roger made a note to the effect that he was unable to correlate the

specimen with any known New Guinea species and regretably did not publish a description or give it a name.

In 1969, in company with Alick Dockrill, then keeper of the Herbarium in Lae and author of *Australian Indigenous Orchids*, I was sent to Lake Ymas off the Sepik River to find the plants and collect as many colour variations as possible. One of the first things we discovered was the wide distribution of the species. It was not confined to the swamps surrounding Lake Ymas but was common in the trees behind the villages for some kilometres on the river itself.

Travelling to the Ymas Lakes in those days was a tiring and very expensive exercise. We left Lae for Wewak in a Fokker Friendship aircraft, and next day chartered a small plane to take us to Angoram. Here we were given the government canoe (about 12 m long, and hollowed from one large tree trunk, and with an out-board motor). On the morning of the third day we set out in the canoe for Amboin Patrol Post. We travelled for over eleven hours up the mighty Sepik, turning into the Karawari River in the late afternoon and then into the Arafundu River, and finally just as dark was settling, we arrived at Amboin.

On the morning of the fourth day we set out in a smaller canoe for the barat (a channel leading through the swamp to the lake) and so to Ymas Lakes and the Sepik Blues.

Comparison of these plants with the *Dendrobium lasiantheras* in Lae Botanic Gardens showed that the morphology of the flowers is different. About this time, plants of *D. ostrinoglossum* were occasionally being brought in from the logging area in the Gogol Valley, Madang, which further added to our knowledge of its distribution, but did not conclusively solve the nomenclature. In 1972, the American Orchid Society's Fund for Education and Research Inc. gave me a grant to travel to the May

River, to collect and study the plants of the 'May River Red' and make a detailed study of the habitat and distribution. The most satisfying conclusion on the patrol was that the upper Sepik, the May and Yellow Rivers are so remote and the swamps so difficult to negotiate, that this lovely orchid is safe from extinction and will grow in its thousands for evermore. Mosquitoes, leeches, and crocodiles in the water will be more than adequate guardians. Transport problems add to security: on this occasion I went from Wewak to Angoram and there joined the government trawler. Five days later I was at the May River Patrol Post and we used small canoes to weave in and out amongst the swamp trees.

In the course of these patrols of discovery, I was considerably surprised at the variation in colour of the flowers and in size of the plant, particularly in the May River swamps. The canes in some of the plants the village people brought into our camp were more than 3 m long: when choosing plants ourselves we were guided by flower colour and a reasonable sized plant—80 to 100 cm. Most of these very long plants had very weak canes, bent and deformed; in most cases because of their struggle to reach the sun, and having to struggle up through the many-branched swamp trees. These trees are small, averaging 3 to 4 m high, and it is something to remember all your life—acres of swamp and the beautiful 'Sepik Blues' or 'May River Reds' in their hundreds standing above the tree tops.

In these swamps several other species grow as luxuriously as does *D. lasianthera*, notably *D. conanthum*, *D. smilliae* (the very beautiful white form with the dark green labellum) and *D. musciferum*. It is often impossible to tell *D. lasianthera* and *D. conanthum* apart when not in flower, and it makes selection of the finer forms for breeding or for species collections a slow process. Until the plant flowers, it is impossible to tell what it is.

The Ymas Lakes plants are not so variable as those from the May River. Some have a deeper blue glow than others, others show the bronze glow which is typical of those from the May River. The variations in the May River plants are innumerable, ranging from very beautiful to very ugly—the latter fortunately do not appear common. I have collected several plants with the petals and sepals dirty white and only just tipped with brown, and the labellum equally colourless. The red glow, which gave the plants their local name of 'May River Red', is a feature of the sepals and petals in most plants and most have the yellow margin as does *D. lasianthera* from Irian Jaya.

The inflorescence of this orchid is much smaller than one would expect from such a large plant. The average is about 35 to 45 cm, as against 45-75 cm in *D. lineale*, with 10 to 15 flowers. The flowers are among the largest of this section and fairly uniform in size. They appear to be almost always in flower in their natural habitat. I have made several visits at different times of the year and some plants were always in bloom. Ten to twelve weeks is the usual life of the flowers.

In the comparatively few years in which *D. lasianthera* has been known, some very beautiful hybrids have been created using it as one of the parents. Some of the finer forms of the May River plants can outshine any hybrid, notably the plant we called *D. lasianthera* 'Veronica Somare'

Dendrobium lasianthera J. J. Sm. 'May River Red'

Habitat. The full extent of the distribution of this form is not yet fully known. It is common in the May River Swamp and all its tributaries. It is also in the rain forest on the ground above the river, epiphytic on very tall trees.

Plant. The canes are up to 300 cm and longer ones are not uncommon. Leaves dark green, very tough, from 7 to 18 cm.

Flowers. The inflorescence is 35 to 50 cm long with between 10 and 15 flowers. The sepals are once twisted, a shining bronze-brown, yellow margined and with a shimmering red glow. The petals are the same colour without the yellow margin. The lip has lateral lobes of dark violet and the inside is a reddish-purple. The basal section is yellow with purplish-red veins.



Dendrobium lasianthera 'Veronica Somare'

Habitat. Epiphytic on a small *Nauclea* tree in the swamps off the May River.

Plant. This plant is 1.5 m tall and has three leafy canes, all flowering when collected, as well as four leafless canes, two with flowers.

Flowers. The inflorescence is between 40 and 50 cm long and the flowers are very beautifully arranged around the stem. The petals are obliquely erect, glossy purple flushed with reddish-brown, three times twisted. The petals are very undulated and the tips curl under. They are white at the base shading through yellow to a deep reddish-purple. The labellum has large, wide spread, deep rich purple side-lobes, the mid-lobe has 5 raised keels, with a yellow border. The tip is a lighter purple with a little gold at the very end.



Dendrobium lasianthera J. J. Sm. 'Sepik Blue'

Habitat. This plant grows in the swamps around Lake Ymas and Chambri Lake and in the surrounding forest, and is now being found in the logging areas near Madang.

Plant. Plants are typical of the *Ceratobium* section with canes varying from 50 to 250 cm. The canes and leaves are often suffused with purple. The roots are exceptionally strong and run for 30 to 60 cm up and down the cane.

Flowers. The inflorescence is comparatively short up to 40 cm long, rarely more. There are up to 20 flowers, each 5 to 7 cm across. The petals are white at the base, reddish-brown for the rest, twisted and very glossy. The sepals are purplish-brown, sometimes reddish-purple. The labellum is mostly a rich purple with a distinct blue sheen to it, hence the common name 'Sepik Blue.'



Dendrobium phlox Schltr.

Habitat. Common in the undisturbed rain forest, this vividly coloured orchid grows as an epiphyte on tall trees in the 600 to 900 m altitude area: higher up in the colder 1,200 to 2,500 m band it is found on rock and clay cliffs.

Plant. The plants vary in size from 20 to 60 cm long, the slender stems branching and with dark green leaves for the whole length of the new stems.

Flowers. The inflorescences are borne at many nodes, not all simultaneously, and a seemingly dry stem will flower for several years. The flowers are in clusters, usually of 4 to 10, each one about 2 cm long. The sepals and petals are orange tipped, the rest of the flower and the mentum bright golden yellow. There is also a bright yellow form.



Dendrobium lawesii F. Muell.

Habitat. Epiphytic throughout Papua New Guinea in mountain forest from 650 to 1,200 m.

Plant. The plant grows semi-pendulous on the undersides of branches. The pseudo-bulbs arch out from the base a short distance so that they hang free and pointing earthwards. The stems are from 25 to 30 cm long, slender, of many nodes. The leaves are dark green, the full length of the stem, and tapering to a slender point.

Flowers. Flowering begins on the leafless stems, a small cluster of 5 to 8 bell-shaped flowers, each from 2 to 5 cm long and about 10 to 15 mm across the tips of the free petals. Colour is variable from a clear glowing red through all shades of red to cerise to deep purple, with or without white tips on the petals and sepals.



Dendrobium aemulans Schltr.

Habitat. The high mountains and swirling mist forests above 2,000 m is the only area in which I have found this lovely orchid. Very closely related to *D. lawesii*, both are in the section Calyptrocalyx.

Plant. The pseudo-bulbs are clustered together on a short rhizome, 25 to 50 cm long, and sometimes branching. They are very slender, about 9 mm in diameter, of many nodes. The leaves are usually on the upper half, but the pseudo-bulbs retain a few terminally when flowering. Leaves are dark green with a purple tinge.

Flowers. The flowers hang singly or in pairs on the underside of the pseudo-bulb from about the middle to where the leaves begin. They are bright red, each one about 4 to 5 cm long and about 20 mm across the open petals and sepals tips.

Dendrobium chloroleucum Schltr.

Habitat. A high altitude orchid which is rarely found below 1,500 m. It is an orchid of the rain forest, but grows on the sheer cliff faces and open cuts on the roads in the high mountains.

Plant. Mainly found epiphytic on trees, growing in lichens and mosses on the branches. The pseudo-bulbs are yellow, up to 15 to 20 cm tall; each one rises from the base on a very brittle slender stem and widens abruptly half way up the pseudo-bulb. Three, sometimes four, tough dark green leaves come from the top.

Flowers. The flowers are clear white, with petals and sepals narrowing at the base. They are similar to *D. johnsoniae* but lax and soft in appearance. They last from 4 to 6 weeks on the plant.



Dendrobium spectabile (Bl.) Miq.

Habitat. A widespread epiphyte from 30 to 120 cm high. Epiphytic on forest trees, sometimes growing in thick peat on the ridges. In the Port Moresby area, it is found on the top of Hombrom Bluff and back through Varirata to the rain forest above Musgrave River. Although essentially an epiphytic plant, I have often collected it on the ground on the ridge tops, where it grows in the thick moss and peat, doubtless from fallen trees.

Plant. The pseudo-bulbs are up to 60 cm long, thickening upwards from a slender base. The leaves, usually three, are large, glossy dark green, 15 by 5 cm and sharply pointed. The pseudo-bulbs are ribbed, yellowish-brown, and the leaves are clustered at the top of each stem.

Flowers. The flowers on each inflorescence are the most spectacular in the genus. The sepals, petals and lips are all distinguished by their very long narrow points and their gawdy red and yellow colours.



Dendrobium bifalce Lindl.

Habitat. *Dendrobium bifalce* grows in all lowland areas, and most of the islands. It grows on large trees in both savannah and lowland rain forest, forming large clumps with anything up to 100 plants in each.

Plant. The pseudo-bulbs are up to 40 cm long, tapering at the base and thickest in the middle, narrowing slightly at the top and with 2 tough mid-green leaves which are minutely bi-lobed.

Flowers. Flowers are variable in size and colour. They vary between 12 mm and 15 mm in width, 6 to 10 flowers on an erect green stem about 30 cm tall. The common form is apple green, petals and sepals marked with dark purple, side-lobes erect, olive green; lip with light purple markings.



Dendrobium capituliflorum Rolfe

Habitat. Epiphytic on trees and rocky outcrops in many parts of the lowlands, up to 600 m.

Plant. The pseudo-bulbs are from 10 to 25 cm long, constricted at the base, and widening abruptly to fleshy stems of several nodes. The leaves are variable in colour, usually dark green on top and velvety purple below; in some areas the leaves are purple on both sides.

Flowers. The flowers are in tufts arising from the nodes. They appear on the leafless pseudo-bulbs, and sometimes with the new leafy stem. Each small flower is about 12 mm long, with 50 to 60 in each cluster. They are white to cream, tinged with green, not opening widely. The pointed labellum is greenish on the medium lobe and also underneath.



Dendrobium smilliae F. Muell.

Habitat. This orchid is not fussy where it lives: epiphytic on swamp trees, on rocky outcrops and rock faces, and in the lowland forest and old plantations.

Plant. This is a very sturdy orchid with thick fleshy pseudo-bulbs from 60 to 80 cm long. They grow into very large clumps. The leaves are thin, mid-green and pointed. Each new cane has leaves along its entire length. The pseudo-bulbs turn brown with maturity.

Flowers. The flowers are in a densely packed raceme, about 10 to 12 cm long and up to 100 flowers on each. The individual flower is from 8 to 10 mm. The petals and sepals are pink varying from light to dark and the front of the lip is like a pouch and always a deep, shining green.

Dendrobium bracteosum Rchb. f.

Habitat. Epiphytic in the lowland rain forest and also found on many of the smaller islands such as Rossel Island where the large dark red forms grow luxuriantly. They are often found in the small mangrove trees in some areas.

Plant. A small compact plant of many stems, averaging 20 to 40 cm but occasionally longer. These pseudo-bulbs are yellowish, ringed with brown, and the leaves are thin, tough, narrow and pointed, dark green in colour.

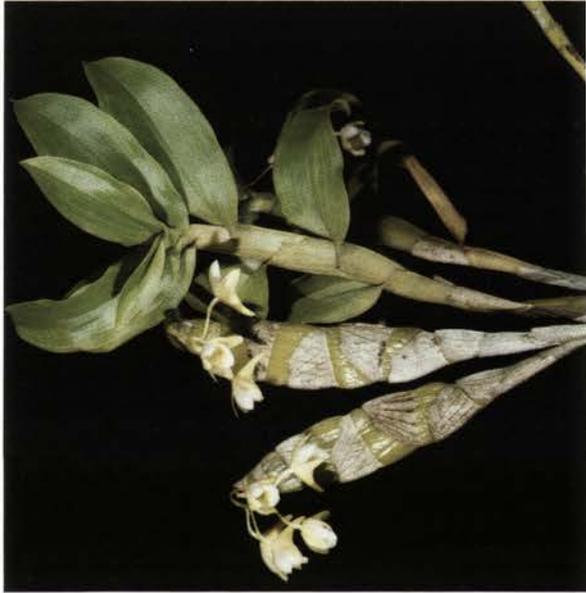
Flowers. The flowers grow in clusters at the nodes of the stems, and the leafless stems continue to flower for many years. The flowers last up to six months. The colour varies from white to cream, pale pink to dark pink to almost red; all with a yellow pointed lip.

Dendrobium rigidum R. Br.

Habitat. A very common lowland orchid. It grows luxuriantly on rock faces and is epiphytic on a wide variety of trees. It is common in the Papuan savannah country, in the *Antidesma ghaesembilla* trees.

Plant. The thin branching stems are not very long, and the leaves are usually 25 mm long, thick but flattened to less than 12 mm wide. They have a rough texture and are dull green, sometimes with purplish tints. The plant size and habit are very variable.

Flowers. The short racemes have from 2 to 5 flowers about 20 mm wide, a beautiful rich creamy colour, tinged inside the petals with red. The side-lobes and the column are a darker red, the labellum is darker yellow in the centre, and the edges are not crisped. The pendulous shape of the plant with its numerous upturned flowers makes it a joy in any collection.



Dendrobium platygastrum Rchb. f.

Habitat. A widespread and variable species common in lowland forest, sometimes on mangroves.

Plant. The pseudo-bulbs are curiously flattened, beginning at the base with a stem less than 6 mm wide, widening a third of the way up rather dramatically, and coming to a blunt point, equally abruptly, at the top. Each stem has several bracts, one at each node, the leaves begin a third of the way up each stem. The leaves are a bright mid-green, thin textured. Both leaves and bracts fall after the initial flowering, but the leafless stem continues to produce groups of flowers from the top nodes.

Flowers. The flowers are pendulous, on short stems, and there are several forms; a beautiful creamy yellow; a true deep cream, rather nearer white than yellow or a pinkish-white, deep pink at the tips of petals and sepals. The flowers are about 25 mm long. The throat is deep yellow.



Dendrobium inequale Rolfe

Habitat. Epiphytic on forest trees from 300 to 600 m altitude in many parts of Papua New Guinea.

Plant. This is a small orchid, which clings to the trunks of very tall trees or far out along the branches. The pseudo-bulbs arise from a tough base; they are slim for half their length, widening abruptly into a flat-sided oblong, the edges of each side almost razor like. Three to five dark green leathery leaves come at the top. Overall size of the plants varies from 10 to 20 cm tall.

Flowers. The petals and sepals are more or less equal in size, from 25 to 35 mm long and are deep cream in colour. The labellum and side-lobes are bright golden yellow. The flowers, usually 3 to 4, come from nodes near the top of the pseudo-bulb.



Dendrobium trilamellatum J. J. Sm.

Habitat. Although known to collectors from literature, it is not a common orchid in Papua New Guinea. I have only found it in one area, in the swampy flats beside the Bensbach River near the border with Irian Jaya.

Plant. The pseudo-bulbs are between 30 and 50 cm long and the leaves about 14 cm long, dark green.

Flowers. The inflorescence is up to 40 cm long and the well spaced flowers are fragrant. The sepals and petals are narrow, twisted and a brownish-yellow with a greenish sheen, each with close dark brown lines. The lip is light yellow with 3 sulphur yellow keels much raised on the mid-lobe. The side lobes are yellow with faint violet veins and the mid-lobe is sulphur yellow.



Dendrobium johannis Rchb. f.

Habitat. Very common in the *Melaleuca* trees of the swamps between the rivers in Western Province. It is sometimes found near Port Moresby, also growing in *Melaleuca* trees.

Plant. Pseudo-bulbs are between 15 and 30 cm long, and the leaves narrow, dark green and tough.

Flowers. The inflorescence is up to 25 cm and the flowers are close together. They average 3 to 4 cm across and have a fragrant spicy scent. The sepals and petals are narrow, twisted, shining dark brown. The lip has 3 main keels and a smaller one each side, and is a clear shining yellow. Colour is variable and it is not uncommon to find a clear yellow form and one with almost dark brown petals and sepals.



Dendrobium antennatum Lindl.

Habitat. This is a common plant in Papua New Guinea, inland up to 800 m altitude. It is often found on islands and near the coast. In the savannah, or the Hula Road, it grows on the *Antidesma* trees and even on the mangroves. It is one of the commonest orchids on *Melaleuca* and *Nauclea* trees in the lowland swamps of Papua.

Plant. The pseudo-bulbs are variable, from 15 to 60 cm long. Stems are yellow, leaves light green and fleshy.

Flowers. The racemes are short, varying from 150 to 350 mm long and the flowers are beautifully spaced, sitting erect on both sides of the stem. The sepals are erect, green and only slightly twisted. The petals are pure white turning back and under at the edges. Side-lobes are erect with violet markings and the labellum is similarly coloured.

Dendrobium canaliculatum R. Br.

Habitat. Epiphytic on *Melaleuca* trees, especially in the swampy areas of Western Province. It has also been found at Hula in Central Province.

Plant. The pseudo-bulbs are set closely together but do not often grow into big clumps in their natural conditions. The leaves vary from 2 to 6, and are about 75 to 150 mm long, narrow, channelled and fleshy.

Flowers. The racemes in all plants I have seen vary from 10 to 15 cm long, are brown and very brittle. The flowers are about 25 mm in diameter, petals and sepals are about equal in size, white at the base, yellow at the top; the lip is 3-lobed, mostly rich purple, and the column is pale green.



Dendrobium torricellianum Krzl.

Habitat. Epiphytic on trees in lowland rain forest; this plant came from the range above Musgrave River.

Plants. This section of the *Dendrobiums*, *Oxystophyllum*, has very attractive plants. The leaves are regularly and laterally compressed, and the stems are always leafy to the apex. The colour is a particularly shiny and beautiful yellow-green.

Flowers. The flowers look like plastic—clear, shiny reddish-purple, rather thick in texture. The lip is narrow, without side-lobes, and has a small conical wart on the lower surface near the tip.



Dendrobium luteocilium Rupp

Habitat. Epiphytic on trees in most lowland areas, especially in beech trees on the small islands. It is especially common in Milne Bay Province.

Plant. A mature plant is often 1 m tall with several woody stems, the leaves are alternate, on most of the stem, dark green and hooked.

Flowers. The flowers are in pairs along the stem, each flower lasting less than a day. Each flower is about 10 mm long, yellow with gold on the lip; not widely open and the sepals and petals are narrowly oblong with the tips curling over the labellum. The plant flowers several times a year and grows quickly. A mature one with 6 to 12 stems in flower is a sight not easily forgotten.



Dendrobium williamsianum Rchb. f.

Habitat. The small *Antidesma* trees in the hot dry savannahs of Papua are the home of *D. williamsianum*. The orchids are also found in the tree tops where the lowland forest and the savannah meet, but not in such large numbers.

Antidesma ghaesembillia trees are less than 7 m tall and the long grass is about 1 m high. This ensures the tree's survival when the long dry season goes over the usual period. Very often the plants will be without rain for six months.

Large plants of *Coelogyne asperata*, *Vanda hindsii*, *Acriopsis javanica* and *Dendrobium bifalce* grow in the same trees, and small plants of *Diplocaulobiums*, *Bulbophyllums* and *Cadetias* grow around the base of *D. williamsianum*. *Platynerium wilhelmina-reginae* and *Nepenthes mirabilis* are common plants in the savannah.

Plant. The canes of this orchid are long and slender, but very strong. The plants will flower at an early stage, but the average length of the cane is from 3 to 3.5 m. Occasionally a longer plant comes in with canes over 5 m long, but these are generally from plants which have been reaching for the sun. The diameter is about 5 to 7 mm.

The leaves are medium green, in the top third of the stem, usually 12 to 14 cms, about 8 cm long and 2 to 2.5 cm wide. The leaves have a distinct yellow tinge in plants exposed to the sun. The plant sets pods freely, and seedlings in all stages of development are found on *Antidesma* trees. Back bulbs will propagate easily, but the plant does not make aerals.

Flowers. This is the only member of the section Phalaenanthe in Papua New Guinea, other than *D. bigibum* which has not yet been found in quantity.

The inflorescence is on an arching stem up to 20 to 25 cm long and the lovely flowers face downwards, so that unless the plant is high above head height the beauty of the purple labellum is lost.

The sepals are about 2 cm across pale mauve with darker purple veining and a purple flush in the top two-thirds, with faint purple lines and pointed.

The labellum is a rich dark purple shading to lighter purple with a creamy white margin. The keels are much raised, blackish-purple. The flowers last for 8 to 10 weeks.





Dendrobium insigne (Bl.) Rchb. f.

Habitat. Widely distributed in most of lowland Papua New Guinea. It is epiphytic on trees from the savannah to primary forest at 600 m and is very common on mangroves in various areas.

Plant. Mature plants grow into large clumps with woody, brittle stems from 50 to 60 mm long. The leaves are alternate, thick, fleshy and dark green. About three-quarters along the length of the stem the leaves reduce dramatically in size.

Flowers. Their colour is bright yellow with liberal reddish-orange markings, which are symmetrical broken lines. The sepals are 12 to 25 mm long, rounded on the top and arching sideways. The upper sepal is twice as long, sharply pointed and the tip sometimes bends forward. The lip is basically cream with 3 glistening white keels covered in soft white hairs.



Dendrobium acerosum Lindl.

Habitat. One of the commonest lowland orchids from Australia through Papua New Guinea to Malaysia and Borneo. There appear to be several closely related species and some confusion in nomenclature. It grows in full sun on rock faces and on any wild or cultivated tree.

Plant. The stems are pendulous, branching with the leaves flattened and fleshy, closely alternate for half the length, then elongating again for the flowering portion.

Flowers. The flowers are 1 to 1.5 cm long and hang downwards on the lateral part of the thin green stem. The upper sepals and petals are equal in size, the lateral sepals twice as wide, uniting to form the mentums. They are creamy with purple veins, and the lip has a central orange spot.



Dendrobium forbesii Ridl. var. *praestans* Schltr.

Habitat. Common in the mountain rain forests of Papua New Guinea between 2,000 and 3,000 m above sea-level. They favour strong light and air movement but no direct sunlight.

Plant. Like the other *Dendrobium* in this section, *D. forbesii* has several pseudo-bulbs thickening upwards from a slender base and with two or three strong green leaves at the top. The pseudo-bulbs widen very abruptly in these plants and are yellowish-green. The roots are particularly strong and fleshy.

Flowers. An endearing habit of the Latourea Dendrobes is their early flowering on quite small plants. The flower is creamy white with the backs of petals greenish and covered in white hairs. The flower is up to 30 mm across and long and a good plant will carry up to 15 flowers.

Dendrobium musciferum Schltr.

Habitat. This plant, with *D. bifalce*, shares the widest distribution of any of the section *Latourea*. This is essentially a lowland form, epiphytic in tall trees, especially in riverine forest and open forest.

Plant. The pseudo-bulbs are about 30 cm tall, with many ribs, and are yellowish-brown in colour. The three leaves at the top are tough and shining light green.

Flowers. There are between 15 and 20 flowers on each stem. The sepals are yellow, hairy on the outside, rather thick textured. Petals are a darker yellow, thin and wavy edged. The large side-lobes spread and then meet above the column; they are darker yellow, white edged with purple veins inside and purple spots outside. The mid-lobe is a warm yellow, with faint purple marks, the tip pointing abruptly downwards.



Dendrobium johnsoniae F. Muell.

Habitat. This species has a widespread but sporadic distribution throughout Papua New Guinea and is usually common where it occurs. It grows from an altitude of about 600 to 1,200 m and especially favours *Casuarina* trees along water courses and in gullies.

Plant. The pseudo-bulbs are slender, narrow at the base, widening abruptly for almost the full length, then narrowing below the leaves. The leaves are thin, tough and leathery, from 2 to 4, from 50 to 150 mm long and 12 to 40 mm wide.

Flowers. Flowers are on an upright inflorescence, varying with the size of the plant (which flowers when very small). They are between 65 to 120 mm across the outstretched petals, snow-white, the lip marked with purple inside. *D. johnsoniae* is the badge of the Orchid Society of Papua New Guinea.



Dendrobium retroflexum J. J. Sm.

Habitat. Rarely found below 2,500 m, *D. retroflexum* appears to grow in isolated areas in the cloud forest, epiphytic on the small trees near the tops of the ridges. This plant came from the Paiela area in the southern highlands.

Plant. An upright small plant with stems 12 cm tall, but usually less. They retain the enveloping bracts for almost the entire life of the stem. The leaves are few, dark green and firm, with two strong longitudinal veins on the undersides.

Flowers. The colour of this flower is almost translucent, sometimes with a glistening silver sheen. The column is dark olive green to almost black and the tip of the labellum bright red. The bracts at the base of the mentum are velvety greenish-yellow.



Dendrobium uncinatum Schltr.

Habitat. Epiphytic in moss-covered trees in the cloud forest, but it is common to find them growing in colonies on the moss-covered roots on the forest floor.

Plant. Each plant has several stems arising from the tightly packed root system. They are up to 12 cm tall, fleshy and with several dark green, narrowly pointed leaves.

Flowers. The flowers come between two top leaves, rarely one, up to 5 flowers opening at the same time. Current collections indicate that there may be several distinct variations. Colour forms found so far include orange, bright red, dark purple and white. The labellums are all dark green. Size varies from 2 to 3 cm wide across the petals and sepals, and they are from 3 to 4 cm long, fused together to form the mentum.



Dendrobium dryadum Schltr.

Habitat. Epiphytic on trees above the 1,500 to 2,000 m mark. It is common in the *Casuarina* trees which have grown up in old food gardens. The wet mountain mists keep the roots damp practically all the time.

Plant. The pseudo-bulbs grow into quite large clumps. They are brownish-green and the remnants of the protecting sheaths are persistent on the plant. The leaves are dark green, sometimes yellow-green from exposure to the sun.

Flowers. The inflorescence arises from the base of the pseudo-bulb and grows in tight clusters with 10 or more flowers. The flowers are bright purple with touches of white on the petals and labellum. They are very long-lasting, up to four months on the plant, and are almost always in flower.



Dendrobium oreocharis Schltr.

Habitat. This small plant comes from the very high mountains, rarely found below 2,500 to 3,000 m. It is epiphytic on the lichen and moss-covered branches of trees, most often in exposed positions and subject to extremes of temperature, wind and the hot midday sun and bitterly cold nights.

Plant. A mat-forming plant with the tiny pseudo-bulbs close together and often growing for 20 to 30 cm along a branch. The pseudo-bulbs are reddish-brown and the leaves dark green, heavily suffused with purple. This is a delightful miniature and the whole plant is never more than 4 cm high.

Flowers. The tiny flowers are brilliant orange or bright red and occasionally a clump of pure yellow is found. They flower for months at a time. In their natural habitat they seed very freely.

Dendrobium quinquecostatum Schltr.

Habitat. One of the commonest of all the section *Oxyglossum*, this orchid is found in most of the high mountain forest, above the 2,000 m mark in all parts of the country. It is especially common in the *Casuarina* trees in old food gardens, growing with *D. dryadum*.

Plant. The average height of the plant is 6 to 8 cm. The pseudo-bulbs are fleshy, thick, narrowing sharply at the top. The leaves are a little smaller than the pseudo-bulb, dark green, and slightly channelled in the middle.

Flowers. Several flowers open together at the top of the pseudo-bulb. They are wide spread, from 25 to 30 cm across the widest part. Petals and sepals are pinkish-purple, the column dark reddish-brown and the tip of the labellum red.



Dendrobium pseudo-frigidum J. J Sm.

Habitat. One of the earliest of the section *Oxyglossum* to be discovered. *Dendrobium pseudo-frigidum* is a high altitude orchid ranging from 2,000 to 3,000 m. It grows on moss-covered trees, and the higher one goes, the smaller the trees. Very often this orchid is collected at eye-level.

Plant. The plants are fairly uniform in size, from 3 to 4 cm tall, and grow into large mats. The leaves are shining dark green, and, like the flowers, very long-lasting.

Flowers. The plants are in flower most of the year. The sepals and petals are creamy yellow, the lateral sepals enclosing the mentum below the green column. The lip is bright orange. *Dendrobium pseudo-frigidum* was one of the first set of Papua New Guinea orchid stamps.



Dendrobium fulgidum Schltr.

Habitat. This plant is found in many areas throughout Papua New Guinea but the greatest concentration of the species appears to be in the islands of Milne Bay. They grow on the huge trees overhanging the beach.

Plant. A slender plant of many canes, often branching and rooting at many places on the stems. It is not uncommon to find plants up to 100 cm long. The leaves are thin, alternate and usually the full length of the new canes, but fall as the flowering nodes reach maturity.

Flowers. They appear in short clusters about 10 to 15 cm long with up to 30 flowers in each. They will flower from various nodes on the leafless canes for many years. Each flower is 20 to 25 mm long, bright golden yellow and lasts up to four weeks.



Dendrobium anosmum Lindl.

Habitat. Common in most lowland rain forest throughout Papua New Guinea. A pioneer plant which soon appears on large trees in the towns.

Plant. The long pendulous stems are between 40 to 60 cm long. The new pseudo-bulb has leaves almost its length and flowering takes place after the leaves have fallen. Sometimes only a portion of the stem will bloom, and small aerial plants are produced from the nodes. This is particularly common if the growing eyes are injured.

Flowers. The flowers vary from 50 to 100 mm across; one form has medium purple sepals and petals with a very dark purple lip. The flower illustrated is usually called var. *huttoni* and has white sepals and petals with a faint mauve blush. The labellum has two deep purple patches with the margins of the side lobes white.



Dendrobium confusum Schltr.

Habitat. This lovely orchid is found in many parts of Papua New Guinea, usually quite common in the particular area in which it grows. It is often found epiphytic on trees overhanging water.

Plant. The plants grow in a cluster of stems arising from the base; they are dark green and leafy all along the length, usually from 6 to 30 cm. The leaves are alternate, flattened and 25 to 30 mm apart.

Flowers. The flowers are pristine white, appearing at the ends or on the upper portion of the stem, 25 to 30 mm long and up to 20 mm wide. The tips of the petals and sepals are free, but join to make the mentum, which frames the beautiful labellum. The only colour is a touch of yellow on the mid-lobe.

Dendrobium malbrowonii Dockr.

Habitat. This is an epiphytic species which grows in almost any situation from the coast up to about 1,500 m. It is common on the trees overhanging the beach throughout the mainland and off-shore islands.

Plant. The stems of this orchid grow into large clumps, often to 30 cm in diameter. Each stem is up to 25 cm in length and is leafy for most of its length. The leaves are a light olive green, very slender and thin, up to 40 mm in length.

Flowers. The flowers are reversed on the stem, are borne on a short stalk and are about 10 mm in diameter. The petals and sepals are widely opened, creamy white, and the labellum is partly yellow, the rest a deep shining reddish-purple.

Dendrobium teretifolium R. Br.

Habitat. The 'Pencil Orchid' is found in the lowland forests and up to 1,500 m, especially in the *Casuarina* trees and *Nauclea* trees near rivers or in swamps.

Plant. Epiphytic in the high branches, the plant is pendulous. The stems are wiry, dark brown and much branched. From the end of each branch is one long pencil-shaped leaf, and the plant varies in size from 4 cm to 60 cm in length.

Flowers. A large plant can have numerous racemes of gossamer-like flowers. They vary in colour from pure white to purple and brown and there may be more species involved. Each flower is between 10 and 20 mm across and each branch can have 20 or more flowers. A mature plant in full flower is a beautiful sight.



Dendrobium cancroides T. E. Hunt

Habitat. An orchid of the lowland forest, especially common in the Western Province. It is widely distributed from North Queensland to Papua New Guinea.

Plant. The stems grow close together from a base of tough roots. They vary from 25 to 90 cm in length and are slightly flattened. The leaves are alternate on the stem, and they grow on almost the entire length. They are dark green and thin textured.

Flowers. The flowers grow in pairs, each one facing the other. They have very short stalks and are borne on the stems underneath the leaves. They are about 20 mm across, and not widely opened. The colour is reddish-brown with yellow markings and they have a warty appearance. The flowers last for less than a day.



Dendrobium roseipes Schltr.

Habitat. A forest species from about 450 to 1,000 m, usually epiphytic on the lower moss-covered branches of the trees. It has been collected in several similar areas throughout the country, but our knowledge of orchid distribution is far from complete.

Plant. The stems are up to 30 to 35 cm in length, the leaves falling before the plant flowers. The new lead is leafy throughout and yellowish-green. The older stem turns greyish-brown.

Flowers. The flowers are in clusters, up to 8 to 10, from the nodes of the leafless stems. The petals and sepals are white at the top shading into a delicate pink. Pedicel and mentum are a darker pink. Each flower is about 15 mm across the petals and sepals and about 20 mm long.



Dendrobium glomeratum Rolfe

Habitat. Although a few plants of this species have been collected in various parts of Papua New Guinea, its greatest distribution appears to be in the swamps beside the rivers in Western Province, and to a lesser degree in the equally wet Gulf District.

Plant. The stems vary from 25 to 50 cm, and are brownish-grey, with many nodes. The leaves appear with each new pseudo-bulb, are thin textured and dark green.

Flowers. The flowers come on the leafless canes and are in clusters of 6 to 10. Each flower is about 3 cm across. The petals and sepals are a deep rose pink, joining to form a rounded mentum. The labellum is bright orange, the tip of the column white. The flowers last for several weeks and the plants bloom several times a year.



Dendrobium chrysoglossum Schltr.

Habitat. The greatest concentration of this orchid is in the *Casuarina* trees on the banks of the Ramu River and surrounding forest at about 1,500 m. It has been collected in other areas at the same altitude, notably in the Waria Valley.

Plant. An epiphytic orchid with tough stringy roots. The pseudo-bulbs are usually between 20 and 30 cm long, brownish-grey. The new season's growth produces a stem with green leaves for all its length. The flowers appear on the leafless stems behind the new lead.

Flowers. The flowers are in clusters, very much like a small form of *D. glomeratum*. The petals and sepals are a paler pink and the lip is orange. It is free flowering, usually with several clusters on each stem. Each flower is 10 to 15 mm wide and long.



Dendrobium atrovioleaceum Rolfe

Habitat. This is the most famous orchid in Papua New Guinea. Hundreds of plants were taken to England in 1900 and none survived. Little was known then about the orchids of Papua New Guinea or their culture. It grows as an epiphyte on Rossel Island.

Plant. The pseudo-bulbs are narrow at the base, widening to club shape above. They are greenish-brown and 20 to 25 cm tall. The leaves, 2 to 4, are very stiff and tough and dark green.

Flowers. The inflorescence is about 20 cm long and carries up to 20 flowers, 50 mm across. They are fragrant, heavy-textured, and very long lasting. Petals and sepals are creamy white with purple markings on them. The labellum is green outside, and a rich violet-purple inside. The flowers face downwards.

Dendrobium bigibbum Ldl.

Habitat. Although *D. bigibbum* has long been ascribed to Papua New Guinea, it has not been collected in recent years. The plant photographed here was my first and it came from the Baimuru swamp country in the Gulf Province. It was growing on the branches of a *Melaleuca* tree in much the same conditions as the North Queensland plants.

Plant. The stems of this plant were 15 cm long, sturdy, and the leaves were very thin textured, mid-green and narrowly pointed.

Flowers. The stem measured 15 cm long and carried 6 flowers; the open flower was 3.5 cm across the widest part. Petals and sepals pale lilac, the labellum darker purple.

Little orchid collecting has been done in the swamp country and I believe that this plant will be found in quantity in this part of Papua New Guinea.



Dendrobium macrophyllum A. Rich.

Habitat. The rain forest, from 600 to 2000 m is the home of *D. macrophyllum*. There is still a lot of confusion in both taxonomy and habitat about the orchids in the Latourea section, mainly due to lack of communications and ability to reach the mountain areas.

Plant. The pseudo-bulbs are from 15 to 30 cm long, thin at the base and widening upwards. They are greenish-brown and the leaves are purple on the reverse and dark green with purple staining on top.

Flowers. The inflorescence is up to 30 cm long with up to 20 flowers from 4 to 6 cm across. The sepals and petals are creamy white, hairy and spotted with purple on the back. The labellum is greenish-white, with large spreading side-lobes heavily spotted with purple.



Dendrobium cincinnatum F.V.M.

Habitat. Epiphytic on beech trees, mainly *Calophyllum inophyllum*, near Wakaiuna on Normanby Island. I have collected extensively in Milne Bay and have not found this orchid anywhere else.

Plant. The slender canes are up to 80 cm long, a distinctive yellowish colour, and they grow into large clumps, often with 20 or more canes. The leaves are olive green, thin textured and pointed. The roots are particularly strong and wiry.

Flowers. The inflorescence is not long, about 15 cm, and has from 8 to 12 pure white flowers, well spaced on the rhizome, and long lasting. The petals are narrowly pointed, slightly twisted, the sepals are wider and curled and the beautiful frilled labellum is like the *Oncidium*. Each flower is about 3 cm long and wide, with a faint perfume.



Dendrobium conanthum Schltr.

Habitat. This orchid has sporadic distribution in widely separated areas, but in the swamps of the upper Sepik it is as numerous as *D. lasianthera*. The plants are impossible to distinguish when not in flower. The older plants are not so robust as *D. lasianthera* of equal age.

Plant. Canes are up to 3 m tall, usually less, and the dark green leaves are to 15 by 6 cm. This species often side branches from nodes on the back bulbs and plants with several flowering stems and 2 or 3 green leafed ones are a joy.

Flowers. The inflorescence is up to 50 cm long with from 15 to 25 flowers. The colour is gold with dark purple lines on the inside of the large flaring side-lobes and the tip of the labellum.



Dendrobium warianum Schltr.

Habitat. The distribution of this species is in lowland forest and especially on trees on the small islands in the reefs, from the Huon Gulf to Milne Bay.

Plant. The canes are sturdy up to 70 cm long. The leaves are wider than most others in the Ceratobium section and are tough and dark, glossy green.

Flowers. The inflorescence is up to 25 cm long with 15 to 20 flowers. The colour varies through all shades of yellow and brown. Background colour on the sepals and petals is usually yellow, closely veined and suffused with brownish-purple. The side-lobes are erect on either side of the column, the edges of the mid-lobe are crimped, the yellow tip turns under, and the keels are white edged with purple.



Dendrobium rhodostichum Schltr.

Habitat. Found in rain forest above 1,500 m. Usually epiphytic, it is also a pioneer plant. In building of the road from the coast to the mountains for the giant copper mine on Bougainville Island, a cutting was made through a mountain to the site and the cliffs above it are about 60 m high. Four years after the road was cut, I found *D. rhodostichum* in flower on the cliff.

Plant. The stems are very slender, but widen to an ovoid pseudo-bulb. The leaves are dark green.

Flowers. The sepals and petals are lax and irregular in shape. The labellum folds to a sharp point at the tip, and the purple veining is the only colour on the white flower.

Dendrobium coeloglossum Schltr.

Habitat. A rain forest species from about 450 to 800 m, growing epiphytically on the branches or trunks of large trees.

Plant. The stems of this orchid are slender for half their length and then widen to 1.5 cm in diameter. They are yellow at maturity. The new shoot comes up from a series of bracts with a pair of leaves, very pale in the developing stage but dark green when fully grown. The old stems die off and the average plant is of 4 to 6 stems.

Flowers. The inflorescence of 2 to 4 flowers comes from the base of the top node. The sepals and petals are creamy, thick textured, sepals and petals uniting to form the mentum. The side-lobes and labellum are yellow with some orange markings. The flower is about 3 cm long and 2 cm wide.



Dendrobium dichaeoides Schltr.

Habitat. A very common orchid in the montane forest from 1,500 m to 2,500 m. It is usually found in among the epiphytes (Rhododendrons, ferns, orchids, Gesneriads, etc.) on large trees. At the highest extent of its range, it grows in small tufts among the lichen.

Plant. A pendulous orchid with soft stems from 3 to 13 cm long. Leaves are at right angles to the stems, slightly crimped in appearance, grooved by the mid-rib, and bluish-green in colour. It has small roots at any point on the reverse side. This plant survives any weather except direct sunlight.

Flowers. The flowers are terminal, typical of the Pedilonum section, a rich cerise-purple. There are from 6 to 10 flowers in each cluster and they are long-lasting.



Dendrobium trachyrhizum Schltr.

Habitat. A lowland forest species which is found in colonies in various areas up to about 600 m. It grows in semi-shade, never in direct sunlight. It is often found in gallery forest along wet-weather water courses.

Plant. A mature plant has many stems, many of them leafless, on which the flowers appear for several seasons. They are up to 45 cm long, curiously banded fawn and brown. The leaves are very thin textured, dark green and pointed.

Flowers. The inflorescence is short, from 4 to 8 cm with 3 to 4 flowers on each, and it is usual to find several on each flowering stem. The flowers are creamy white. The labellum is large and the tip bi-lobed with dark purple and green markings.



The Section Grastidium

This section of the *Dendrobiums* cannot be overlooked in any introduction to the orchids of Papua New Guinea. It is a section of numerous species which reach their greatest development in Papua New Guinea, where about 80 have been recorded. The habit of the flowers, most of which last only one day, a few lasting two days, has precluded any serious interest being taken by amateur collectors.

The plants are in tufts from a few to many, and plants are from a few centimetres high to nearly 2 m. The leaves vary from grass-like foliage (from which the section takes its name) up to 10 cm long.

Most of the species are epiphytic but some are equally at home on the ground.



The flowers on this species are bright purple in colour with a touch of white in the labellum and mentum. They are in pairs, sometimes single, from the nodes between the leaves. This is not a common orchid and I have only seen three plants.

The stems are up to 30 cm in length, greenish-brown and not woody. The leaves vary with the size of the plants, up to 10 cm long or more. They are dark emerald green flushed with purple and a dull purplish-green on the reverse.

The plant tends to be overlooked by collectors as the flowers appear behind the leaves and are often not visible from the front. I have collected this once from Kikori River and twice on the Sogeri Plateau.



The beautiful white flowers pictured here are from a plant growing in the rain trees along Markham Road, Lae, in the heart of the town.

The flowers are in pairs from nodes on the woody stem, the petals and sepals are equal in length, usually 10 cm, measured from the base to the tips. They are pure white except for a little yellow in the fringed labellum.

The plant grows into huge clumps with up to one hundred stems, each up to 1 m in length. The habit of the mature plants is pendulous, and they hang down from the interlocking branches over the road. They flower several times a year and are a beautiful sight on that particular day. The leaves remain on the plant for many years.

Identification Problems

Anyone working on botanical matters in Papua New Guinea must find species, not necessarily new to science but new to the explorer. Schlechter and J. J. Smith did some very comprehensive work in the early years of this century, and sporadic identification comes in from the odd plant. Some of the major world herbaria are holding hundreds of sheets of orchid material from Papua New Guinea and lack of literature plus access to the type, plus pre-occupation with the flora of other countries, has precluded identification. Although it is easy for anyone to identify a plant wrongly, no one likes to do so in print. The only consolation that any orchid author has is that if anyone believes an orchid wrongly identified, he will correct it.

Latourea Dendrobiums

The golden orchid is terrestrial, found on the forest floor in deep leaf mould and full shade, flowers to 1.5 cm across and wide.



I first saw this beautiful little orchid at the first international orchid conference held in Port Moresby. It was brought over by a Papua New Guinean member, who had collected it near his home village, Finschhafen.

The plant is very like the common *Dendrobium bifalce*, and anyone giving it a cursory glance when on patrol would also class it as such and leave it there. The stems are more slender, and the leaves thinner in texture and tapering to a sharp point.

The habit of the inflorescence is the same, slender stem to 12 cm high, with 4 to 8 flowers. The photograph is the best description of this plant. Petals and sepals are apple green and the beautiful labellum is striped and suffused with rich purple.



This is *Bulbophyllum nasica* Schltr. and its correct name came to me a few months ago. It is a small plant of the mountain rain forest, from 850 to 2,000 m.

The whole plant is usually less than 6 cm tall. The dark greenish-brown pseudo-bulbs are close together and the leaf is medium green, with a blunt tip. The petals are dark red, the upper sepal is fringed on the reverse side and the two lateral sepals are wide at the base, narrowing abruptly to a thin, folded tip in the lateral third. The labellum ends in a bright golden extended tip.



Dendrobiums: Variations of the species

The Dendrobium Phlox Alliance

In spite of the considerable knowledge we have of the species of the Latourea section, the names applied to the individual orchids are more confused than any others. I suspect there are even more variations of these than there are in the Ceratobiums.

The one pictured here is known locally as 'one of the *Dendrobium musciferums*'. The parts of this flower are very distinctive. The upper sepal leans forward, is yellow inside, greenish on the reverse and covered with white hairs. The lateral sepals are yellow with dark purple spots on the reverse, the sepals are yellow.

The distinctive feature is the labellum. The large side-lobes are yellowish with longitudinal purple veins and the median lobes and tip are apple green.



The variations of this species appear to be infinite. You can get into more trouble climbing around the high mountains trying to sort out the coloured forms of *D. phlox* than you can sailing a trawler in the off-shore islands collecting *D. lineale*. I strongly suspect there are several distinct species involved, and until some institution undertakes the mammoth job of sorting out the Papua New Guinea Orchidaceae, they will stay involved.

This is one of the bright red-orange yellow tipped petals and sepals form. It is distinct in many respects, grows in the highest altitudes, is a large (to 1 m long) plant, much branched, flowers on leafy and leafless stems, very floriferous and colours very vivid.

The yellow form of *D. phlox* has many variations within itself, in size and growing habits. It grows epiphytically on trees, on rocks and terrestrially in the peaty swamps. It is constant only in the clear yellow colour of the flowers and in habitat: it grows always in the cold high mountains.

In the swampy valleys of the high mountains the yellow form grows in profusion in the peat and sphagnum moss. It is an erect, much branched form, like a small shrub.

The Orchidaceae in these swamps present one of the most interesting ecological studies in the world of botany.

Many orchids classed as epiphytes grow there, and a host of epiphytes about which we know very little.

Dendrobium 'Mushroom Pink'

Another *Dendrobium* from New Britain which became known at the same time as 'Pomio Brown'. Several educated guesses have been made as to its scientific name but none has been accepted by the taxonomists, so we continue to hide behind the safe *Dendrobium* sp.

The petals are yellow, three and half times twisted, at 45° angle to the upper sepal, which is erect above the column, the top half curling crisply over and under. The lateral sepals flare out from the column, curled in the same way, and the colour is mushroom pink. The side-lobes are large, flare outwards and have dark lilac veining. Tips of the mid-lobe on keels are lilac. The texture of the flower is firm and crisp, colour beautifully glossy.



'Pomio Brown'

Dendrobium 'Pomio Brown' is one of the finest orchids in this country. The flowers should be a judge's model of what is required of a *Ceratobium Dendrobium*. It became well known between 1958 and the early 1960s when it was collected from a small island off Pomio, in New Britain. There was no literature relative to the plant and its environment, and so the locality and colour became the horticultural name: *Dendrobium* 'Pomio Brown'.

The texture of the flower is firm. The petals are obliquely erect, 3 times twisted, 4 to 5 cm long, glossy bronze-brown with a thin yellow margin. The upper sepal twists back and curls under, similar colour with yellow staining and border. The later petals are turned under and the same colour. The labellum has a mauve tip.



There are over 500 different species of *Dendrobium* in Papua New Guinea and nobody knows how many floral variations. This presents a very difficult task to a taxonomist who already has enough difficulties with the great diversity of plant form. The inability of past scientists to undertake systematic exploration and recording of the vegetation leaves great gaps in knowledge of the geographical distribution of the species.

The white form of *D. smilliae* is found in the Sepik swamps, growing with *D. lasianthera* and *D. conanthum*. The plants are much larger than elsewhere, owing to the growing conditions. The flowers are a sparkling white flushed with pale green on the mentum and pedicel. The tip of the labellum is vivid, shining dark green. The canes are clear yellow.



Bulbophyllum

The genus *Bulbophyllum* is the largest in Papua New Guinea, Schlechter acknowledging 569 species, and it is certain that more have been found since his day. Some are known and named and frequent collections have been made. Others have one or two imperfect herbarium specimens and there is still much to be discovered. There are large plants such as *B. macrobulbum* with the leaf often over 1 m in length, to the species very minute in both flower and plant structure.

The attractive reddish star-shaped species shown here came from the Kikori River. The pseudo-bulbs are brown tinged with red, about 10 to 12 cm long and the solitary leaf almost twice as long. The leaf colour olive green on top, yellowish below.



Bulbophyllum c.f. *elisae* (F.Muell.) Bth.

Habitat. Lowland forest from 600 m upwards is the home of this attractive *Bulbophyllum*, epiphytic on large trees, especially near water courses. This has been identified as *B. elisae*, and is almost identical to the Australian species. The colour is the only difference. Dockrill describes *B. elisae* as usually a rather vivid green, occasionally very pale with a pinkish tinge, or, rarely, wholly reddish-purple. The Papua New Guinea plants are all pale yellow wherever they are found.

Plant. The pseudo-bulbs are to 3 cm tall, and the leaf is up to 12 cm long by 2 cm wide.

Flowers. The inflorescence is up to 20 cm long, sometimes longer. The flowers face downwards and are a uniform lemon yellow. The lateral sepals are about twice as long as the upper sepal, and have a slight fragrance.



Pedilochilus c.f. *flavum* Schltr.

Habitat. A high altitude species within the 2,500 to 3,000 m band. It is epiphytic on the moss-covered branches of large trees on the slopes of Mt Kaindi, and in similar areas throughout the country.

Plant. The habit of the plant is very similar to the genus *Bulbophyllum*, and if collected not in flower is usually classified as such. The pseudo-bulbs are green and the young shoot is protected by a papery sheath. The leaves are to 5 cm long, tapering to a sharp point.

Flowers. The inflorescence is to 4 cm long, very slender, pale green, whitish at the top. The pedicel arises from a yellow bract and supports the flower with its soft, yellow pouch. The plant seeds freely as can be seen in the picture.

Bulbophyllum trachyanthum Krzl.

Habitat. A *Bulbophyllum* of the high mountains which is found growing epiphytically on the moss-covered branches of big forest trees, and also in sphagnum moss near the ridge-tops between 2,300 and 3,000 m.

Plant. The pseudo-bulbs are tan in colour, from 3 to 5 cm long, wide at the base and about 1.5 cm at the leaf base.

Flowers. The petals are very tiny on each side of the column. The upper sepal is hooded, a creamy colour with deep red closely-set spots and dark red at the base. The tip narrows abruptly behind the hood and shades to bright yellow. The lateral sepals are purplish-red at the base and then yellow. They are joined at the base, but as the flower grows they turn yellow and elongate to 7 cm or more, twisting together.



Bulbophyllum cinciatum J. J. Sm.

Habitat. A forest species from the lowland forests to about 1,500 m. It is epiphytic on a variety of trees, usually on high branches in the canopy.

Plant. The pseudo-bulbs are very close together, flat on the bottom and somewhat conical in shape. They are reddish-brown, up to 3 cm across at the base and narrowing to about 10 mm at the top, from which comes the medium green leaf. The plants grow in mat formation.

Flowers. The flowers come from the base of the pseudo-bulb, on very short pedicels. They measure about 2 cm across at the widest point, and about the same length. Their colour is wine-red with white stripes and the intricate shape of the lip is enhanced by the yellow and red colouring.



Bulbophyllum streptosepalum Schltr.

Habitat. A very common orchid in the forest, from 500 m in the lowland rain forest to 2,500 m in the cloud forest.

Plant. The pseudo-bulbs are greenish-yellow, closely set and branching in all directions to make a compact little plant up to 20 cm long and 10 cm or more wide. The leaves are a shining olive green.

Flowers. The stem is usually about 7 cm, very slender and brittle and slightly arched at the very top. The tiny petals are blackish-purple. The upper sepal is large, about 1.5 cm across the widest part, and the colour is tessellated wine red. The lateral sepals are much the same colour with a little yellow and they narrow to a long thread, twisting around each other. The plant is very free-flowering.



Bulbophyllum baileyi F. Muell.

Habitat. A widespread lowland orchid found in many parts of Papua New Guinea, very common in the Trans-Fly. It is epiphytic on a variety of trees, especially along river banks.

Plant. The rhizome is thick and the pseudo-bulbs are set well apart, each one up to 25 mm high, and with one erect leaf, from 5 to 20 cm. They are yellowish-green and slightly bi-lobed.

Flowers. The inflorescence is erect, 4 to 10 cm long, and has one flower, which is about 3 cm in diameter and faces upwards. The sepals and petals are cup-shaped; the colour is creamy white with reddish spots on both sides. When the flower is fully mature it turns pink before dying. The flower has a strong spicy-honey smell.



Bulbophyllum longiflorum Thou.

Habitat. This is a rain forest species, up to 600 m or more and is found in many parts of the mainland and offshore islands.

Plant. An epiphytic *Bulbophyllum* of the *Cirrhapetalum* section, the plant resembles several other *Bulbophyllums*. The rhizome is woody, of many internodes with pseudo-bulbs 30 mm long or more each about 10 mm apart. The leaf is up to 15 cm long, thick and dark green.

Flowers. The inflorescence is on a slender stem about 6 to 12 cm tall with 6 to 8 flowers radiating from the tip. Each flower is up to 4 cm long, greenish-cream with many purple dots and suffusions. The petals and the lip are purple. The petals are small, the side sepals are joined together at their top margins, and the lip is slender.



Bulbophyllum fletcherianum Rolfe

Habitat. Rain forest up to 600 m and several special localities such as cliff faces and rocky outcrops. This is not a common species but there are usually large colonies where it grows.

Plant. The pseudo-bulbs are large, up to 10 cm long and 5 cm in diameter. The colour is dark olive green with a tough pitted exterior and they have one long, strap-like leaf. The colour of the leaf is usually dark green with purple overtones, a narrow purple margin and the reverse side is distinctly purple.

Flowers. The outstanding characteristic of the flowers is their unpleasant odour, which attracts all the blowflies in the area. The flowers do not open widely. The colour is a rich velvety red, and the mentum and pedicel are white.

Bulbophyllum orthoglossum Krzl.

Habitat. This is essentially a forest species, and is epiphytic on trees in many parts of the islands.

Plant. The pseudo-bulbs are evenly spaced on a sturdy rhizome. They are erect, smooth, pale green and oval in shape. The new leads are covered in rather sticky bracts which fall away as growth proceeds. The solitary leaf is from 150 to 200 mm long, fleshy and dark green.

Flowers. The flower stalk arises from the base of the pseudo-bulb, taller than the leaves. The flowers open in succession, usually from 4 to 6 on each stem. The petals and sepals are shining greenish-yellow, the lateral sepals folded close together. The sepals are twice as big as the petals; labellum is thick, deeply channelled in the median lobe, the tip is reddish-purple.



Bulbophyllum graveolens J. J. Sm.

Habitat. Exact distribution of this plant is uncertain. It appears to go right through to Indonesia, and has been collected in several areas in Papua New Guinea.

Plant. The light green angled pseudo-bulbs are on a strong, creeping and branching rhizome. Leaves are a shining mid-green, thick and tough.

Flowers. The scape is about 170 mm long with 2 or 3 green bracts at the base. The 7 to 9 flowers are arranged in a fan shape; upper sepal 25 mm long and 10 mm wide, erect lateral sepals to 38 mm long, joined together and pointing forward, pale green marbled reddish-purple inside. The petals are very small, about 8 mm long and wide, pointed at either side of the column. The labellum is curved in a semi-circle, orange, darkening to reddish-purple. Flowers last about two weeks.

Bulbophyllum sessile (Koen.) J. J. Sm.

Habitat. Again exact distribution of this species in Papua New Guinea is unknown, but as in Java, Sumatra, Borneo and Malaysia, it is abundant as an epiphyte on trees in open forests. In the Port Moresby and Lae areas it is often found on huge rain trees planted in the early days of town building.

Plant. The rhizomes are slender, pendulous and much branched. The pseudo-bulbs are small and sit close to the rhizome; leaves are fleshy, dark green and tough.

Flowers. The tiny flowers are borne from all nodes on the rhizome, with very conspicuous sheaths. Sepals are about 4 mm long, creamy tipped with pale yellow; petals are 1.5 mm long and creamy in colour. The lip is about the same size and yellowish-green.



Bulbophyllum grandiflorum Bl.

Habitat. Distributed from Papua New Guinea to parts of Indonesia, it is usually epiphytic up to 500 m.

Plant. Pseudo-bulbs are widely spaced on a creeping, branching rhizome. The leaf is stalked, one to each bulb, up to 150 mm long and almost 50 mm wide. It is bluntly rounded, bi-lobed, bright green, thick and tough. Plants growing in the sun have yellowish leaves. If there are 3 or 4 leafless pseudo-bulbs behind several strong growing ones, a new shoot almost always appears.

Flowers. Though not beautiful, the flowers are large enough to make a well grown plant a conversation piece. The upper sepal is 100 to 130 mm long by 40 to 50 mm wide; the lateral sepals are about half the size, curiously curved and twisted. The overall colour is greenish-yellow with greyish mottling.



Bulbophyllum fritillariflorum J. J. Sm.

Bulbophyllum arfakianum Krz1.

Habitat. This orchid is widespread in Papua and some of the New Guinea islands, and may even be common on the New Guinea side in certain areas. It is one of the commonest *Bulbophyllums* on the Sogeri Plateau.

Habitat. This is an epiphytic orchid in many parts of lowland Papua New Guinea. It is often found in long mats on horizontal branches about 10 to 15 m above ground.

Plant. The pseudo-bulbs are erect and firm, purplish on a woody rhizome. An undisturbed plant will completely encircle a large branch, and climb upwards for several metres. Leaves are one to each pseudo-bulb, dark green, stalked and about 100 mm long by 40 mm wide, blunt, rounded and slightly bi-lobed.

Plant. This plant grows into large mats up to 75 cm long. The rhizome is creeping, woody, the pseudo-bulbs firm and light green. Leaves are thick, fleshy and narrowed to a blunt tip, with a dark purple flush.

Flowers. The flowers are very striking, unusual rather than beautiful. Each single flower is on a sturdy, very straight stem, 100 to 150 mm long. The upper sepal is about 70 by 50 mm and the laterals are just as long, joined together and pointing forwards. The basic colour is yellowish-green, but it is closely marbled with purplish-red.

Flowers. Basic colour is off-white, very closely marbled in pinkish-red. The tiny petals are dark red. The upper sepal is curved gracefully down to the tips of the lateral sepals. These are fused throughout their length. The edges of both upper and lower sepals are folded up and towards the centre. The plant flowers several times a year.

Bulbophyllum cheiri Lindl.

Habitat. A species of the lowland rain forest, distributed from Papua New Guinea to Malaysia. It is one of the first epiphytic orchids to colonise on rubber trees, especially near water courses.

Plant. The plant grows into sizable clumps of many light green pseudo-bulbs each with one bright green leaf about 12 cm long, oval and with a rounded tip.

Flowers. The solitary flowers are on a brittle scape about 12 cm long. The small petals are about 5 by 2 mm, curved over the dark brown lip. The lateral sepals are red, wider at the base, narrowing to slender white points. The upper sepal is red, yellow margined; the sides close abruptly forming a cup shape above the column and narrowing to the yellow tip.



Bulbophyllum halianum Schltr.

Habitat. A very common orchid in the lowland rain forest.

Plant. It grows into large clumps of 100 or more pseudo-bulbs on a creeping and branching rhizome. The pseudo-bulbs are spaced about 1 cm apart and are smooth and light green. The leaves are dark glossy green and rounded at the tip.

Flowers. This photograph is the best description of this beautiful little flower. The petals are dark reddish-purple and hooded over the labellum which narrows abruptly to a dark red thread. The upper sepal is erect, very closely veined in red and with a white margin. The long slender lateral sepals may be separate but are often twisted together. They are dark red with a purplish sheen with a vivid yellow margin.



Bulbophyllum tolleneniferum J. J. Sm.

Habitat. A lowland rain forest species, common on the Sogeri Plateau. It is found epiphytic on the branches of tall trees on the forest edge.

Plant. The rhizome is thick, woody and covered with chaffy bracts. The plants grow in a solid mat. The pseudo-bulbs are pale green, ovoid, to 4 cm tall. The leaf is thick, bright green and slightly bi-lobed.

Flowers. The flower stands above the mass of pseudo-bulbs on a yellow pedicel. The whole flower has a shine like plastic. The petals are half the size of the sepals and sulphur yellow in colour. Both sepals and petals have green tips on the reverse side. This photograph shows the fruit fly, *Drosophila*, in the act of pollinating the flower, which closes up afterwards and almost every flower sets a pod.



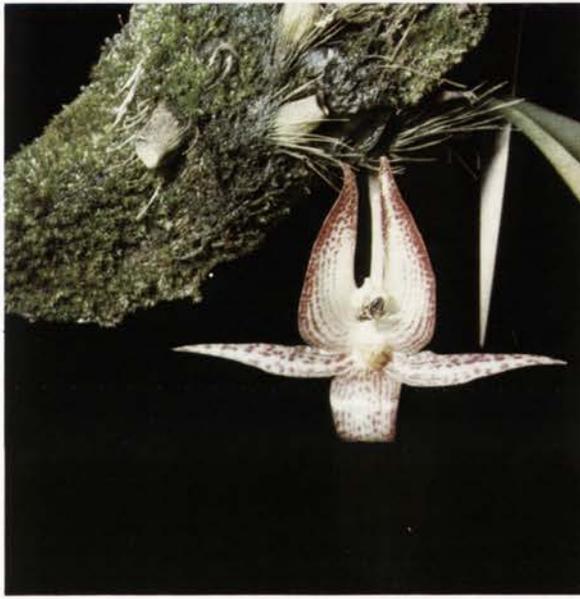


Bulbophyllum macranthum (Lindl.)

Habitat. Essentially a forest species, *B. macranthum* is found up to 1,200 m. Distribution is fairly even throughout the mainland and islands and west as far as Malaysia and Sumatra.

Plant. The rhizome is strong and woody, with very persistent sheaths, remaining as groups of fibre at the base of each leaf and pseudo-bulb. The pseudo-bulbs are light to medium green, usually smooth, and about 10 to 12 cm apart. The leaves are fleshy, 25 to 35 cm by 7 cm, narrowed at the stalk and widest near the rounded top. The rhizome branches if damaged and, in cultivation, beautiful specimen plants develop if a sharp cut is made every 6 or so pseudo-bulbs, making sure there are 3 or 4 strong well-leaved bulbs in front.

Flowers. The flowers are distinguished by their very beautiful shining petals and sepals, and their wide opening habit, not very common in *Bulbophyllums*. The sepals are about 3 by 1 cm, the wide spreading petals slightly smaller. The upper sepal and petals are white, with many reddish-purple spots in fairly regular lines. The lateral sepals are yellowish on the inner edges, similarly spotted on the outer. The lip has short, spreading side-lobes at the base.



Pollination of *Bulbophyllum macranthum*

1. Flower newly opened, sweetly scented and ready to welcome the pollinator.
2. The insect alights on the slippery sepals, which tip it neatly on to the column, tail first.
3. In pulling itself out, the insect holds on to the side-lobes of the lip. Its tail then comes into contact with the rostellum and the pollinia is removed.
4. This is deposited on to the stigma when the insect visits another flower. The petals and sepals close shortly afterwards.

Other Orchids

Acampe longifolia Lindl.

Habitat. Our plants were found at Kikori in Gulf Province of Papua New Guinea, but I believe this orchid is well distributed throughout the mainland of Papua New Guinea, and from the Sikkim Himalayas south to Malaysia. My plants were found in the forks of large trees 15 m from the Laloki river bank.

Plant. The stems are sturdy, often branching, and reach a length of 4 m. The leaves are thick, tough, dark green and are about 10 to 12 cm long and up to 4 cm wide.

Flowers. The inflorescence is erect, sometimes with one or two side branches. The flowers are bunched together, not opening very widely (1.5 cm wide and high). The sepals and petals are yellow with crimson spots and markings. Labellum is white with purple spots.



Robiquetia gracilistipes (Schltr.) J. J. Sm. L.

Habitat. An epiphytic orchid which grows on trees or on rock faces up to 600 m. It will grow equally well in shade or in almost direct sunlight.

Plant. The stem grows from a strong root system and mature plants usually have several short branches developing near the base. It is leafy throughout with long aerial roots at many nodes. The leaves are dark green, fleshy and brittle.

Flowers. The racemes are pendulous, between 20 and 35 cm long, and carry 40 or more flowers, from 7 to 10 mm in diameter, a brownish-yellow with tiny dark red spots. The labellum is very beautiful, 3-lobed and spurred. The side-lobes are very small but the middle lobe is reversed and pear-shaped. The flowers have a distinct but delicate fragrance.



Dendrochilum longifolium Rchb. f.

Habitat. One of the commonest orchids in Papua New Guinea, growing from 1,000 to 2,500 m in rain forest. It is epiphytic on trees and equally common on cliff faces. On the heaps of rocks left by gold mining it settles among the crevices and grows into large clumps.

Plant. The pseudo-bulbs are conical in shape, close together, 8 to 10 cm long, pale green and smooth. The leaf is up to 45 cm long by 7 cm wide, mid-green, and thin textured.

Flowers. The inflorescence is about as long as the leaf, very slender and carries up to 40 flowers. They are pale green and the labellum is sepia coloured. The sepals and petals are about 9 mm long and are very narrow. The lip has small side-lobes, and the mid-lobe is 2.5 mm wide.



Epiblastus basilis Schltr.

Habitat. A rain forest species from 1,400 m upwards. It grows among the epiphytes on the branches of the giant trees, but at about 2,000 m upwards it is common on the moss-covered banks above the hunting tracks in light shrub cover.

Plant. The plant has pseudo-bulbs of many joints and can be pendulous or erect. Each shoot produces one folded leaf, fleshy, shining dark green, and from 5 to 15 cm long.

Flowers. The flowers come from the base of the leaf, 6 or more, on pedicels up to 8 cm long, dark green. The ovary is dark rose red as is the mentum and the tips of the petals and sepals and the inside are pale pink. The flowers are long-lasting and the plant seeds freely.



Ephemerantha rhipidolobium Schltr.

Habitat. A lowland plant found up to 300 to 400 m in many situations: rain forest, on the rocky cliff faces and in the scattered trees in the savannah.

Plant. The plant has many close erect branched shoots from 20 to 40 cm high; the pseudo-bulbs are slightly flattened, about 5 by 2 cm. They are greenish-brown and the leaf is olive green.

Flowers. The flowers are at the base of each leaf, and about 1.2 cm across. The sepals and petals are white with a suffusion of pale green at the base and the sepals are spotted purple on the reverse side. The labellum is cream with purple spots on the side-lobes and at the base of the mid-lobe, which widens from a narrow base, edges folded, with 2 wavy keels.



Ephemerantha comata (Bl.) P. F. Hunt & Summerh.

Habitat. A common lowland forest orchid throughout Papua New Guinea.

Plant. A mature plant has rootless branching stems up to 1 m long, sometimes erect, sometimes pendulous. Each branch is terminated by a pseudo-bulb which decreases in size as each one succeeds the other. There is one light green leaf to each pseudo-bulb.

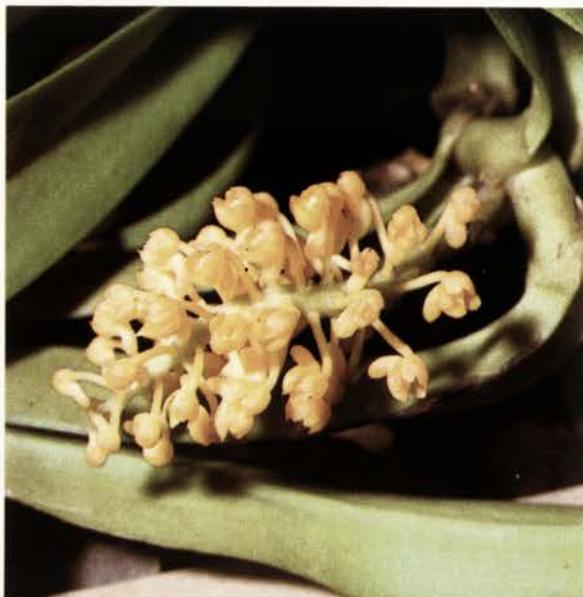
Flowers. The flowers are in clusters from the top of each pseudo-bulb, from 1 to 5 or more, and last less than one day, but the stems flower frequently. Each flower is about 25 mm wide, deep cream with faint purple lines at the base of the petals and sepals, the side-lobes purple. The end of the lip is densely fringed with long thick hairs, crimped, and the colour varies from cream to mauve.

Robiquetia c.f. squamulosa J. J. Sm.

Habitat. A lowland species found in coastal rain forest, in scattered trees in the savannah and in various situations up to 500 m. It is widely distributed throughout the country and appears to grow on anything it can take root on.

Plant. A small plant, with a very short stem and fleshy leaves in the habit of *Vanda hindsii*. The leaves are curved, to 12 cm long and 3 cm wide. The roots are often 3 or more small plants clustered close together on the rhizome.

Flowers. The inflorescence is short, with flowers its full length which is between 6 to 10 cm, and there are 20 or more flowers crowded all around the stem. They are a bright uniform gold with a few reddish spots inside and the pedicel is a lighter yellow.



Robiquetia mooreana (Rolfe) J. J. Sm.

Habitat. A beautiful orchid growing on trees in the rain forest from 200 m to over 1,000 m. It prefers shade, but needs a strong light intensity to flower well.

Plant. The stems are more or less pendulous turning upwards in the lateral third. Often the plant branches at the base, and the stems can be 60 cm long, sometimes more. The leaves are 20 cm long and 5 cm wide, glossy dark green, unequally bi-lobed.

Flowers. The inflorescence points straight down to the ground, to 30 cm long, and the rachis is densely covered with flowers, which gradually open from the bottom up. The sepals and petals are red, upper sepal concave about 5 by 3 cm, lateral sepals a little wider. The lip is red with yellow at the base of the column.



Sarcanthus litoreus (J. J. Sm.) Schltr.

Habitat. A common epiphyte in all parts of the country from the coast to over 1,000 m. It will grow in almost complete shade and tolerates a lot of sunlight.

Plant. The stems are erect, pendulous or scrambling, up to 30 cm or more, with aerial roots at any point on the stem. The leaves are olive green, 10 to 12 cm long, fleshy, grooved and tapering to a point. The stems branch at various nodes and the plant grows into sizable clumps.

Flowers. The inflorescence is up to 15 cm long, and has up to 20 flowers. The sepals and petals are a translucent white when first opened; the labellum is a pale lilac and the spur is white with a lilac flush. The whole flower turns yellow within a week of opening.



Tapeinoglossum centrosemiflorum (J. J. Sm.) Schltr.

Habitat. This small plant is epiphytic on large trees in the rain forest from 800 m upwards. This is the only plant I have seen in flower. It was collected in the ranges behind Varirata in Central Province.

Plant. The pseudo-bulbs are about 2 cm tall and the same across the base. They are spaced 3 cm apart on the creeping rhizome, are olive green in colour, four angled and narrow sharply to the top. One thin dark green leaf up to 4 cm long is semi-pendulous from the top of the pseudo-bulb.

Flower. The flower of this delightful miniature resembles a little duck, and sits straight at the base of each pseudo-bulb. The colour is dark red and white. We were able to photograph this plant but unhappily broke it in collection.



Podochilus australiensis (F. M. Bail.) Schltr.

Habitat. Common in the trees in the lowland rain forest, and up to 1,000 m. It is also native in North Queensland. The plants are of botanical interest rather than a collector's item.

Plant. The stems are usually erect, sometimes pendulous, 30 cm or more tall, the new stems leafy throughout, the older ones lose their leaves gradually from the base upwards. The leaves are to 5 cm long, thin textured, glossy mid-green.

Flowers. The very short inflorescences are borne from nodes in the upper half of the stem and there are from 1 to 6 flowers, each about 4 mm in diameter. The colour is creamy white with a flush of green. The plants are usually in flower for several weeks and it is a very pretty plant.



Podochilus microphyllus Lindl.

Habitat. Distributed throughout the country in lowland rain forest to 1,000 m.

Plant. The stems are up to 30 cm long about 10 mm thick. The leaves are very close together, sharply pointed, twisted at the base and about 10 by 4 mm. They are a shining green, suffused with purple on the reverse.

Flowers. The inflorescence comes from the top of the stem and also between the leaves. The flowers are in groups of up to 4 in each cluster, and each one is no more than 4 or 5 mm long. They are white, the upper sepal hooded and the laterals united to form a mentum, all three sometimes with a median purple line. The petals have a purple patch in the centre. The zig-zag pattern of the inflorescence is most attractive.

Eria imitans Schltr.

Habitat. The exact distribution of this species is not clear. It grows as an epiphyte on trees and also as a terrestrial on the forest floor up to 1,800 m.

Plant. The pseudo-bulbs are clustered, rather sharply four-angled, about 50 mm in diameter at the base and less than 25 mm at the top. The leaves are a shining soft green.

Flowers. The inflorescences arise from the tops of the pseudo-bulbs, usually two at a time, and are green, three-angled, channelled on the top. They begin to flower two-thirds of the way up the stem, usually one flower at a time, more opening as the stem elongates. They are greenish-yellow, translucent, 3 to 4 cm across. The labellum has two rows of minute triangular flaps pointing back to the base of the column. The mid-lobe is a small white hinge and the large gold-edged and bronze lip hangs from it and the sharp tip points under.



Eria xanthotricha Schltr.

Habitat. This is perhaps the commonest of the lowland *Erias*, epiphytic in forest trees from a little way inland to about 200 m above sea-level.

Plant. The stems are up to 20 cm long, usually covered with the papery remains of the bracts which protect the new leaf. There are 3 or 4 leaves, dark shining green, between 15 and 20 cm long and pointed.

Flowers. The flower stems are almost horizontal from near the top of the stem and it is not unusual to find a plant with 20 or more inflorescences out together, and up to 15 flowers on each. The sepals and petals are a translucent creamy white, the mid-lobe is bright yellow. Each flower is about 2 cm wide and 1.5 cm high. The plant flowers several times a year.



Eria velutina Ldl.

Habitat. The *Trichostomia* is a large section and is fairly common in both lowlands and mountains. It is epiphytic on trees, and the species vary in size according to the harshness or otherwise of their surroundings. There are several species in this group and nomenclature is doubtful.

Plant. This is a clumping plant with stems up to 40 cm long. The leaves are fleshy, rounded at the top and both stems and leaves are densely covered with very short red-brown hairs.

Flowers. Each inflorescence is about 3.5 cm long with about 6 bracts. The flowers are about 2 cm long and do not open widely. The colour is pale pink, which is very pretty against the dark red hairs on the bracts, stems and leaves.



Eria floribunda Lindl.

Habitat. This *Eria* is found throughout lowland Papua New Guinea on both mainland and off-shore islands and has a fairly wide distribution up to Malaysia.

Plant. The stems arise from a creeping rhizome and average 20 to 25 cm in length. It is common to find a plant with up to 20 or more stems in one clump. The roots are dark brown, thin and very wiry. The leaves are dark green, thin and tough, 3 or 4 at the top of each stem. The plant is epiphytic.

Flowers. The inflorescences are horizontal, or nearly so, from the top of the stem, 7 to 10 cm long, and the flowers grow right to the base. Flowers are about 2 cm wide and have a sweet, honey-like scent. The petals and sepals are creamy yellow with a very beautiful translucent appearance. The mid-lobe is bright yellow.



Eria bractescens Lindl.

Habitat. This is one of the commonest orchids in the trees alongside the rivers of Western Province, and it is also found throughout the country in the lowland forest.

Plant. Clumping plants with short stems about 6 cm long and 1.5 cm thick. They are greenish-brown, fleshy and the remnants of the papery bracts are persistent. The leaves are from 10 to 12 cm long and very glossy.

Flowers. The stem has creamy bracts, usually a few empty, the others shielding the young bud. The sepals and petals are white with the faintest touch of pink and the side-lobes are light purple. The lip has pinkish keels and the mid-lobe is cream. The inflorescence is usually a little longer than the leaf. The sepals have purplish hairs on the back.



Eria javanica Bl.

Habitat. A lowland species, epiphytic in trees along water-courses and rivers. It is common in many parts of the country.

Plant. The pseudo-bulbs are erect and ovoid and each has two large foliage leaves and several scale leaves. The new shoots emerge first as a strong creeping bud which develops into a new pseudo-bulb. The size of the plants varies with the amount of exposure to light and wind.

Flowers. The inflorescence arises near the top of the pseudo-bulb, and can attain 60 cm in length. The flowers usually appear on the full length of the stem, with scape, rachis and bracts usually hairy. The flowers face in all directions, are about 4 cm wide, pearly white, and with a pleasant fragrance.

Acriopsis javanica Reinw.

Habitat. A lowland orchid in almost all conditions, savannah trees, forest trees, old coconut and rubber trees. It is widespread throughout the country.

Plant. The pseudo-bulbs are ovoid, ridged and 3 to 5 cm long and have 2 or 3 leaves near the top. The leaves are thin, to 20 by 1.2 cm, usually smaller.

Flowers. The inflorescence comes from the rhizome, the total length 40 to 50 cm with a long scape, usually branching a few times. There are many small flowers set well apart from each other. The flowers are pale yellowish with a purple median stripe. The lip forms a tube about 2.5 mm long with the base of the column: the blade is 3-lobed, 5 to 6 mm long, crimson-purple with white edges. The variety *nelsoniana* has white flowers with a touch of yellow.



Grammatophyllum scriptum (L.) Bl.

Habitat. An epiphytic orchid common in the lowland forest of New Britain, New Ireland and the North Solomons. It is very common on coconut trees in old plantations.

Plant. The pseudo-bulbs are to 25 cm long and to 9 cm thick and the plant grows into large clumps with 20 or more pseudo-bulbs. The leaves are mid-green and the roots are numerous, erect, branching around the plant and usually encircling the branch or tree it is on.

Flowers. Inflorescence is to 2 m long and curves gracefully out from the base of the pseudo-bulbs, with between 20 and 30 flowers. The colour is greenish (rare plants are yellow) suffused with brown, about 8 cm across. The flowers last for several weeks and seed freely.



Grammatophyllum papuanum J. J. Sm.

Habitat. Epiphytic on trees and sometimes on rocks throughout the country up to 1,200 m. It grows high up in the giant trees and also on rocky outcrops and cliff faces.

Plant. This is the largest orchid in the world. The stems are thick, fleshy and up to 4 m long. The leaves are thin textured, alternate and overlapping on the stem.

Flowers. The flowering stems are up to 2 m long, and carry up to 40 flowers each about 25 to 30 cm across. The bottom 3 to 5 flowers are abnormal having two petals, no lip and an abortive column. The normal flowers are about 10 cm wide. The sepals and petals are wide spreading, greenish-yellow, with large reddish-brown blotches. Another variety has olive green petals thickly dotted with small dark reddish spots.



Luisia teretifolia Gaud.

Habitat. Widely distributed from Australia to Malaysia, there is still some doubt as to the correct nomenclature of the *Luisias*. This is a lowland species, to 900 m, and is epiphytic.

Plant. The stems spring from a woody rhizome and are branched near the base, or in the lateral third. They are dark brown and of many nodes, between 10 to 30 mm tall. The roots are few, but extensively branched. Leaves are dark olive green, and pencil-shaped.

Flowers. The small flowers are turned in all directions, usually close to the stem. Petals are greenish-yellow with the tips curled inwards; sepals are greener and the labellum is broad, dark purple and minutely hairy. Each flower is about 12 mm across, and usually 1 to 3 open at a time, in each cluster.



Ascoglossum calopteryx (Rchb.f.) Schltr.

Habitat. Epiphytic in habit, it is usually found high up in the spreading branches of leafy trees. It is often collected in old plantations.

Plant. The leafy stems usually curve out from the branch, turning up at the apex, about 60 cm long, but smaller plants are common. The leaves are very rigid, 25 cm long and 2.5 cm wide, unequally bi-lobed at the tip. They are dark green, often with a suffusion of purple.

Flowers. The inflorescence is usually many-branched, following the same curve as the leaf stem. The flowers are many, rather densely set and a beautiful magenta-purple in colour, each flower 25 mm long and from 40 or more in number. The labellum has a distinct spur.

Grammatophyllum papuanum, plant in flower.



Vandopsis warocqueana (Rolfe) Schltr.

Habitat. Widely distributed in lowland areas, on both mainland and islands. It grows on rocks and cliff faces as giant plants many metres long. A colour variety grows on trees beside the sea on North Solomons and is short.

Plant. Stems are very robust from 1 to 3 m long. The aerial roots appear at intervals as the stem lengthens; the stem is leafy throughout its length.

Flowers. The inflorescences, which appear from buds between the leaves as the plant grows upwards, develop two or more at a time. They are branching, from 20 to 35 cm long and many flowered, each to 2.5 cm long and wide, slightly fragrant when first opened. Colour is variable in different areas. Basic colour is cream, liberally spotted inside with dull red; petals are dark, almost black-purple on the reverse. Side-lobes erect, pointed, white, median lobe white on top.



I have followed a long carrier line up and into the far blue mountains, on horizons like this—



At the little grass airstrip at Wagau, in New Guinea, after a trek into the Mapos Mountains, we waited for a small one-engineered plane that forgot to come on the right day.

Saccolabium rhopalorrhachis Rchb.f.

Habitat. Very common in small trees in the lowland savannahs of Papua. It has been collected in several other parts of the mainland.

Plant. The stems of this orchid vary from 25 to 150 mm long, narrow and oblong in shape, thick and light green in colour. The 4 to 8 leaves are thick, narrowly oblong, pale green, about 12 cm long and 3 cm wide.

Flowers. The stem of the inflorescence is club-shaped, which accounts for its specific name: the Greek word *rhopalon*, a club. It flowers in spasms over a period of 3 to 4 months, with from 2 to 8 flowers open at one time. The whole flower is less than 12 mm wide and long. A deep cream with gold markings on the labellum.

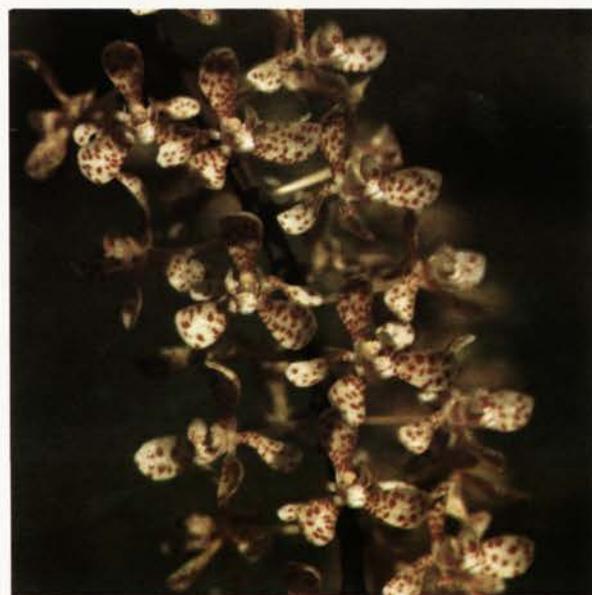


Sarcanthus bicornis J. J. Sm.

Habitat. A rain forest species distributed widely in Papua New Guinea. It is common in the forests up to 600 m.

Plant. The stems are slender, branching and pendulous, and the end of each branch turns upward. The base is attached to the tree with strong roots, and there are aerial roots all along the branches. The leaves are dark green, slightly grooved and about 75 mm long.

Flowers. The flowering spikes come between the leaves, each branch having 10 to 12 spikes, about 57 mm long, of up to 15 small intricately shaped flowers. The sepals and petals are glistening white; the lobes are tipped with purple and the lip has two purple keels. The flowers open in succession and turn yellow with age.



Sarcochilus moorei (Rchb.f.) Schltr.

Habitat. Epiphytic on large trees from the coast to 1,000 m, well distributed from the mainland to the islands.

Plant. Variable in size and leaf colour. In plants collected in rain forests, the 3 to 5 leaves are usually up to 20 cm long and about 4 to 5 cm wide, soft and dark green. Plants growing on trees overhanging the sea have purplish leaves. The plant is usually pendulous, or partially so, and the wide, flattish roots run for long distances along the branch.

Flowers. The raceme is pendulous, usually pushing out from the base of the plant up to 10 cm and then arching gracefully down. The buds develop very quickly. There are 20 or more flowers each about 25 mm wide and all flowers on the stem open together. They only last one day. They vary in colour from cream to deep yellow, and are heavily spotted with purplish-brown.



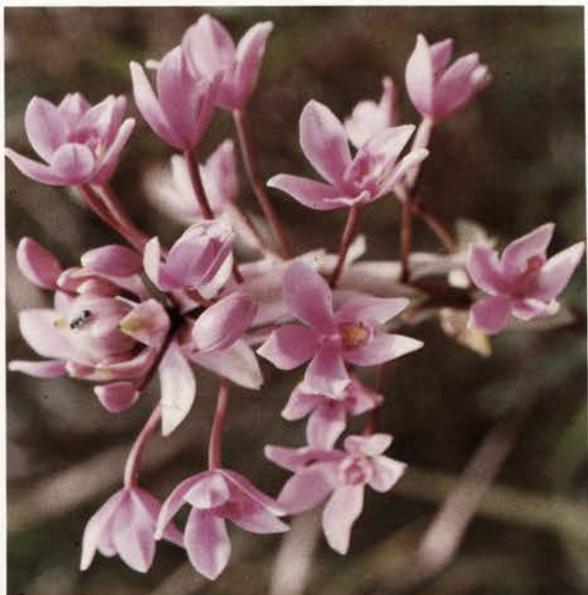
Spathoglottis Bl.

This is a large genus, found in many countries, from northern India to southern China, throughout Malaysia, down through Papua New Guinea to Australia and as far into the Pacific as Samoa and New Caledonia.

The exact distribution of the 20 or more species in Papua New Guinea is unknown. Many of these have several variations. They range from the coast to the lowlands, the savannahs, small islands and the swamps to the high mountains.

They are terrestrial, growing in sunny situations, and some such as *S. rivularis* Schltr. grow on the rocks in the grassy slopes below Varirata. Not usually deciduous, the leaves die in the long dry, and the bulbs are protected by the dead stalks and foliage of other plants.

Spathoglottis rivularis is impossible to recognise when not in flower, as the foliage in most species is so similar. The distinctive feature about this species is the colour, a shining rosy purple with reddish-purple side-lobes, and the large number of flowers.



S. plicata has long been a cultivated garden plant, and under cultivation many plants have responded with lush foliage and stronger stems. The same thing applies to certain plants in the wild: optimum conditions produce much improved plants or flowers and a horticultural name is given to that plant, which further adds to the identification problem. Holttum says that there is reasonable doubt if *S. plicata* is a Papua New Guinea species. The one pictured here has been called *S. plicata* var. *alba*.

This species is *S. portus finschii* Krzl., found in the drier lowland grasslands such as the Markham Valley. The plant is deciduous during the worst of the dry weather, but invariably flowers on the leafless pseudo-bulbs following isolated storms or temperature changes.

The flowers are among the largest in the genus, often 5 cm across, and the sepals and petals are beautifully shaped. The labellum and side-lobes are bright red, but the colour of the flower varies from white through pinkish-mauve, lilac to dark purple. The flowers have a velvety sheen.

An interesting point about this plant is that it seldom branches, each bulb succeeds another and the back bulbs die off as the plants increase. The plant favours steep grass-covered cliffs.

Sarcochilus moorei Schltr. A teak post in the National Capital Botanic Gardens.



Schoenorchis densiflora Schltr.

Habitat. Probably widespread throughout the country, but first collected by me on Sogeri Plateau. It is quite common on old rubber trees, and also in the forest at Musgrave River. It is always epiphytic, usually in branches protected by the canopy.

Plant. The whole plant rarely exceeds 15 to 20 cm and grows into small tangled clumps. The leaves are dark green, thick textured, and channelled, about 6 by 1 cm.

Flowers. The flowering stem is usually less than 3 cm long with between 6 to 20 minute white flowers. They are very dainty, long-lasting and bell-shaped. The plant grows very readily on coconut husks, or in small wooden baskets.



Thrixspermum arachnites (Bl.) Reichb.f.

Habitat. Common in lowland Papua New Guinea. It often appears on the branches of very old Hibiscus and Crotons in settled areas, growing into a sizable, tangled clump on the lower part of the shrubs.

Plant. The stems are of many internodes, about 25 cm long. The plant attaches itself very firmly to its support, and also has long, white aerial roots from many parts of the stem. Leaves are a light yellowish-green, rather fleshy in texture, each one about 12 cm by 2 cm.

Flowers. The inflorescence has a scape about 80 cm long and the rachis elongates to 15 cm with flattened, slightly curvy bracts, from each of which comes a delicate flower, usually two at a time. The petals and sepals are pale yellow, and the whitish labellum is spotted with orange-red.



Thrixspermum platystachys (F. M. Bail.) Schltr.

Habitat. This is a lowland species epiphytic on rain forest trees, distributed from Northern Australia to many localities in Papua New Guinea.

Plant. The stems are from 15 to 35 cm long, very often branched and with a few to several leaves between 8 to 10 cm long and 2 to 4 cm wide. The plant is often held on to the host tree by just a few of the many roots.

Flowers. The inflorescence is about 20 cm long, the flowering portion is flattened and consists of two rows of overlapping bracts. The flowers appear one or two at a time over a period of twelve months or so. Each flower is about 4 to 6 cm in diameter, cream with an orange and white lip. They open in the early morning and close before the sun goes down.

Vanda hindsii (Ldl.)

Habitat. Widespread throughout Papua New Guinea, *V. hindsii* grows on a variety of trees, in strong light or in filtered sunshine.

Plant. Specimen plants up to 1 m tall develop very quickly and have a clumping habit. Leaves are dark green, straplike, alternate, to 45 cm long, 4 to 5 cm wide, and are tough and leathery.

Flowers. The inflorescence is up to 40 cm long and has 8 to 12 flowers in the top half. Each flower is up to 35 mm across and long. There is little difference in the size of petals and sepals. Colour is variable but the more usual form is a bright cinnamon brown with a yellow margin. There is also a very rare pure yellow form.



Diplocaulobium tipula J. J. Sm.

Habitat. The plants grow on trees on the edge of the rain forest. They require good light but not direct sunshine. This species is common throughout the country.

Plant. The plant has creeping and branching rhizomes and the pseudo-bulbs are quite close to each other, from 10 to 15 cm long. The pseudo-bulbs narrow about 2 cm from the base and are slender and bright brown in colour. Each one has a shining dark green leaf.

Flowers. The flowers come from a bract near the base of the leaf. The petals and sepals are glistening white for two-thirds of their length when they change to bright reddish-orange. The labellum is golden yellow and the tip turns under. The flowers turn pink in the late afternoon, and die very quickly.



Diplocaulobium hydrophyllum J. J. Sm.

Habitat. A rain forest species seldom found below 500 m. It is epiphytic and is usually found in more shade than the other lowland species of *Diplocaulobium*.

Plant. The pseudo-bulbs clump together, up to 100 or more, with a particularly strong root mass. The stems are slender, rising from the swollen bases which are covered with large thin papery bracts. The slender leaf is very dark green and the pseudo-bulbs reddish-brown.

Flowers. The flowers are on white pedicels 1.5 to 2 cm long. The sepals and petals are white at the base, about 3.5 cm long, narrowing very abruptly and changing to bright yellow. The flowers are among the prettiest in this large genus and are star-shaped when first open. They change to pink and fall off by evening.



Diplocaulobium arachnoideum (Schltr.) Krzl.

Habitat. Common in lowland forest and one of the pioneer plants which establishes itself in large numbers in mature rubber trees or coconut palms on plantations. It likes strong light but little sun.

Plant. The pseudo-bulbs are in the usual clump formation and the stems are up to 18 cm from the swollen base, a deep blackish-brown. The leaf is up to 6 cm long and 4 cm wide, bright shining green.

Flowers. A feature of this plant is the multiple flowering of some of the stems, up to 4 flowers out at a time. The sepals and petals are very slender, yellow for three-quarters of their length and white near the base. The beautiful labellum is bright gold.



Dipodium punctatum (J. E. Sm.) R. Br.

Habitat. Common in the grasslands but not in the forest. It is a wet season species in Papua, appearing soon after the rains begin.

Plant. This is a leafless plant and depends on some sort of fungal symbiosis for existence. So far, cultivation has failed. It has a small underground rhizome with a mat of thick fleshy roots. The inflorescence comes from an offshoot of the rhizome.

Flowers. The inflorescence is from 30 to 40 cm long and carries up to 50 flowers 25 mm across. The colour varies from pale pink to dark purple, usually spotted with purple in the lower half of the petals and sepals. It seeds freely and our research has shown that it does not always come up in the same place.



Dipodium pandanum F. M. Bail.

Habitat. Common in the lowland rain forest in many parts of both mainland and islands. Usually epiphytic, they will grow among the roots and moss of the forest floor. On many islands off the coast they are found on the top of cliffs, beneath the trees and often hanging over the edge.

Plant. The stem is long, climbing, and roots at any point. The leaves are very closely two-ranked with overlapping bases, each about 25 cm long; where the stem is broken, a new side shoot will develop below the break.

Flowers. The scape is about 20 cm long and the flowering portion about the same, and there are up to 12 or more flowers. The sepals and petals are about equal in size, pale yellow with dark purplish-red blotches on the back. The lip is striped with purple and the apical half has long white hairs.

Geodorum densiflorum (Lan.) Schltr.

Habitat. This is a terrestrial orchid distributed from New South Wales in Australia to Papua New Guinea. Here it is found throughout the country, from the lowland grasslands to 1,000 m.

Plant. Deciduous, with clumping pseudo-bulbs, which are above ground for half their length. There are 3 to 5 pleated green leaves from 10 to 30 cm tall and about 4 to 5 cm across the centre.

Flowers. The inflorescence has a fleshy green stem which bends over at the top in a perfect U shape. The flowers are clustered on the down-pointing portion of the stem, but once they are fertilised the stem lengthens until it is straight. The flowers are pale pink, sometimes white and a darker pink.



Cadetia taylori (F. Muell.) Schltr.

Habitat. Usually found in rain forest trees up to 600 m. Widely distributed in other areas throughout Papua New Guinea.

Plant. A clump-forming plant, often collected in dense mats 20 cm long and wide. The stems are angular with 3 blunt edges, and about 10 cm long. Each one bears a solitary leaf, up to 75 mm wide, rounded and slightly bi-lobed at the tip. The leaves are fleshy and light green.

Flowers. One flower—very occasionally two—comes from the base of the leaf, each bud emerging from a yellow-green bract. The flower is about 12 mm in diameter and pure glistening white. The mid-lobe has a tinge of pinkish yellow. A plant with 50 of these small flowers out at one time is a truly beautiful sight.

Cadetia potamophila Schltr.

Habitat. The *Cadetias* are distributed throughout the country and are one of the commonest orchids in the open savannah forest. They are epiphytic on large and small trees, and often on clay banks and rocky outcrops.

Plant. The plant grows into extensive mats of closely packed stems. Each stem is up to 100 mm by 5 mm long and the leaf from 45 mm by 10 mm. The leaves are thick, firm and fleshy, medium green in colour.

Flowers. The sepals are about 6 by 2 mm; petals are about 6 by 0.5 mm, slender, slightly recurved. The mid-lobe has a touch of yellow. Although Schlechter lists over 40 species in the genus, there are known to be about 50 altogether. Very few have at this stage been collected and positively identified. More work is required.



Ceratostylis humilis J. J. Sm.

Habitat. The *Ceratostylis* are a particularly interesting genus and there are over 60 species known to science. Schlechter alone lists over 40 and others have been found since his death. The centre of the greatest distribution is Papua New Guinea and the range is greater in the cooler altitudes.

Plant. The plant grows in mat-forming clumps. The rhizome is creeping and covered with many brown sheaths as are the pseudo-bulbs and leaf stalks. The leaves are semi-terete, dark green and joined to the rhizome.

Flowers. The inflorescence is always terminal and the leaf is joined to the stem just below it. The flowers are pure glistening white and appear at any time during the year. It is very unusual to find a plant without at least 2 or 3 flowers open.



Coelogyne beccarii Rchb.

Habitat. Widespread in many parts of Papua New Guinea from 300 to 1,200 m, colonising freely in the old rubber plantations. Epiphytic on trees with maximum light and little direct sunshine.

Plant. The pseudo-bulbs are smooth, oval, dark green and emerge from a series of pale green bracts from the top of which two strongly-ribbed, shining green leaves appear, which grow to 20 to 30 cm long. The pseudo-bulb widens and firms after flowering.

Flowers. The inflorescence comes with the new leaves and grows with them. Two or three flowers open successively sometimes two weeks apart. The petals and sepals are glistening white, almost translucent. The magnificent labellum has warm cinnamon-brown side-lobes and keels, which open deep black and lighten to brown within two days.

Coelogyne asperata Lindl.

(Synonym: *Coelogyne pustulosa*) Ridl.

Habitat. Widely distributed from Papua New Guinea to Sumatra, *C. asperata* is an adaptable species which grows on almost anything from the coast up to 1,000 m. It forms huge clumps in trees, on the forest floor and on the rocks in the grasslands and cliff faces above the roads.

Plant. A large plant will have as many as 50 pseudo-bulbs, each 150 mm long, broadly conical and set very closely together. The leaves are usually in pairs, a clear mid-green, 600 by 120 mm.

Flowers. The inflorescence has from 15 to 20 creamy white flowers along the full length, usually to 30 cm long. The mid-lobe is white, fleshy, with two broad keels covered with raised wart-like lumps which are a beautiful bronze-brown colour.

Coelogyne alata

Habitat. The distribution of this species is not fully known. It is common in the Daga in southern Papua and I have found it on Sogeri Plateau, always in very old rubber trees or the remnants of rain forest above plantations.

Plant. This is a small species, with shiny green pseudo-bulbs each with one leaf, 15 to 20 cm. The new pseudo-bulbs are strongly sheathed and the inflorescence appears with each new growth.

Flowers. As the rachis elongates, the covering bracts fall and the flowers open, usually singly but sometimes in pairs. The sepals and petals are creamy white. The petals are narrow, almost horizontal and the upper sepal is hooded over the column. The wide labellum has bright orange side-lobes and mid-lobe.



Acanthephippium papuanum Schltr.

Habitat. This is a genus of about 10 species, found mainly in the Pacific-Asiatic tropics. This species has been found in many parts of island and mainland Papua New Guinea, always in shady, moist locations on the forest floor. This may well be identical with *A. javanicum* Bl. of Malaysia.

Plant. The pseudo-bulbs are thick and fleshy, about 25 mm long and 5 mm thick, with about 4 large leaves near the top; the leaf blades are about 50 by 5 mm.

Flowers. The flower spikes are fleshy, and carry between 5 and 7 flowers. The basic colour is creamy-pink with reddish-purple stripes and spots. The sepals which form the sac-like structure of the flowers are about 6 mm long and partially united, and the petals are very much reduced.



Calanthe chrysantha Schltr.

Habitat. This is a plant of the forest floor. It grows in rain forest, under the canopy, and in company with ferns, Gesneriads and other orchids. It needs deep mulch, shade and the cool nights of the mountains. It is found in many areas in Papua New Guinea up to 1,000 to 2,000 m.

Plant. The pseudo-bulbs are small, woody and on a creeping rhizome. The leaves are thin, sharp-edged, dark green and to 40 cm tall.

Flowers. The beautiful bright gold of these flowers is a joy in the dark rain forest. The stem is usually 30 to 40 cm tall, light green and with 20 or more small flowers, each about 1.5 cm long. The flowers open over a period from the bottom upwards and seed prolifically.



Calanthe triplicata (Willem) Ames

Habitat. A very widely distributed orchid from parts of Australia through Papua New Guinea, Indonesia, Malaysia, India and on to China. It is a forest floor species growing in deep leaf litter, most often near creeks and rivers. It likes only the dappled light that filters down from the tree tops.

Plant. An evergreen terrestrial orchid, with a large clump of fleshy pseudo-bulbs, most of which are above ground level. The leaves are dark green, pleated in appearance, about 50 mm long and 15 mm wide. There is a silvery sheen to the mature leaves.

Flowers. The scape is about 60 mm long, with several small greenish bracts. The beautiful, glistening white flowers are crowded on the rachis, each about 2.5 to 3.5 mm wide.



Diplocaulobium regale Schltr.

Habitat. *Diplocaulobium regale* is a high mountain forest species and is epiphytic on moss-covered trees from about 1,200 m upwards.

Plant. Each stem arises abruptly from its small round base up to 35 cm. The lower part of the stem is covered in golden brown viscid sheaths. The solitary leaf is dark green and very shiny.

Flowers. The flowers are protected by a narrow sheath in the folded base of the leaf. Each stem produces 1 or 2 flowers over a long period, each flower lasting 1 to 2 days. The flowers are large, between 2 to 4 cm across. The petals and sepals are more or less equal, 2 to 3 cm long and less than 12 mm wide. The colour is deep rose pink inside, royal rose red outside.



Diplocaulobium chrysotropis Schltr.

Habitat. Epiphytic on trees in many parts of Papua New Guinea—in Port Moresby often found on *Antidesma ghaesembilla* trees in company with *Dendrobium williamsianum*. Common also on trees in forest margins on river banks.

Plant. This is a mat-forming plant with small pseudo-bulbs and narrow, olive green leaves, less than 50 mm long. The pseudo-bulbs are on a strong rhizome and branch in all directions, sometimes completely encircling a branch in mats 300 to 600 mm long.

Flowers. Pure white flowers stand out from the mat of leaves on 50 mm long white pedicels. The mid-lobe is light yellow. This is the most enchanting of the species, lasting 2 to 4 days.

Diplocaulobium chrysotropis Schltr.—a beautiful clump 10 by 30 cm, growing on a tree fern slab.





Diplocaulobium glabrum (J. J. Sm.) Krzl.

Habitat. Epiphytic on trees in or near the rain forest. Fairly common on the old rubber trees.

Plant. Mat-forming with many 25 to 50 mm pseudo-bulbs, close together on a tough, branching rhizome. Leaves are a little larger, widest at the base, narrowing to a bi-lobed tip and dark green.

Flowers. The flowers are star-shaped, less than 25 mm wide and long, creamy white. They last less than a day, but flower frequently.



Thelasis carinata Bl.

Habitat. The distribution of this species is very wide in the south east Asian tropics. It is always epiphytic and most often found high up in large forest trees in company with other orchids, Gesneriads, Rhododendrons and Aroids, from 400 to 600 m.

Plant. The stems are tufted, flattened and with about 5 light green leaves. It grows into very compact plants with up to 10 stems.

Flowers. The flowers are tiny, white and petals are about 5 mm, sepals slightly smaller. The structure of the labellum is very interesting: the lip is about 4 mm long, tip shortly pointed, base suddenly widened, concave, with a nectary on each side.



Appendicula reflexa Bl.

Habitat. A forest species from the lowlands to about 1,000 m. Epiphytic on tall moss-covered trees overhanging the water.

Plant. The stems (pseudo-bulbs) are erect, up to 45 cm tall with leaves alternate, each about 30 mm long, and less than 12 mm wide. The colour of the leaves varies with habitat, from dark green to purplish-bronze. As a general rule, plants from highest up in the mountains have the longest leaves.

Flowers. The small flower spikes are somewhat pendulous, usually in groups of 6 to 19, with up to 12 minute flowers, most exquisitely shaped. The petals and sepals are greenish and the lip white.

Agrostophyllum majus Hk.f.

Habitat. Epiphytic on trees in a wide variety of habitats. It grows in dense shade and in almost full sun; found on tall forest trees and small scrubby trees in the savannah. It is common throughout the islands.

Plant. The stems are up to 50 cm long, flattened and widening slightly towards the tip. The leaves are two-ranked, narrow, thin and with overlapping sheaths. It is common to find a huge clump of *Agrostophyllum* with up to 30 or more stems.

Flowers. The inflorescences are in terminal heads of many white flowers, each about 5 to 7 mm in diameter. The lip is sac-shaped at the base. The plant is an asset in any collection for its beautiful green leaves and a pot specimen is a useful plant in the background for show purposes.



Phaius tancarvilleae (Bl.) O.Ktze.

Habitat. *Phaius tancarvilleae* is very widespread from the lowlands to about 1,000 m. The common name is 'kunai orchid' after the long grass in which it is often found.

Plant. The size of the plant usually conforms to the ground cover: the leaves are longer in tall grass, usually from 30 to 90 cm long. The pseudo-bulbs are above the ground and each one will develop from 4 to 7 leaves, thin textured and pleated.

Flowers. The stem is up to 120 cm tall and has a head of large flowers, up to 12 and about 10 cm wide. The sepals and petals are chalk white on the back, and a reddish-brown on the inside. The labellum is trumpet-shaped, whitish outside, dark red inside and purplish at the apex. The colour is variable according to the light in which it is growing. A form with yellow on the insides of the petals and sepals and a yellow labellum is not rare, but it is always in the higher altitudes.



Arachnis beccarii J. J. Sm.

Habitat. On the highest cliffs, on the hottest rocks, grows the gigantic *A. beccarii*. Very little is known of its exact distribution, but it is common on the Sogeri Plateau.

Plant. The plant resembles a giant strap leaf vanda; leaves are up to 3 m long and the plant itself often over 2 m. The tough, leathery leaves are a dull yellowish-green. The woody rhizome elongates backwards and many small plants grow from it, eventually forming huge, impenetrable clumps.

Flowers. The inflorescence is 5 to 7 m tall, with very many branches and many flowers each 3 to 4 cm across. The sepals and petals are widely separated, the petals slightly wider than the sepals. Colour is a warm gold very liberally blotched with tan-brown. Column and side-lobes and up-turned labellums are yellow. There are vivid purple markings inside the lip and the column cap is white.



Phalaenopsis amabilis Bl. var. **papuana** Schltr.

Habitat. Native from Northern Australia, through Papua New Guinea and from Java up through Borneo to the Philippines, this is a very variable species. The differences are minor, size of flowers, breadth of mid-lobe etc. It is found from Rossel Island at the tip of Papua and in high forest trees up to 1,500 m.

Plant. Epiphytic on large trees near water. The dark green leaves are 10 to 30 cm long, stand out from the tree and are pendulous. The short base is attached to the trees by long, wide, fleshy roots.

Flowers. The inflorescences are sometimes 1 m long and usually with several branches. Each branch carries up to 15 long-lasting flowers, about 40–70 mm in diameter, pure white with a few spots of yellow on the lip.



Phreatia baileyana Schltr.

Habitat. Usually found as an epiphyte growing on trees in the rain forest or on rock faces above rivers. It has a wide distribution from northern Australia to Papua New Guinea. The plant photographed here was collected on a mature rubber tree.

Plant. A small orchid, usually of many stems, sometimes branching and with 3 to 6 leaves. The whole plant is about 40 to 50 mm tall.

Flowers. The inflorescence is almost as tall as the plant and appears from the leaf axils. The tiny flowers are white or cream with light brown bracts.

Arachnis muellerii cultivated in the National Capital Botanic Gardens.

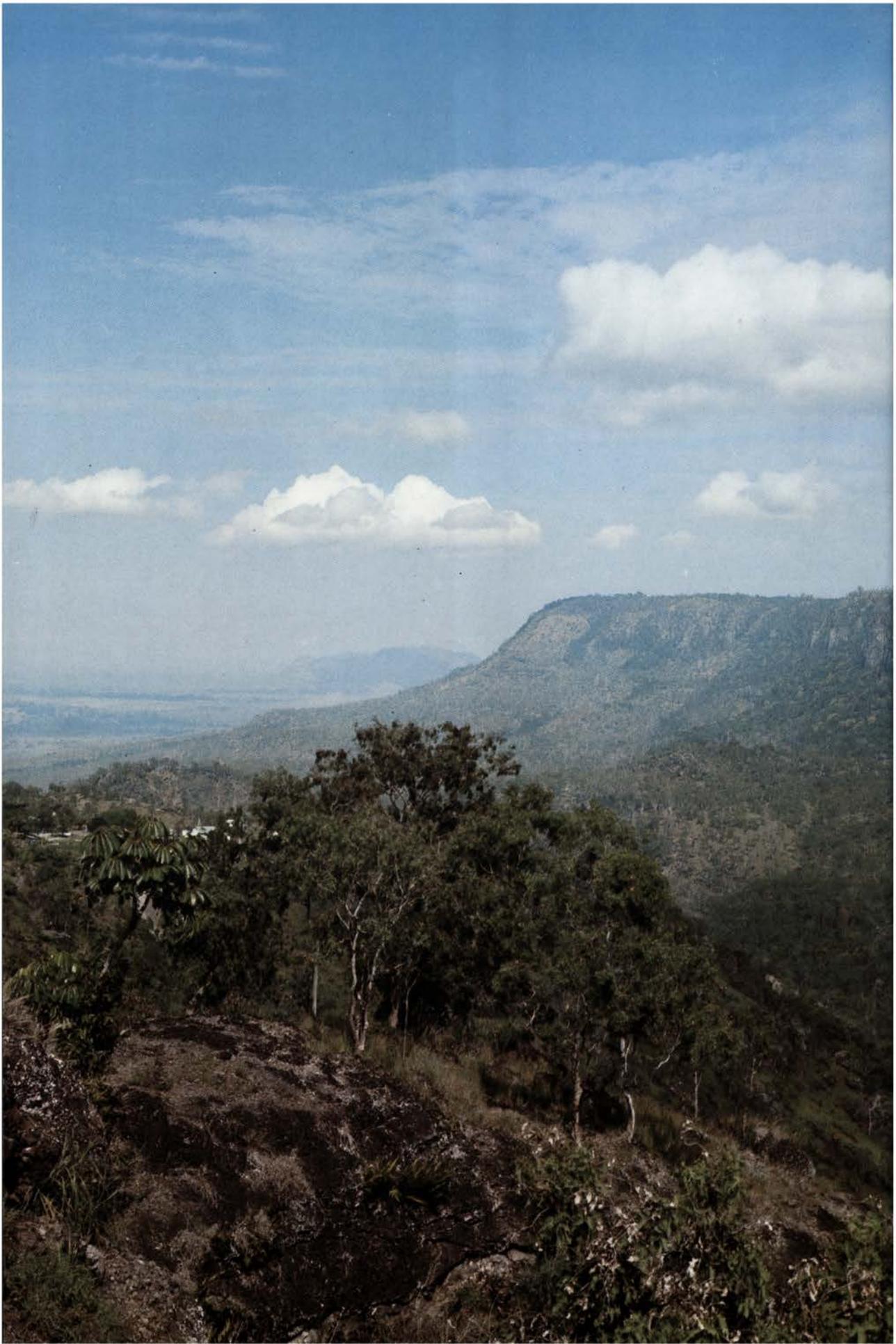


Phreatia robusta Rogers

Habitat. Epiphytic in trees of the lowland rain forest throughout the country, especially on coastal trees.

Plant. Often called the 'fan orchid' for its shape. The base of the fan appears to be swollen, but this is caused by the persistent sheathing bases of the leaves. Usual height is about 15 cm; leaves from 6 to 10, in a perfect fan. The plants are very small when they flower and as each new leaf comes up, the plant widens and the base becomes thicker.

Flowers. The long slender green stalk comes between the upper leaves: usually erect and about 20 mm long. There are numerous, small white flowers, about 2 mm in diameter, on the top two-thirds of the stem. This *Phreatia* is one of many: Schlechter alone described 75 species; research may prove many are only varieties.



Camarotis papuana J. J. Sm.

Habitat. This is a common orchid in the rain forest near Sirinumu. This and many other plants of the same species were rescued from the tree-tops in the drowned forest of Sirinumu dam.

Plant. The stems are long, climbing, with many roots, both clinging and aerial. The leaves are narrow, dark green and fleshy; about 10 cm long and about half as wide, well spaced on each stem. The plant has many erect stems, makes an attractive plant, with green leaves in the upper half.

Flowers. The racemes are erect, standing out from the plant, and each about 25 to 30 cm long, with from 12 to 20 flowers. The petals and sepals are yellowish; the column and side-lobes are white and the saccate tip is creamy yellow. One of the many climbing Vandaceous orchids in the lowland forest.

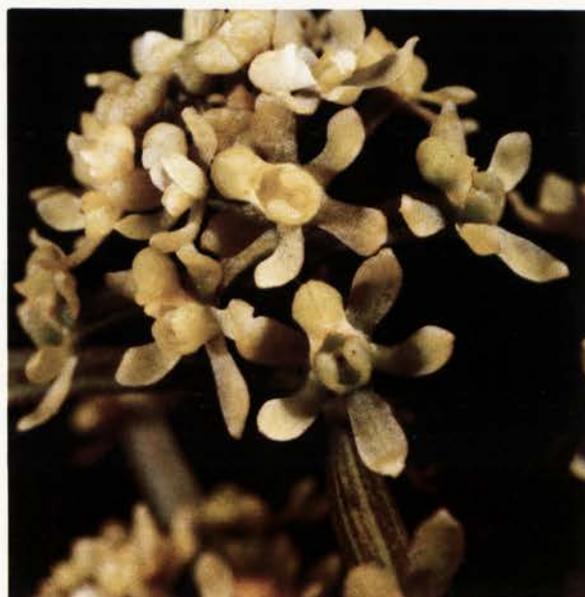


Pholidota pallida Ldl.

Habitat. Widely distributed from Australia to China. It grows epiphytically on trees and rock faces.

Plant. The pseudo-bulbs are in tight clumps, up to 30 each with a solitary grey-green leaf. The pseudo-bulbs are up to 12 cm, usually smooth, conical and greyish-green. Plants growing on the rocks are often furrowed and more compact in size. Leaves are thick textured and pleated.

Flowers. Often called the necklace orchid for the arrangement of the flowers, the inflorescence is terminal on the pseudo-bulb, and develops with it and the new leaf. The stalk is erect but the flowering part is pendulous. There are up to 50 flowers, usually 1.5 cm across, round in shape and creamy white.



Pomatocalpa marsupiale Krzl.

Habitat. Very widely distributed in Papua New Guinea from the coast to about 70 m above sea level, sometimes higher, in the dry forests. Epiphytic on large trees.

Plant. Size variable from 80 cm to 1 m tall. Leaves are large, strap-like, fleshy and yellowish-green in colour. A well grown mature plant often branches at the base, making a sizable clump.

Flowers. The inflorescence is tall, often up to 90 cm, branching and with a crowded, almost flat head of flowers near the top of the stem. Each flower is about 13 mm wide and long. Sepals and petals are greenish-yellow inside, dark purple outside, lightening to minute spots about half way up. The labellum is a yellow pouch with erect side lobes and pointed tip.



Renanthera edelfeldtii F.V.M. & Krzl.

Habitat. A scrambling orchid on cliff faces, rocky outcrops and river banks, up to 500 m. Common on mainland and islands in many parts of Papua New Guinea.

Plant. The stems are long and climbing, usually branching especially if the growing tip is broken. The leaves are oblong, well spaced, thick and about 100 to 150 mm long and yellowish-green if grown in sun. The long aerial roots develop as the stems elongate, sometimes reaching 1 m in length.

Flowers. The inflorescence is horizontal, branched and has up to 40 bright red flowers, each about 18 mm long and 12 mm wide. Once this plant settles down in cultivation it is very attractive. Grows well on a 1 m length of teak and fibre, standing in a pot.



Porphyrodesme papuana Schltr.

Habitat. Little is known of the distribution of this orchid. It is a lowland forest species epiphytic on tall trees. I have collected it once in the Lae area, and twice on the Sogeri Plateau at about 600 m.

Plant. A rambling branching plant, with stems up to 4 m with many aerial roots. The stems are brittle, about 5 mm in diameter. The leaves are very dark green in the top third of each branch, up to 9 cm long and 4 cm wide.

Flowers. The inflorescence varies in length, up to 6 to 8 cm, branching and bright red. The beautiful little flowers are a darker red about 5 to 8 mm across the petals and sepals. The labellum has a touch of yellow in it and the spur is rounded, deep red.



Pomatocalpa macphersonii (F. Muell.) T. T. Hunt

Habitat. An eastern tropical species epiphytic in rain forest trees, especially in Western Province. The plant extends from North Queensland to Papua New Guinea.

Plant. The stems of this plant are up to 10 cm long, the roots are long, up to 3 mm in diameter. The leaves are yellowish-green to 6 cm long and from 2 to 3 cm wide.

Flowers. The racemes are up to 10 cm usually less, with from a few to 30 flowers. The flowers are about 10 to 15 mm in diameter, yellow with red markings, and the lip is white with red markings. The sepals and petals are rather broad, and the side-lobes short; the front lobe is thick and fleshy and curves downward. The inflorescence curves near the base and points downwards.

Pomatocalpa leucanthum Schltr.

Habitat. Epiphytic in large trees in lowland forest areas up to 700 m. The only collections I have made of this plant are in swamp forest trees of the Upper Sepik and again in similar conditions on the Bensbach River.

Plant. Stems are up to 30 cm or more, thick and woody. The yellowish-green leaves are up to 30 cm long and 5 cm wide, leathery, apex rounded and bi-lobed. It is similar in form to *P. marsupiale*.

Flowers. Inflorescence to 25 cm, branched, stiffly spreading, each to 10 cm long. The flowers are close together, creamy yellow, with touches of red. The labellum is typical of the genus, with the lip saccate and the tongue on its back wall. The inflorescence is erect and the flowers very long-lasting.



Hippeophyllum scortechinii (Hk. F.) Schltr.

Habitat. This is one of the many small orchids in the lowland rain forest, always in shade and common in trees on the river banks.

Plant. Stems are 4 to 6 cm apart, short, and with up to 6 leaves, each to 20 to 25 cm long and 1 to 2 cm wide. They are dark green, fleshy, straight, and not widely diverging. The plant is pendulous.

Flowers. The inflorescence is to 20 cm long with a short scape. The many very small flowers are less than 3 mm long and wide, and burnt orange in colour, with a yellowish lip. The sepals are slightly reflexed, with the edges turned back, petals are narrow, curving forwards and the lip is concave at the base with raised side-lobes and a reflexed mid-lobe. The flowers are very long-lasting.

Hippeophyllum micranthum Schltr.

Habitat. A common plant in the lowland forest throughout the mainland, and on some of the offshore islands in the reefs. It is sometimes found growing on the ground near the ridge tops up to 1,000 m.

Plant. The branching stems arise from a woody and elongating base with up to 4 leaves on each stem. The leaves are a light yellowish-green, thick and fleshy, slightly rounded in the middle. Each new branch sends out new roots.

Flowers. The inflorescence is up to 15 cm, erect, with the top slightly arched. The many flowers are minute, greenish-white with a yellowish lip. Each flower has a pointed green bract. The habit of the plant is very like *Oberonia*.



Paphiopedilum violascens Schltr.

Habitat. The only member of the genus *Paphiopedilum* in the eastern half of Papua New Guinea. It has been found in several locations in various parts of the country: in the mountains behind Kui in the Huon Gulf, in the Waria Valley below Garaina and in 1974, following the reading of a report by Dr Brass with the Archbold Expedition of 1937, we found it in its thousands on Normanby Island, Milne Bay. Some years ago it was found on Karkar Island off Madang growing up the steep slopes to the crater (which is still irritably spitting smoke). Unhappily most of the plants which were easy to obtain were stripped out by 'orchid lovers' who could not grow them on the coast anyway.



Plant. The leaves are about 15 cm long, mottled dark and light green, and do not make large clumps. Single shoots are predominant in any colony, some plants having two, and a few with three or more.

Paphiopedilum wenworthianum and *P. zieckianum* from the North Solomons Province (formerly called Bougainville) are probably synonymous with *P. violascens*. All the plants I have seen of these three have little or no difference, only perhaps darker colouring in the petals and labellum.

The ecological conditions under which it grows are very stringent. It grows in deep leaf litter under the canopy, where it gets very good light but little or no sunlight. It can withstand periods of drought in its natural habitat and will not tolerate over-watering.

Flowers. The scape is reddish-brown and carries one flower, between 4 and 5 cm in diameter. The upper sepal is about 2.5 cm long, narrows abruptly in the middle and forms a slight hood. The centre narrows to a sharp point. Basic colour is yellowish-green with close purple shading in the lateral half. The petals, up to 4 cm long, are whitish with the outside half of each a clear bronze-purple and purple veins are closely set on the other half. The tips have a tiny point and are greenish-white. The pouch is yellowish-green to about 5 cm long with brown overtones. The inflexed side-lobes are sometimes marked with dull purple.

Oberonia anceps Lindl.

Habitat. A lowland species found in many situations from deep shade to fairly exposed positions. It is epiphytic on a variety of trees and often appears on coconut palms in old village sites.

Plant. The stems are up to 30 cm long, usually smaller; the stems and leaves together are about 2 to 3 cm wide. The leaves are flattened and yellowish-green. The stems die off after flowering and setting seed.

Flowers. The inflorescence is about 8 to 10 cm long, densely covered with flowers for all its length. The minute flowers are bright orange, with broad bracts with toothed edges. The flowers are long-lasting, pendulous and make an attractive plant in a collection.



Plocoglottis maculata Schltr.

Habitat. A terrestrial orchid of the forest floor, usually found in the 600 to 1,000 m altitude range. It grows in deep shade and forest litter, and is found in all parts of the country. The plant is intolerant of sun and can stand long periods of dry weather.

Plant. Leafy stems to about 100 cm. The leaves are deep green, sometimes purple tinged, stemless, strongly ribbed and narrowing to a fine point.

Flowers. Inflorescence is strong, straight, from the base of the leafy stem. The bracts are to 1.5 cm long with a narrow tip. The sepals and petals are orange-red on the outside shading to yellow, and yellow inside. The labellum is yellow, 3-lobed, and the flowers have a slightly foetid smell.



Oxyanthera papuana Schltr.

Habitat. A small plant which usually grows on the branches of lowland rain forest trees at about 500 m in company with a host of other epiphytes. It is not often collected and has been confused with *Thelassia*.

Plant. The stems grow in tufts, few to each plant. The leaves are very thin, to 20 cm long and 2 cm wide, narrowing to a sharp point.

Flowers. The flowers are on the top third of the rachis, each one in a yellow-green bract. The flower is white, sepals are about 3 mm long and the lip is about the same with a blunt tip.

Little work has been done on orchids of this size: This plant has very close affinity with *Thelassia carinata* (Brongn.) J. J. Sm. the Malaysian species, and may prove to be identical.



Malaxis latifolia J. E. Sm.

Habitat. Common on the forest floor in many parts of the country. It grows in deep forest litter and on the banks of small creeks within the rain forest.

Plant. The stems are thick and fleshy, yellowish-green and from 7.5 to 20 cm tall, usually with only one new flowering shoot, but occasionally found with two. The new leaves are soft and shining, very pale green, pleated and from 7 to 15 cm long.

Flowers. The inflorescence is terminal on the stem, and variable in length, from 5 to 300 mm tall. The small flowers are crowded on the top third of the stem, usually creamy green, but sometimes yellowish-green to brown or purple and they may be a combination of these colours.



Habenaria goodyeroides D. Don

Habitat. A wet season orchid, *H. goodyeroides* comes up in the swampy areas of grasslands shortly after the first rains. It is usually found where sedges flourish.

Plant. The whole plant is about 16 cm tall, the basal part being leafless; the leaves are about 20 mm long, very sharply pointed at the tip, dark green on top, and glaucous underneath. They grow from a small underground tuber, which is dormant below the soil in the dry weather and apparently survives the grass fires.

Flowers. The inflorescence is usually longer than the leafy stem, about 25 cm long. It has 7 to 12 beautiful little flowers, each one opening within hours of each other. The lip is pristine white, petals and sepals cream, yellow in the lateral half.



Nervilia discolor (Bl.) Schltr.

Habitat. A widespread terrestrial in many parts of Papua New Guinea. It appears in the savannah shortly after the rainy season begins, and also in the rain forest, among the ferns on the forest floor.

Plant. It has an underground tuber much like a small potato with thick short and brittle roots radiating all round it. The solitary leaf comes up after the flowers. It is almost round, a bright, pale green, pleated on top, on a short stalk, and almost prostrate on the ground.

Flowers. The slender stem arises from a succession of bracts, about 9 cm tall. Petals and sepals are creamy green. The white side-lobes are incurved close to the column. The mid-lobe is expanded bright purple with a sharp lip.

Sarcanthus robustus Schltr.

Habitat. A Vandaceous plant of the lowland rain forest sometimes found in trees in both savannah and swamps. Usually epiphytic, but is occasionally found on rocky outcrops.

Plant. A very robust plant of the strap leaf section of the Vanda tribe. It is between 30 and 50 cm tall, and the leaves are from 30 to 40 cm long to 9 cm wide, very thick and tough, yellowish-green. A mature plant has small leaves coming up at the base and making quite a big clump.

Flowers. The inflorescence is 40 to 60 cm long, branching, of many small flowers. The petals and sepals are creamy when first opened, labellum pale yellow and the mentum green. The whole flower very quickly turns to dull yellow, and is long-lasting.



I have waited with friends at Tambunam Village on the Sepik River, while the canoes assembled for the day's work.



Jewel Orchids

Habitat. The Jewel Orchids—the common name because of their beautiful leaves—are found on the forest floor, growing in deep leaf litter and full shade. Growing conditions appear to be more important than altitude. All the species I have ever seen have been between 350 and 1,200 m altitude and each species has been at varying altitudes within that range. I have been able to grow them on the coast using the same growing media and full shade plus plenty of air movement.

These orchids are considered to be the nearest living relatives of the original monandrous orchids. Holttum (*Orchids of Malaya*) says that the ancestors of orchids were certainly terrestrial plants, and we are therefore likely to find the most primitive orchids among the terrestrial species.



Plants. The plants belong to the *Goodyera* and *Corymborchis* tribes within the *Orchidaceae*, and Papua New Guinea has all but two of the genera ascribed to the Indo-Malaysian area. Many of the species recorded have only been collected once or twice and we need to know more about them.

Many of the genera, especially the *Anoectochilus*, *Macodes* and some of the *Goodyera*, have beautifully coloured leaves, with glittering gold or silver veins. The plants are usually of one stem, and after flowering another shoot comes up from the base. The plant seeds freely where the environment meets its particular needs. The plants are small, seldom more than 15 cm tall (without the inflorescence) and the lower leaves are often prostrate on the ground. The roots are spreading rather than penetrating.

Flowers. The flowers are the least important feature of these orchids. Many of the species do not flower either regularly or continuously and, without flowers, identification is impossible.

The inflorescence is erect, not branched and the size varies with the species. In the *Macodes* the scape is from 10 to 16 cm long, the *Goodyera* averages 20 cm but some of the larger species such as *Hetaeria* are up to 60 cm tall.

The flowers are usually rather small, often not widely opening. The upper sepals and petals are usually joined to form a hood over the column and the lip is usually saccate or spurred at the base.

The Jewel Orchids deserve recognition in any work on the orchids of Papua New Guinea in spite of their insignificant flowers.

Cultivation Notes

Orchid collectors in Papua New Guinea have, over the years, developed some very individualistic methods of cultivation. These methods were devised because of lack of accepted materials in the country when collecting began. The infrequent boats from the south made it unprofitable to import materials since the plants would be dead long before the pots or potting materials arrived.

People tended to collect the orchids around them and treat them as garden subjects. Epiphytic orchids were placed on trees or coconut palms. Terrestrials such as *Calanthes* and *Phaius* grew in the garden. The vast majority of European householders had huge clumps of *Dendrobium discolor*, *Grammatophyllum papuanum* and other easily cultivated and obtainable orchids growing in Frangipanni trees.

Years of experience, sad losses and failures, and some joyful successes, have developed local techniques and specialised methods of growing our native orchids.

1 Trees

Many collectors plant trees in their gardens especially for orchid hosts. The two most popular are the Frangipanni (*Plumeria rubra* and *P. obtusifolia*) and the imported Calabash tree (*Crescentia cujete*). Both of these grow easily and quickly from cuttings and large branches up to 2 metres or so make instant orchid trees. It is not uncommon to see a tree like this with literally hundreds of orchids growing on the branches.

Judicious pruning of these trees to regulate light and air circulation is usually necessary. Prune as much as is necessary, and only as the need arises. If the pruned branch has an exposed surface more than 12 mm diameter, then paint the exposed surface with a sealing wax or a lead-based paint, to prevent die-back or fungus infection. The *Crescentia* tree has numerous tufts of leaves between the branches and some of these may need removing to give the orchid room for its roots.

When orchids are tied on to trees, use a non-cutting material. I prefer plastic-covered wire, as this can be twisted firmly and then untwisted again with ease when the roots have taken hold. Wire left on the branch cuts into the bark as the tree grows.

In a large garden, where it is possible to build up a collection of tree-grown orchids, the trees should be 6 m apart.

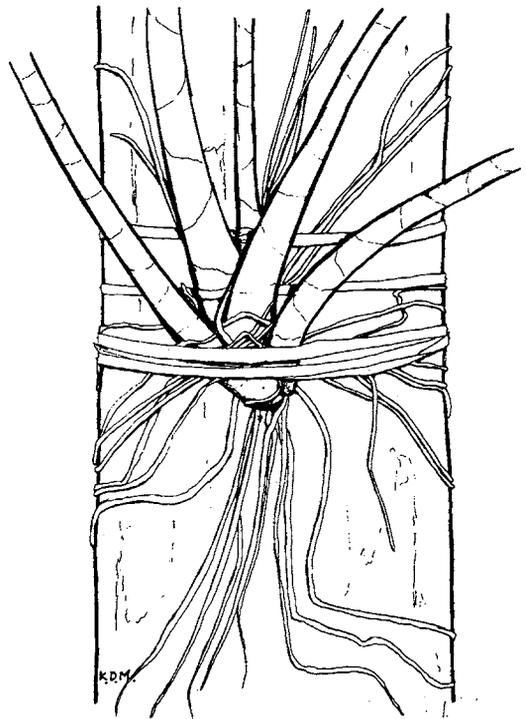
Other trees are acceptable hosts, and orchids in private gardens grow on almost any tree. An outstanding native tree in the Port Moresby area is *Antidesma ghaesembilla*.

Tree culture presents few problems: perhaps the most annoying is the frequency with which the Frangipanni tree contracts sooty mould and scale. However, a thorough spray with white oil and your favourite insecticide will control it. All surfaces of leaves and branches must be covered and at least four hours must elapse before watering or before rain falls. If caught in time, one application is enough and the sooty mould will eventually flake off.

The orchids need cleaning well so that the plant can sit firmly on the branch. Place each orchid carefully and make sure it has room to 'walk' forward and up the branch.

2 Teak Posts

The teak post method of cultivation of epiphytic orchids was an emergency measure invented to accommodate over 30,000 orchids which Lae Botanic Gardens had to accept



Teak post. *Dendrobium* attached to post with plastic ties.

almost without notice, following the resumption of the New Guinea Biological Foundation property for the giant copper project on Bougainville Island. The experiment was so successful that teak post culture is now perhaps the commonest outdoor method.

Large forests of teak (*Tectona grandis*) have been planted as an aid to the timber industry. The thinnings have many uses—not the least valuable being as orchid hosts.

The posts are ideally between 2 to 3 m long and 15 to 20 cm in diameter. Original posts were planted 60 cm in the ground and in a 3 m triangle in staggered rows. After two years or so, the underground portion rotted and the posts crashed down, injuring many orchids.

Today the practice is to tie the teak post to an iron picket 15 cm above the ground. The posts last years longer. Of course our ultimate aim is to transfer our plants to living trees as soon as practicable.

Teak posts, however, for many of our showy *Dendrobiums*, especially of the *Ceratobium* and *Latourea* sections, will play a lasting role in our tourist and garden attractions. A small industry has begun in hiring such posts out for hotel decoration. The flowers last for ten to twelve weeks, and the hundreds of spikes give a glorious display over a period of 3 to 4 months.

Plants should be thoroughly cleaned, all damaged roots and stems cut off. They should be tied firmly to the post, taking care not to take a wire across a growing eye. It is also sensible to tie one long cane flat against the post so that the plant will not wobble in the wind and so damage new root tips.

The tops of the pseudo-bulbs should be about 15 cm above the top of the post. The new growth and flower stems will then conceal the bare wood.

Posts should be in semi-shade, preferably an area with large trees about 15 to 18 m apart. In this way, posts usually have early morning sunshine but some protection from the midday sun.

Plants which will not tolerate full sunlight, such as *Sarcophilus moorei* or the *Erias*, should have a 1 m square 'hat' on top of the post. I make these on a wooden frame with Sarlon cloth or Trical tacked to it. The frame needs a cross piece so that it can be nailed on to the post. This gives adequate shade and ensures plenty of air-movement.

I like several posts of each of the long-flowering varieties, such as the *Ceratobium* and *Latourea* *Dendrobies*. They flower for months at a time, and this is good for either garden decoration or for commercial cut flowers.

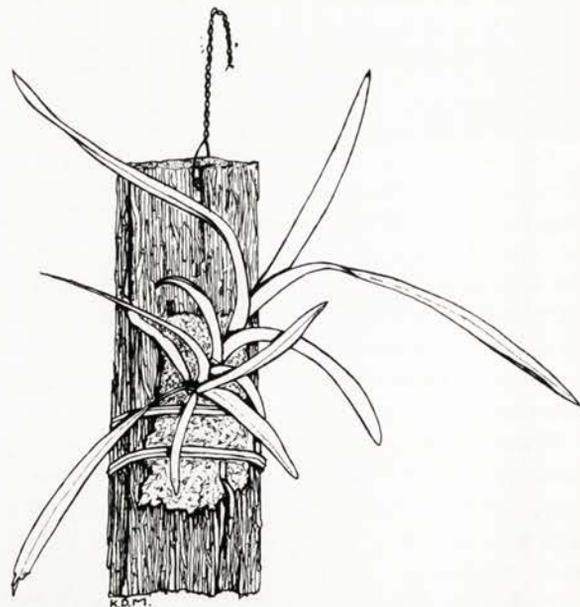
3 Tree Fern Fibre

A very common tree fern about the 500 m mark is *Cyathea*. The lower part of the trunk is almost solid fibre and very useful for epiphytic orchids.

Small slabs, varying in length to suit the orchid, and about 20 mm thick are ideal. The fibre should be clean, and stored dry until wanted, and the slabs cut as required. A small wire hook at the top for hanging on to rails or A.R.C. mesh is all that is necessary.

The plant should be placed with room for the roots to go down and the plant to go up, or the reverse if a pendulous one such as *Dendrobium anosmum*.

I use a small piece of fibre as a support in pots of brick and charcoal. Tying the orchid firmly to fibre support and then packing the brick and charcoal around it ensures that the new root tips will not be damaged in the early growth stage. This often happens if the orchid pot is knocked or blown about in high winds.



Tree fern fibre

The fibre usually lasts about two years, and does not break down easily.

A mixture of the shredded fibres is useful as one of the ingredients in potting composts for *Paphiopedilums* and the smaller botanicals. I use small pieces of brick and charcoal with the fibre, and top with sphagnum moss in the dry season.

The vast majority of orchids that we grow are epiphytes and therefore we need room for the roots to walk about. Air must be able to circulate through the compost or the plants will die.

Fibre on its own tends to pack down too firmly as it ages: the brick helps to counteract this and the charcoal keeps it sweet.

4 Brick and Charcoal

The most common material used in place of true brick is broken drain pipes: most bricks made here are of cement and not suitable for orchid composts. Fortunately in this young developing country, building is going on everywhere,

every day, and damaged earthenware pipes are fairly easy to come by. In Port Moresby, we find chips of the rocks on Tuaguba Hill very useful. I use one-third charcoal in each pot, and it keeps the roots clean and healthy.

The pieces of brick and charcoal should be graded to the size of the pot: the larger the pot, the larger the pieces. They should be quite small near the top, about 12 mm, as these can be packed around the roots without damaging the new growth.

When the pots are changed, the old brick can be used again. I soak it in a strong fungicide, and sun-dry for several days before re-using.

5 Coconut Husk

A segment of coconut husk, usually a quarter, is a good medium for starting new orchids on the road to good growth, and is especially good for large jungle collections.

In our rescue operations in logging areas, we are often faced with hundreds of sunburned, usually damaged epiphytic orchids. The coconut husk is cut into segments,



Pot of brick and charcoal



Segment of coconut husk with growing orchid

flattened with a heavy rock hammer, and all but a little of the husk removed: the fibre is less than 10 mm thick. A small wire hook is attached and the plant tied on with plastic-covered wire.

A good dunk in a bucket of warm water and they are then hung on A.R.C. mesh frames.

6 Hanging and Display Methods

Few of us build expensive orchid houses: a good lath house (of wood, bamboo or pit-pit) is very handy, but most of our orchids are grown in outdoor conditions as near to those of nature as we can achieve.

A.R.C. mesh is a favourite with most of us. We stand it up between two iron pickets in semi-shade and hang slabs of fibre, teak blocks or coconut husks on to it with wire hooks.

In the National Capital Botanic Gardens in Port Moresby I made three-railed frames of pipe—about 1.5 cm wide, about 2 m high and 6 m long by 40 cm wide. I covered these with either Sarlon or Trical shade cloth and what

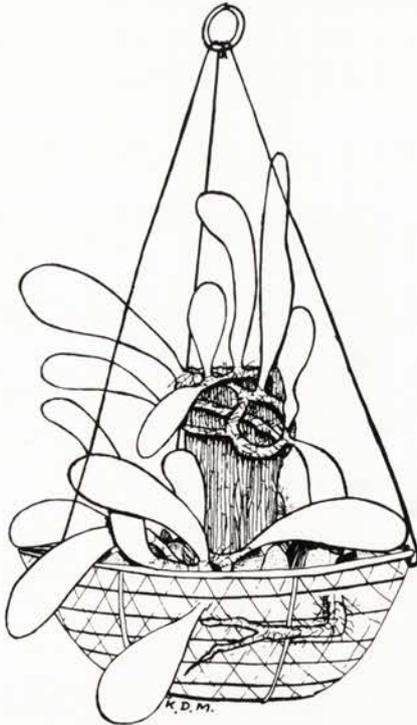
began as a piece of improvisation to handle hundreds of orchids from our rescue and conservation operations has developed into an ideal display method. This is particularly so in small home collections because the shade can be adapted to the orchids hung under it: 40 per cent for *Dendrobiums*, 60 per cent for *Cattleyas* and 80 per cent for *Phalaenopsis*; these shades suit my conditions.

7 Wooden baskets

Slatted wooden baskets are an ideal way of growing most of our orchids, and in particular, the mat-forming *Bulbophyllums*, *Erias* and *Coelogynes*. The pendulous *Dendrobiums* and Vandaceous species—*Sarcanthus*, *Sarcochilus*—do very well in these conditions. We use the same composts as we do in pots.

Phalaenopsis do especially well in slatted baskets. The plant is allowed to extend over the side, and the roots and compost kept in place with a square of chicken wire.

They usually last eighteen months to two years, and re-basketing is very easily done if tackled before the actual



Wire basket



Wooden basket of brick and charcoal

collapse of the old one. The rotted wood peels away leaving the roots still firmly attached to the brick pieces. The plant is packed into a new basket, dunked in a bucket of fungicide and re-hung. In a day or two, the plant has settled down and new roots take hold.

8 Feeding Notes

Papua New Guinea orchids are not hard to cultivate. Most of their requirements in Nature come from air and water. Epiphytic orchids collect falling debris and when I bring them in from the bush, I try to compensate. Once a week I put leaf mould into a bucket and fill it with water—one part leaf mould and two parts water. I let it soak for 24 hours and then pour it on to my posts—orchids on slabs, I dunk in the bucket.

Once the new roots have developed and the plant is growing well, it goes into harder conditions and gets the usual fortnightly spray with Aquasol or any other nitrogen-heavy fertiliser. The only other luxuries my plants get are a quarterly feed with cold beer (1 part beer to 32 of water). Pieces of dried cow manure are placed on top of the pots.

Most of our orchids are easy to grow if the climatic conditions are studied, and growing methods equalised. It is for this reason that I have included brief habitat notes in each description. Plants from varying altitudes can often be grown in the one collection if the surface needs of the roots and rhizome are studied before cleaning and potting.

Epiphytic orchids invariably cling to a hard surface such as tree branches or trunks, rocks and other media: *Dendrobiums* of the *Ceratobium* section have their roots exposed to the elements in all seasons; the *Oxyglossums* and almost every other orchid in the high mountains have moss covering all roots and often the pseudo-bulbs too. In cultivation I use a compost of hard chunks of brick and charcoal, with the plant tied to a small piece of tree fern, and a covering of sphagnum moss.

In the high mountains, these orchids sometimes have periods of dry weather, but usually several times a week rain falls in the late afternoon, the temperature drops sharply and, in the morning, the air is thick with mist or low cloud. This usually lifts in two or three hours and the sun is extremely hot, and so the plants dry out again before the afternoon. This can be equalled with daily waterings and a light misting in the morning.

However, I am bound to say that the beautiful, psychedelic-coloured orchids of the high mountains are as temperamental as so many beautiful women: no two orchids behave in quite the same way, and growers must accept the challenge, pander to each one's whims and variations and the rewards are well worth it.

The two basic rules in orchid cultivation are, I think, perfect drainage and correct watering. The orchids of Papua New Guinea follow these rules and they are very rewarding to grow.

Photography

I have read a few accounts by professional photographers who warn the intending professional that it is very unprofessional to go on a photographic assignment and suddenly find you have the wrong film, or no film or one camera which is unreliable, etc. It so happens that when I first took on the task of photographing orchids with Andréé, I was using a 35 mm camera and after using a whole film, found I was using black and white instead of colour film. Andréé was forbearing so I started again with a new colour film. At about the fortieth shot I realised all was not right. The film had not gone through at all. Why I was not thrown out on my ear I could not understand then. But Andréé is a very understanding person so I photographed the same series of orchids a third time. They must have turned out satisfactorily for we have continued as partners in this project over the past few years.

One cannot go out and photograph all the orchids one wants for a book in a short time. Some species flower for about four hours in the middle of the day, maybe three or four times a year, some once a year. Others do not reach the flowering stage because of insect attack, many are rare and it takes considerable time and energy to find them. Once found they are either photographed on the spot or brought back and cultivated, then photographed in their next flowering season. It is not a matter of taking just one or two photographs of each species. A whole series is taken to show the plant, a full raceme of blooms or just one bloom. The selection in this book has been made from our collection of over one thousand slides of orchids.

Few, except the most accessible orchids, were photographed in the natural state. It is awkward hanging underneath a moss covered branch in a dark and misty forest, trying to get the right angle and light intensity on a long drape of *Dendrobium anosmum*. Photographing in the field has other problems too as when trying to focus on a specimen of *D. cincinnatum* you have set up against a background in the cabin of a trawler lurching onto its beam ends in a thirty knot breeze. This we did off the coast of Fergusson Island in 1974.

It is convenient to have a wife who is also a good photographer for sometimes I will be holding an orchid in a particular position while Margaret photographs it or vice versa. At times I have been on field duties in another province when a particular orchid has just bloomed in the National

Botanic Gardens. Andréé has then called on Margaret to 'come out and photograph this orchid; it is a one day wonder and will be dead by this evening'. Orchids are like that. They will flower when you least expect them to.

Photographing orchids in the field sometimes has unexpected hazards. Walking down from the top of Mount Albert Edward last year, at about 3,300 m altitude, I passed through moss forests laden with rhododendrons and many species of orchids but there was no hope of photographing them. A continual sleety drizzle whipped along by a ten knot S.E. wind, mist and bone chilling cold prevented the use of cameras and time was against us. It was very frustrating.

There are also moments of elation such as the time when Margaret and I were with Andréé and two German botanists in the Milne Bay Province. We were looking for a Slipper Orchid (*Paphiopedilum* sp.) found once before in this area by the 1953 Archbold Expedition. We were struggling up a mountainside through patchy rain forest, boulder strewn creeks and tall grassland containing patches of Pitcher Plants (*Nepenthes* sp.) but not one slipper could we find. We turned down a slope into a bamboo thicket on our return and were startled by Dr Schoser, one of the German botanists, jumping up and down in a paroxysm of joy. We had walked over dozens of slipper plants without recognising them but Dr Schoser, trailing the team, had recognised them. We stayed there to collect some samples and to photograph them *in situ*. Unfortunately none were in flower but it was a nice moment.

Some of the memorable times in taking photographs of orchids have been on the field days organised by Andréé and her staff. A day in the old rubber plantations at 700 m altitude behind Port Moresby brought forth a surprising wealth of material some of which was photographed immediately as the flowers sometimes do not travel well in a bouncing truck and, if damaged at all, they are not worth photographing. It is not always possible to get a good plant and a good flower together. Broken or stained leaves, petals with holes or frayed edges should not be photographed. Only the best possible blooms were selected except for the very rare species when it may be years before another is found.

As this is basically a book for the identification of orchids, we felt it best to portray the orchids with as little extraneous

background as possible. Consequently a large percentage of these photographs were taken against a length of black velvet which completely eliminates shadows. Most of the photographs were taken on Kodak Ektachrome EX 120 (64 ASA) film and used in two Zenza Bronica S2A cameras with bellows. The bellows have the advantage of focusing from 1:1 magnification through to infinity as well as providing rise, tilt and swing. Detail was guaranteed by the standard 75 mm Nikkor H.C lens. This lens also has exceptional colour rendition. Two electronic flashlights were used, one on each side of the camera on a metal bar, slotted so that we could move the flashes close in or up to 40 cm away from the camera. At such close distances exposure was judged by experience. Some instruction sheets with electronic flash units point out that their exposure chart may not work at distances of less than one metre. Each flower is a different size, a different colour or a different shape and therefore the exposure for each orchid had to be estimated individually. As a guide, closeups of individual florets were taken at f.16 or f.22 with both flashes approximately 30 cm away from the flower. The flashlights were Kako model 828 (guide no.40). Some of the photographs were taken on Kodak Ektachrome EX:135 (64 ASA) using a Nikon F2 camera with the 50 mm F2 lens or the Micro-Nikkor 55 mm F3.5 lens with the supplementary ring. The latter is a superb lens for closeup work. Almost invariably, a tripod was used.

Roy D. Mackay.

Glossary

- Acute** Tapering to a point.
- Adventitious** When applied to roots, those which arise from the stem or pseudo-bulb: 'adventitious plants', commonly called 'Kikis', arising from a node on the flowering stem (as in *Phalaenopsis*) or pseudo-bulb.
- Anther** Part of the main portion of the flower which holds the pollen. In orchids it is usually cap-like.
- Apex** The terminating point.
- Axil** The angle formed between the axis and any part which arises from it: e.g. the leaf and the stem.
- Bract** A modified leaf which is below the normal leaves on a stem or between the calyx and the normal leaves.
- Callous** An unusually thickened part.
- Cleistogmatic** Fertilisation taking place within unopened flowers.
- Column** The solid part of the centre of the orchid flower which is formed by the fusion of the stamens and the styles.
- Concave** Hollowed out.
- Constricted** Sharply narrowed.
- Contracted** Narrowed.
- Convex** Arched, or having a rounded surface.
- Cordate** Heart-shaped.
- Corm** Swollen base of a stem containing food reserves.
- Crisped** To describe margins—such as the outer edge of petals—which are curled up and irregularly twisted and divided.
- Deciduous** Falling in season.
- Disc** The part of the labellum from which the lobes radiate.
- Endemic** Confined to a region.
- Epiphytic** Growing on another plant but not parasitic.
- Filament** The stalk on an anther.
- Filiform** Thread-like.
- Glabrous** Smooth as opposed to hairy.
- Hirsute** Hairy (the hairs being long enough to be distinct).
- Holotype** The specimen of any scientific item (plant, insect, animal, etc.) from which the original description was made.
- Inflorescence** The part of the plant from which the flowers come—including the peduncle bracts, rachis, pedicels, ovaries and flowers.
- Internode** The portion between the nodes.
- Labellum** The third or unpaired petal: it is usually larger, often lobed or with appendages attached to it.
- Lanceolate** Said of a leaf or a flower, part of which is shaped like a lance: that is, narrow and tapered at both ends.
- Lithophytic** Growing on rocks.
- Lobe** Division of an organ.
- Membranous** Thin and transparent.
- Mentum** In orchids, a chin-like extension at the base of the flowers, which is formed by the combination of the column foot and the bases of the lateral sepals.
- Node** The thickened knot or part of the stem which usually bears a leaf or a bract.
- Oblong** For example, an oblong leaf—longer rather than broad and with parallel sides.
- Panicle** A branched inflorescence.
- Pedicel** The stalk of a single flower.
- Peduncle** The basal (or lower) stalk of an inflorescence which terminates in a rachis, pedicel or group of pedicels.
- Pendulous** Hanging or pendant.
- Persistent** Parts which remain until the whole reaches maturity, e.g. bracts on a stem.
- Petal** In orchids there are two petals which are segments of the second whorl of the flowers. The third petal is called the labellum and is usually greatly enlarged.
- Pistil** The female or seed-producing organ of a flower, consisting usually of the ovary, style and stigma.
- Plicate** Folded lengthwise in pleats.
- Pollen** The fertilising agent produced by the anthers.
- Pollinia** The coherent masses of pollen found in the anthers.
- Pseudo-bulb** A thickened and bulb-like internode or group of internodes in the stem of an orchid.
- Pubescent** Hairy, the hairs being soft.
- Raceme** An inflorescence which bears single-stalked flowers usually opening progressively from the base.
- Rachis** That part of the flower stem which carries the pedicels or sessile flowers.
- Recurved** Curved upward or backward.
- Reflexed** Sharply bent upward or backward.
- Rhizome** The root stock or stem from which the roots appear and from the apex of which come the stems or leaves.
- Rosette** A cluster of leaves in a circle form.
- Rostellum** A small beak.
- Sac** A pouch or cavity.
- Saccate** Shaped like a sac.
- Sepal** A segment of the calyx or first (outer) whorl of the flower.
- Sessile** Stalkless.
- Sporadic** Widely scattered.
- Terete** Pencil shaped.
- Terrestrial** Growing in the ground.
- Tomentose** Densely hairy.

The Names

When an amateur plant collector reads the initials or abbreviations after a plant name he may wonder what they mean. Briefly it means that this name is the scientifically accepted and correct name for that plant, and the initials indicate the name of the man who made the description.

For example, *Dendrobium nindii* was first found and named by W. Hill in Australia in 1874. The orchid was again described by F. M. Bailey and called *Dendrobium tofftii* in 1896. In July of 1909, Rudolph Schlechter found the species in what was then German New Guinea, and he called it *Dendrobium ionoglossum*. Research and study of the orchids confirmed the first and valid name, *Dendrobium nindii* W. Hill.

The authority is not part of the name, but it is cited whenever historical or botanical accuracy is necessary. In popular writing and speech it is not necessary or even good taste to use the authority.

The following list gives the name and a brief history of the authorities quoted:

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F. M. Bail. F. M. Bailey, author of *Queensland Flora*. 1902.
Bl. Karl Ludwig Blume, 1796-1862, of Holland. Writer on the plants of Java.
R. Br. Robert Brown, 1773-1858, of Great Britain.
Dockr. A. W. Dockrill, author of *Australian Indigenous Orchids*. 1969.
D. Don. David Don, 1799-1841, Scotland.
G. Don. George Don, 1798-1856, England.
Gaud. Charles Gaudichaud-Beaupré, 1789-1854, France.
W. Hill W. Hill, Scottish horticulturist and botanist, born 1820 in Scotland; died in Brisbane 1904, first Queensland colonial botanist.
Hook f. Joseph Dalton Hooker, 1807-1911, son of the great William Jackson Hooker, 1785-1865.
P. F. Hunt Botanist, Kew, England, orchid specialist.
T. E. Hunt Trevor E. Hunt, Australian botanist and author.
Koen. Johann Gerhard Koenig, 1728-1755, German botanist who travelled in India.
Kranzl. Fritz Wilhelm Ludwig Kranzlin, born 1847, orchidologist, Germany.
Ktze. Otto Kuntze, 1843-1907, German traveller and botanist. Famous for large herbarium and collection of plant pictures: published *Revisio Generum Plantarum*, 1891-1893, 3 vols.
Lindl., Ldl. John Lindley, botanist, England, 1799-1865.

F. Muell. Ferdinand von Mueller, 1825-1896, Royal Botanist of Australia, author of works on economic plants.
Miq. Frederick Anton Wilhelm Miquel, 1811-1871, of Utrecht, Holland.
Rchb. Heinrich Gottlieb Ludwig Reichenbach, 1823-1889, Germany.
Rchb. f. Caspar George Carl Reichenbach, 1773-1854. Professor, of German birth, later worked in Indonesia and founded Bogor Botanical Garden, Indonesia, in 1817.
G. Reich. Heinrich Gustav Reichenbach, 1823-1889, German botanist and orchidologist, Professor of Botany, Hamburg.
Ridl. Henry N. Ridley, Assistant, Botanical Department, British Museum, London.
Rogers R. S. Rogers, 1862-1942, physician and botanist.
Rolfe R. Allen Rolfe, A.L.S., Assistant to the Herbarium of the Royal Botanical Gardens, Kew.
Rupp Rev. T. E. Rupp, Australian cleric and botanist.
Schltr. Rudolph Schlechter, 1823-1908, German botanist, who wrote the first great work on the orchids of Papua New Guinea, *Die Orchidaceen von Deutsch-Neu-Guinea*.
J. E. Sm. Sir James Edward Smith, 1759-1828, British botanist; founding member of the Linnaean Society and Royal Horticultural Society.
J. J. Sm. Johannes Jacobus Smith, 1867-1947, Belgian-Dutch botanist, horticulturalist, who specialised in orchids.
Summerh. Victor S. Summerhayes, botanist and specialist on South African orchids, Kew Herbarium.

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The American Orchid Bulletin.
Malayan Orchid Review.



I have walked back over a reef after a glorious day collecting on an island in the blue, blue seas, with orchids in my arms, and blue star-fish and sea urchins at my feet.

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