Collecting Rhododendrons in New Guinea

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At present there are more than 220 recognized species of rhododendron in New Guinea, with every possibility of this total reaching 300 when more of the country is explored. As the only ones with which we are really familiar in this country may be counted on the fingers of two hands, it seemed to be high time to go and hunt for more of them, and to bring back plants and seed in order to assess their undoubted horticultural value. The flower colour of many of them is striking, with a clarity which I found most refreshing, and they should prove a worthy complement to the species we already cultivate from the Asian Mainland. A great deal of interest in this neglected branch of the family has been shown by rhododendron enthusiasts abroad, especially in Holland and the United States.

Dr. Cowan once wrote me, "An expedition to a largely unknown tropical country is not to be undertaken lightly." However, I flew out to Lae at the beginning of April, arriving in time to attend the opening of the new herbarium by Sir George Taylor. The Chief of the Division of Botany, John Womersley, suggested I fly to Kainantu in the Central Highlands to get the feel of the country for a few days before beginning any serious collecting. Here I met my first rhododendron, R. macgregoriae, with orange-yellow flowers, growing in open kunai grassland associated with hypericums and a vaccinium with delicately scented flowers and attractive pale bronze young growth. Walking a mile through the kunai, rhododendron plants occurred sporadically right up to the edge of a near-by forest, but within 50 yards of the trees the number of plants increased tenfold, with hundreds of seedlings in all stages of development. They did not however extend more than five yards into the shade. One of the botanists in Lae told me that he found a white-flowered form of this species in this area-I had no such luck. It has a reputation

throughout the country of being exceedingly poisonous to livestock, and I was told of three mules which had recently expired after eating small quantities of the foliage. The next few days were spent trying to talk with the natives and learning something of their customs and way of life. Returning to Lae to collect my gear, I set off in a Land-Rover for Edie Creek near Wau, which lies at 6,500 feet, and quite often experiences hoar frost-cold enough while I was there to sleep in an extra pullover.

Vast quantities of gold were mined here thirty years ago, and now the sluiced areas are thickly colonized by ericaceous plants, especially rhododendrons. It was not at all what I had expected, with very little humus, shade or surface moisture, though the rainfall here is about 100 inches. The gold workings are composed of a sandy clay studded by rocky outcrops and low cairns, the surface of the clay caked so hard that most of the rain must quickly run off into the near-by creek. My first soil sample was taken here.
One of the few plants in flower was R. gracilentum, with pretty pink bells. It has the appearance of an alpine, though it has not yet been found at a greater altitude than 9,000 feet. Prominent among the other species here was R. luteosquamatum, which has rather shoddy small red tubular flowers. More impressive was R. konori, which we used to hear of as R. devriesianum, growing up to 7 feet high, with large white tubular campanulate flowers with seven petals generally tinged pink near the base, the tube flushed pink inside and out. They are scented like carnations. While unfolding they look rather like bloated barbers' poles. R. herzogii has a scent more like honeysuckle, with white flowers of the same character. I was delighted to hear from Patrick Woods in Edinburgh that this species has recently flowered there. Like many other New Guinea plants, R. beyerinckianum has most attractive "old gold" dense scaly young growth. R. leptanthum was also here, and though still in the open did show a slight preference for sandy and more shady spots. I also found R. nummatum, R. anagalliflorum and R. invasorium which normally grows at a much greater altitude. Other species found have not yet been identified by Dr. Sleumer of Leiden, who has been in the area, and accomplished a great deal in his classification of its ericaceous flora.

Walking along the Bulldog Road from Edie, which was gouged through the mountains and thick forest during the war, and is now reduced to a narrow native track, it was noticeable how many species had made themselves at home on the steep cuttings in the hillsides, and to a lesser extent on the road itself. While digging some of them up, I was amazed at the depth to which the roots penetrated, up to 2 feet in the case of small plants about 3 feet high, with very little surface rooting. The roots are thick and of a soft consistency, pruning shears sliding through them with ease. This applied to all the rhododendrons I met. These roots seem capable of storing a considerable amount of water, enabling the plants to survive almost xerophytically on hot dry banks during fry spells. Though it was the driest part of the season, many of them were putting on new growth. As the road twisted deeper into the primary forest, R. konori became more common, and one plant I saw in the middle of the path though persistently broken down by passing natives still continued to thrive. This species should stand any amount of pruning. Very large plants were seen growing epiphytically, the largest being more than 10 feet high. Some were growing at a height of 80 feet in the forks of trees or on their moss- and orchid-festooned trunks and branches. It was interesting to see that the roots here invariably run vertically, and do not clasp a supporting trunk laterally to any appreciable extent.

From Edie, I drove up to the South Summit of Mt. Kaindi at 8,300 feet. It was a very steep rough road requiring four-wheel drive almost all the way. There were young rhododendrons on the road cuttings, but seldom in damp shady spots, which were very often taken over by an interesting Gunnera, with occasional plants of Astilbe papuana and hosts of ferns and mosses, including some excellent sphagnum which was most useful for packing. Moss forest surrounded the summit, and the area was conspicuous for a number of fine foliage plants such as Rhodomyrtus novoguineensis with its outstanding furry wine-red young foliage, a species of Poikilogyne with purple leaf under-surfaces, and an Archboldeodendron. In the forest rhododendrons grew terrestrially in the few places to which the sun penetrated, but most were

epiphytic. Many of the plants found on the gold workings turned up again here, this presumably being one of their primary stands, but one wonders if in fact they were in ages past terrestrial and have had the "wits" to get themselves into the treetops to survive. They quickly come down to earth if given the chance. These plants obviously have a flowering season, probably in August, and do not usually flower intermittently throughout the year, consequently there was very little seed available. I dug up over a hundred, a representative cross-section. Many of them were in growing condition, so I left a good deal of soil around their roots, swathed them in sphagnum wrapped in plastic, put layers of newspaper in between and packed them in wooden boxes and tea chests. The trip home by air freight took six days, and 90 per cent of the plants arrived in excellent condition.

From Edie Creek I travelled back to Wau, and visited the Macadam Park with John Womersley. This is a very fine nature reserve, with an attractive small lake bordered by an impressive planting of Araucarias. We thought that many of the Burmese rhododendrons would do well here, and that Gunnera manicata would look well beside the lake. Arrangements are being made to send some of these to New Guinea in the autumn. Driving back to Lae, we saw R. aurigeranum in a grassland gulley near Patep Creek, which lies a few miles beyond Bulolo at about 2,000 feet. While it would be surprising if this species proved even half hardy in this country, it should prove a first-class ornamental in such a climate as that of California, and a very satisfactory pot plant here. This is one of the few N. G. rhododendrons which will actually need heat in winter; others will need to be kept just frost free, and some should be hardy, certainly on the West Coast. R. commonae has already survived a couple of winters outdoors in Holland. On the Markham Ridge 2,000 feet above the head of the Huon Gulf, grows another low-altitude rhododendron, R. retrorsipilum. Growing epiphytically, it reaches 6 feet, and has small white tubular campanulate flowers of little decorative value.

On my next excursion, I flew up to Mt. Hagen in the Western Highlands, and from there drove over Tomba Pass to Wabag. Tomba lies on the slopes of Mt.

Hagen itself, at about 8,500 feet. The area is rich in rhododendrons, both in grassland and forest. Among the more conspicuous was R. herzogii growing up to 9 feet and poking its head above the surrounding grasses and scrub. In the young state it is a most tidy symmetrical plant with the typical leathery leaves of the N. G. species. The road here is rough, and we came upon a steep embankment beyond Tomba thickly colonized by at least six species, including R. rarum. Its specific name seems incongruous as it was the most common rhododendron I met in the Western Highlands. Usually an epiphyte, here it was growing in hard moss-covered clay similar to that at Edie. It is a loose-growing plant when epiphytic, and will straggle up the mossy trunk of its host for as much as 5 feet. It has most elegant lanceolate leaves with pretty scarlet tubular flowers about 2 inches long; some forms are met with deep pink corollas, in heads of two or three.

Running short of time, I hastily gathered a soil sample and made a mental note to look over this spot on my return journey, to collect some of the young plants. It was noticeable they grew on that part of the bank which was most exposed to the sun, and rapidly thinned out on the few flat ledges.

Driving down the impressive Lai Gorge, odd rhododendrons were seen all the way, large clumps of R. macgregoriae being prominent as many of them were in flower in the grassland. On arrival at Wabag in the late afternoon, I was amazed to find that it had taken almost ten hours to cover the eighty-odd miles from Mt. Hagen, largely due to rough road conditions. John and Jill Flenley who were up there doing ecological research for Canberra University, generously put me up for the ten days I spent in the area, and lent me two of their native assistants who knew the lie of the land-invaluable assets.

The next day we drove along a hair-raising new road to the top of the Kandep-Lagaip Divide at 9,600 feet, where the scenery was splendid with mountains fading away into the pale blue distance. Growing epiphytically on trees felled to make the road was an interesting rhododendron with sessile orbicular leaves and bright red flowers. It was most ornamental. We did not have time

for a full-scale hunt here, as it looked like rain, and it was not a good place to be bogged down, miles from anywhere. In the Lagaip Valley on the way back I collected what I took to be R. warianum, and another species with beautiful pink flowers R. leptanthum. There was also a fine vaccinium with sessile leaves, and young growth that would compare favourably with Pieris forrestii. There were exquisitely graceful trees of Papuacedrus, both P. oligodon and P. papuana, the latter being more compact with darker foliage. One area of grassland was especially interesting, and I returned later to spend a whole day looking over an area of about fifty acres. It was in a shallow valley with a stream running along the floor in a channel 20 feet deep, in places cutting through deposits of volcanic ash. In general the area was very wet, but had grassy tussocks sticking up 3 or 4 feet above the damp level. Native pigs ran between these, and their tracks made it easier to travel, but one still needed a jungle knife to cut through the thicker brushwood. In the tussocks most of the rhododendrons and other shrubs grow jumbled up together, with their roots almost inextricably entangled; they included Hypericum and Dimorphanthera, with zingibers and the inevitable orchids, ferns and lycopodiums. It was noticeable that almost all of the rhododendrons had most of their foliage disfigured by insects, and the loss of new shoots had led in many cases to grotesquely shaped plants. It occurred to me that it might be interesting to collect and identify some of these pests, so during the remainder of my trip I collected as many as I was able and pickled them in 60 per cent alcohol.

About noon it began to rain heavily so I retired to a near-by village and sat smoking in the men's house until it eased off. The locals smear themselves with pig fat which smells strongly when a number of them are huddled round a fire, so I was pleased to get outside. Resuming operations I struggled through the wet scrub down towards the stream, and was rewarded by the discovery of two apparently natural hybrids. In both cases one parent was certainly R. macgregoriae, and the other was most probably the fine pink-flowered species R. leptanthum; the foliage and flowers were intermediate between the two. It was difficult to estimate the extent of natural hybridization, or even to

identify accurately plants when so few were in flower, but I feel sure they hybridize reasonably freely.

All the rhododendrons were well mixed in the grassland, and no species was predominant in any particular area. The natives knew them well though they had no domestic or medicinal use for them. Occasionally they used R. macgregoriae to make a hedge round gardens of sweet potatoes which were at their upper altitudinal limit here. The altimeter recorded 8,400 feet, and the crops appeared scanty. They told me that in 1941 there was a disastrous frost which lasted a fortnight, destroying much of the food crop and creating a famine. The local population was forced to go down to lower altitudes where they received a hostile reception from their traditional enemies. Word of the frost was music to my ears, as many of the rhododendrons were older than thirty years. Some of the species in the area were R. warianum, with long lanceolate leaves and red flowers, R. vaudeursenii, R. scabridibracteum, R. commonae, R. dielsianum and one of the finest forms of R. macgregoriae I met, with huge multiflowered trusses reminding one of a hydrangea when viewed from a distance. The remainder have yet to be identified.

After two unsuccessful attempts to drive back to Mt. Hagen due to some of the bridges being washed out, I finally made it after a stop at Tomba and a brief skirmish up the slopes of Mt. Hagen. I sent off my plants, then drove down the Waghi Valley to Nondugl, the roadsides ablaze with dark red cannas. I was most hospitably received by Mike Newcomb, who was growing coffee there. Fred Shaw-Meyer's collection of Birds of Paradise was fascinating, but I was surprised by their raucous crow-like calls, as if a primadonna were to belch!! There are very spacious gardens at Nondugl inspired by Sir Edward Halstrom, with fascinating tree ferns and huge fountains of bamboo erupting from the lawns. Fine trees of Papuacedrus, which looked like Lawson's Cypresses from a distance, added to the effect, as did trees of Ficus dameropsis, one of the most effective foliage plants I know. Round the ponds, and in the shade house, Fred Shaw-Meyer has planted several rhododendrons which he had come across during his extensive

travels collecting zoological specimens. The only ones in bloom were R. konori, whose scent floated among the trees with the fireflies in the evening, and R. macgregoriae, several compact plants in a raised bed, including a fine yellow form. This species is found down the whole length of the Waghi Valley, often in very dry situations. Its range of distribution is great. I found it growing as high as 8,700 feet, and as low as 4,000 feet. Near Nondugl I also found R. phaeochiton with its interesting furry young growth, and was much surprised to see an old hybrid of R. arboreum outside one of the houses. It must have an interesting history and was probably imported from Australia.

For three days Mike Newcomb and I waded up the rivers Al, Ga and Kori, above the station, and scrambled up the neighbouring hills to about 8,000 feet. It was tough going, but our natives cut their way through the forest like machines. We saw many rhododendrons here, mostly overhead, but even out of flower their foliage was distinctive. R. rarum was by far the most common. On the banks of the rivers there were several species growing terrestrially, one with leaves which reminded me of a hardy hybrid, but the locals passed it off as being of little account, with very small flowers. Identification of this and other species from this area is proceeding, but I am reasonably certain they include R. anagalliflorum, R. scabridibracteum, R. konori and R. gracilentum.

After a week's training we set off with nine natives and a couple of youngsters to climb Mt. Manduil and the Waghi-Sepik Divide, which rises to over 12,000 feet. Climbing up through the moss forest was one of the toughest climbs I have done, and real will-power had to be exercised to push on for hour after hour, scrambling often almost vertically up a muddy track over fallen trees with ever shortening breath, and being assiduously attacked by leeches and a species of biting fly (Simulium sp.) which concentrated on one's eyes, and appeared to enjoy cigarette smoke as much as I. Some of the natives pushed on ahead, and two of them, carrying five gallons of paraffin and a bag of sweet potatoes swarmed up with as little effort as flies climbing up a window. It was with relief that we emerged from the forest quite abruptly at 9,500 feet, in pouring rain and with the temperature at 48F. A rhododendron with fine

obovate leaves edged the forest, and then we came upon an area of thick sphagnum with islands of shrubs, perched on top of a narrow ridge about 20 yards across, and falling away almost vertically on either side. Here we made our camp.

Climbing a thousand feet the next day we met gentians, Ranunculus and Potentilla, with a shrubby vegetation consisting of 60 per cent rhododendron, along with interesting species of Drimys, Olearia, Veronica and Vaccinum. A highlight here was the discovery of R. hooglandii in a new locality, the second so far recorded. It has extremely narrow linear leaves, closely recurved at the margins, and deep pink scaly flowers. Another species had very fine dense scaly coffee-brown young foliage and leaf under-surfaces, with deep pink scaly flowers. The stigmas appeared to be white, but on close inspection they were seen to be thickly covered by a species of white mite, which I collected. Whether this insect has any part to play during fertilization I am unable to say. We saw no birds at this height so it seemed unlikely that they play any significant role; this would indicate that insects are largely involved. I suspected a weevil which was present in the corollas of several species; R. beyerinckianum was one of them. It was interesting that many plants were growing simultaneously terrestrially and epiphytically, being rooted deeply through the sphagnum and into the mossy accumulations on the branches of adjacent Olearias. The natives were not keen to go higher, as this was the land of their devils, and they would not stay up there at night. However, we pressed on and came across such interesting species as R. womersleyi with its peculiarly congested leaves, fastigiate habit and pretty red flowers, and R. commonae, with others of similar alpine caste. The summit of Mt. Manduil and the ridge of the Divide were grass-covered with rocky outcrops; several rhododendrons were growing in clumps and as isolated bushes all along. I was surprised not to find R. saxifragoides, which grows on Mt. Wilhelm at a similar altitude. This plant forms almost prostrate tufts of leaves with comparatively large red flowers standing well up above the foliage. The tap root is long, and I imagine it would be almost impossible to transplant, but it is

a species well worth getting into cultivation, which will have to be tried from seed.

It was extremely cold at night, the temperature dropping into the low forties. Frost is known to occur, and we had hoar frost outside the tent one morning. The plants here should be hardy, and will certainly not need to be pampered in hothouses. They should be able to stand a fair amount of shade as well as full sun, being accustomed to cloudy and misty conditions. It has been suggested to me that the decreasing amount of ultraviolet light at lower altitudes will upset their applecart. All I can say is that we appear to have got on all right with plants from much greater heights on the Asian Mainland. I collected about two hundred plants here, then set off by road for Goroka, only to be turned back at the approaches to Daulo Pass by a huge landslide which blocked the road for three weeks. While turning above the river I spotted several plants of R. macgregoriae growing epiphytically in the classical situation for a Javanicum, overhanging the water. There were orchids growing on their mossy trunks, epiphytes growing upon epiphytes. After collecting two other species I drove back to Banz, and flew out to Lae the next day.

After working over some of the specimens in the herbarium, I joined a party of botanists headed by John Womersleyi on the Fatima River about twenty miles out from Goroka. Timber was being felled here, and it gave me an excellent opportunity of seeing a selection of epiphytes at close quarters. Predominant among them were R. konori, R. rarum and R. herzogii, with a good sprinkling of other species. Of the unidentified plants, one which was especially attractive had finely scented tubular campanulate white flowers like coach horns, with rich green glossy foliage. The best plant I saw grew 8 feet tall and was 75 feet up on a Podocarpus branch. We only saw three all told, one of which I obtained after it had been stripped of its flowering branches for use as botanical specimens. Another more common species had small but attractive, clear red flowers. On one excursion to the upper reaches of the Fatima, we waded up the river bed for about 5 miles, sometimes up to the armpits in swirling water. The vegetation was so thick on either side that it was the

fastest way to travel. Many rhododendrons grew in the gravel and among the rocks on the banks, and in one place where the river had changed its course there were quite a number colonizing the old river bed, which appeared to be pure sand and gravel, but I took a sample to see what the soil specialists say about it. I obtained plants of R. luteosquamatum here, which strangely enough travelled much better than the ones from Edie Creek. There were of course the inevitable plants of R. macgregoriae growing up to 15 feet and flowering their heads off. There were also large plants of R. konori over-hanging the river by about 8 feet, and though not in flower, the young foliage was most attractive. There was also a most interesting species with red tubular flowers, and another whose general appearance suggested that it was a hybrid of R. rarum. A peculiar, though not really ornamental, Coriaria spread itself in all directions, sharing the ground with a beautiful purple-flowered Olearia, tree ferns and rhododendrons. On the way back to camp it rained heavily, a cold biting rain which etched one's bones. It put a stop to photography for the day. Later we came across a very fine form of R. rarum, with flowers slightly larger than the type; this was collected under the New Guinea flora number 24571, and the plant is now growing in my garden in the Lake District. Another day we climbed up to Kerigomna Sia through thick moss forest, which is usually described as being dark and depressing, but which I found to be fascinating with interesting plants round every corner. The Sia itself was on the summit of a mountain at about 10,000 feet, and was largely covered by open grassland liberally dotted with tree ferns, and with large islands of trees and scrub, edged by a fine rhododendron growing up to 25 feet high, and forming about 25 per cent of the shrubby vegetation. Its elegant pink and white flowers were scented rather like a daphne, lying in trusses almost like clusters of loudspeakers. I was overwhelmed by the beauty of this plant, and remember thinking at the time that if I had to choose between it and any man-made hybrid, I should take it without any hesitation. Its foliage was generous, and the plant was not unduly straggly. It was R. pleianthum. I dug up several seedlings growing in sphagnum about 8 inches deep, but found only one other rhododendron on the Sia, which I believe to be R. phaeochiton, with a brownish leaf and pink tubular flowers.

Shortly after this trip at the beginning of June, I decided that I had collected so many plants that I must fly home and see how they were faring. By introducing live plants I aimed at cutting out two possibly weak links in the chain of introduction, non-germination of seed and failure to raise plants to maturity. On arrival here they were planted outdoors in beds of bracken soil in three-quarters shade on the hillside, and were frequently sprayed. A few were potted up in a very loose bracken peat mixture and put in a cold house shaded by an acacia. Both lots have settled down well. So far there is little to comment upon, but the plants of R. macgregoriae outside have produced flowers and new growth whereas those indoors appear to be more or less static, and R. konori has produced new growth inside but not out. R. herzogii is happy in both situations, even a plant which was put experimentally on a very hot dry bank. I intend to move the majority into a cold house with a minimum temperature of 45F this winter leaving a few from high altitudes outdoors in the shelter of a high wall. The essential factor in their cultivation must be good drainage with a fairly open root run, which in the case of the alpine species should be on the moist side. As the majority of epiphytes may be seen growing terrestrially, I see no point in treating them as epiphytes with all the paraphernalia of slatted boxes, etc. I will most probably be shot down for this remark; however we shall see. Seed germinates readily under the usual conditions. So far I have used plastic boxes and peat, but sphagnum may be an improvement. I feel that our varying hours of daylight will not affect them adversely, though doubtless they would benefit from extra lighting in winter, and would make quicker growth. However the obvious course to be taken at the moment is to find out which are hardy, and the varying temperature requirements of the remainder.

The results of the soil analyses are not yet available, but a preliminary examination of one indicated that the pH was 5.8.

I was very fortunate in being able to see so much of this beautiful country and so many rhododendrons in such a short time, and I should like to record my gratitude for the great help given me by John Womersley and his staff in the

Department of Botany in Lae. This trip was little more than a reconnaissance, and further expeditions will be most rewarding.

Top left - Rhododendron konori

Top right - the best form of R. macgregoriae from Sirunke

Centre left - foliage of R. konori

Centre right - R. womersleyi from the Waghi-Sepik Divide

Bottom left - an epiphytic Rhododendron species on the Fatima River

Bottom right - a R. pleianthum from Kerigomna Sia