THE MADDENI SERIES OF RHODODENDRON.

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In the absence of a monograph of *Rhododendron*, the material for which is as yet far from adequate, it seems convenient to select, as Professor Bayley Balfour* has done, a fairly well-known species as the typical representative of a particular "series" or group, and to bring our knowledge of that group as much as possible up to date. The present contribution deals in such a manner with *Rhododendron Maddeni*, Hook. f., *R. Dalhousiae*, Hook. f., *R. ciliicalyx*, Franch., and the species closely allied to them; and this group for the sake of convenience may be called the "Maddeni series." This series, however, is no doubt a composite one, and contains three fairly well-marked but closely associated subordinate groups, each of which would more exactly correspond with Professor Bayley Balfour's conception of a "series." It includes practically all the larger-leaved Indian Rhododendrons with *lepidote* leaves, and their Chinese relatives.

This revision owes its conception entirely to the enthusiasm and encouragement of Professor Bayley Balfour, with whom the writer had lately the pleasure of comparing notes on a number of troublesome taxonomic questions regarding certain species of *Rhododendron*. The advantages of such to the writer of this paper will be obvious to all who know this large and difficult genus. Any special merits the present work may possess are due to the fact that the author has had for study the whole of the Edinburgh material of the series, including the beautifully preserved and fully annotated Yunnan collections of Mr George Forrest, with much other material gathered in Bhutan by Mr R. E. Cooper, and in Burma and Yunnan by Mr Kingdon Ward.

* Rhododendrons of the Irroratum Series, Trans. and Proc. Bot. Soc. Edin. xxvii. 157–220 (1917).

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For the opportunity of studying these specimens the writer tenders his grateful thanks to Professor Balfour, to the Kew Directorate for the necessary facilities in carrying out the work, and in particular to Dr Stapf, who has been ever ready to help with difficult questions.

The text figures are mainly of those species of which the material preserved up to the present is very scanty, often a single sheet. They do not claim any artistic merit, nor, having been prepared from dried material, can they give, of the flowers especially, a correct representation of perspective. But they will give some idea of the appearance of the dried plant (only one corolla is shown in each), particularly the shape of the leaves, the disposition of the leaf-scales and the appearance of the calyx, with the degree of scaliness of the style, etc., on which I have relied so much in framing the key.

DISTRIBUTION OF THE MADDENI SERIES.

The group has a fairly wide area of distribution, ranging from Sikkim (*R. Dalhousiae*, and others) in the west, east to Kweichow (*R. liliiflorum*), and southward to Tenasserim, in Lower Burma (*R. Veitchianum*). There are thirty-nine species in the series so far as known at present. The following list gives their names, distribution, and the name of the discoverer and year of collection; from it may be gathered some idea of the great number of species which have come to light during the last few years:—

SPECIES.	HABITAT.	COLLECTOR AND DATE.
R. brachysiphon, Balf. f.	Bhutan (6000–7000 ft.).	R. E. Cooper (1915).
R. burmanicum, Hutchinson	S.W. Burma (alt. ?).	Lady Wheeler Cuffe (1913).
R. calophyllum, Nutt.	Bhutan (6000–7000 ft.).	T. J. Booth (1850 ?)
R. carneum, Hutchinson	N.E. Burma (7500 ft.).	Major C. W. Browne (1912).
R. ciliatum, Hook. f.	Sikkim (9000–11,000 ft.).	J. D. Hooker (1849).
R. ciliicalyx, Franch.	W. Yunnan (7300 ft.).	Delavay (1883–5).
R. crassum, Franch.	W. Yunnan (7000–12,000 ft.) and N.E. Burma (8000–9000 ft.).	Delavay (1889).
**R. Cubittii*, Hutchinson	N. Burma (5500 ft.).	G. E. S. Cubitt (1909).
R. Cuffeanum, Craib	S.W. Burma (alt. ?).	Lady Wheeler Cuffe (1913).
R. Dalhousiae, Hook. f.	Sikkim (6000–8000 ft.).	J. D. Hooker (1848).
**R. dendricola*, Hutchinson	N.E. Burma (alt. ?).	Kingdon Ward (1914).
R. excellens, Hemsl. and Wils.	S.E. Yunnan (alt. ?).	A. Henry (1896–8).
R. formosum, Wall.	Khasia Hills, Assam (4000–5500 ft.).	R. Smith (1832).
**R. inaequale*, Hutchinson	Khasia Hills, Assam (4000–6000 ft.).	Griffith (1835).
**R. iteaphyllum*, Hutchinson	Khasia Hills, Assam (2000 ft.).	J. D. Hooker (1850).

* Described for the first time in the present paper.

SPECIES.	HABITAT.	COLLECTOR AND DATE.
**R. Johnstoneanum*, Watt	Manipur, Assam (6000–7500 ft.).	G. Watt (1882).
**R. lasiopodum*, Hutchinson	W. Yunnan (8000–9000 ft.).	G. Forrest (1913).
R. liliiflorum, Léveillé	Kweichow (alt. ?).	J. Cavalerie (1902).
R. Lindleyi, T. Moore	Sikkim, Bhutan, and Manipur (6000–10,000 ft.).	J. D. Hooker ? (1848).
R. Ludwigianum, Hosseus	Siam (6600 ft.).	C. C. Hosseus (1905).
R. Lyi, Léveillé	Kweichow (alt. ?).	J. Cavalerie (1912).
R. Maddeni, Hook. f.	Sikkim and Bhutan (5000–9000 ft.).	J. D. Hooker (1848).
R. manipurense, Balf. f. et Watt	Manipur, Assam (8000–10,000 ft.).	G. Watt (1882).
R. megacalyx, Balf. f. et Ward	N.E. Burma (7000–8000 ft.).	Kingdon Ward (1914).
R. missionarum, Léveillé	W. Yunnan (9000 ft.).	E. E. Maire (1911).
R. Nuttallii, Booth	Bhutan (4000–5000 ft.).	T. J. Booth (1850 ?).
R. pachypodum, Balf. f. et W. W. Sm.	W. Yunnan (9000–10,000 ft.).	G. Forrest (1913).
**R. pilicalyx*, Hutchinson	S.E. Yunnan (8000 ft.).	A. Henry (1896–8).
**R. polyandrum*, Hutchinson	Bhutan (8500 ft.).	R. E. Cooper (1914).
**R. pseudociliicalyx*, Hutchinson	Szechuan ?	Coll. ?
R. rhabdotum, Balf. f. et Coop.	Bhutan (8000 ft.).	R. E. Cooper (1915).
**R. roseatum*, Hutchinson	W. Yunnan (9000 ft.).	G. Forrest (1913).
**R. rufosquamosum*, Hutchinson	S. Yunnan (4800 ft.).	A. Henry (1896–8).
**R. Scottianum*, Hutchinson	W. Yunnan (6000–8000 ft.).	G. Forrest (1912).
**R. Smilesii*, Hutchinson	Siam (alt. ?).	F. H. Smiles (1893).
**R. supranubium*, Hutchinson	W. Yunnan (10,000–12,000 ft.).	G. Forrest (1906).
R. Surasianum, Balf. f. et Craib	N. Siam (4500 ft.).	A. F. G. Kerr (1914).
**R. Valentinianum*, G. Forrest	W. Yunnan (11,000 ft.).	G. Forrest (1917).
R. Veitchianum, Hook. f.	Central and Lower Burma and Siam (5000–7000 ft.).	T. Lobb (1856).

GROUPING OF THE SPECIES.

The thirty-nine species fall into three fairly natural groups as follows :—

Subseries I.—**Eumaddenia,** with numerous (15–25) stamens, numerous (10–12) ovary cells, a fairly large calyx, medium-sized leaves very densely covered with ferruginous scales, and with the petiole grooved on the upper surface. According to the prevailing views on the phylogeny of *Gamopetalae* in general this should, I think, be regarded as the more ancient group of this particular series. Its headquarters seems to be in Bhutan, where there are four species represented, and there is one species in Sikkim, one in Manipur, and one common to North-East Burma and Western Yunnan.

* Described for the first time in the present paper.

Subseries II. — **Megacalyx,** with usually 10 stamens, always 5 ovary cells, a large calyx, and large leaves rather laxly lepidote, with a raised midrib on the upper surface, and convex petioles; the *convex* upper surface of the petiole is a splendid mark for distinguishing this group. Here again Bhutan is the chief centre of distribution, as it harbours four species, two of which extend into Sikkim, whilst Burma, Yunnan, and Kweichow have each a separate species. To this group belong the finest species of the whole series, with very large scented flowers and handsome foliage.

Subseries III.—**Ciliicalyx** is the largest group, made up of twenty-six species, which are the most troublesome to define. They are probably the more modern representatives of the series as a whole. The stamens are nearly always 10 in number (rarely 12–13), the ovary cells very frequently 6 (rarely 5 or 7), a calyx (often ciliate) which becomes gradually reduced to a mere undulate rim, rather small leaves more or less densely lepidote below and frequently ciliate, with a V-shaped groove on the upper surface of the petiole. There is only one species of this subseries in Sikkim, none in Bhutan, three species in the Khasia Hills, one in Manipur, six in Burma, three in Siam, and one species common to these two countries, ten in Yunnan, and one in Kweichow. Subseries *Ciliicalyx* is thus typical of Burma and Yunnan.

DISTRIBUTION OF INDIVIDUAL SPECIES.

As careful work in the discrimination of *Rhododendron* species proceeds, it becomes increasingly evident that the majority are very local in distribution. Only two species of our series are common to Sikkim and Bhutan (*R. Maddeni* and *R. Lindleyi*), the latter species also occurring in Manipur, Assam, and there is one species (*R. Veitchianum*) common to Burma and Siam, whilst *R. crassum* occurs in Western Yunnan and N.E. Burma. With these exceptions no species is common to any two of the countries mentioned above. The occurrence of *R. Lindleyi* in Sikkim, Bhutan, and in Manipur affords an interesting link between the Rhododendron floras of these mountainous regions. The more or less isolated mountain ranges of Burma, too, seem to possess their own particular species. Of special interest in this respect is Mount Victoria (10,150 ft.) in the Chin Hills, Western Middle Burma, where Lady Wheeler Cuffe has, within the last few years, collected and introduced into cultivation two interesting new species in *R. burmanicum* and *R. Cuffeanum*.

In regard to Yunnan, Professor Balfour (l.c.) has already demonstrated in his paper on the *Irroratum* series the extremely

limited and local distribution of several species. This fact is confirmed in the case of *R. ciliicalyx* and its relatives, many of which are described for the first time in the present paper. In this case a difference in altitude seems to produce a difference in species, all of which, however, belong to the same complex. *R. ciliicalyx* itself occurs at an altitude of 7300 ft. near Mo-so-yn, whilst *R. Scottianum* grows at a similar elevation near Tengyueh and Chutong. At 8000–9000 ft. on the Shweli-Salween Divide we get *R. roseatum* and *R. lasiopodum*, whilst on the eastern flank of the Tali Range, between 10,000 and 12,000 ft., there is a beautiful little species, which from its occurrence at such a high altitude I have called *R. supranubium*. No doubt Mr Forrest could enlighten us much more regarding the distribution of these species now that they have been segregated from *R. ciliicalyx*, to which they had been provisionally referred. True *R. ciliicalyx* has not appeared in any recent collections. Then even Szemao in South and Mengtz in South-Eastern Yunnan has each its characteristic species, belonging to the same group, in *R. rufosquamatum* and *R. pilicalyx* respectively, whilst a near relative, *R. Lyi*, occurs in the neighbouring province of Kweichow. Just how constant are the differences which go to distinguish these Yunnan species as shown in the key (p. 16), and to what extent they will stand the test of cultivation and further collection, I am not prepared to say.

VALUE OF CHARACTERS IN THE MADDENI SERIES.

Habit.—Some of the species are epiphytic on old tree stumps; such are *R. Nuttallii*, *R. Lindleyi*, and *R. Veitchianum*, whilst *R. dendricola* grows at the tops of trees 50–60 ft. high; the majority, however, are terrestrial shrubs or small trees, ranging in height from 1½ to 20 ft.

Bark.—In only a few species is the bark of the stem and older branches known to the writer; in *R. ciliicalyx* it is very membranous and purplish-brown, and curls off in large pieces; a similar but thicker bark is found in *R. Veitchianum*.

One-year-old Shoots.—All are more or less lepidote, whilst in subseries *Ciliicalyx* they are very frequently bristly hairy as well as lepidote, as in *R. ciliatum*, *R. Johnstoneanum*, and *R. Lyi* (fig. 7).

Axillary Leaf-bearing Buds.—The dormancy or degree of development of the axillary leaf-bearing buds at the time of flowering seems worthy of attention, although the character might vary in different individuals of the same species. In *R. ciliicalyx* and *R. Scottianum* the leaf-buds are well developed at the time of flowering.

Terminal Leaf-bearing Buds.—In regard to the structure of

the *terminal* leaf-bearing buds Professor Balfour makes some interesting remarks at the end of the description of *R. Valentinianum* on p. 49.

Leaves.—These are always evergreen, and more or less coriaceous in texture; they persist for at least three years; in shape they vary from linear (*R. iteaphyllum*) to obovate (*R. Dalhousiae* and *R. Scottianum*), and ovate (*R. roseatum*), rounded, obtuse to acutely cuneate at the base; frequently, especially in subseries *Ciliicalyx*, they are fringed with long hairs (*R. ciliatum*, *R. formosum*, and others); the upper surface on the unfolding of the leaves is almost without exception lepidote, the scales soon falling off; a characteristic feature of *R. burmanicum* is that they persist on the upper surface and are nearly as dense there as on the lower surface; the lower leaf surface is always lepidote, and the disposition of the scales provides a useful and apparently very constant specific mark; for instance, in *R. Maddeni* they completely hide the lower epidermis, whilst in *R. Lindleyi* and *R. ciliicalyx* they are considerably more than their own diameter apart; the distance apart relative to their own diameter seems to be the most lucid way of expressing the disposition of the scales; were it measured in terms of millimeters or fractions thereof, the distinctive marks as shown by the scales would not be so readily interpreted; the structure of the scales is on the same general plan throughout the series; the stalk of the scale is more or less fleshy, and a little immersed below the level of the surrounding leaf surface; the stalk supports the membranous fringe, which encircles it and spreads horizontally over and in close proximity to the leaf surface; the fringe of the scale is made up of numerous radiating parallel cells arranged in a single row; I have not considered it worth while to count the number of these fringe cells, but they might prove to be relatively constant in the same species, and would perhaps differ sufficiently in the various species as to provide additional distinctive characters; between the scales the epidermal cells are always produced into a rod-like or bluntly awl-shaped papilla; these are a very marked feature * in the leaves of the whole series, and readily detected by a low power of the microscope; they are not visible through an ordinary hand lens; the midrib in subseries *Eumaddenia* and *Ciliicalyx* is always more or less sunken below the upper surface of the leaf blade, whilst in subseries *Megacalyx* it is raised; this impression and elevation of the midrib is accompanied by a marked difference in the *petiole*; those leaves with an impressed midrib have always petioles with a concave upper surface and

* In *R. ciliicalyx* they tend to disappear in cultivation under certain conditions; see p. 53.

a V-shaped groove down the middle, whereas those with the elevated midrib have a convex upper surface and no groove, with one slight exception (*R. megacalyx*).

Inflorescence.—This is a terminal loose umbellate truss, and from 1-flowered (*R. pachypodum*, *R. supranubium*) to 12-flowered (*R. Nuttallii*); the flower-bearing bud is usually broadly ovoid, and covered with numerous *bud-scales* leathery in texture, usually bluntly mucronate, and variously lepidote and glabrous or pubescent outside; in *R. Nuttallii* the flower-bearing bud just before opening is about 6 inches long (Hook., Bot. Mag., t. 5146); the length of the axis from which the bud-scales have fallen, and the approximation of the straw-coloured scars, vary considerably in separate species; the bracts and bracteoles subtending the individual pedicels have frequently fallen away at flowering time, and are so often absent from dried specimens that I have seen few to describe; as a rule they furnish little of specific importance; the pedicels are lepidote, except in *R. megacalyx*, and they are both pubescent and lepidote in *R. Dalhousiae* and *R. rhabdotum*; they nearly always arise from approximately the same height (subumbellate); in *R. lasiopodum* they break off and leave a projecting "foot" like tomentose portion of the axis of the inflorescence.

Calyx.—This varies from a mere undulate rim (*R. lasiopodum*) to very large (2.3 cm.), especially in subseries *Megacalyx* and in subseries *Eumaddenia*; frequently the lobes (or the rim) are longer on the dorsal (adaxial) side; in subseries *Ciliicalyx* the lobes (or the rim) are very frequently bristly ciliate, but the degree of ciliation is evidently subject to considerable variation, and is sometimes present and absent even in the same inflorescence (*R. supranubium*); in the other two groups the calyx is usually not ciliate, or if it is, then very softly and weakly so (*R. Lindleyi*); *R. megacalyx* (see fig. 4) is remarkable in having the calyx campanulate and lobed only to about the middle; in nearly all the species the calyx is lepidote outside, especially towards the base.

Corolla.—In shape more or less tubular or funnel-like, and always 5-lobed; the presence or absence of scales on the outside of the tube furnishes a good specific character, and I have freely employed this feature in framing the key; the lobes are always lepidote down the middle and occasionally on the margin; the corolla of *R. Ludwigianum*, in addition to being lepidote outside, is very softly and densely villous, whilst several more species of the *Ciliicalyx* group are minutely and softly pubescent outside the base of the corolla tube; the colour of the corolla is white or white and flushed with rose, and a few (*R. lasiopodum*, and others) have a yellow blotch inside the base of the tube;

there is no red or purple spotting, such as one gets in *R. yunnanense*, for example. *R. burmanicum* has a greenish-yellow and *R. pachypodum* a yellow corolla.

Stamens.—These are numerous (15–25) in the *Eumaddenia* group, and usually 10 in the other two groups; they are, almost without exception, considerably longer than the corolla tube and rather unequal in length, corresponding to the slight zygomorphy of the corolla; the filaments, except in *R. Maddeni* and *R. calophyllum*, are pubescent in their lower part; the anthers are very large (8–13 mm.) in group *Megacalyx*, whilst in the other two groups they are much smaller, averaging about 5–6 mm. in *Ciliicalyx*.

Ovary.—The number of ovary cells is usually consistent in each species. In the *Eumaddenia* group there are from 10 to 12 cells, and the ovary passes gradually into the style; in group *Megacalyx* the number is constantly 5, whilst in *Ciliicalyx* it is more often 6, and the transition to the style is usually very abrupt; in all the species the ovary is densely lepidote, and girt at the base by a more or less shortly tomentose annular disk.

Style.—Except in *R. ciliatum*, where it is glabrous, the style is more or less lepidote; in *R. ciliicalyx* it is only so for a few millimeters above the base, and in this species there are a few hairs as well; I find the degree of scaliness of the style to be very constant in each species.

Stigma.—The exact form of the stigma is not readily made out from dried specimens; in most species it appears to be depressed and lobulate, and more or less viscid.

Capsule.—This is very oblique in *R. inaequale*, less so in a few other species, but straight in the majority; the number of valves always corresponds with the number of ovary cells; the capsule is constantly more or less lepidote, and the central axis, from the top of which the valves dehisce, is often tipped by the persistent style.

Seeds.—Always small, brown or straw-coloured, mostly acute at both ends, and narrowly winged.

Professor Balfour had already studied the indumentum of the *Maddeni* series when I took up this revision, and he very kindly allows me to insert the following notes of his own:—

"These Rhododendrons have all of them lepidote leaves. Some of them have in addition in the young state a varying number of setose hairs which may disappear before the leaf reaches full size. The peltate scales occur upon both surfaces of the young leaf. They are sunk in pits of the leaf surface, these varying in depth, each scale showing a stout pluricellular stalk and a disk with typical umbo and fringe equalling the radius of the umbo. The outermost cells of the umbo at an

early period develop a yellowish subsequently red content which ultimately spreads over the whole umbo. Hence the change of colour in some species of the under leaf surface to a ferruginous tint. The pits on the upper leaf surface hardly deserve the name. From this surface the scales fall off early as a rule and the mature leaf shows scarcely an undulation to indicate the points of fall. At the same time a few remanent scales may always be found and in some cases these may be numerous. In *Rh. Maddeni*, Hk. f., for instance in cultivation the surface is often bronzed by them and the same may be seen often in *Rh. crassum*, Franch. On the under surface the pits are deeper and can always be seen even on the oldest leaves from which the scales have fallen. In some where the leaf pit is shallow and the stalk long enough to raise the umbo out of it the fringe is depressed; in others the umbo is beneath the level of the mouth of the pit and then the fringe becomes slightly concave upwards—in the case of a species like *Rh. megacalyx*, Balf. f. et Ward, where the pit is deep and the whole scale barely reaches its mouth the fringe is turned directly upwards. The scales vary in size and there seems a general tendency for some of them to form longer stalks and broader disks and to stand out well above the surface of the leaf on the under side especially on the larger veins.

"The distribution of the scales on the under side gives us a readily observed mark by which to diagnose species and it is particularly valuable for the separation of *Rh. formosum*, Wall. from other forms which have been confused with it. And here let me say that the distribution of the scales is correlated with other leaf characters which shows that their relative position is not fortuitous. In none of the species as yet known to me do the scales on the under surface of the mature leaf overlap, in none do neighbouring ones touch each other everywhere. A portion of the leaf epidermis is always visible between the scales. Most of the species have the scales approximating so that one may say there is visible as much if not more scale surface than epidermal surface. We may for convenience speak of this as a *densely lepidote surface*. A smaller number of forms—amongst them *Rh. formosum*, Wall., *Rh. Veitchianum*, Hook., *Rh. Dalhousiae*, Hk. f.—have the scales relatively far apart and the visible epidermal surface is far larger in area than the scale surface. This I designate a *laxly lepidote surface*.

"The leaf surface between the scales is always grey or white grey, the latter specially in the laxly lepidote forms. This bloom can be rubbed off and if one handles fresh specimens the fingers become greasy. The colour is due to the epidermal papillae with their granular coating of wax making a surface

unwettable to water from the outside and restraining the exit of water from within the leaf. In species of the laxly lepidote series where the exposed leaf surface is largest—*Rh. Veitchianum*, Hook., *Rh. formosum*, Wall., *Rh. Dalhousiae*, Hk. f. for example —the epidermal papillae are long rod-like outgrowths with parallel sides standing out at right angles from the epidermis and more or less closely packed. In no one of the densely lepidote series are those papillae long rod-like and close-set but more or less conoid or in the form of low domes having wider spaces between than in the case of rods with parallel sides. Sometimes where a scale fringe arches over the leaf surface the papillae are longer than elsewhere. There is clearly a correlation between the form of papillae with their wax and the covering of peltate scales. That the southern types *Rh. Veitchianum*, Hook., and *Rh. formosum*, Wall., are conspicuously laxly lepidote with grey white bloom may be noteworthy in relation to their habitat."

Certain species need special mention. These are *R. Dalhousiae*, Hk. f., *R. formosum*, Wall., and *R. inaequale*, Hutchinson.

R. Dalhousiae, Hook. f.

In the examination of the dried material of *Rhododendron Dalhousiae* I have detected a very fine species of Rhododendron which appears to have been overlooked by Sir Joseph Hooker. *R. Dalhousiae* was described by Hooker in his account of the Sikkim Rhododendrons, p. 2, t. i and ii (1849). The first plate of that work is a picture of the plant as it grows epiphytically on trees in Sikkim (see extracts from Hooker's Journal below). The second plate was drawn by Fitch from Hooker's original sketch, *and evidently also from the dried specimens*. Emphasis is laid on the latter fact, because it seems partly responsible for the confusion of two species. Amongst Sir Joseph's exsiccatae is one sheet marked " Rhod. xiv. J. D. Hooker, Sikkim Himalaya 1848, 6–8000 ft." It is a fine leafy flowering branchlet, and in the corner is a solitary fruit which certainly does not belong to it. This specimen differs from typical *R. Dalhousiae* (as represented by Hooker's *original sketch* and by the remainder of his dried specimens) in having only scaly pedicels (not hairy as well), broad membranous striate calyx lobes *with a dense fringe of soft hairs on the margin* (in true *Dalhousiae* they are narrower and not fringed), a corolla with a tube only 5 cm. long (much smaller than in typical *Dalhousiae*), which is sparingly scaly outside the base; the leaves also differ from typical *Dalhousiae* in that they are elliptic and more or less *rounded*

at the base, and the scales are more laxly disposed on the lower surfaces. Comparing with *Dalhousiae*, this distinct species may therefore be at once recognised by its *fringed calyx* and *smaller flowers* (see fig. 6).

Now it is quite clear on consideration of the evidence before us that Fitch's plate No. ii. is made up from a confusion of two species. Hooker's original sketch of what he no doubt regarded as the real *Dalhousiae* shows the large flowered species with the glabrous calyx and the smaller obovate cuneate-based leaves, typical of the species as known in our gardens. But unfortunately for the accuracy of his beautiful plate, Fitch must also have had recourse to the dried specimens: he draws faithfully the large corolla of the real *Dalhousiae*, but has appended to it the large ciliate calyx of the other species, which I identify with the hitherto imperfectly known *R. Lindleyi*, T. Moore (*R. bhotanicum*, Clarke). The leaves, shown in the plate, are I think rather those of *R. Lindleyi* than of *Dalhousiae*; they are larger than any on Hooker's sketch, and the glands are shown more laxly dispersed.

In Hooker's description accompanying the plate there is no mention of the hairs on the margin of the sepals, though they are shown clearly enough. But Hooker, himself, evidently brought the specimens of *R. Lindleyi* into his later descriptions, for in the Royal Horticultural Society's Journal for 1852, p. 77, he describes *R. Dalhousiae* as having "sepals oblong, blunt, hairy on the margin," whereas in the specimens of his typical *Dalhousiae* they are quite glabrous.

Hooker (Himal. Journ. i. 125) mentions *Rhododendron Dalhousiae* in his account of the ascent of Sinchul near Darjeeling. He describes the vegetation as follows: "The purple-flowered kind of Magnolia (*M. Campbellii*) hardly occurs below 8000 feet, and forms an immense but very ugly black-barked sparingly branched tree, leafless in winter and also during the flowering season, when it puts forth from the ends of its branches great rose-purple cup-shaped flowers, whose fleshy petals strew the ground. On its branches, and on those of oaks and laurels, *Rhododendron Dalhousiae* grows epiphytically, a slender shrub, bearing from three to six white lemon-scented bells, four and a half inches long and as many broad, at the end of each branch. In the same woods the scarlet rhododendron (*R. arboreum*) is very scarce, and is outvied by the great *R. argenteum*, which grows as a tree forty feet high, with magnificent leaves twelve to fifteen inches long, deep green, wrinkled above and silvery below, while the flowers are as large as those of *R. Dalhousiae* and grow more in a cluster."

Again in his account of Tonglo Mountain near Darjeeling

in May 1848 he says: "Above Simonbong, the path up Tonglo is little frequented: it is one of the many routes between Nepal and Sikkim, which cross the Singalelah spur of Kinchinjunga at various elevations between 7000 and 15,000 feet. As usual the track runs along ridges, wherever these are to be found, very steep, and narrow at the top, through deep humid forests of oaks and Magnolias, many laurels, both *Tetranthera* and *Cinnamomum*, one species of the latter ascending to 8500 feet, and one of *Tetranthera* to 9000 feet. Chestnut and walnut here appeared, with some leguminous trees, which however did not ascend to 6000 feet. Scarlet flowers of *Vaccinium serpens*, an epiphytic species, were strewed about, and the great blossoms of *Rhododendron Dalhousiae* and of a Magnolia (*Talauma Hodgsoni*) lay together on the ground."

In his herbarium there is an envelope containing a single leaf and a corolla which are unmistakably *R. Dalhousiae;* and the envelope is marked "Rhod. Dalhousiae, Tonglo, Sikkim. May 1848." This corolla is no doubt one of those which he mentions as lying on the ground with those of the *Talauma*.

Hooker only refers to *Rhododendron Dalhousiae* on two other occasions. In describing his ascent of Choongtam Mountain (10,000 ft.) in May 1849 (Journal, ii. p. 25) he mentions its occurrence: "On the hill above Choongtam village I gathered, at 5000 to 6000 feet, *Rhododendron arboreum* and *Dalhousiae*, which do not generally grow at Darjeeling below 7500 feet. I collected here ten kinds of Rhododendron, which, however, are not the social plants that they become at greater elevations. Still, in the delicacy and beauty of their flowers, four of them, perhaps excel any others; they are, *R. Aucklandii*, whose flowers are five inches and a half in diameter; *R. Maddeni*, *R. Dalhousiae*, and *R. Edgeworthii*, all white-flowered bushes, of which the two first rise to the height of small trees."

Whether in this case Hooker was speaking of true *R. Dalhousiae* or *R. Lindleyi* I cannot say, as there seems to be no specimen amongst his exsiccatae from Choongtam. However, in the Journal, p. 185, we learn that Hooker and his party in October "arrived at Choongtam (for the fourth time). . . . I spent a day here in order to collect seeds of the superb rhododendrons which I had discovered in May, growing on the hills behind." In a footnote to p. 186 he says: "These Rhododendrons are now all flourishing at Kew and elsewhere; they are *R. Dalhousiae, arboreum, Maddeni, Edgeworthii, Aucklandii* and *virgatum*."

On Hooker's journey to the Chola Pass in November 1849 (p. 197) he says: "A long march up a very steep, narrow ridge took

us by a good road to Langhep, a stone resting-house (10,475 ft.) on a very narrow flat. I had abundance of occupation in gathering rhododendron seeds, of which I procured twenty-four kinds on this and the following day. These occurred in the following order in ascending, commencing at 6000 feet.—1, *R. Dalhousiae*; 2, *R. vaccinioides*; 3, *R. camelliaeflorum*; 4, *R. arboreum*. Above 8000 feet.—5, *R. argenteum*; 6, *R. Falconeri*; 7, *R. barbatum*; 8, *R. Campbelliae*; 9, *R. Edgeworthii*; 10, *R. niveum*; 11, *R. Thomsoni*; 12, *R. cinnabarinum*; 13, *R. glaucum*. Above 10,500 feet.—14, *R. lanatum*; 15, *R. virgatum*; 16, *R. campylocarpum*; 17, *R. ciliatum*; 18, *R. Hodgsoni*; 19, *R. campanulatum*. Above 12,000 feet.—20, *R. lepidotum*; 21, *R. fulgens*; 22, *R. Wightianum*; 23, *R. anthopogon*; 24, *R. setosum*.

We may assume that all the earlier cultivated plants of *R. Dalhousiae* in this country were grown from seeds collected by Hooker on the Choongtam Mountain at 5000–6000 ft., and on his ascent to the Chola Pass between 6000 and 8000 ft.

Regarding the epiphytic habit of some species, Hooker says (Journ. Hort. Soc. Lond. vii. 72 (1852): "Much undue importance has been given to the fact of some kinds growing habitually epiphytically (*R. Dalhousiae*, *R. camelliaeflorum*, *R. pendulum*), and it has been supposed that much difficulty must attend their cultivation. Having occasionally seen all these species growing on rocks, and the two latter sometimes becoming erect, and that always in exposed but very moist localities, I have been induced to attribute their predilection for the branches of trees to their weak habit and want of light elsewhere. Being plants of the forest region, and unable to contend against the vigorous undergrowth that prevails there, the offspring of such seeds as fall to the ground are choked, whilst the perennially humid atmosphere supports such as sprout on the mossy limbs of trees, where they receive the stimulus of light. *R. Dalhousiae*, for instance, which is never found on the ground in the woods of Darjiling, grows in thousands on the clay and mould banks of the roads which are cut through the forest, the young plants coming up in profusion as soon as the cuttings are made: these, however, seldom attain any size, from the too great exposure of the soil, which in the dry season rapidly parches during a short day's heat. In Dr Campbell's garden at Darjiling there is a perpendicular bank, 15 feet high, exposed to the west, and partly sheltered from the south-west by a house. *R. Dalhousiae* has annually appeared on this, the seeds being imported by winds or birds from the neighbouring forest. The seedlings, however, perished till within the last two years, since which time abundance of *Lyco-*

podium clavatum and a *Selaginella*, with *Marchantia*, retain so constant a supply of moisture that the plants now flourish and flower in perfection."

R. formosum, Wall.

Rhododendron formosum was first described by Wallich in 1832 (Plantae Asiaticae Rariores, vol. iii. p. 3, t. 207) from specimens communicated to him by a Mr Smith in the year 1815. Wallich says the specimen came from "the mountains bordering on the province of Sylhet by the late Mr Smith." On the back of the original Wallichian drawing in the Kew collection, marked as having been painted by "Royle, Carey & others," there is a pencil note saying the plant figured was from the Khasia Hills. In the first volume of Wallich's publication we learn from the preface that Mr R. Smith was "an inhabitant of Sylhet," and no doubt his excursions carried him into the Khasia Hills to the North-West. I have not found a specimen of *R. formosum* in Wallich's herbarium at Kew. But a Griffithian specimen (Kew Distrib. No. 3506 partly) corresponds very closely indeed to the drawing, and might be regarded as a suitable *topotype*. This was collected by Griffith on the 9th November, 1835 near a torrent on the road between Moflong and Myrung, Khasia Hills. It is very nearly devoid of the long slender hairs on the petioles and leaf margins which are often so characteristic a feature of *R. formosum* in cultivation. But there are a few on the petioles of Griffith's specimen and some on the margin of the very young leaves. Wallich's description makes no mention of these cilia, nor does he show them in his excellent figure. But he no doubt described an entirely epilose mature condition, which is represented by another of Griffith's specimens not localised or dated but bearing the same Kew distribution number (3506). I am convinced that the entire absence of cilia from the petiole and leaf margins is not to be relied on as a mark of specific distinction in this particular instance. Neither is Wallich's description of the ovary as *villous* of much importance; he very probably saw the ovary through the densely pubescent filaments and thought it was villous, when in reality it is only densely lepidote. In the picture there is no indication of its being hairy. Yet another discrepancy is the fact that he described the style as glabrous, whereas it is rather minutely lepidote in the lower part. The importance of close observance of these fundamental specific characters was no doubt in those early days not realised.

The plant described and figured as *R. Gibsoni* by Paxton in his Magazine of Botany, viii. p. 217, is in my opinion not

specifically different from *R. formosum*. It was found on the summit of the Khasia Hills at an elevation of about 4000 ft. by Mr J. Gibson, by whom it was introduced in 1837 into the gardens of His Grace the Duke of Devonshire at Chatsworth. The herbarium specimens at Kew show almost every gradation in the ciliation of the mature leaves, from entirely glabrous to long-ciliate; the young leaves are almost invariably densely ciliate. The degree of ciliation is no doubt regulated by the age and vigour of individual plants, the older plants, like *R. yunnanense*, tending to lose their hairs altogether.

The status of the varieties *salicifolia* and *inaequalis* of C. B. Clarke in the Flora of British India deserves closer study than has perhaps hitherto been accorded them. They seem to me to be worthy of specific rank, and I am confident they would appear so if all were in cultivation. I have only seen *R. formosum* in gardens, where it is still usually grown under the name *R. Gibsoni*. Some future collector in the Khasia Hills will be able to throw much further light on this question. The dried material of the three forms in this country is scarcely sufficient to give a final opinion, but it is enough to show that these plants should by no means be "lumped" together under one name. There is very great variation in *R. formosum* as shown by cultivated plants in the Temperate House, Kew, but I do not think it possible to segregate them into distinct varieties or even forms.

Rhododendron inaequale, Hutchinson.

(*R. formosum*, var. *inaequalis*, C. B. Clarke.)

Excepting Mr C. B. Clarke's record from Shillong, Khasia Hills, this species would appear to have been gathered only on the Kollong Rock, a remarkable hill visited by Hooker in July 1850, and described (Himal. Journ. ii. p. 293 with drawing) as follows:—"We twice visited a very remarkable hill, called Kollong, which rises as a dome of granite 5400 feet high, ten or twelve miles south-west of Myrung, and conspicuous from all directions. . . . All the streams rise in flat marshy depressions amongst the hills with which the whole country is covered; and both these features, together with the flat clay marshes into which the rivers expand, are very suggestive of tidal action. Rock is hardly anywhere seen, except in the immediate vicinity of Kollong, where are many scattered boulders of fine-grained gneiss, of which are made the broad stone slabs, placed as seats, and the other erections of this singular people. We repeatedly remarked cones of earth, clay, and pebbles, about twelve feet high, upon the hills, which

appeared to be artificial, but of which the natives could give no explanation. Wild apple and birch are common trees, but there is little jungle, except in the hollows, and on the north slopes of the higher hills. Coarse long grass, with bushes of Labiate and Composite plants, are the prevalent features.

" Kollong rock is a steep dome of red granite, accessible from the north and east, but almost perpendicular to the southward, where the slope is 80° for 600 feet. The elevation is 400 feet from the mean level of the surrounding ridges, and 700 above the bottom of the valleys. The south or steepest side is encumbered with enormous detached blocks, while the north is clothed with a dense forest, containing red tree rhododendrons and oaks; on its skirts grew a white bushy rhododendron, *which we found nowhere else.*"

This white bushy rhododendron must have been *R. inaequale*, though there are no flowers on Hooker's specimens. The red one collected by Hooker was no doubt what is at present regarded as *R. arboreum*, but it too is in fruit. One wonders why, if they were in flower, Hooker did not collect flowering material; or did he guess the colour of the flowers? Hooker collected only these two Rhododendrons on the Kollong Rock, a locality which would no doubt repay the attention of some future collector.

Mr Clarke made the following remark regarding his var. *inaequalis* (Fl. Brit. Ind., iii. p. 473) :—" This has been considered a distinct species, and may be so, but the flowers are unknown. Branches often hirsute-setose; leaves entirely without the setose ciliae common (but sometimes wanting) in *R. formosum*. Capsules (of which there are numerous examples) more unsymmetric than in any other Indian Rhododendron." These remarks are very much to the point. In his own herbarium there are flowers, though much past their best and rather withered, which were collected after the publication of the Flora of British India.

KEY TO THE SPECIES OF THE MADDENI SERIES.

I. **Eumaddenia.**—*Petiole with a V-shaped groove on the upper side; leaves medium-sized, very densely rufous-lepidote, with the midrib impressed on the upper surface; stamens* 15–25 (see also R. excellens), *the filaments either glabrous or pubescent; ovary cells* 10–12; *calyx usually well developed.*

Filaments of the stamens glabrous :

Scales on the lower surface of the leaves contiguous or nearly so, never more than their own diameter apart . . 1. *Maddeni.*

Scales on the lower surface of the leaves from 2–3 times their own diameter apart, the lower epidermis glaucous . 2. *calophyllum.*

Filaments of the stamens hairy in their lower part :
Corolla tube about 2 cm. long ; anthers 3–4 mm. long . . . . . 3. *brachysiphon.*
Corolla tube over 3 cm. long ; anthers 5–6 mm. long :
Stamens 25 ; leaves rather small, oblong-lanceolate, obtuse and rounded at both ends . . . . . 4. *polyandrum.*
Stamens 15–21 :
Scales of the winter flower-bearing buds not pubescent . . . . . 5. *manipurense.*
Scales of the winter buds silky-pubescent towards the top . . . . . 6. *crassum.*

II. **Megacalyx.**—*Petiole convex and not grooved on the upper side (very slightly so in* R. megacalyx) *; leaves usually large and strongly nerved, with the midrib raised on the upper surface ; stamens* 10–15, *the filaments always hairy ; ovary cells* 5 ; *calyx large, with broad lobes* 1–2.3 cm. long.

Stamens 15 ; corolla lepidote all over the outside ; leaves large, 15–19 cm. long, oblong-elliptic, with 18–20 lateral nerves ; petioles 2.5–4 cm. long . . . . . 7. *excellens.*
Stamens 10 :
Pedicels and calyx not lepidote ; calyx divided to about the middle, with very broad lobes ; capsule 2 cm. long, scarcely longer than the persistent calyx lobes . . 8. *megacalyx.*
Pedicels and lower part of the calyx lepidote :
Corolla lepidote all over the outside ; capsule 4.5 cm. long, curved, acute ; Chinese (Kweichow) species . 9. *liliiflorum.*
Corolla not lepidote or only on the lower part of the tube or at the base ; Indian species :
Pedicels softly pubescent as well as lepidote ; young or one-year-old branchlets bristly hairy ; calyx lobes glabrous on the margins :
Corolla cream, with broad red lines outside down the middle of the lobes and down the tube . . 10. *rhabdotum.*
Corolla white, sometimes tinged with rose outside . . . . . 11. *Dalhousiae.*
Pedicels only lepidote :
Corolla about 7–8 cm. long ; calyx lobes rather densely ciliate ; lateral nerves of leaves 12–16 . 12. *Lindleyi.*
Corolla about 10 cm. long or more ; calyx lobes sparingly or scarcely ciliate ; lateral nerves 10–12. 13. *Nuttallii.*

III. **Ciliicalyx.**—*Petiole with a V-shaped groove on the upper concave side ; leaves medium-sized or rather small, the midrib impressed above ; stamens* 10 (–13) ; *ovary cells* 5–7 (*frequently* 6) ; *calyx usually poorly developed and often ciliate.*

Style quite smooth its full length, neither hairy nor lepidote ; calyx lobes broad, 8–10 mm. long ; corolla not lepidote outside ; leaves and branchlets bristly hairy ; Sikkim species . 14. *ciliatum.*
Style slightly lepidote at the base ; calyx lobes large, about 8 mm. long, densely fringed with crinkly hairs, lepidote outside ; corolla densely lepidote outside, yellow ; leaves small, like the young branchlets bristly with stiff hairs ; W. Yunnan species . . . . . 15. *Valentinianum.*

Style mostly lepidote well above the base; calyx lobes usually rather small:

* Corolla tube not lepidote outside or only slightly so at the base of the lobes:

Some of the calyx lobes connate to above the middle, nearly 1 cm. long; leaves oblanceolate or oblong-oblanceolate, broader above the middle; S.W. Burmese species . 16. *Cuffeanum.*

All the calyx lobes more or less equally separated, never more than 6 mm. long; calyx sometimes saucer-shaped and undulate:

Burma and Siam species; leaves more or less obovate-oblanceolate, narrowed from about or above the middle to the base, obtusely triangular-acuminate at the apex; ovary 5-celled; capsule 3 cm. long; young shoots not setose . . . . . 34. *Veitchianum.*

Yunnan (and Szechuan ?) species; leaves mostly rather acutely triangular-acuminate; ovary usually 6-celled; capsule 1.2–2 cm. long; young shoots mostly setose:

Leaves more or less elliptic, equally pointed to both ends, widest at the middle; scales on the lower leaf surface more than their own diameter apart; W. Yunnan species . . . . . 17. *ciliicalyx.*

Leaves as in previous species; scales very unequal, less than their own diameter apart; young branchlets very bristly; (Szechuan ? species) . . . . 18. *pseudociliicalyx.*

Leaves obovate-oblanceolate, long-cuneate at the base, widest above the middle; leaf-scales about their own diameter or less apart; young branchlets sparingly strigose; N.E. Yunnan species . . . . . 19. *missionarum.*

Kweichow species; leaves oblanceolate or oblong-oblanceolate, shortly rounded-triangular at the apex; shoots bristly hairy; style lepidote in the lower $\frac{2}{3}$; capsule 2·5 cm. long 20. *Lyi.*

** Corolla tube more or less densely lepidote all over the outside or down one side:

† Leaves elliptic or ovate, broadest below or at the middle:

Calyx ciliate; leaves ovate, acutely triangular-acuminate, broadly rounded at the base; scales on the lower surface of the leaves nearly contiguous; flowers white, rosy outside; calyx setose-ciliate; Yunnan species . . 21. *roseatum.*

Calyx not or very sparingly ciliate; leaves elliptic or oblong elliptic; scales laxer on the lower surface of the leaves:

Leaves more or less rounded to a blunt apex; pedicels inserted on a softly tomentose "foot" 1.5 mm. long, from which they fall off; flowers white, yellow inside the base; W. Yunnan species; calyx not ciliate . 22. *lasiopodum.*

Leaves rather abruptly and subacutely acuminate; pedicels without a tomentose "foot"; flowers white, tinged with pink, with an orange mark inside the lower petals; calyx sparingly ciliate; N. Burma species . 23. *dendricola.*

†† Leaves obovate to oblanceolate or linear, widest above the middle:

§ Leaves not linear or much elongated, usually well over 1.5 cm. broad:

‖ Corolla flesh-coloured or white or flushed with pink, sometimes with a yellow spot within the base:

Corolla densely pubescent-villous all over the tube outside; Siamese species . . . . 24. *Ludwigianum.*

Corolla not pubescent except sometimes near the base :
= Leaf-scales dense below, usually much less than their diameter apart :
Leaf-scales contiguous or very nearly so :
Leaves oblanceolate, long-tapered to the base ; S. Yunnan (Szemao) species 25. *rufosquamosum.*
Leaves obovate, shortly narrowed to the base :
Leaves rounded triangular at the apex ; W. Yunnan species . . 26. *Scottianum.*
Leaves acutely triangular-acuminate :
Leaf-scales purplish below, small and rather fleshy, with the epidermis clearly visible between ; S. Yunnan . . 27. *pilicalyx.*
Leaf-scales brown below, fairly large and flaky, almost entirely hiding the epidermis ; anthers 7 mm. long ; Siamese species . . . . . 28. *Surasianum.*
Leaf-scales not nearly contiguous below :
One-year-old shoots very slightly or not at all bristly hairy :
W. Yunnan species ; leaves rather small, oblanceolate or obovate-oblanceolate ; flowers dull white, rosy outside ; corolla about 6 cm. long . . . . . 29. *supranubium.*
N. Siam species ; leaves obovate-oblanceolate, small ; flowers white ; corolla small, about 4 cm. long . . . . . 30. *Smilesii.*
N. Burma species ; flowers flesh-pink ; corolla about 6.5 cm. long . . . 31. *carneum.*
One-year-old shoots very densely bristly hairy ; leaves obovate ; flowers white, spotted with red inside ; Manipur species . 32. *Johnstoneanum.*
One-year-old shoots bristly ; leaves oblanceolate to oblong-oblanceolate ; flowers probably not spotted ; Kweichow (China) species . . . 20. *Lyi.*
≡ Leaf-scales 1–3 times their own diameter apart ; Assam and Burmese species :
Capsule 3 cm. long, very oblique at the base ; corolla tube scaly all over the outside ; leaves not setose on the margin ; Khasia Hills species 33. *inaequale.*
Capsule 3 cm. long, straight ; corolla tube scaly mainly on the dorsal (adaxial) side ; flowers white or tinged with pale green outside, the lobes with crinkled margins ; young branchlets not setose ; leaves distinctly more or less obovate ; Central and South Burma . . . . 34. *Veitchianum.*
Capsule not known ; corolla tube scaly only on the dorsal (adaxial) side, colour not known ; young branchlets, leaves, and petioles with bristly hairs ; leaves elongate oblong-elliptic ; N. Burmese (Bhamo) species . . . . . 35. *Cubittii.*
Capsule 1.5–2 cm. long, straight ; corolla white and tinged with yellow and rose or red ; tube equally lepidote all over the outside, the lobes not or scarcely crinkled on the margins ; young branchlets and the

margins of the leaves nearly all setose pubescent; Khasia Hills species . . . 36. *formosum.*

|||| Corolla yellow or greenish-yellow:

Mature leaves densely lepidote on the upper surface, green below between the scales; inflorescence several-flowered; S.W. Burmese species . . 37. *burmanicum.*

Mature leaves more or less lepidote on the upper surface, glaucous below between the scales; inflorescence often 1-flowered; W. Yunnan species . 38. *pachypodum.*

§§ Leaves linear, acute, usually less than 1.5 cm. broad, 5–9 cm. long, the scales below about their own diameter apart; Assam (Khasia Hills) species . . 39. *iteaphyllum.*

1. **Rhododendron Maddeni,** Hook. f., Rhod. Sikkim Himal. p. 19, t. 18 (1851); Journ. Hort. Soc. Lond. vii. 79, 95 (1852); Hook. Bot. Mag. t. 4805 (1854); Fl. des Serres, t. 912 (1854); Rev. Hortic. 301, t. 16 (1855); Illustr. Horticol. t. 140 (1857); C. B. Clarke in Hook. f. Fl. Brit. Ind. iii. 472 (1882), incl. var. *calophylla* (partly); Millais, Rhodod. 206 (1917); *R. Jenkinsii,* Nutt. in Hook. Kew Journ. v. 361, incl. vars. (1853); Regel, Gartenfl. ix. 1, t. 277 (1860).

A much-branched shrub up to 2.75 m. high; branches erect, supple, covered with pale papery bark; older branchlets marked with the broadly triangular leaf-scars, the bark closely marked with small black spots; one-year-old branchlets laxly leafy, about 5 mm. thick, rather closely dotted with the minute dark-coloured remains of the fallen scales; young lateral branchlets closely covered with rust-coloured scales, not hairy. *Leaves* of the one-year-old shoots lanceolate or oblong-lanceolate, obtuse or subacute at the base, acutely shortly acuminate at the apex, averaging about 10–12 cm. long, and 3–4 cm. broad, the leaves from older parts of the shoots more elliptic and about 15 cm. long and 6.5 cm. broad, all firmly coriaceous, dull green and at length nearly glabrous above (at first fairly densely lepidote), completely covered below with very dense overlapping reddish-brown scales,* the latter with a membranous fringe nearly as broad as the nucleus; lateral nerves 8–10, very slender, slightly raised and forming a reticulate surface above, fainter beneath, in the older leaves several secondary lateral nerves appearing between the original ones; petiole 1.5–2.5 cm. long, closely punctulate with the remains of the scales. *Flowers* 2–4 in each inflorescence, all arising from the same level; floral buds broadly ovoid, about 2.5 cm. long and 1.5 cm. in diameter, the surrounding foliage leaves gradually becoming smaller inwards;

* When these scales fall off, as they frequently do in older leaves, they leave the lower leaf surface with a punctate appearance, the "pits" in this species appearing about their own diameter apart.

perulae in about 4–5 series, few, broadly ovate-orbicular, the outer leathery, minutely downy, all provided with small rather scattered scales except towards the margins, the latter very minutely fringed with extremely short hairs; scars of the fallen perulae very crowded (contiguous), longitudinally linear; pedicels stout, 1.3–1.5 cm. long, about 3.5 mm. thick, covered with small nearly contiguous scales, not hairy; bracts not seen. *Calyx* 5-lobed, the lobes frequently very unequal, broadly ovate to oblong, normally about 4 mm. long but occasionally the adaxial one elongated to 1.5 cm. long, rather densely scaly except towards the margin, not ciliate except the elongated one, which bears a few short hairs at its tip. *Corolla* tubular funnel-shaped, fleshy, white with a faint flush of rose on the outside of the lobes which are outermost in bud; tube 4.5 cm. long, slightly widened in the upper part, covered with scales outside about their own diameter apart; limb with a spread of 8–10 cm., nearly flat, 5-lobed, the lobes broadly suborbicular, about 4 cm. wide, with undulate margins, scaly outside except towards the margins. *Stamens* 20, about as long as the corolla tube; filaments glabrous; anthers 5 mm. long, orange-yellow. Ovary 10-celled, rather short for the size of the flower, covered with contiguous scales; style exserted, a little longer than the total length of the corolla, scaly its full length except where it expands into the large 5-lobed disciform stigma. *Capsule* oblong-ellipsoid, 2–2.5 cm. long, about 1.4 cm. thick, 10-celled. *Seeds* 3–4 mm. long, tailed-acuminate, scarcely winged.

SIKKIM. Very rare in thickets by the Lachen and Lachoong rivers at Choongtam, 6000 ft., fl. June to August, fr. November, J. D. Hooker (type). Choongtam, by the bridge, 5000 ft., fls., June 1910, W. W. Smith, 3347; without definite locality, G. H. Cave, 6734.

BHUTAN. Angduphorang (Angduphodang ?), 7000 ft., 3 ft. bush on dry hill side; fls. white, scented, with pink lines outside and yellow throat, 6th June 1915, R. E. Cooper, 3957. Tongsa, 7000 ft., September 1915, fr., R. E. Cooper, 4980. Timpu, 9000 ft., 8th August 1911, young fr., R. E. Cooper, 3423. Punakha Timpu, 7000 ft., bush 6 ft., fls. white, 6th June 1914, R. E. Cooper, 1292. Yonbo La, 7500 ft., 28th May 1905, J. C. White, 17. Bhutan, without definite locality, Griffith, 1134, 2254; Booth.

This species was named in compliment to Major Madden of the Bengal Civil Service, of whom Sir J. D. Hooker * says "a good and accomplished botanist, to whose learned memoirs on the plants of the temperate and tropical zones of north-west Himalaya the reader may be referred for an excellent account of those regions."

* Sikkim Rhod. p. 19.

R. Maddeni is well worth cultivating, but except in the warmer parts of these islands it requires the shelter of a cool greenhouse. At Kew it flourishes in the Himalayan House. In the herbarium there is a dried specimen with semi-double flowers which occurred at Kew in July 1882. One of the leaves of this is remarkable in that it is obovate-orbicular, a character which appears to occur occasionally in garden forms inclined to doubling of their flowers.

In cultivated examples especially the leaf-scales are frequently laxer than in wild specimens, and I strongly suspect that this condition is brought about by change of environment. The calyx, too, seems to be very variable in garden plants of this species.

2. **Rhododendron calophyllum,** Nutt. in Hook.

Kew Journ. Bot. v. 362 (1853).

Leaf rather widely obovate, narrowed to the base, rounded to a shortly mucronate obtuse apex, 9.5 cm. long, 4.8 cm. broad, glabrous and laxly reticulate above, very glaucous and rather laxly lepidote beneath, the scales about 2–3 times their own diameter apart and very small, the epidermis very densely papillous between the scales with rod-like papillae; midrib a little impressed above, prominent beneath and scaly, about 2.25 mm. wide at the base, gradually tapered to the apex; lateral nerves about 6 on each side of the midrib, the lower ascending, the upper ones more spreading, slightly raised but covered with papillae below; petiole broken off but rather wide and finely channelled above, lepidote. *Inflorescence* 4–5-flowered (Nuttall). *Calyx* not seen, lobes short, sub-equal, obtuse (Nuttall). *Corolla* 7 cm. long, 5-lobed; tube broad, straight in the lower part, a little expanded above, 4 cm. long, about 1 cm. in diameter at the base, very densely scaly all over the outside; lobes ovate-rounded, 2.5–3 cm. long, about 2.5 cm. broad, densely scaly outside. *Stamens* probably more than 15; filaments unequal, the longest reaching to about the middle of the corolla lobes, glabrous; anthers about 7 mm. long. *Ovary* and *style* not seen. *Capsule* (according to Nuttall) " cylindric-ovate, obtuse, 10-celled."

BHUTAN. On the southern slope of the Oola Mountain, at about 6000–7000 ft., Booth.

The accompanying drawing shows part of the material (one leaf and two flowers) upon which the above description is based. The specimen is labelled " Rhod. calophyllum, Nutt. Bot. Mag., t. 5002, Hort. Nutt." It agrees with Nuttall's account of the

species, a transcription of which is given below.* C. B. Clarke's "R. Maddeni var. calophyllum" of the Flora of Brit. India is nearly all *R. Maddeni*. This meagre specimen is the only one I have seen of the true *R. calophyllum*, Nutt.; probably all so named in cultivation at the present day are *R. Maddeni*. The plant shown in the drawing cannot very well be the type

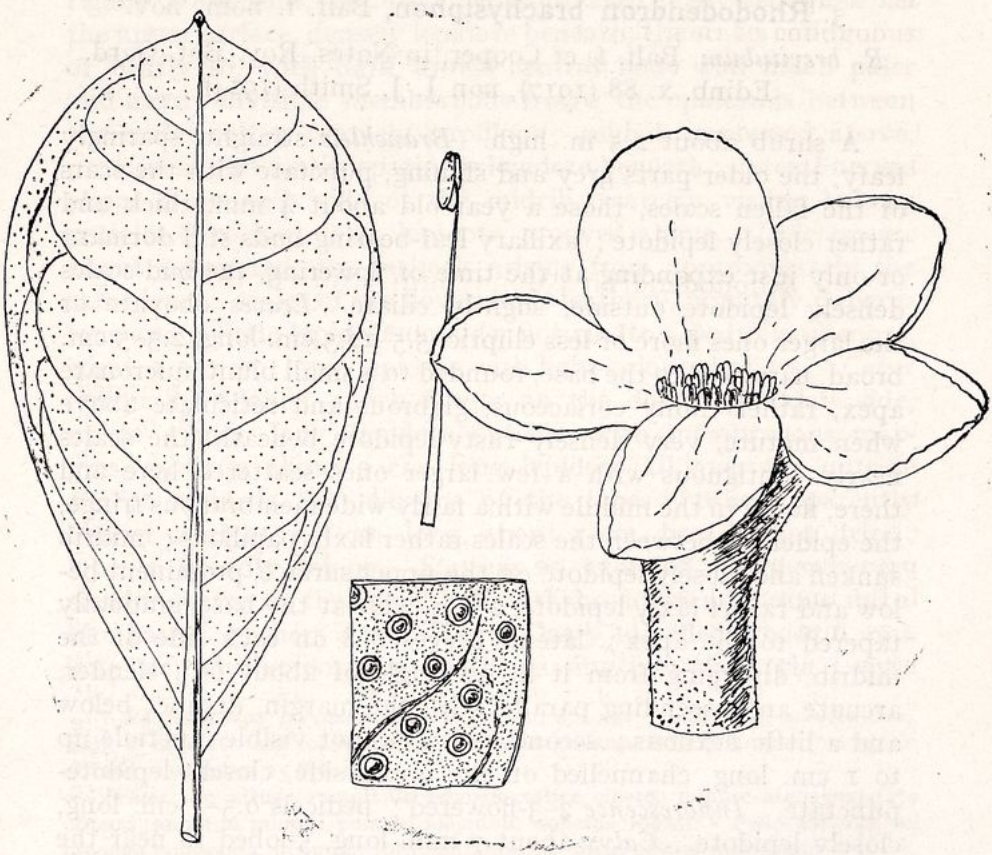

FIG. 1.—*Rhododendron calophyllum*, Nutt. (type). Nat. size.

of the Botanical Magazine, t. 5002, because the scales on the under surface of the leaves in that figure are shown to be nearly

* "*Rhododendron calophyllum*, Nutt.—Fruticosum: foliis brevi-petiolatis, oblongo-ovatis, subellipticis, acutis, basi subrotundis subtus glaucis squamosis; corymbis 4–5-floris; calycis laciniis brevibus, lobis subaequalibus obtusis; capsulis cylindraceo-ovatis obtusis 10-locularibus.

"Hab. In Bhotan, with *R. Jenkinsii*, from which it is perhaps not sufficiently distinct, though readily distinguished by the eye. The flowers of both are yet unknown, the specimens having been collected in the month of December. Mr Booth supposed, from the examination of the buds, that *R. Jenkinsii* would have yellow flowers; in the present species the bud-scales, in three specimens, are reddish-purple, indicating probably a red flower. The leaves are 3½–4 inches long, about 1½ inch wide, pointed, but not acuminate, also less scaly beneath."

contiguous, whilst in the specimen before us they are 2–3 times their own diameter apart. It should be noted in Nuttall's description (see below) that the leaves are described as being glaucous, and also as less scaly than in *R. Jenkinsii* (=*R. Maddeni*), points which fit the specimen shown in the drawing exactly.

3. **Rhododendron brachysiphon,** Balf. f. nom. nov.

R. brevitubum, Balf. f. et Cooper, in Notes, Roy. Bot. Gard. Edinb. x. 88 (1917), non J. J. Smith (1914).

A shrub about 2.5 m. high. *Branchlets* straight, sparingly leafy, the older parts grey and shining, punctate with the scars of the fallen scales, those a year old about 4 mm. thick and rather closely lepidote; axillary leaf-bearing buds still dormant or only just expanding at the time of flowering, the bud-scales densely lepidote outside, slightly ciliate. *Leaves* obovate or the larger ones more or less elliptic, 5.5–12.5 cm. long, 2.5–5 cm. broad, narrowed to the base, rounded to a small blunt mucronate apex, rather thinly coriaceous, glabrous and reticulate above when mature, very densely rusty-lepidote beneath, the scales nearly contiguous with a few larger ones scattered here and there, fleshy in the middle with a fairly wide membranous fringe, the epidermis between the scales rather laxly papillous; midrib sunken and closely lepidote on the upper surface, prominent below and rather laxly lepidote, 2 mm. wide at the base, gradually tapered to the apex; lateral nerves 6–8 on each side of the midrib, diverging from it at an angle of about 60°, slender, arcuate and ascending parallel with the margin, distinct below and a little flexuous; secondary nerves not visible; petiole up to 1 cm. long, channelled on the upper side, closely lepidote-punctate. *Inflorescence* 2–3-flowered; pedicels 0.5–1 cm. long, closely lepidote. *Calyx* about 7 mm. long, 5-lobed to near the base; lobes ovate-triangular, unequal, submembranous, glabrous except the lepidote base outside. *Corolla* 5-lobed, pink and scented, only 4.5 cm. long; tube 2 cm. long, lepidote outside and on the back of the lobes; lobes 2.5 cm. long, rounded. *Stamens* 20, unequal, exserted, reaching to above the middle of the corolla lobes; filaments slender, strigillose-pubescent in the lower third or half; anthers 3.5–4 mm. long. *Ovary* short, broadly ovoid, about 5 mm. long, rusty-lepidote; style about as long as the corolla, curved, laxly lepidote in the lower half, crowned by a large lobulate stigma. *Capsule* not seen.

BHUTAN. Punakha, 6000–7000 ft., bush 8 ft. high, on steep hillsides, fls. 27th June 1915, R. E. Cooper, 3936 (Herb. Edinb.).

4. **Rhododendron polyandrum,** Hutchinson, n. sp.*

A bush 1 m. high; older branches covered with dull grey bark finely punctulate with small black spots; one-year-old branchlets finely punctulate-lepidote, leafy at the top. *Leaves* oblong or oblong-lanceolate, rounded-obtuse at both ends, bluntly mucronate at the apex, 6–8 cm. long, 2.5–3 cm. broad, rigidly coriaceous, minutely lepidote and glossy-reticulate on the upper surface, densely lepidote beneath, the scales contiguous or nearly so, with dark brown central body and much paler and nearly invisible membranous fringe, the epidermis between the scales rather coarsely papillous; midrib impressed above, prominent and rather sparingly lepidote beneath; lateral nerves about 6 on each side of the midrib, scarcely visible below; petioles 8–10 mm. long, lepidote, grooved above. *Inflorescence* about 5-flowered, the pedicels arising from approximately the same level; scales of the flower buds leathery, minutely puberulous and a little lepidote outside, not ciliate; pedicels unequal, stout, 1.5–2 cm. long, lepidote with light-coloured scales. *Calyx* unequally 5-lobed, much longer on the dorsal (adaxial) side, up to 3 mm. long, lepidote outside, with membranous margins. *Corolla* about 7 cm. long, lepidote all over the outside except towards the margins of the lobes; tube apparently almost straight, 3.5 cm. long, about 1 cm. broad when dried; lobes 5, broadly oblong. *Stamens* 25, exserted; filaments very slender, hairy in the lower half with broad membranous flake-like hairs; anthers 5 mm. long. *Ovary* 12-celled, about 6 mm. long, densely lepidote, gradually passing into the style; style

* *Rhododendron polyandrum*, Hutchinson, sp. nov.; affinis *R. manipurensi*, Balf. f. et Watt, sed foliis oblongis vel oblongo-lanceolatis utrinque rotundato-obtusis staminibus 25 differt.

Frutex 1 m. altus; ramuli vetustiores cortice cinereo minute nigro-punctato obtecti, annotini minute punctato-lepidoti, superne foliati. *Folia* oblonga vel oblongo-lanceolata, utrinque rotundato-obtusa, apice obtuse mucronata, 6–8 cm. longa, 2.5–3 cm. lata, rigide coriacea, supra minute lepidota et nitido-reticulata, infra dense lepidota squamis contiguis vel fere contiguis corpore centrali atro-brunneo margine membranaceo, epidermide crasse papillosa; costa media supra impressa, infra prominens et parce lepidota; nervi laterales utrinsecus circiter 6, infra vix evidentes; petioli 8–10 mm. longi, lepidoti, supra canaliculati. *Inflorescentia* terminalis, circiter 5-flora, pedicellis subumbellatis; gemmarum floriferarum squamae coriaceae, extra minute puberulae et parum lepidotae, eciliatae; pedicelli inaequales, robusti, 1.5–2 cm. longi, squamulis pallidis lepidoti. *Calyx* inaequaliter 5-lobatus, lobo dorsali (adaxiali) multo longiore, usque ad 3 mm. longus, extra lepidotus, margine membranaceo. *Corolla* circiter 7 cm. longa, extra ubique lepidota; tubus rectus, 3.5 cm. longus, sicco circiter 1 cm. latus; lobi 5, late oblongi. *Stamina* 25, exserta; filamenta gracilia, in parte inferiore pilis latis membranaceis pubescentia; antherae 5 mm. longae. *Ovarium* 12-loculare, circiter 6 mm. longum, dense lepidotum, in stylum sensim angustatum; stylus corollae fere aequilongus, fere ad apicem lepidotus, stigmate late lobulato coronatus. *Capsula* non visa.

nearly as long as the corolla, lepidote close up to the broad lobulate stigma.

BHUTAN. Chapcha Timpu, 8500 ft., bush 3 ft. high on hill top, fls. white, 8th July 1914, R. E. Cooper, 1454 (Herb. Edinb.).

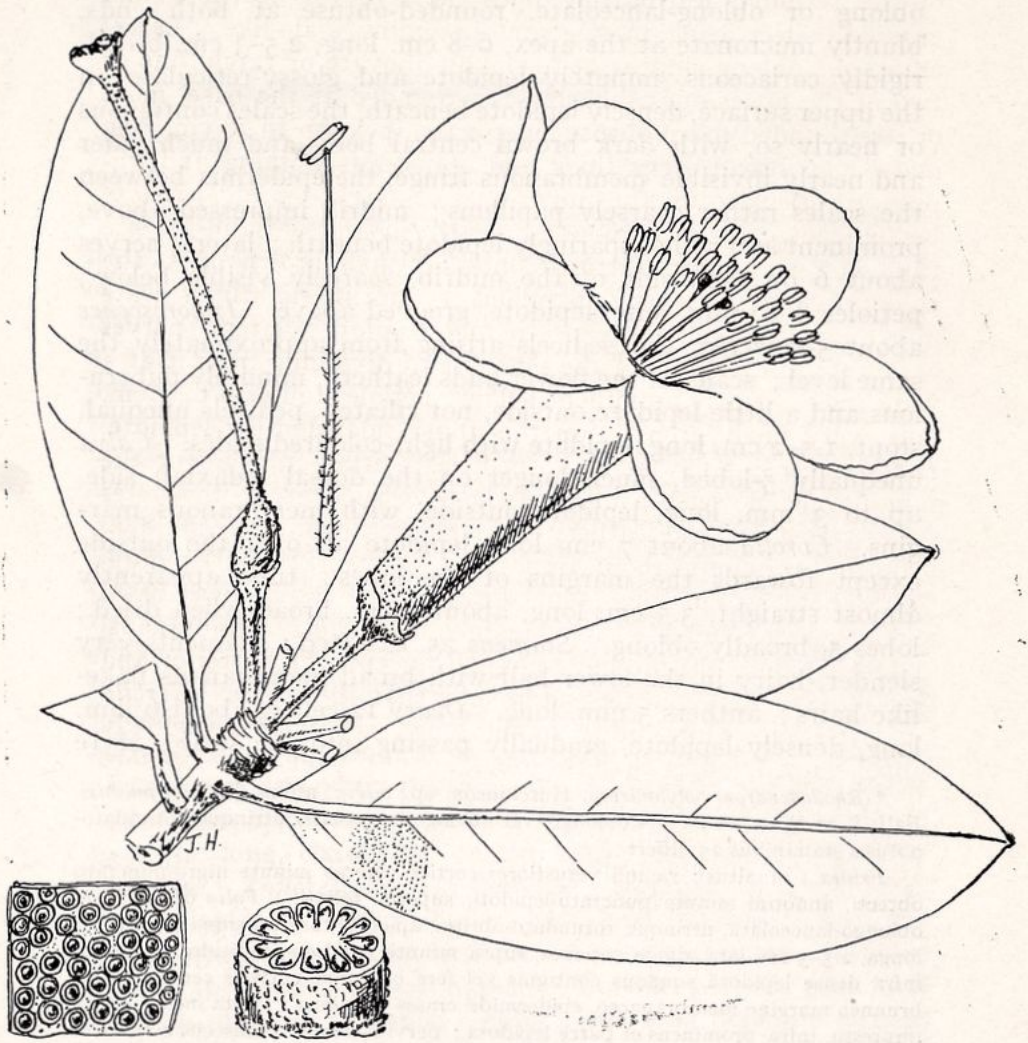

FIG. 2.—*Rhododendron polyandrum*, Hutchinson, n. sp. Nat. size.

5. **Rhododendron manipurense,** Balf. f. et Watt, in Notes, Roy. Bot. Gard. Edinb. x. 119 (1917). *R. Maddeni*, var. *obtusifolium*, Hutchinson in Bot. Mag. t. 8212 (1908).

A much-branched tortuous tree or shrub ; young branchlets lepidote with imbricate scales, girt at the base by the persistent crowded outer scales of the leaf-buds, sometimes a few of the inner bud-scales also persisting ; one-year-old branchlets about

6 mm. in diameter, dark red or greyish-brown, lepidote with brownish scales, the older branches becoming glabrous; axillary leaf-bearing buds still dormant and very small at the time of flowering, ovoid-globose, densely lepidote outside; outer perulæ of the terminal leaf-bearing buds more or less leaf-like, and gradually decreasing in size and becoming scale-like. *Leaves* elliptic or oblong-elliptic, occasionally obovate or rarely one or two of the lower ones suborbicular, rounded at the base, more or less rounded to an obtuse mucronate apex, up to 18 cm. long and 8 cm. broad, very thick and coriaceous, shining and impressed-reticulate on the upper surface, very densely lepidote below, the scales contiguous or nearly so and variable in size from larger blacker scattered ones to small brown ones, the epidermis conspicuously papillous; midrib slightly sulcate above, very prominent beneath and lepidote; lateral nerves about 10 on each side of the midrib and diverging from it at a wide angle, slightly prominent below; petiole stout, up to 3 cm. long, very finely grooved on the upper side, densely lepidote. *Inflorescence* 4–5-flowered, the pedicels arising from about the same level; flower-bearing buds large, ovoid, viscid, the outer scales very thick and leathery and lepidote towards the middle; pedicels very stout, about 1 cm. long, 3-4 mm. thick, lepidote. *Calyx* about 1.5 cm. long, 5-lobed to near the base; lower basal portion lepidote outside; lobes more or less oblong, membranous, at first lepidote outside but soon glabrescent, the posterior and lateral ones a little shorter and broader than the others. *Corolla* large and pure white, up to 10 cm. long; tube rather narrowly funnel-shaped, longer than the lobes, about 6.5 cm. long, lepidote all over the outside; lobes 5, rounded, about 3 cm. broad, lepidote outside mainly towards the middle. *Stamens* 17–20, exserted; filaments pubescent in the lower half; anthers 5 mm. long. *Ovary* 12-celled, about 8 mm. long, densely lepidote; style nearly as long as the corolla, lepidote nearly to the apex, crowned by a very large lobulate disk-like stigma. *Capsule* 2–4 cm. long, about 1.5 cm. thick, lepidote, the central axis capped by the lower persistent portion of the style.

MANIPUR. Naga Hills: Japvo Mountain, 8000–10,000 ft., fr., 9th March 1882, G. Watt, 6461; 10,000 ft., fls. 22nd July 1882, Dr W. Coury in Herb. G. Watt, 7333. Japvo, 9900 ft., fr., 25th October 1885, C. B. Clarke, 41348. Sirohifurar, 8000 ft., a common Rhododendron on the smaller peak, fr., 12th April 1882, G. Watt, 6461. Ching Sow, 8000–8500 ft., old fr., 14th to 16th April 1882, G. Watt, 6512, 6513. Keyang and the ranges approaching Sarameti into Burma, 9500 ft., in bud 22nd April 1882, G. Watt, 6703 (Herb. Kew).

6. **Rhododendron crassum,** Franch. in Bull. Soc. Bot. France, xxxiv. 282 (1887); Bean in Kew Bull. 1914, 201; Millais, Rhododendrons, 149 (1917).

A shrub or tree up to 6.5 m. high; older branchlets covered with minutely punctate grey bark; one-year-old branchlets closely covered with small scales; axillary leaf-bearing buds minute and still dormant at the time of flowering. *Leaves* rather crowded and whorled, lanceolate or obovate-oblanceolate, mostly more or less triangular and obtusely mucronate at the apex, subcuneate at the base, 6–12 cm. long, 2–7 cm. broad, very thick and rigidly coriaceous, lepidote above especially when young and later mainly towards the midrib, at length rather glossy and reticulate, densely lepidote below, the scales ferruginous, unequal, and less than their own diameter apart or more or less contiguous, with rather narrow membranous fringe; midrib impressed above, prominent below and lepidote; lateral nerves 8–12 on each side of the midrib; slender but fairly distinct below; petiole about 1.5–2 cm. long, stout, closely lepidote, grooved on the upper side. *Inflorescence* 3–5-flowered, the pedicels arising from approximately the same level; bud-scales very thick and leathery, the outer ones rounded, laxly lepidote and minutely puberulous outside, the inner ones widely bilobed at the apex and silky villous outside towards the top; pedicels stout, 1–1.5 cm. long, densely lepidote especially towards the apex. *Calyx* rather variable, up to 1.3 cm. long, 5-lobed to near the base, lobes membranous, more or less oblong, glabrous. *Corolla* white, 6–9 cm. long, rather narrowly funnel-shaped, densely lepidote all over the outside; tube longer than the lobes; lobes 5, oblong or broadly elliptic, with wavy margins. *Stamens* 15–21,* longer than the corolla tube; filaments strigillose-pubescent in their lower half; anthers about 6 mm. long. *Ovary* 10-celled, densely scaly, short and broadly ovoid; style a little shorter than the corolla, stout, lepidote to near the apex, crowned by a large disk-like stigma. *Capsule* straight, 3 cm. long, about 1.4 cm. thick, lepidote, 10-ribbed or valved.

WESTERN YUNNAN. Hou-tien-pa, Mt. Tsang-chan, above Tali, 7500 ft., Delavay, 2112 (type in Herb. Paris)—not seen. Amongst shrubs on Mt. Tsang-chan, 9000 ft., fls. 15th June 1889, Delavay, 4157. Shady moist situations in pine forests on the eastern flank of the Tali Range, lat. 25° 40′ N., 11,000–12,000 ft., shrub 15–20 ft., fls. rosy-white, August 1906, G. Forrest, 4139. Eastern flank of the Tali Range, lat. 25° 40′

* Franchet describes the number of stamens as 13, but in the specimen at Kew there are 20. I have not found fewer than 15 in any specimen of *crassum*.

N., 12,000 ft., amongst scrub and rock, shrub 4–8 ft., fls. white, washed with rose at the base, fragrant, July 1910, G. Forrest, 6759; same region, 10,000 ft., June 1913, G. Forrest, 11672; June 1914, G. Forrest, 13457. Western flank of the Shweli-Salween Divide, lat. 25° 20′ N., 9000–10,000 ft., amongst scrub, shrub 4–8 ft., in fruit, December 1912, G. Forrest, 9431. Shweli-Salween Divide, lat. 25° 30′ N., 10,000 ft., open rocky slopes and in thickets, shrub 4–6 ft., fls. white, flushed with rose outside, August 1917, G. Forrest, 15887. Mekong-Salween Divide, lat. 28° 12′ N., 10,000 ft., on ledges of cliffs and humus-covered boulders, shrub 2 ft., fls. fragrant, creamy-white, July 1917, G. Forrest, 14239.

UPPER BURMA. Ridge of Naung-chaung, Nwai Divide, on open granite ridge in forest, 8000–9000 ft., fls. pure white, marked with pale yellow at extreme base of corolla, very fragrant, 17th July 1914, Kingdon Ward, 1817 (Herb. Edinb.). Hpimaw, open forest, on damp shady limestone cliffs, small bush, with spreading loose habit, 6–10 ft. high, fls. white, not fragrant, 9th July 1914, Kingdon Ward, 1757 (Herb. Edinb.).

It is not without considerable hesitation that I have included in the above Mr Kingdon Ward's specimens from the Nwai Divide and Hpimaw, Burma. They are more robust and their leaves are larger than in the Yunnan plants, but I can discover no real difference to separate them.

7. **Rhododendron excellens,** Hemsl. et E. H. Wils. in Kew Bull. 1910, 113.

A shrub about 3.3 m. high; one-year-old branchlets dark purple, slightly flexuous, about 6 mm. thick in the middle, terete, rather densely covered with small very dark ferruginous scales; axillary leaf-buds very small (about 2 mm. in diameter) at the time of flowering, subglobose, densely lepidote, the bud-scales glabrous towards the margin and very minutely ciliolate. *Leaves* large, oblong-elliptic, rounded at both ends, slightly unequal at the base, obtusely mucronate at the apex, 15–19 cm. long, 4–5.5 cm. broad, coriaceous, glabrous and dull above, somewhat glaucous and rather densely lepidote below, the scales about their own or a little less than their own diameter apart (probably almost contiguous in younger leaves), the epidermis densely papillous between the scales; midrib slightly raised above, a little scaly towards the base, very prominent and rounded below, about 4 mm. thick at the base, gradually tapered to the apex; lateral nerves about 18–20, distinct on the upper, prominent on the lower surface, spreading from the midrib at a wide angle, slightly arcuate, looped and branched

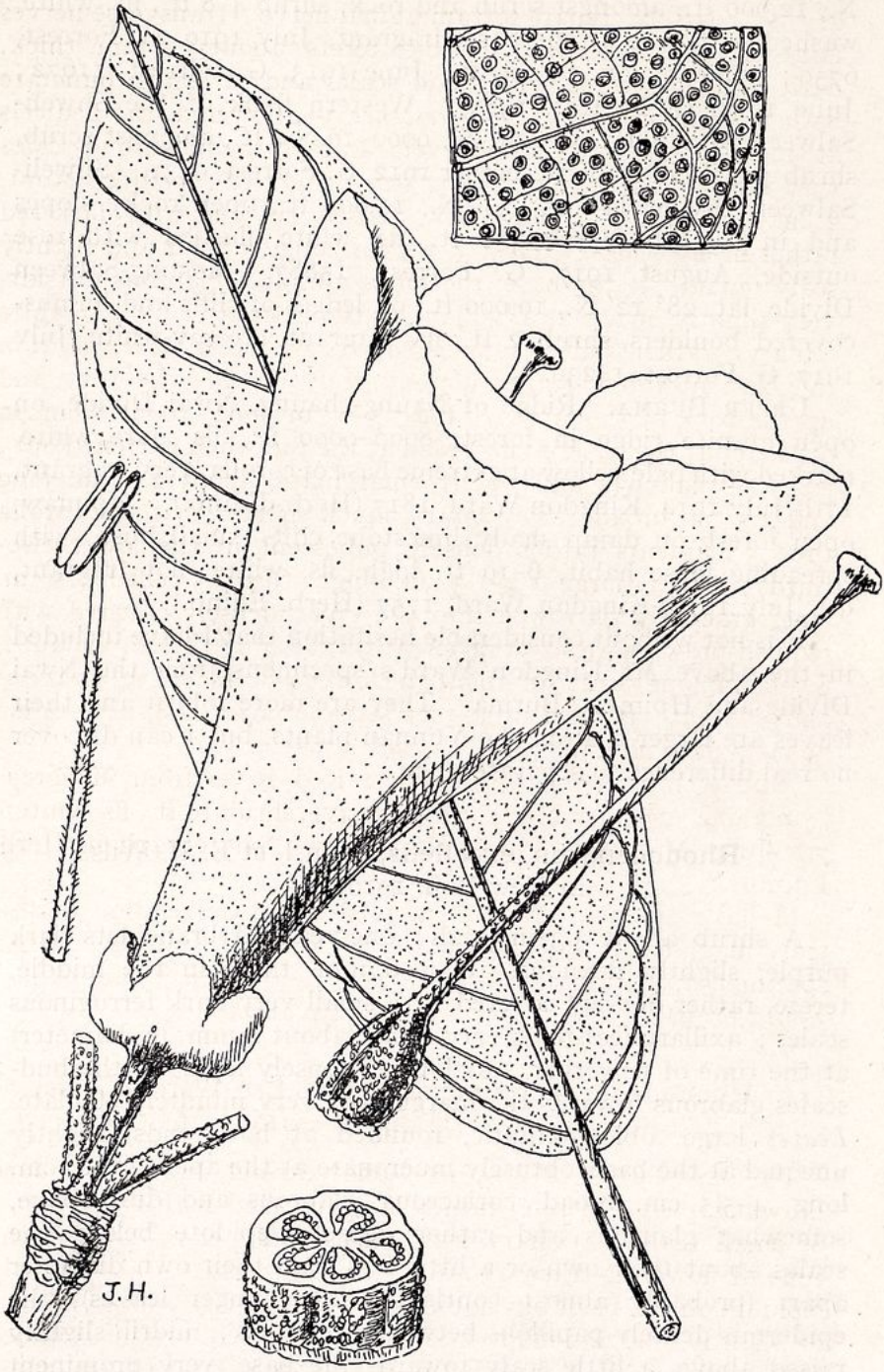

FIG. 3.—*Rhododendron excellens*, Hemsl. and Wils. Nat. size.

towards the margin, the junctions of the nerves forming a distinct coarsely crenate intramarginal nerve; transverse nerves faint and inconspicuous; petioles terete, about 3.5 mm. thick, dark purple, covered with small scales and at length punctate with their impressions. *Inflorescence* 3–4-flowered, the pedicels arising from about the same level; scars of the fallen bud-scales very dense, transversely linear, straw-coloured; pedicels stout, 2 cm. long, about 4 mm. thick, densely covered with dark red rather fleshy scales. *Calyx* 1–1.5 cm. long, tubular and slightly scaly outside at the base, the lobes rounded, glabrous outside, very slightly or not at all ciliate on the margins. *Corolla* white (Henry), rather widely funnel-shaped, gradually widened from the base upwards, rather densely scaly outside the tube and up the back of the lobes; tube 7.5–8 cm. long, about 1 cm. in diameter at the base, 7 cm. broad at the top when flattened out; lobes 5, shallowly and widely emarginate, about 2.5 cm. long and 3.5 cm. broad. *Stamens* 15, much shorter than the corolla tube; filaments rather densely pubescent in the lower two-thirds; anthers large, 1.2–1.3 cm. long. *Ovary* 5-celled, 1.5 cm. long, gradually narrowed into the style, densely covered with reddish-brown scales; style slightly exceeding the corolla tube, 8.5–9 cm. long, scaly for about the lower ⅓ of its length, glabrous above, stout, crowned by a very large lobulate disk-like stigma about 7 mm. in diameter. *Capsule* not seen.

SOUTH YUNNAN. South of the Red River from Mengtze; "only one specimen brought by a native, shrub 10 ft., fls. white," 7th July, A. Henry, 13666 (Herb. Kew; photograph in Herb. Edinb.).

I have given a new and more detailed description of this truly magnificent species because there is so far only one dried specimen in existence. As it flowers in July in S. Yunnan, it would probably also flower late in cultivation.

8. **Rhododendron megacalyx,** Balf. f. et Ward in Notes, Roy. Bot. Gard. Edinb. ix. 246 (1916).

A bushy tree of 3–5 m.; one-year-old branchlets dark brownish-purple, terete, rather laxly marked with the remains of small scales; axillary leaf-buds already elongating at the time of flowering, then about 1.5 cm. long, their scales slightly lepidote on the back but not ciliate. *Leaves* fairly large, elliptic or slightly obovate-elliptic, slightly narrowed to the rounded base, rounded to a sunken tip at the apex, 11–14.5 cm. long, 4–7 cm. broad, rather rigidly coriaceous, glabrous and dull above when mature (densely lepidote above when young), glaucous and densely lepidote below, the scales small and much

sunken, about their own diameter apart, with scarcely any membranous fringe; midrib impressed above, very prominent below, about 4 mm. wide at the base, gradually tapered to a

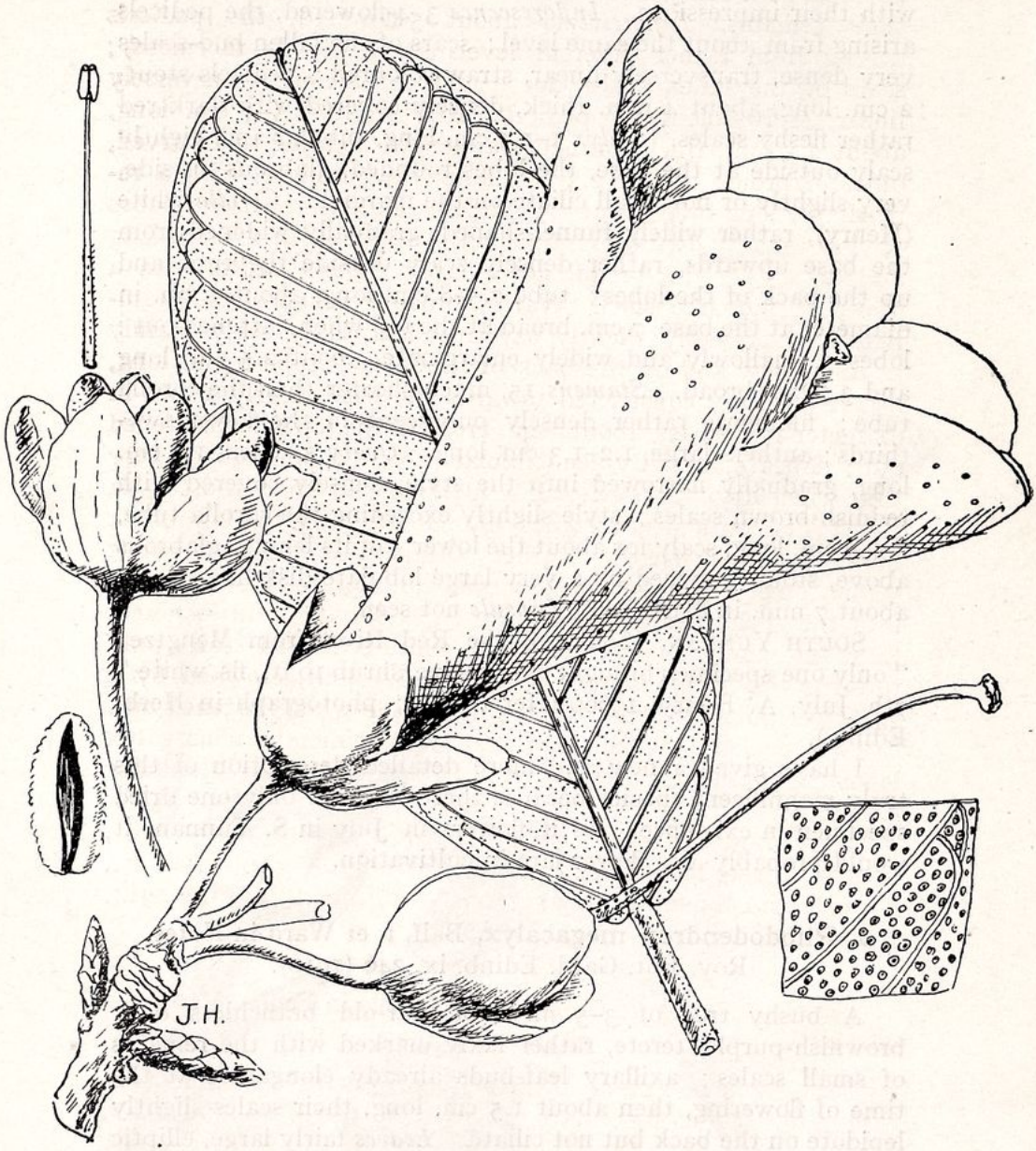

FIG. 4.—*Rhododendron megacalyx*, Balf. f. Nat. size.

small rounded callous sunken apex, very slightly lepidote below; lateral nerves about 15 on each side of the midrib, diverging from the midrib at an angle of 45°, very prominent below, straw-coloured, sparingly lepidote, branched and faintly looped

towards the margin; secondary nerves slender and inconspicuous, more or less parallel; petioles terete except for a shallow groove on the upper side, about 3 mm. thick, dark purple, covered with fairly close small whitish scales or punctate with their remains. *Inflorescence* about 5-flowered, the pedicels arising from rather different levels (very shortly racemose); scars of the fallen scales dense and contiguous, transversely linear, straw-coloured; pedicels fairly stout, 2.5–3 cm. long, about 2.5 mm. thick, probably at length nodding and curved, quite glabrous. *Calyx* 2.3 cm. long, campanulate, with a remarkably long tube about 1.5 cm. long, glabrous outside; lobes 5, very broadly ovate, rounded at the apex, about 1.3 cm. long and up to 1.5 cm. broad, not ciliate. *Corolla* white, with a sweet nutmeg-like smell (Ward), broadly funnel-shaped-campanulate, probably slightly asymmetrical, laxly scaly mainly in line below and on the back of the lobes; tube 6 cm. long, rather abruptly constricted towards the base, nearly 1 cm. in diameter at the base, about 8 cm. broad at the top when flattened out; lobes 5, broadly semicircular, about 3 cm. broad, very thin when dry. *Stamens* 10, a little shorter than the corolla tube; filaments slender, unequal, pubescent in the lowermost fourth of their length; anthers comparatively small, about 5 mm. long. *Ovary* 5-celled, 7 mm. long, abruptly contracted into the style, densely lepidote; style curved, a little longer than the corolla tube, with a few white scattered scales only towards the base, glabrous above, fairly stout, crowned by a slightly lobulate stigma about 5 mm. wide when flattened out. *Capsule* enclosed by the persistent rigidly membranous calyx lobes, 2 cm. long, covered with golden somewhat glandular scales.

EAST UPPER BURMA. Nwai Valley; bushy tree of 15–25 ft., in rain forest, rather open ground, by stream, 7000–8000 ft., flower white, smelling very sweetly of nutmeg, 4th June 1914, Kingdon Ward, 1628 (Herb. Edinb.).

9. **Rhododendron liliiflorum,** Léveillé in Fedde, Repert. xii. 102 (1913).

Branchlets not seen. *Leaves* (seen only in a fragmentary condition) oblong-lanceolate, slightly narrowed to the base, apex not seen but evidently subacute, 7–14 cm. long, 2–4 cm. broad, rigidly coriaceous, dull and impressed-reticulate on the upper surface, glabrous except for the finely scaly lower portion of the midrib, finely lepidote below, the scales about their own diameter apart, small and equal in size, reddish-brown, glistening when dry, fleshy in the middle, with a rather narrow membranous

fringe, the epidermis very slightly papillous between the scales; midrib slightly raised in a groove, raised below, rather densely covered with a little larger scales than on the leaf surface, about 2.25 mm. broad at the base, gradually tapered to the apex; lateral nerves probably about 10 (in one small leaf there are 8), slightly impressed above, a little prominent below, diverging

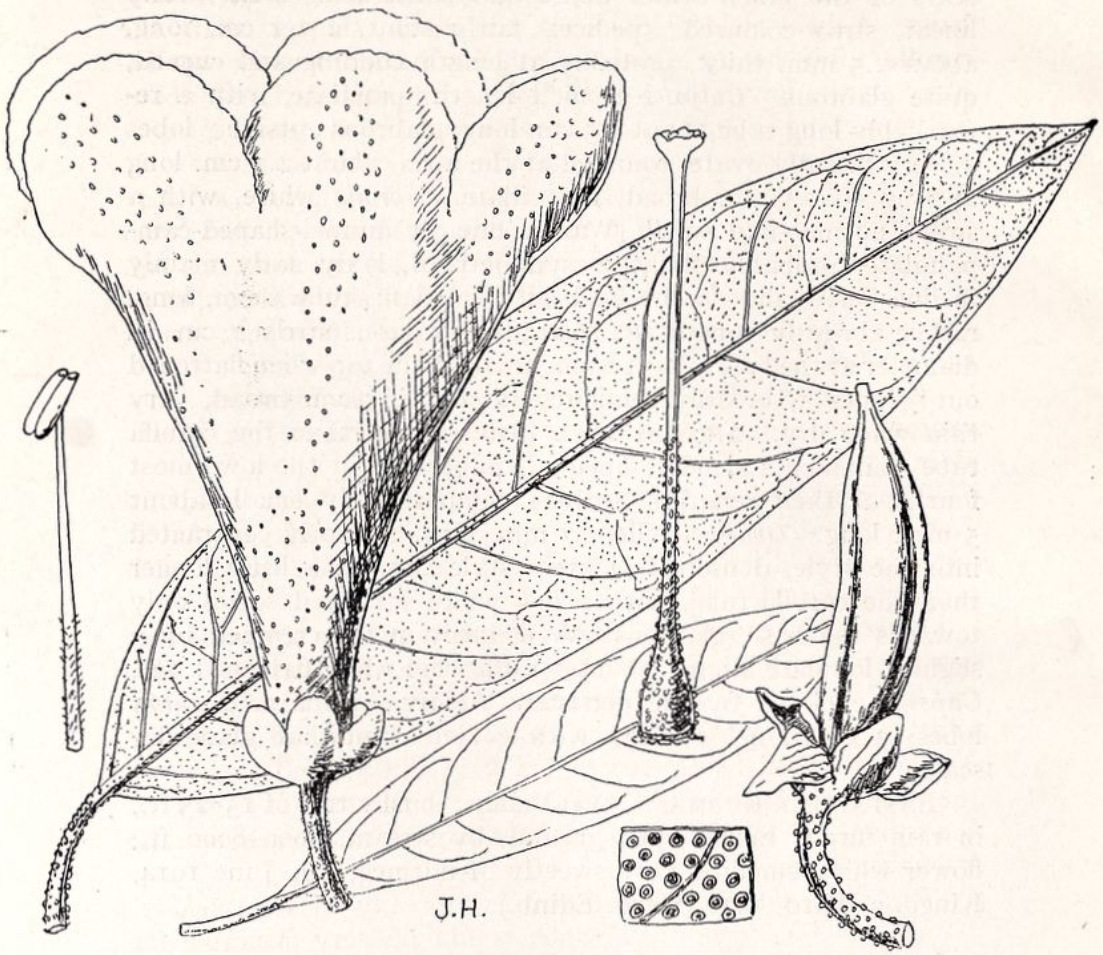

FIG. 5.—*Rhododendron liliiflorum*, Lév. Nat. size.

from the midrib at an angle of about 60°, slightly flexuous, faintly looped towards the margin; secondary nerves scarcely visible below; petiole 2.5 cm. long, nearly 3 mm. thick at the base, closely scaly, apparently not grooved on the upper side, reddish-purple. *Pedicels* (length ?) rather closely scaly, about 3 mm. thick at the tip. *Calyx* 1 cm. long, lobed to nearly the base on one side, on the other the lobes connate nearly their full length, very broadly oblong, rounded at the apex, with crenulate (probably at first scaly) margins, membranous, about

7 mm. broad, sparingly lepidote all over the outside but more densely so towards the base. *Corolla* white, scented (Cavalerie), tubular below, widely funnel-shaped from about 2 cm. above the base; tube 7 cm. long, 1 cm. diameter at the base, 6 cm. broad at the top when flattened out, rather densely lepidote outside with small fleshy scales; lobes 5, broadly semicircular, about 3 cm. broad and 2 cm. long, slightly fringed with short hairs, scaly outside. *Stamens* 10, much shorter than the corolla tube, nearly equal; filaments rather densely woolly-hairy in the lower third of their length; anthers large, about 8.5 mm. long. *Ovary* scaly, probably 5-celled (see capsule); style about as long as the corolla tube, 6 cm. long, rather densely scaly in the lower half, fairly stout, crowned by a large lobulate "fist-like" stigma about 6 mm. wide. *Capsule* 5-celled, with 5 rounded ribs, curved, acuminate, about 4.5 cm. long, 1.3 cm. broad, rather closely lepidote with small fleshy scales, girt at the base by the persistent rigidly chartaceous strongly striate calyx lobes.

KWEICHOW. Pin-Fa: Yuin-Ou-chau, "fl. blanches, odorantes," 3rd June to 15th July 1902, J. Cavalerie, 54 (Herb. Edinb.).

The presence of this species, apparently a very beautiful one, and perhaps hardy, in Kweichow is interesting, in that it extends the distribution of the Maddeni series very much farther eastward.

I have drawn up the above description from an imperfect specimen (see fig. 5) in the Edinburgh Herbarium. This material consists of two fragmentary leaves, one nearly whole, and a single but perfect flower, and a fine capsule. The capsule is remarkable in being curved, strongly ribbed, and tipped by the persistent base of the style, whilst at the base it is girt by the somewhat toughened persistent calyx lobes which become strongly striate.

R. liliiflorum is undoubtedly a close ally of *R. excellens*, Hemsl. and Wils., both of which would be very desirable for cultivation, as they are about the finest of the series and late flowering.

10. **Rhododendron rhabdotum,** Balf. f. et Cooper in Notes, Roy. Bot. Gard. Edinb. x. 141 (1917).

A tree 4 m. high; one-year-old branchlets rather slender, reddish-brown, very sparingly scaly, with a few rather long setose hairs towards the apex, the young branchlets densely scaly and bristly with hairs; axillary leaf-buds very small (about 1.5 mm. in diameter) and globose at the time of flowering,

the scales apparently not lepidote. *Leaves* fairly large, obovate-oblong-elliptic, slightly narrowed to an obtuse or subacute base, rounded to a small blunt callous tip, 9–14 cm. long, 3–4.8 cm. broad, rather thinly coriaceous, glabrous and dull green above when mature (at first rather densely scaly), laxly reticulate, glaucous-green below and lepidote, the scales about 3 sizes and always more than their own diameter apart, rather fleshy in the middle with a narrow membranous fringe, the epidermis between the scales densely papillous, the papillae pale coloured and rod-like; midrib slightly raised above, very prominent and slightly scaly below, about 2.25 mm. broad at the base, gradually tapered to the apex; lateral nerves about 9–10 on each side of the midrib, like the veins slightly raised and distinct on the upper surfaces, prominent but slender and flexuous on the lower surface, straw-coloured, diverging from the midrib at an angle of about 60°, arcuate, rather faintly looped towards the margin; secondary nerves few and rather faint; petioles 1.5 cm. long, about 3 mm. thick at the base, subterete, apparently not grooved on the upper side, slightly scaly when mature, setose on the edges and densely scaly when young. *Inflorescence* probably very few-flowered (only 3 flowers seen), the pedicels arising from the same level; scars of the fallen bud-scales rather broadly transversely linear, contiguous, pale straw-coloured; pedicels 1.7 cm. long, 2.5 mm. thick, rather densely scaly and softly pubescent. *Calyx* 1 cm. long, 5-lobed to nearly the base, scaly outside only at the base, the lobes oblong or oblong-elliptic, about 9 mm. long and 4–5 mm. broad, membranous, softly and thinly pubescent about the middle outside, very finely and inconspicuously ciliate around the apex, glabrous within, striate. *Corolla* cream-coloured with red lines down the back of the lobes, gradually funnel-shaped from the base, glabrous outside; tube 8 cm. long, about 1 cm. in diameter at the base, nearly 8 cm. wide at the throat when spread out; lobes 5, with rather shallow sinus between, about 1.5 cm. long and about 3.5 cm. broad, not at all emarginate. *Stamens* 10, slightly longer than the corolla tube; filaments slender, woolly-pubescent in their lowermost third; anthers large, 1–1.2 cm. long. *Ovary* 5-celled, conical, 1 cm. long, gradually narrowed into the style, densely covered with overlapping scales; style slightly longer than the corolla, about 10 cm. long, rather slender, laxly scaly in the lower half, crowned with a lobulate stigma about 5 mm. broad. *Capsule* not known.

BHUTAN. Punakka, 8000 ft., on dry rocky faces, tree 12 ft., fls. 29th May 1915, R. E. Cooper, 3937.

11. **Rhododendron Dalhousiae,** Hook. f. Rhod. Sikkim, t. i, quoad icon. orig. in MSS., nec icon. ii. ed.; Hook. f. in Journ. Hort. Soc. Lond., vii. 77, 93 partim; Hook., Bot. Mag., t. 4718 (1853); Fl. des Serres, v. 460–468 (1849) partim; *R. macrocarpus*, Griff. Itin. Notes, 138.

An epiphyte on tree stems, rarely on rocks. *Branches* rather elongated, the older ones reddish-purple and smooth; one-year-old branchlets rather closely lepidote and bristly towards the apex; axillary leaf-bearing buds quite small and still dormant at the time of flowering, the covering scales slightly lepidote outside and fringed with a few hairs. *Leaves* obovate or oblanceolate, rounded to an obtuse hardened apex, cuneate at the base, 7–15 cm. long, 2.5–6 cm. broad, firmly coriaceous, at first densely scaly above but soon becoming glabrous and dull, mostly somewhat glaucous below and rather densely lepidote, the scales very small and unequal in size, fleshy in the middle, with a narrow membranous fringe, about their own diameter (or slightly more) apart, the epidermis between the scales very densely papillous with rod-like papillae; midrib raised on both surfaces, more prominent beneath and slightly lepidote, about 2 mm. broad at the base; lateral nerves about 10 on each side and diverging from the midrib at an angle of 40°–60°, forked and faintly looped towards the margin, prominent below but rather slender; secondary nerves not visible; petioles 1–1.5 cm. long, almost terete, not grooved above, rather densely covered when young with scales which soon fall off, mostly bristly with long hairs. *Inflorescence* about 5-flowered, the pedicels arising from approximately the same level; flower-bearing buds ovoid, about 4 cm. long just before opening, the scales not or only very slightly lepidote outside but fringed towards the mucronate tips with soft short white hairs, appressed-villous within the apex; scars of the fallen scales very high and contiguous, straw-coloured; pedicels 1–2 cm. long, softly pubescent and rather densely covered with small fleshy scales. *Calyx* about 1 cm. long, 5-lobed to nearly the base; lobes oblong or oblong-elliptic, rounded at the apex, up to 5.5 mm. broad, a little scaly towards the base, sparingly clothed about the middle outside with a few delicate hairs, not at all ciliate on the margins. *Corolla* white, tinged with rose outside, fragrant, about 9 cm. long, gradually funnel-shaped from a fairly wide base; tube glabrous outside except for a few scales towards the base on the adaxial side, 6–8 cm. long, about 7–8 cm. in diameter at the mouth; lobes 5, broad, with undulate margins. *Stamens* 10, slightly longer than the corolla tube; filaments broad, pubescent towards the base; anthers large, about 1.3 cm.

long, chocolate-brown. *Ovary* 5-celled, rather abruptly tapered into the style, about 1 cm. long, very densely covered with closely packed scales; style curved about as long as the corolla, scaly in its lower two-thirds, crowned by the large depressed-globose somewhat horny stigma. *Capsule* about 4.5 cm. long, the valves rugulose-lepidote, slightly keeled, girt at the base by the persistent calyx. *Seeds* 2 mm. long, narrowly margined and shortly tailed, straw-coloured.

SIKKIM. Darjeeling, 6000–8000 ft., J. D. Hooker. Tonglo, May 1848, J. D. Hooker. Senchal Forest, 7000 ft., 13th May 1902, J. H. Lace, 2208 (Herb. Edinb.). Senchal, 8000 ft., fls. 23rd June 1912, Ribu and Rhomoo (Herb. Edinb.). Sikkim, without definite locality, G. H. Cave, 6735 (Herb. Edinb.).

BHUTAN. Chukka Timpu, 6000 ft., bush 8 ft., fls. yellow-primrose, 24th April 1915, R. E. Cooper, 3806 (Herb. Edinb.). Punakka, 6000–7000 ft., bush 8 ft., fruiting on steep dry hill-side, 26th June 1915, R. E. Cooper, 3935 (Herb. Edinb.). Bhutan, without precise locality, Griffith, 22, 37.

The confusion of *R. Dalhousiae* with *R. Lindleyi*, Moore, is dealt with at some length in the introductory notes to this paper (see p. 10). The differences between the two are numerous, and may be shown as follows:—

R. Dalhousiae, Hook f. (sensu stricto).	*R. Lindleyi*, T. Moore.
One-year-old *branchlets* bristly towards the apex.	One-year-old *branchlets* not bristly.
Leaves obovate, cuneate at the base, the scales below about their own diameter apart.	*Leaves* elliptic, rounded at the base, the scales below much more then their own diameter apart.
Pedicels softly hairy as well as scaly.	*Pedicels* only scaly.
Calyx lobes quite glabrous on the margins.	*Calyx* lobes densely fringed with soft white hairs.
Corolla about 9–12 cm. long, more or less gradually widened upwards.	*Corolla* about 7–8 cm. long, more or less saccate and abruptly widened about the middle.
Anthers about 1.3 cm. long.	*Anthers* 7–8 mm. long.
Style lepidote in its lower two-thirds.	*Style* lepidote only at the very base.
Capsule valves keeled.	*Capsule* valves not keeled.

12. **Rhododendron Lindleyi,** T. Moore in Gard. Chron. 1864, 364. *R. bhotanicum*, C. B. Clarke in Hook. f. Fl. Brit. Ind. iii. 475 (1882).

A woody parasitic climber growing upon various species of trees (Watt, n. 7004); older branchlets brown or greyish, spotted

with the remains of the scales; one-year-old branchlets rather sparingly lepidote, not setose; axillary leaf-buds very small, and still dormant at the time of flowering. *Leaves* elliptic or rather elongate-oblong-elliptic, rounded at both ends or occasionally a little cuneate at the base, rounded to a projecting or reflexed obtuse callous apex, 6–15 cm. long, 1.5–5.5 cm. broad, rather thinly coriaceous, glabrous dull and laxly reticulate above, glaucous beneath and rather laxly lepidote, the scales somewhat small and unequal and about 2–3 times their own diameter apart, the epidermis between the scales very closely papillous; midrib very slightly impressed on the upper surface, prominent below, about 2.5 mm. broad at the base, gradually tapered to the apex of the leaf, sparingly lepidote; lateral nerves 10–12 on each side of the midrib, diverging from it at an angle of about 45°, distinct above, prominent below and rather wavy, crenately looped near the margin; secondary nerves lax and subparallel; petioles 1.5–2 cm. long, not grooved above, rather sparingly lepidote. *Inflorescence* 4–6-flowered; scars of the fallen bud-scales very wide, straw-coloured; pedicels arising from slightly different levels, 1–1.5 cm. long, very densely covered with rust-coloured scales. *Calyx* about 1.5 cm. long, 5-lobed to near the base; lobes broadly oblong-elliptic, about 7 mm. broad, rounded at the apex, membranous, finely striate, glabrous outside except for a few scales at the base, rather densely fringed with soft white hairs. *Corolla* about 7–8 cm. long, widely tubular and rather suddenly broadened and slightly saccate in the middle; tube 5–6 cm. long, lepidote around the base only; lobes 5, rounded and emarginate. *Stamens* 10, about as long as the corolla tube; filaments rather densely villous in their lower third or nearly half; anthers 7–8 mm. long. *Ovary* 5-celled, nearly 1 cm. long, very densely covered with rusty scales; style curved, a little shorter than the corolla, lepidote only at the very base, crowned by a very large disk-like stigma. *Capsule* apparently straight, 5 cm. long, the valves finely lepidote, not keeled, somewhat membranous, surrounded at the base by the persistent calyx. *Seeds* not seen.

SIKKIM. 6000–8000 ft., 1848, fls., J. D. Hooker. Langhep, 9000 ft., 4th May 1876, fls., C. B. Clarke, 27762. Dikeeling, 8000 ft., 11th May 1876, fls., C. B. Clarke, 27876A. Darjeeling to Tongloo, in Magnolia forests of Lower Sikkim, 8000–9000 ft., 19th April 1881, flowers pale white, scented, G. Watt, 7004. On the way from Tongloo to Sandukfu, S. Sikkim, 10,000 ft., just past flowering, 11th May 1881, G. Watt, 5363. Tongloo to Sandukfu, 9500 ft., 29th May 1902, J. H. Lace, 2253. Darjeeling, towards Jalapahar, about 7500 ft., epiphytic, 13th April 1913, young flowers, C. Lacaita, 15667.

BHUTAN. Without definite locality, T. J. Booth.

MANIPUR. On 1st peak North East of Ching Sow, epiphytic on trees, forming a small bush, in bud 20th April 1882, G. Watt,

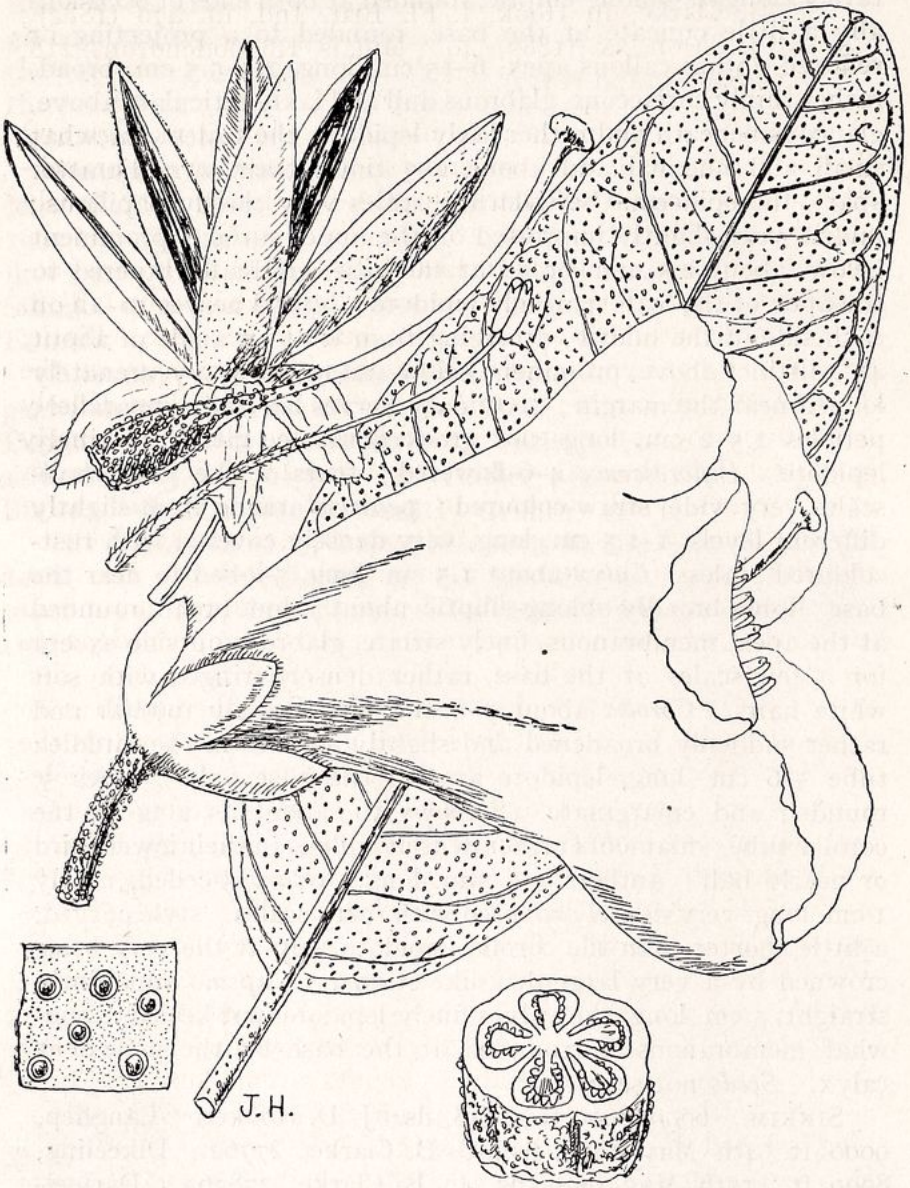

FIG. 6.—*Rhododendron Lindleyi*, T. Moore. Nat. size.

6595 (Herb. Edinb.). Summit of Keyar, 9000 ft., an epiphyte with long drooping branches and long yellow-white tubular flowers, 22nd April 1882, G. Watt, 6716 (Herb. Edinb.).

For notes on this species and its confusion with *R. Dalhousiae*, Hook. f., see pp. 10, 11.

13. **Rhododendron Nuttallii,** Booth in Kew Journ. Bot. v. 355 (1853); Hooker, Bot. Mag., t. 5146 (1859); Fl. des Serres, xiii. t. 1326–27 (1858); Illustr. Hortic. 1859, t. 208; C. B. Clarke, in Hook. f. Fl. Brit. Ind. iii. 470 (1882); Gard. Chron. xx. (1883), 49. Millais, Rhododendrons, 218, with photograph (1917).

A tree 10 m. high or a parasitic shrub about 4 m. high and then straggling with thick tuberous roots; one-year-old branchlets stout, 6–8 mm. thick, dark purplish-brown when dry, nearly glabrous; axillary leaf-buds very small and still dormant at the time of flowering; young branchlets with a few of the lower scale-leaves persistent, densely lepidote with scales which soon fall off. *Leaves* large, coarsely and strongly bullate-reticulate, elliptic, rounded at both ends, shortly and obtusely mucronate at the apex, 12–20 cm. long, 6–10 cm. broad, coriaceous, at first densely lepidote on the upper surface, soon becoming glabrous, densely lepidote below, the scales about 1½–2 times their own diameter apart, rather small, unequal in size and more or less rusty-brown when dry, the epidermis between the scales laxly papillous; midrib raised on the upper surface especially towards the base, very prominent below, sparingly lepidote, about 3–4 mm. broad at the base, gradually tapered to the apex; lateral nerves 12–16 on each side of the midrib, slightly elevated in a depression above, very prominent beneath, diverging from the midrib at an angle of about 45°, repeatedly looped and flexuous towards the margin; secondary nerves lax and distinct below; petioles about 2 cm. long, 3–4 mm. thick, compressed-terete, convex and not grooved on the upper side, rather sparingly lepidote when mature. *Inflorescence* about 5-flowered (sometimes up to 11-flowered, Hooker, l.c.), the pedicels arising from approximately the same level; flower-bearing buds very large, broadly ovoid, about 5 cm. long and 3.5 cm. through, the scales glaucous outside, very thick and leathery, and fringed in the upper part with soft short hairs, appressed silky villous towards the apex within; pedicels nodding, about 3 cm. long, reaching 4–5 cm. in fruit, lepidote, about 4 mm. thick. *Calyx* 1.5–2.5 cm. long, 5-lobed nearly to the base, the lobes chartaceous, oblong-elliptic, rounded at the apex, usually about 1 cm. broad, glabrous outside, sometimes with a few short weak hairs on the margin. *Corolla* 10 cm. long or more, widely campanulate in the upper part, with a limb about 15 cm. across, 5-lobed, white suffused with yellow within the tube, the lobes slightly tinged pink; tube lepidote mainly towards the base outside; lobes scarcely lepidote, rounded. *Stamens* 10, crowded together in the middle of the flower, about as long as the corolla tube; filaments

pubescent towards the base; anthers about 1 cm. long, reddish-brown. *Ovary* 5-celled, nearly 1 cm. long, densely lepidote only towards the base, curved towards the top, nearly as long as the corolla, crowned by a very large depressed stigma about 8 mm. in diameter. *Capsule* straight, 3–3.5 cm. long, the valves faintly keeled on the back, lepidote. *Seeds* 3 mm. long, broadly winged, light straw-coloured.

BHUTAN. Duphla Hills at Meré Patar about Seram's village, on the banks of the Papoo, swampy ground amongst Yews and Oaks at 4000–5000 ft., T. J. Booth.

I have seen no other dried wild specimens than the original ones collected by Booth, of which there are four sheets at Kew, and upon which the above new description is based.

This beautiful species needs no recommendation as a greenhouse plant; it is perhaps the finest of the lepidote-leaved Rhododendrons. Sir William Hooker (Bot. Mag. l.c.) described it as the "Prince of Rhododendrons," and continues, "It flowered in the Rhododendron House at Kew in May of the present year [1859], and of which a drawing of the flowering portion, on imperial folio, is now before us. The height was nine feet. The principal branch was terminated by a corymb of ten or twelve flowers, the cluster measuring fifteen inches across; the corollas white, yellow in the centre, having measured six inches across, with a tinge of blush on the lobes; and the bud, just before expansion, is of the same length. The leaves have their charms too; the largest of them a foot long, including the short thick petiole, are much puckered on the superior surface, that is swollen or blistered in the areoles of the network, and these reflect a strong light. Nor does this include all the beauties of the plant. The corymb, long before it is developed, is enclosed within a scaly bud, if I may call it, six inches long and nearly four inches in diameter, very much resembling a pine-cone or the flower-head of some South African Proteaceous plant; and the large deciduous scales are richly coloured too, almost white below, deep rose in the centre, and tipped with green. Somewhat similar but smaller scale-buds envelop the infant foliage, which, too, is red when it first bursts forth. Such a Rhododendron well merits the name of the late Mr Nuttall, given to it by its discoverer, Mr Booth; and we know that but a little before his lamented death, one of the last sources of pleasure he derived from the vegetable creation, which he had so long and so successfully studied, was the information of his namesake having for the first time flowered (at Kew), and the sight of the large drawing above referred to."

Mr Millais tells us that *R. Nuttallii* is seldom grown out of doors even in Cornwall; there it is sometimes planted against

walls, and there are good specimens at Tregye, Bosaham, Tremough, and Scorrier. In mid-winter, like nearly all Himalayan Rhododendrons, it withstands rather severe cold, but the young shoots which appear early in spring are readily nipped by late frosts.

There are at least two fine hybrids: *R. Victorianum*, between *R. Nuttallii* and *R. Dalhousiae*; and *R. edinense*, a cross between *R. Nuttallii* and *R. Henryanum*, the latter a hybrid of *R. Dalhousiae* and *R. formosum*.

Some interesting crosses will no doubt be possible in the future from *R. Nuttallii* and its nearer relations as shown in the present paper, especially the Chinese species, *R. excellens*, *R. liliiflorum*, and *R. megacalyx* (Burma).

14. **Rhododendron ciliatum,** Hook. f., Rhod. Sikkim Himal. t. 24 (1851); Hook. f. in Journ. Hort. Soc. Lond. vii. 77, 95 (1852); Hook. Bot. Mag., t. 4648 (var. roseo-album) (1852); Lindl. & Paxt. Fl. Gard. t. 83 (1852–3); Lemaire, Jard. Fleur. iii. t. 312 (1853); Fl. des Serres, viii. t. 766 (1852–3); Regel, Gartenfl. t. 563 (1867); Millais, Rhododendrons, p. 144 (1917).

A shrub 0.6–1.3 m. high, often procumbent on rocks (Clarke); older branches becoming smooth by the bark peeling off; one-year-old branchlets setose with long slender hairs and finely lepidote; axillary leaf-buds still more or less dormant at the time of flowering; young branchlets clothed for some time with the subpersistent bud-scales. *Leaves* elliptic or oblong-elliptic, rounded at the base, with a triangular obtusely mucronate apex, 4–9 cm. long, 1.5–4 cm. broad, firmly coriaceous, setose with long rather weak hairs above especially when young, becoming glabrescent with age and slightly bullately reticulate, green and fairly laxly lepidote below, with a few setae only on the midrib, the scales small and about 2–3 times their own diameter apart (*i.e.* about one in the middle of each mesh of the network of veins), the epidermis somewhat pustulate between the scales; midrib somewhat setose on both surfaces, prominent below; lateral nerves about 10 on each side of the midrib, diverging from it at an angle of about 45°, slender but distinct below; petioles 5–7 mm. long, setose with long hairs. *Inflorescence* 2–4-flowered, very shortly racemose; bud-scales apiculate, fringed with soft white hairs, only the outermost with a few scales on the back; pedicels about 1 cm. long, elongating to 2 cm. in fruit, densely setose and finely lepidote. *Calyx* well developed, 5-lobed to near the base, 8–10 mm. long, lobes broadly ovate-rounded, nervose, densely fringed with long stiff hairs, sparingly lepidote outside towards the base. *Corolla* nodding, about 4 cm.

long, white slightly tinged with rose fading deeper rose * ; tube rather broadly funnel-shaped, about 2 cm. long, glabrous outside ; lobes 5, emarginate, shorter than the corolla, glabrous. *Stamens* 10, about as long as the corolla tube ; filaments densely pubescent towards the base ; anthers 3–4 mm. long, chocolate-brown. *Ovary* 5-celled, closely scaly, the cells with copious " shoulders " at the apex ; style curved, about as long as the corolla, quite smooth, crowned by the disk-like lobulate stigma. *Capsule* 1.5 cm. long, surrounded by the persistent calyx, the valves very obtusely acuminate. *Seeds* linear, with the testa crested at one end.

SIKKIM. Lachen, in swamps, 9000 ft., past flower 2nd June 1849, J. D. Hooker (type). Lachen, 10,000 ft., fls. May 1885, Pantling in Herb. Clarke, 46449A. Laghep, 11,000 ft., 5th May 1876, procumbent on a rock, corolla white with rose flushes, C. B. Clarke, 27785A. Yeumthang, 11,000 ft., 15th June 1915, fls. white, G. H. Cave (Herb. Edinb.). Without definite locality, fr., G. H. Cave, 6737 (Herb. Edinb.).

In the Fl. Brit. Ind., l.c., Mr Clarke records it from Chola and Dikchoo, Sikkim.

As there seems to have been some mis-interpretation regarding the colour of the flowers (explained in the footnote below) through Hooker f. having drawn them in a faded condition, I give below a transcript of Hooker senior's notes accompanying his var. *roseo-album* in the Botanical Magazine, t. 4648 (1852) :—

" It is scarcely two years since the seeds of this *Rhododendron* were received from Dr Hooker, and already (March 7, 1852) six plants of it have produced flowers while only seven inches high, and many others are showing blossoms. Their flowering has given us peculiar pleasure, as the first of the Sikkim-Himalayan Rhododendrons which have done so ; and on another account. From more than one quarter hints have been thrown out that the author of the work above cited has used some freedom in going beyond nature in the size and colouring of the flowers. Such gratuitous statements, from very incompetent judges, are contradicted by the first species that has blossomed ; for assuredly our cultivated *R. ciliatum* far excels in size of the corolla, and delicacy of tint, Dr Hooker's original figure. Even were the reverse the case, it would be no proof of any inaccuracy in Dr Hooker's figures, for no intelligent traveller in Sikkim can fail to observe how liable the flowers of all the species of Rhododendron are to vary in size and colour (nor are the leaves more

* Hooker figures the flowers as dull violet, but Clarke (l.c.) remarks : " The wild plant has the flowers white, slightly tinged with rose, fading a deeper rose. Sir J. D. Hooker sketched his species in Sikkim (Rhod. Sikkim, t. 24) from a plant ' past flower,' hence with too purple a corolla."

constant) : in the present instance the difference is so great, though there cannot be a question of the identity of species, that we feel ourselves, as it were, compelled to make it a *variety*. The corollas are nearly, if not quite, double the size of the native plant as seen by Dr Hooker, and instead of being of a uniform lilac-purple colour, they are of the most delicate white, tinged with red-rose colour. In all other respects the two plants perfectly agree. It is a native of wet rocky places (rarely in woods) of Sikkim-Himalaya, in the Lachen and Lachoong valleys; elevation 9–10,000 feet. It may be expected to be hardy therefore; and, indeed, we may observe, that young plants of nearly all our species from Sikkim-Himalaya have passed this winter in the open air, simply surrounded by a bank of earth a foot and a half high. *R. Dalhousiae* alone has failed in such a situation, and in many cases we know that it has equally failed under glass. *R. ciliatum* has been kept in a cool greenhouse, and has certainly the merit of being a ready flowerer, and that at a very early age."

Professor Balfour gives some interesting notes on the colour of the flowers of this species under various cultural conditions in his notes at the end of the description of *R. Valentinanum* (p. 48).

Mr Millais, in his book on Rhododendrons, l.c., gives an interesting account of this species in cultivation, to which the reader may be referred for fuller details. He states that in Cornwall and the West of Scotland it grows as much as 9 ft. high and 16 ft. through. The species proves to be more hardy than most of the others from the Himalayas, and in gardens there is apparently considerable range in the colour of the flowers. Mr Millais describes them as "rich red in bud and opening to pale pink, pale reddish-purple or white, all fading to white after a few days." He speaks very highly of this species as a garden plant, and gives what is known of its use in hybridisation.

The following remarkable species, closely resembling *R. ciliatum*, has turned up since this paper was completed. Professor Balfour very kindly allows the description to appear here :—

15. **Rhododendron Valentinianum,*** G. Forrest.†

A small shrub attaining a height of about 1 m., freely branched and bearing rosettes of 4–5 small leaves at the ends

* Named after Père S. P. Valentin of the Tsedjong Mission, to whom I am indebted for much assistance during my explorations. G. Forrest.

† *Rhododendron Valentinianum*, G. Forrest.—Species nova Sectionis Maddeni Rhododendro ciliato, Hook. f. arcte affinis.

Frutex ad 1 m. altus, foliis ad apicem ramulorum strigillosorum et lepidotorum

of the branches, the last-formed leaf or two leaves markedly smaller than the others, falling off with the flush of the following year. Young twigs about 2 mm. in diameter densely setose, the long setae covering the lepidote surface beneath, which has peltate scales with wide umbo and equal fringe, setae and scales disappearing more or less in second year; older branches at first dark grey then decorticating and exposing a red-purple smooth surface. Foliage-leaf bud nestling in centre of leaf-rosette, the last leaf of rosette smaller than others with its broader petiole adpressed to the bud; outer scales-leaves oblong broadly triangular and rounded, lepidote outside and puberulous, setulosely ciliate, mucronulate and slightly keeled, persisting on the branches for one or two years, inner spathulate, obtuse, membranous, as much as 2 cm. long, 8 mm. broad, lepidote and puberulous outside, ciliate, carried up on the elongating shoot; young expanding leaves conduplicate convolute, densely lepidote on both surfaces, setulose on upper surface and on margin. Leaves petiolate, as much as 4.5 cm. long; lamina thickly coriaceous, elliptic or oblong-elliptic, as much as 4 cm. long, 2 cm. broad, rounded at the shortly mucronulate tuberculate apex, margin setulose-ciliate, base obtuse or rounded; upper surface mat pale green; midrib grooved, primary veins about 8 on each side, hardly visible, whole surface including midrib more or less setulose and punctulate with withered peltate scales or marked with traces of the juvenile setae and scales; under surface somewhat tawny brown with prominent midrib and hardly visible primary veins, densely lepidote with partly contiguous partly discontiguous peltate scales never more distant than the diameter of the scales, the midrib lepidote without bristles or with a few at the base, scales somewhat unequal in size a few scattered ones much larger than others, each with a very broad umbo and very narrow entire fringe all infiltrated with orange or reddish secretion, intervals between scales green grey beset with rod-like epidermal papillae; petiole

rosulatim confertis; alabastrorum perulae persistentes, vernatione conduplicato-convoluta. Folia coriacea, elliptica vel oblongo-elliptica, ad 4.5 cm. longa, 2 cm. lata; lamina apice rotundata, mucronulata, margine setoso-ciliata, basi obtusa vel rotundata, supra setulosa et lepidota vel vestigiis setularum et squamarum induta, infra dense lepidota, epilosa; petiolus ad 1 cm. longus. *Flores* in umbellas terminales 2–6-floras aggregati; bracteae per anthesin persistentes; bracteolae calyce longiores; pedicelli setosi et lepidoti. *Calyx* foliaceus fere ad basim 5-lobatus; lobis membranaceis extus lepidotis margine setoso-lanato-ciliatis. *Corolla* laete flava, ad 3.5 cm. longa, infundibuliformi-campanulata, extus intusque puberula, extus ubique lepidota squamis scintillantibus; lobis rotundatis circ. 1.3 cm. longis saepe squamoso-ciliatis. *Stamina* 10, inaequalia, corolla breviora; filamentis complanatis a basi villosis. Discus dense puberulus. *Gynaeceum* staminibus longius corolla brevius; ovarium circ. 3 mm. longum dense lepidotum squamulis succulentis; stylus basi lepidotus apice sub stigmate lobulato clavatus.

as much as 1 cm. long, usually shorter, setose and lepidote like the young stems. Inflorescence a 2--6-flowered terminal umbel; bracts persisting during flowering, outer reddish, broad, rounded, glabrous outside, inside puberulous and whitely sericeous near the top, margin particularly over the summit fringed with dense short white stiff straight hairs, inner fertile bracts broadly spathulate the lower half grasping the flower-pedicel about 1.5 cm. long, 1 cm. broad, chartaceous, the back finely puberulous the margin whitely ciliate as in the outer ones; bracteoles persisting during flowering as much as 1.3 cm. long slightly exceeding the calyx, linear-spathulate, densely pilose throughout on back and hair-crested with simple white stiff hairs and some twisting long setae, usually elepidote, occasionally one or two scales; pedicels at most 5 mm. long, setulose with twisting setae and also lepidote like the stems. *Calyx* leafy, about 8 mm. long, cut to the base into 5 membranous lobes; cup very densely lepidote with fleshy scales; lobes oblong, acute or obtuse, lepidote on back, glabrous inside, densely lanately setulose at margin, flabellate-veined. *Corolla* bright yellow, funnel-campanulate, about 3.5 cm. long, 5-lobed, puberulous with long hairs both outside and inside the entire portion, lepidote all over the outside, the scales glistening fleshy yellow or red; lobes rounded, about 1.3 cm. long and broad, spreading, slightly crenulate and more or less scale-fringed. *Stamens* 10, unequal, shorter than corolla, longest about 2.8 cm. long with anther 3 mm. long, shortest about 1.8 cm. long with anther 2.5 mm. long; filaments band-like, flattened from the base, white villous over one half in shorter, one third in longer stamens; anthers oblong, pink. Disk densely white puberulous. *Gynaeceum* about 3.2 cm. long, shorter than corolla, longer than stamens; ovary conoid truncate about 3 mm. long, densely lepidote with larger red and smaller yellow fleshy scales; style lepidote at the base, glabrous above expanding at tip into a lip around the lobulate discoid broad stigma. *Capsule* ovoid (? mature), lepidote outside, enclosed by the calyx.

"YUNNAN. Shweli-Salween divide. Lat. 25° 20′ N. Alt. 11,000 ft. In open scrub. Shrub of 2½–3 ft. Flowers bright yellow. G. Forrest. No. 15899; May–June 1917. In fruit. No. 16011; Nov. 1917.

"A distinct species and best described as a yellow-flowered *Rh. ciliatum*, Hook. f. Not that it is *Rh. ciliatum* in every respect save in flower colour. It shows many other differences. The readiest of recognition are these—the leaves are not setulose over the under-surface as in *Rh. ciliatum* and the corolla is lepidote and pilose not elepidote and epilose. *Rh. ciliatum* is without doubt the nearest ally of *Rh. Valentinianum*, and in habit the

plants are very much alike. *Rh. ciliatum* is an old-established garden plant and *Rh. Valentinianum* is now also in cultivation raised by Mr J. C. Williams at Caerhays from seed of Forrest's collecting. It has not yet flowered. We have promise therefore of a pair of beautiful horticultural plants representing one the Himalayan, the other the West Chinese, evolution of the same phylum. Coming from an elevation of 11,000 ft. near Tengyueh, *Rh. Valentinianum* should like *Rh. ciliatum* be a thoroughly hardy plant if grown under right conditions. And saying this leads me to add that *Rh. ciliatum* is commonly regarded as one of the not altogether hardy of the Himalayan species or at any rate is supposed to require a sheltered spot in the garden. That is not our experience in Edinburgh. Certainly if planted out of the wind and where it gets a moderate amount of sunshine it forms a larger bush than in more exposed situations, but it is then cut back more or less every year and soon becomes a sorry spectacle. Here our greatest success with it is in positions the opposite of sheltered. We plant it high up on the rock garden to fill a shallow col between two mounds. There it gets every ray of sunshine available, drops of all the rain that falls, a blow from every wind whether a gentle zephyr or a gusty gale. It forms a dense carpet about a foot high closely leafed to the soil all around the margins so that no wind blows through amongst the stems of the mass—this I think most important—and is covered in spring with large flowers tinted most of them from their opening a deep rose and in a degree such as to lead one to believe that the colour given by Hooker in his Sikkim Rhododendrons if perhaps 'too purple' as Clarke * says may be near the predominant shade at higher elevations. In sheltered situations here the flowers are usually white tinged with rose as descriptions give it; in the greenhouse pure white—all of which modification in tint is consonant with the function of the anthocyanin in the corolla acting as a heat regulator as it does elsewhere in this genus and in other genera. In this exposed situation on our rock garden the plant is not cut back. There is no dying back of shoots making gaps in the uniform carpet. Our experience with this *Rh. ciliatum* is repeated in the case of many another evergreen undershrub from high altitudes—very markedly in the case of New Zealand whipcord Veronicas which in the ordinary mixed garden border have their symmetry spoiled by the dying back of individual shoots, but exposed to every wind that blows and in full sunshine do not or rarely exhibit this defect. Thinking of an explanation of the phenomenon described, I suggest that it is the wind-currents which make the difference. Water does not lie on the

* Hook. f. Fl. Brit. Ind. iii (1882), 470.

leaves and twigs and consequently respiration is not interfered with, and along with this as a factor in the case is the harder growth of the plant which the situation evokes. This is not to be taken as an infallible prescription for horticultural practice, but our experience confirms me in believing that within the limits of the constitution of the plant rigorous environment, rather than genial, will give better results in the case of many of those plants which in our oscillating climatic conditions show themselves not quite hardy.

"*Rh. Valentinianum* like *Rh. ciliatum* is one of many species of *Rhododendron* which were placed by Maximowicz * in his Section Eurhododendron, but which have such fundamental characters of difference from other species of his Section that they cannot be associated together in one section. The bulk of the species known to Maximowicz and included in his Eurhododendron possess a foliage-bud of remarkable construction which may be called a chamber-bud. By this designation I mean that the scale-leaves of the bud form a definite chamber at the bottom of which the primordia of the foliage-leaves arise each developing with a revolute ptyxis quite free from its neighbour. The young leaves stand erect in a group free within the chamber and only fill it up when the bud is on the way to maturity before expansion. There is a sharp distinction between the last scale-leaf and the first foliage-leaf. This type of bud is found in most of the series of Rhododendrons with large leaves—for example in those of *arboreum, barbatum, Edgeworthii, Falconeri, Fortunei, heliolepis, irroratum, lacteum, ponticum, Thomsoni.* In contrast with this type of bud is that in which there is no chamber. The scale-leaves overlap with vernation that becomes convolute and the young foliage-leaves continue the ptyxis and vernation of the scale-leaves and the more external are convolutely wrapped round the inner ones in a normal succession. Often the delimitation of the last scale-leaf from the first foliage-leaf is not easy to determine. This is the type of bud that is found in most of the small-leaved Rhododendrons—for instance the Lapponicum, Fragrans, Cephalanthum Series; in Rhododendrons with intermediate size of leaf—for instance the Triflorum Series; and in larger-leaved forms—for instance Maddeni, Boothii, Camelliaeflorum Series. *Rh. Valentinianum* belongs in leaf-scale to the Maddeni Series and has thus its characteristic convolute type of bud. I cannot discuss here the grouping of the species of Rhododendron. I hope to deal with that question later in these pages. But I want to point out that this difference in bud-construction is primary and must be taken into account in any scheme of

* Maximowicz, *Rhododendreae Asiae orientalis* (1870).

subdivision of the genus. Species with revolute ptyxis must belong to a different division from those with convolute. So far as I know it has not hitherto been recognised, at any rate no importance has been attached to it. And perhaps one reason for its being overlooked may be found in an incident of the development. In many species with convolute leaves in bud the young leaves as they unfold from the bud at once become recurved at the sides. The change may be interpreted as providing protection to the underleaf surface. Its effect is that the leaves are revolute when they open, but this is a secondary not a primary position and is brought about in a very different way and at a different period in development. Casual observation of the leaves at expansion would not supply evidence for deciding whether a revoluteness is primary or secondary and misinterpretation may have resulted. *Rh. Dalhousiae* of the Maddeni Series shows this passage from convolute to revolute very clearly. In the Triflorum Series *Rh. chartophyllum* does not show it nor does *Rh. Davidsonianum*, but many plants the identity of which is not yet clear and which have been called *Rh. Davidsonianum* show it.

"The Maddeni Series to which *Rh. Valentinianum* belongs is a natural one. It has a wide area of distribution from Sikkim in the west through Bhutan, Siam, Burma, right across Yunnan to Mengtz in the extreme south-east of the province and in Kweichow. We may safely say that other species of it yet await discovery. Those we know of show interesting divergences within the phylum and through minor characters of relation fall into subordinate groups within the series. *Rh. ciliatum* and *Rh. Valentinianum* make one such group—a Sikkim-Bhutan form on the west and a Yunnan form on the east, doubtless to be hereafter connected by the finding of linking forms in the intermediate region. *Rh. Dalhousiae* is a western type to which *Rh. rhabdotum*, Balf. f. et Cooper and other forms belong; *Rh. Maddeni* itself is a western form with several microforms; in the middle area of distribution *Rh. formosum* with *Rh. Veitchianum* represent a differential form; and on the eastern area of distribution there are two prominent types centering one in *Rh. ciliicalyx* and the other in *Rh. crassum*. Notwithstanding divergences all the species conform to one prominent type of bud—the nest-bud it may be called because of the disposition of the surrounding leaves to the terminal bud. The last formed foliage-leaves of the shoot lying close up to and around the terminal bud are much reduced in size, have a broad somewhat vaginate petiole adpressed to the bud and the shoot, and the lamina stands off at nearly right angles from the petiole. They are of a

form as it were intermediate between foliage-leaves and scale-leaves. The bud—vegetative as well as flower—lies embosomed in these which do not belong to the axis-segment of the bud, are not bud-scale leaves, but the last formed of the preceding foliage-shoot and have buds in their axils."

16. **Rhododendron Cuffeanum,** Craib ex Hutchinson in Bot. Mag. t. 8721 (1917).

A loosely branched shrub ; stem swollen at the base ; young shoots pale grey, covered with brown peltate scales ; older branchlets pale brown, closely marked with the traces of fallen scales. *Leaves* few, oblanceolate or oblong-oblanceolate, gradually and shortly acuminate to an obtuse tip, gradually narrowed to the base, up to 10 cm. long and 3 cm. broad, coriaceous, at first lepidote above, soon becoming glabrescent and conspicuously reticulate, rather densely lepidote below, the scales unequal and about their own or slightly less than their own diameter apart, the epidermis densely papillous between the scales ; midrib impressed above, slightly raised beneath ; lateral nerves 6–7 on each side of the midrib, slender, flexuous, slightly raised on each surface ; petiole 1.2 cm. long, lepidote, grooved above. *Inflorescence* about 5-flowered, the pedicels arising from approximately the same level ; pedicels 1–1.5 cm. long, densely lepidote, about 1.5 mm. thick. *Calyx* foliaceous, nearly 1 cm. long, unequally 5-lobed, the 2 abaxial lobes larger than the others, oblong or oblong-rounded, rounded at the apex, lepidote, fringed with a few weak hairs. *Corolla* tubular-campanulate, 6.5 cm. long, white, with a large yellow blotch within the upper side of the tube ; tube 3.5 cm. long, softly pubescent outside towards the base, not lepidote except towards the 5 lobes which are sparingly so towards the middle. *Stamens* 10, exserted, unequal, the shortest a little longer than the corolla tube ; filaments softly villous-pubescent in their lower half ; anthers brown, 6 mm. long. *Ovary* 6-celled, about 1 cm. long, densely lepidote ; style longer than the corolla, sparingly lepidote towards the base, crowned by a capitate dark brown stigma. *Capsule* not seen.

SOUTH-WEST BURMA. Mt. Victoria, Lady Wheeler Cuffe.

Young plants of this species were collected on Mt. Victoria by Lady Wheeler Cuffe and presented to the Royal Botanic Gardens, Glasnevin, in August 1913. From one of these, which flowered in May 1915, was obtained the material on which the above description is based, and which was figured in the Botanical Magazine.

Owing to some mischance it was stated in the Botanical Magazine that this species was gathered on Sindaung Mountain in the Southern Shan States, but Sir Frederick Moore wrote later informing the Director, on Lady Wheeler Cuffe's authority, that it was from Mt. Victoria in S.W. Burma.

17. **Rhododendron ciliicalyx,** Franch. in Bull. Soc. Bot. France, xxxiii. 233 (1886); Le Jardin, ix. 51 (1895); Rev. Horticol. 1899, 36; Hook. f. Bot. Mag. t. 7782 (1901).

A shrub up to 1 m. high (up to 3 m. in cultivation); older branchlets with loose grey smooth bark; one-year-old branchlets pale yellow when dry, rather loosely covered with small scales, sometimes sparingly strigose amongst the scars of the bud-scales; axillary leaf-buds just elongating at the time of flowering, the scales broadly ovate, subacute, leathery, slightly lepidote on the back, fringed within the margin with a conspicuous beard of dense soft white hairs. *Leaves* elliptic, obovate-elliptic or oblong-lanceolate, rather acutely pointed, slightly narrowed or rounded to an obtuse base, 6–9 cm. long, 2–3.5 cm. broad, rigidly coriaceous, conspicuously reticulate and glabrous (at first lepidote) above, glaucous-grey beneath and lepidote, the scales golden-brown and considerably more than their own diameter apart, in the wild examples the epidermis rather densely covered between the scales with short rod-like papillae (see note at end of description); petioles 1.3–1.5 cm. long, punctate with small scales, with a narrow groove on the upper side, with a few long bristles on the edges especially when young. *Inflorescence* about 3-flowered, the pedicels arising from about the same level; scars of the fallen bud-scales fairly dense, transversely linear, straw-coloured; pedicels 1–1.5 cm. long, about 2 mm. thick, rather densely lepidote with small scales especially just below the calyx. *Calyx* rather variable in size, 5-lobed to near the base; lobes 2.5–6 mm. long, 3–4 mm. broad, submembranous, laxly scaly outside, bristly all round the margins with slender hairs about 3 mm. long. *Corolla* white or rose (Delavay), rather widely funnel-shaped, gradually opening from the base upwards; tube a little shorter than the lobes, 2.5–3 cm. long, about 5 mm. in diameter at the base, 3–4 cm. wide at the top when flattened out, not scaly outside but slightly and shortly pubescent towards the base; lobes 5, ovate-orbicular, about 3.5 cm. long, and broad, sometimes with a few golden scales on the back. *Stamens* 10–11, unequal in length, the longest nearly as long as the corolla; filaments rather long-pilose in their lower third; anthers 4 mm. long.

Ovary 6-celled, 5 mm. long, densely lepidote; style about as long as the stamens, scaly and slightly pilose only as far as 8 mm. above the base, the upper part glabrous, crowned with a green discoid stigma. *Capsule* 6-valved, 2 cm. long, about 1.5 cm. thick, rather asymmetrical at the base, densely scaly, girt at the base by the persistent calyx and the conspicuous tomentose disk.

As *Rhododendron ciliicalyx* is likely to prove of considerable interest to physiologists (see note below), it seems advisable to give the salient features of the *type* specimen, collected by Delavay, 736, on Mt. Pee-cha-ho, near Mo-so-yn, Yunnan. These are as follows:—

One-year-old branchlets scaly, sometimes sparingly strigose amongst the scars of the bud-scales. *Petioles* scaly, long-setose on the margin (these setae readily rub off). *Leaf-scales* below unequal-sized, *considerably more* than their own diameter apart. *Pedicels* densely scaly. *Calyx lobes* well developed but variable in size, oblong to oblong-ovate, rounded at the apex, 2.5–6 mm. long in the same flower, in other flowers as small as 2–3 mm. long, sparingly scaly outside, rather densely fringed with hairs about 3 mm. long. *Corolla* sparingly lepidote only on the back of the lobes, the tube softly pubescent towards the base. *Style* pubescent and sparingly scaly only towards the base.

W. YUNNAN. On the sides of rocky hills at the entrance to the gorges of Mt. Pee-cha-ho, near Mo-so-yn, 7300 ft., shrub about 3 ft. high, flowers rose or white, 27th March 1887, Delavay, 736 (type); same locality, in fruit, 16th November 1887, Delavay; in flower, 17th April 1888, Delavay.

R. ciliicalyx has not appeared among any recent collection that I have seen, and it has probably not been gathered since the date of the specimens quoted above. In the plants of this species grown in the Himalayan and Temperate Houses at Kew I was very surprised to find that the papillae, so characteristic of the whole of the *Maddeni* series, have almost entirely disappeared. Only occasionally in leaves near the glass and exposed to good light do the epidermal cells of the lower leaf surface show a trace of papillous differentiation, and then only of the slightest. The same is evident of a plant grown in an unheated greenhouse by Mr J. C. Williams, Caerhays Castle, Cornwall, who very kindly forwarded a twig for examination. On the other hand, the specimens cultivated in the greenhouses at the Edinburgh Botanic Garden have papillous leaves. I hope to publish a separate note on this later.

18. **Rhododendron pseudociliicalyx,** Hutchinson, n. sp.*

One-year-old shoots about 4 mm. thick, rather densely bristly with hairs in the upper part, becoming less bristly below, rather minutely lepidote; bark dull brown; axillary leaf-bearing buds still dormant or just starting to elongate at the time of flowering, the scale-leaves leathery, lepidote outside, fringed with soft white hairs. *Leaves* elliptic or elliptic-lanceolate, widest at the middle, equally narrowed to both ends, with an obtuse callous mucro at the apex, 6–8 cm. long, 2.5–3 cm. broad, thinly leathery, laxly and faintly reticulate above and with a few scales persisting here and there, glaucous-green below and rather densely covered with very unequal-sized pale orange-yellow scales below, the scales less than their own diameter apart, with very narrow fringe; epidermis rather laxly covered with rod-like papillae; midrib slightly impressed above, prominent below, covered with a few scales; lateral nerves about 6 on each side of the midrib, rather faint on both surfaces, looped some distance from the margin; petiole 0.5–1 cm. long, grooved above, densely lepidote, ciliate with long weak hairs. *Inflorescence* 3–4-flowered; pedicels arising from different levels, about 8 mm. long, densely lepidote with light-coloured scales. *Calyx* saucer-shaped, undulately lobed, 2 mm. long, lepidote outside, the tops of the lobes sometimes with a few (1 or 2) long hairs. *Corolla* about 6.5 cm. long; tube 4 cm. long, very slightly pubescent outside the base, sometimes with one or two scales here and there; lobes 5, broadly oblong-rounded, lepidote outside and on the finely undulate margin. *Stamens* 10, unequal, exserted; filaments pubescent in the lower part; anthers 4 mm. long. *Ovary* 5-celled, 5 mm. long, densely lepidote; style nearly as long as the corolla, lepidote in the lower half,

* *Rhododendron pseudociliicalyx,* Hutchinson, sp. nov.; affinis *R. ciliicalyci,* Franch., sed ramulis dense setosis foliorum squamis valde inaequalibus densioribus differt.

Ramuli annotini circiter 4 mm. crassi, superne dense setosi, inferne subglabrescentes, minute lepidoti, cortice fusco-brunnei; gemmae foliiferae axillares sub anthesin vix evolutae. *Folia* elliptica vel elliptico-lanceolata, medio latiora, utrinque aequaliter angustata, apice obtuse mucronata, 6–8 cm. longa, 2.5–3 cm. lata, tenuiter coriacea, supra laxe reticulata, infra glauco-viridia, dense lepidota, squamis valde inaequalibus pallide aurantiacis fere contiguis, epidermide laxe papillosa; costa supra leviter impressa, infra prominens, laxe lepidota; nervi laterales utrinsecus circiter 6, inconspicui, petioli 0.5–1 cm. longi, supra canaliculati, dense lepidoti, pilis debilibus ciliati. *Inflorescentia* 3–4-flora; pedicelli subracemosi, circiter 8 mm. longi, dense lepidoti. *Calyx* patelliformis, undulate lobatus, 2 mm. longus, extra lepidotus, interdum parce ciliatus. *Corolla* circiter 6.5 cm. longa; tubus 4 cm. longus, extra basin leviter pubescens; lobi 5, late oblongo-rotundati, extra lepidoti. *Stamina* 10, inaequalia, exserta; filamenta inferne pubescentia; antherae 4 mm. longae. *Ovarium* 5-loculare, 5 mm. longum, dense lepidotum; stylus corollae fere aequilongus, in dimidio inferiore lepidotus, stigmate profunde lobulato coronatus.

crowned by a fairly large deeply lobulate stigma. *Capsule* not known.

Described from a specimen in the Edinburgh Herbarium inscribed as follows: "Rhododendron spec.? No. 7167. Mᵉᵉ L. de Vilmorin. Chine. Cult. Verrières, France, serre, 19.4.18."

Unfortunately we have no definite information as to the habitat of this species. Professor Balfour says in regard to it: "Raised from seed received in 1912 from China by M. Philip de Vilmorin. Most of de Vilmorin's seeds came from N.E. Szechwan." If this species came from this province, it will be a valuable addition to our gardens, as it would no doubt be fairly hardy, and is, moreover, almost a replica of the beautiful but somewhat tender *R. ciliicalyx* from Western Yunnan. It differs from *R. ciliicalyx* in its very bristly shoots and the denser leaf-scales.

19. **Rhododendron missionarum,** Léveillé in Bull. Geogr. Bot. xxiv. 20 (1915).

A shrub with short knotty branches, the older parts covered with grey transversely splitting bark; one-year-old branchlets very short, very slightly lepidote, strigose-pilose. *Leaves* obovate-oblanceolate, narrowed to the base, apex triangular-apiculate with a rather long callous mucro, 5–7 cm. long, 1.5–3 cm. broad, rigidly coriaceous, lepidote above when young, soon becoming nearly glabrous and slightly reticulate, glaucous and lepidote below, the scales slightly unequal and less than their own diameter apart, the epidermis densely papillous between the scales; midrib and lateral nerves impressed above, the former prominent and lepidote below; lateral nerves about 8 on each side of the midrib, arcuate and ascending; petiole 6–10 mm. long, grooved above, lepidote. *Inflorescence* 2–3-flowered; floral bud-scales softly appressed-villous in the upper part; pedicels 6–10 mm. long, arising from about the same level, densely lepidote with flake-like scales. *Calyx* about 1 mm. long, obscurely 5-lobed, densely lepidote outside and fringed with stiff hairs about 1 mm. long. *Corolla* violet or white (Maire), 5 cm. long, not lepidote outside or rarely with one or two scales here and there; tube funnel-shaped, 2.5 cm. long, minutely pubescent towards the base outside; lobes 5, 2.5 cm. long and nearly as much broad, undulate on the margin and sometimes fringed with a few scales. *Stamens* 10, exserted; filaments villous pubescent in the lower third; anthers 6 mm. long. *Ovary* 5-celled, 5 mm. long, lepidote; style curved, a little longer than the corolla, lepidote in the lower half or

two-thirds, crowned by a large lobulate stigma. *Capsule* 1.2 cm. long, wrinkled and lepidote.

N.E. YUNNAN. Tong-Koua-pin, 9000 ft., on rocks, fls. April 1911, E. E. Maire; E. E. Maire, 20, 21 (Herb. Edinb.). Motsou region of Kiao Kia, plant collected by Père S. Ten, March 1909, F. Ducloux, 1270, 1271.

20. **Rhododendron Lyi,** Léveillé, in Fedde, Repert. xiii. 147 (1914).

A shrub 1.75–2 m. high; one-year-old branchlets slender, about 2.5 mm. thick, sparingly lepidote and bristly with rather

FIG. 7.—*Rhododendron Lyi,* Léveillé. Nat. size.

weak long hairs. *Leaves* oblanceolate or oblong-oblanceolate, shortly rounded-triangular and obtusely mucronate at the apex, a little narrowed to an obtuse base, 3.5–8 cm. long, 1.3–3 cm. broad, rigidly coriaceous, glossy and reticulate above, lepidote below, the scales rather unequal and less than their own diameter apart, the epidermis between the scales rather densely papillous; midrib impressed above, prominent below and lepidote; lateral nerves about 6 on each side of the midrib, slightly distinct below; petiole 5.7 mm. long, at first ciliate,

grooved above, lepidote. *Inflorescence* up to 4-flowered; pedicels 5 mm. long, arising from about the same level, rather densely lepidote. *Calyx* about 2 mm. long, 5-lobed, densely lepidote outside, and fringed with a few long hairs, the lobes enlarging in fruit and becoming more or less triangular. *Corolla* white, scented, 5 cm. long, spreadingly funnel-shaped, sparingly lepidote only on the back of the lobes, rarely a few on one side of the tube; tube 3 cm. long, pubescent outside in the lower part; lobes 5, rounded, emarginate, about 2.5 cm. broad. *Stamens* 10, unequal, a little longer than the tube; filaments pubescent in the lower part; anthers 5 mm. long. *Ovary* 6-celled, lepidote; style much longer than the corolla, lepidote in the lower two-thirds, crowned by a rather small stigma. *Capsule* 2.5 cm. long, constricted at the base and apex, wrinkled and lepidote, tipped by a small portion of the persistent style, and girt at the base by the persistent enlarged ciliate calyx lobes.

KWEICHOW. Gan Chouen, April 1912, J. Cavalerie, 3883 (Herb. Edinb.).

21. **Rhododendron roseatum,** Hutchinson, n. sp.*

A shrub 1–3 m. high. One-year-old branchlets brownish straw-coloured, rather closely spotted with small scales, apparently not hairy; young branchlets not seen. *Leaves* ovate,

* *Rhododendron roseatum*, Hutchinson, sp. nov.; affinis *R. ciliicalyci*, Franch., sed ramulis et petiolis estrigosis, foliis ovatis infra densissime lepidotis, corollae tubo extra dense lepidoto differt.

Frutex 1.25–3 m. altus. *Ramuli* annotini brunneo-straminei, squamis parvis arcte lepidoti, ut videtur esetosi, hornotini non visi. *Folia* ovata, acute triangulari-acuminata, basi late rotundata, 8–10 cm. longa, 3–4.5 cm. lata, rigide coriacea, supra primum lepidota, mox fere glabra et opaca, infra glauca et densissime lepidota, squamis inaequalibus rubris spatium diametro suo multo minus distantibus vel fere contiguis, epidermide inter squamas dense papillosa; costa media infra impressa, subdense lepidota, infra prominens et rotundata, lepidota, basi circiter 2.25 mm. lata, apicem versus sensim attenuata, apice calloso; nervi laterales utrinsecus 6–8, graciles, infra arcuati et paullo flexuosi, nervis secundariis et venis vix evolutis; petioli supra canaliculati, circiter 7 mm. longi et 3 mm. lati, lepidoti. *Inflorescentia* terminalis, circiter 4-flora, pedicellis umbellatis; cicatrices squamarum delapsarum calloso-incrassatae, fere contiguae; gemmarum squamae extra molliter et breviter pubescentes, lepidotae; pedicelli circiter 1 cm. longi, dense lepidoti. *Calyx* parvus, obscure 5-lobatus, circiter 1.5 mm. longus, extra ubique dense lepidotus, pilis debilibus circiter 1.25 mm. longis, arcte setoso-ciliatus. *Corolla* alba, extra roseo paullo suffusa (Forrest), late infundibuliformis, extra ubique praecipue in tubo densissime lepidota; tubus circiter 3 cm. longus, apice usque ad 5 cm. latus (complanatus); lobi rotundato-elliptici, circiter 4 cm. longi et lati, primum squamis marginati. *Stamina* 10, exserta, usque ad loborum medium extensa; filamenta in triente inferiore molliter pubescentia; antherae 5 mm. longae. *Ovarium* 6-loculare, 5 mm. longum, densissime lepidotum; stylus curvatus, corollae fere aequalis, in dimidio inferiore dense lepidotus, stigmate magno lobulato viscidulo coronatus. *Capsula* non visa.

acutely triangular-acuminate, broadly rounded at the base, 8–10 cm. long, 3–4.5 cm. broad, rigidly coriaceous, at first lepidote above, soon nearly glabrous and rather dull, glaucous and very densely lepidote below, the scales unequal in size, reddish, and much less than their own diameter apart, or nearly contiguous, the epidermis between the scales densely papillous; midrib sunken above and rather densely lepidote, prominent and rounded below and lepidote, about 2.25 mm. broad at the base, gradually tapered to the apex into the somewhat callous mucro; lateral nerves about 6–8 on each side of the midrib, slender, rather arcuate and a little flexuous below, with scarcely any visible secondary nerves or veins; petioles grooved above, about 7 mm. long and 3 mm. wide, lepidote. *Inflorescence* about 4-flowered, the pedicels arising from about the same level; scars of the fallen bud-scales callously thickened, nearly contiguous; bud-scales (only one seen) softly and very shortly pubescent outside and lepidote; pedicels about 1 cm. long, densely lepidote. *Calyx* small and obscurely 5-lobed, about 1.5 mm. long, densely scaly all over the outside, densely setose-ciliate with rather weak hairs about 1.25 mm. long. *Corolla* white, faintly flushed with rose outside (Forrest), widely funnel-shaped, densely scaly all over the outside, especially on the tube; tube about 3 cm. long, up to 5 cm. wide at the top when flattened out; lobes rounded-elliptic, about 4 cm. long and as much broad, at first fringed with scales. *Stamens* 10, exserted, reaching to about the middle of the corolla lobes; filaments softly pubescent in their lower third; anthers 5 mm. long. *Ovary* 6-celled, 5 mm. long, very densely scaly; style curved, nearly as long as the corolla, rather densely scaly in its lower half, crowned by a large lobulate somewhat viscid stigma. *Capsule* not seen.

WESTERN YUNNAN. Shweli-Salween Divide, lat. 25° 20′ N., 9000 ft., shrub 4–9 ft., on open scrub, May 1913, G. Forrest, 11866.

22. **Rhododendron lasiopodum,** Hutchinson, n. sp.*

A shrub 4–5 m. high; one-year-old branchlets pale straw-coloured, rather blotched and sparingly lepidote; young branchlets densely lepidote; axillary leaf-buds already elongating at the time of flowering, when partly developed more or less shaped

* *Rhododendron lasiopodum,* Hutchinson, sp. nov.; affinis *R. ciliicalyci,* Franch., sed petiolis plerumque brevioribus, foliis infra dense lepidotis, corollae tubo lepidoto, stylo in partibus duabus inferioribus lepidoto differt.

Frutex 4–5 m. altus; ramuli annotini pallide straminei, parce lepidoti, juniores dense lepidoti. *Gemmae* foliiferae axillares sub anthesin jam elongatae, squamis inferioribus ad breve tempus persistentibus dorso leviter lepidotis et pilis brevibus

like a golf-club, the lowermost scale-leaves persisting for some time, fringed with short soft white hairs and slightly scaly down the back, the intermediate scale-leaves early falling off, with one or two of the upper ones persisting for some time below the young leaves. *Leaves* rather broadly elliptic, rounded at both ends or shortly triangular-acuminate at the apex, 6–11 cm. long, 3–5.5 cm. broad, rigidly coriaceous, lepidote above when young and ciliate, but soon becoming quite glabrous, shining and reticulate, glaucous and rather densely lepidote below, the scales ferruginous, unequal in size and less than their own diameter apart, the larger ones scattered, the epidermis densely clothed between the scales with rod-like papillae; petioles about 7 mm. long or less, rather flattened on the upper surface and grooved, fairly densely lepidote. *Inflorescence* apparently 2-flowered, the pedicels supported on a softly tomentose "foot" (above the scars of the scales) from which they disarticulate; scars of the fallen bud-scales rather lax and ladder-like with lepidote portions of the branchlet visible between; pedicels 1 cm. long, densely lepidote. *Calyx* very small, oblique, with an undulate margin, scaly outside and on the margin, not ciliate. *Corolla* white, yellow inside the base (Forrest), somewhat narrowly funnel-shaped from the base upwards, rather laxly scaly all over the outside; tube as long as the lobes, 4–4.5 cm. long, about 5 mm. in diameter at the base, and 5 cm. broad at the top when flattened out, softly pubescent towards the base; lobes oblong-orbicular, crenulate, 2.5–3 cm. broad. *Stamens* 10, unequal, the longest reaching to about the middle of the lobes; filaments densely and softly pilose in their lower half or third; anthers 5–6 mm. long. *Ovary* 5-celled, 7 mm. long, densely lepidote; style curved,

mollibus albidis barbatis, squamis intermediis mox caducis, paucis superioribus subpersistentibus. *Folia* late elliptica, utrinque rotundata vel apice triangulari-acuminata, 6–11 cm. longa, 3–5.5 cm. lata, rigide coriacea juventute supra lepidota et ciliata, mox glabra, nitida et reticulata, infra glauca et subdense lepidota, squamis ferrugineis inaequalibus spatium diametro suo minus distantibus, epidermide dense papillosa; petioli circiter 7 mm. longi vel minores, supra subcomplanati et canaliculati, subdense lepidoti. *Inflorescentia* terminalis, ut videtur biflora, pedicellis in pedem molliter tomentosum insertis ab eo disarticulatis; cicatrices squamarum delapsarum laxae et scalariformes; pedicelli 1 cm. longi, dense lepidoti. *Calyx* minimus, obliquus, extra et margine undulato lepidotus, eciliatus. *Corolla* alba, intra basin flava (Forrest), e basi paullo anguste infundibuliformis, extra ubique laxe lepidota; tubus lobis aequalis, 4–4.5 cm. longus, basi circiter 5 mm. diametro, apice (sicco et complanato) 5 cm. latus, basin versus molliter pubescens; lobi oblongo-orbiculares, crenulati, 2.5–3 cm. lati. *Stamina* 10, inaequalia, usque ad corollae loborum medium extensa; filamenta in triente vel dimidio inferiore dense et molliter pilosa; antherae 5–6 mm. longae. *Ovarium* 5-loculare, 7 mm. longum, dense lepidotum; stylus curvatus, corollae fere aequalis, in dimidio inferiore lepidotus, epilosus, stigmate viscido lobulato circiter 3.5 mm. lato coronatus. *Capsula* non visa.

nearly as long as the corolla, lepidote in its lower half, not hairy, crowned by the lobulate viscid stigma about 3.5 mm. broad. *Capsule* not seen.

WESTERN YUNNAN. Shweli-Salween Divide, lat. 25° 5′ N., 8000–9000 ft., in pine forest, shrub 12–15 ft., flowers white, yellow inside the base, fragrant, May 1913, G. Forrest, 9919.

This is about the nearest approach to *R. ciliicalyx*, Franch., collected by Mr Forrest. It seems sufficiently distinct, however, in its shorter petioles, much more densely scaly leaves, lepidote corolla tube, and the style lepidote for about two-thirds of its length.

The name *lasiopodum* applies to the small softly tomentose portion of the axis of the inflorescence, which protrudes above the scars of the floral bud-scales, and from which the pedicels eventually break off.

23. **Rhododendron dendricola,** Hutchinson, n. sp.*

A small shrub 1.25–2 m. high, generally epiphytic at summits of trees 16–20 m. high; one-year-old branchlets sparingly lepidote, apparently not hairy; young branchlets evidently well advanced at flowering time, laxly lepidote. Leaves oblong-elliptic, rather abruptly and subacutely acuminate, rounded-obtuse at the base, 8–12 cm. long, 3–5 cm. broad, rigidly coriaceous, glabrous dull and not reticulate above (lepidote when quite young), densely lepidote beneath, the scales reddish-brown and a little less than their own diameter apart, rather unequal in size, the lower epidermis between the scales densely papillous; midrib impressed above, prominent and finely

* *Rhododendron dendricola*, Hutchinson, sp. nov., affinis *R. lasiopodo*, Hutchinson, sed foliis abrupte subacute acuminatis, pedicellis basi non lasiopodis, calyce parce ciliato differt.

Frutex 1.25–2 m. altus, plerumque in arboribus epiphyticus; ramuli annotini parce lepidoti, epilosi, juniores sub anthesin jam bene evoluti, lepidoti. *Folia* oblongo-elliptica, abrupte et subacute acuminata basi rotundato-obtusa, 8–12 cm. longa, 3–5 cm. lata, rigide coriacea, glabra, supra opaca et non reticulata (juniora lepidota), infra dense lepidota, squamis rubro-brunneis spatium diametro suo minus distantibus inaequalibus, epidermide inferiore dense papillosa; costa supra impressa, infra prominens et lepidota; nervi laterales utrinsecus 7–8, infra inconspicui; petioli 1–1.3 cm. longi, minute lepidoti, juniores parce ciliati. *Inflorescentia* ut videtur 3-flora, umbellata; pedicelli 1 cm. longi, lepidoti, subrobusti. *Calyx* undulatus, brevis, circiter 1.25 mm. longus, extra lepidotus, margine parce ciliatus. *Corolla* alba, roseo suffusa, petalis inferioribus aurantiaco-maculata, circiter 8 cm. longa; tubus late infundibuliformis, basin versus abrupte constrictus, circiter 3.5 cm. longus, extra dense lepidotus et basi minute pubescens; lobi 5, rotundati, extra lepidoti. *Stamina* 10, exserta; filamenta in dimidio inferiore dense pilosa; antherae 7 mm. longae. *Ovarium* 6-loculare, 8 mm. longum, costatum, dense lepidotum, basi disco tomentoso cinctum; stylus corollae aequalis, in dimidio inferiore lepidotus, stigmate disciformi multilobulato coronatus. *Capsula* non visa.

lepidote below; lateral nerves about 7–8 on each side of the midrib, faint below; petiole 1–1.3 cm. long, finely lepidote, sparingly ciliate when quite young. *Inflorescence* (only one seen, apparently 3-flowered) umbellate; pedicels 1 cm. long,

FIG. 8.—*Rhododendron dendricola*, Hutchinson, n. sp. Nat. size.

lepidote, rather stout. *Calyx* an undulate rim, scaly outside and with a few slender hairs on the margin about 1.25 mm. long. *Corolla* white tinged with pink, with an orange mark on lower petals, about 8 cm. long; tube widely funnel-shaped, rather abruptly constricted towards the base, about 3.5 cm. long, densely lepidote outside and minutely pube-

scent around the base; lobes 5, rounded, lepidote outside. *Stamens* 10, reaching to about the middle of the corolla lobes; filaments densely pilose in the lower half; anthers 7 mm. long. *Ovary* 6-celled, 8 mm. long, ribbed, densely lepidote, girt at the base with a lobulate tomentose disk; style as long as the corolla, lepidote in the lower half, crowned by a large disk-like many lobulate stigma. *Capsule* not seen.

N. BURMA. Nwai Valley; small shrub 4–6 ft., generally epiphytic at tops of 50–60 ft. trees; trusses with few flowers, white tinged with pink, orange mark inside on lower petals, 11th May 1914, Kingdon Ward, 1538 (Herb. Edinb.).

24. **Rhododendron Ludwigianum,** Hosseus in Beihefte z. Bot. Centralbl. xxviii. 422 (1911). *Rhododendron sp.*, Hosseus, l.c. xxvii. 506 (1910).

A shrub 1–1.5 m. high; branches evidently very short and almost leafless at the time of flowering, closely warted with the scars of the fallen leaves; one-year-old branchlets very short and lepidote. *Leaves* (only three small ones seen) obovate, narrowed to an obtuse base, triangular at the apex, 3–4 cm. long, 1.5–2 cm. broad, rigidly coriaceous, dull and impressed reticulate above and apparently glabrous, densely lepidote below, the scales about one-half their own diameter apart, dark brown in the middle with a narrow paler fringe, the epidermis papillous between the scales; midrib impressed above, prominent and rather densely lepidote beneath; lateral nerves 5–6 on each side of the midrib, impressed above, distinct below; petiole about 4 mm. long, grooved above, lepidote. *Inflorescence* 2–3 flowered; pedicels inserted on a densely villous very short axis, 3–6 mm. long, very densely lepidote; bracts linear-spathulate, softly villous and lepidote. *Calyx* small, obscurely lobed, densely lepidote, very sparingly ciliate. *Corolla* white and rose (Hosseus), about 6.5 cm. long, densely and softly villous-pubescent all over the outside, lepidote on the back of the lobes and down one side of the tube; tube about 3.5 cm. long, funnel-shaped; lobes 5, rounded, glabrous towards the margin. *Stamens* 10, a little exserted; filaments pilose in the lower $\frac{1}{3}$, the longest about 3 cm. long; anthers 5–6 mm. long. *Ovary* 6-celled, lepidote; style lepidote in the lower half; stigma rather small and disk-like, about 3 mm. wide (when dry). *Capsule* not seen.

SIAM. Doi Djieng Dao, Kalkgipfel III, 6600 ft., shrub 3–4$\frac{1}{2}$ ft. high, fls. white-rose, twigs without leaves, 17th February 1905, C. C. Hosseus, 401.

25. **Rhododendron rufosquamosum,** Hutchinson, n. sp.*

A shrub 1 m. high; older branchlets covered with smooth grey bark; one-year-old branchlets sparingly lepidote, about 3.5 mm. thick; axillary leaf-buds still dormant at the time of flowering, the scale leaves rather lax, leathery, and minutely fringed with hairs a little keeled and lepidote near the middle. *Leaves* oblanceolate, obtusely triangular-acuminate at the apex, gradually narrowed to an acute base, 7–12 cm. long, 1.8–4 cm. broad, rather thinly coriaceous, strongly reticulate above and lepidote towards the midrib, densely rufous-lepidote below, the scales about one-half their own diameter or less apart, with a few larger and darker coloured ones scattered here and there, the lower epidermis between the scales densely papillous; midrib impressed above, prominent and lepidote beneath; lateral nerves very slender, about 8 on each side of the midrib, a little raised on the upper surface, slightly prominent below; petiole 0.8–1.3 cm. long, deeply grooved on the upper side, punctate-lepidote. *Inflorescence* few-flowered (probably about 3), the pedicels arising from approximately the same level; pedicels 5–7 mm. long, lepidote. *Calyx* very small, plate-like, scarcely lobed, densely lepidote outside and closely fringed with weak hairs about 3 mm. long. *Corolla* white, pink in bud (Henry), tubular-funnel-shaped, rather narrow towards the base, about 7 cm. long, lepidote all over the outside except towards the margin of the lobes; tube 3.5–4 cm. long, softly pubescent at the base outside; lobes 5, rounded-oblong, about 2.5 cm.

* *Rhododendron rufosquamosum,* Hutchinson, sp. nov.; affinis *R. supranubio,* Hutchinson, sed foliis basi longe attenuatis stylo in partibus duabus inferioribus lepidoto differt.

Frutex 1 m. altus; ramuli vetustiores cortice cinereo levi obtecti, annotini parce lepidoti, circiter 3.5 mm. crassi; gemmae floriferae axillares sub anthesin adhuc non elongatae, squamis laxis coriaceis et pilis minutis marginatis carinatis medium versus lepidotis. *Folia* oblanceolata, obtuse triangulari-acuminata, basi acuto sensim angustata, 7–12 cm. longa, 1.8–4 cm. lata, tenuiter coriacea, supra reticulata et medium versus lepidota, squamis spatium diametro suo dimidius minus distantibus, epidermide inter squamas dense papillosa; costa supra impressa infra prominens et lepidota; nervi laterales gracillimi, utrinsecus circiter 8, supra parum elevati, infra leviter prominentes; petioli 0.8 cm. longi, supra profunde canaliculati, punctato-lepidoti. *Inflorescentia* pauciflora (probabiliter 3-), pedicellis subumbellatis; pedicelli 5–7 mm. longi, lepidoti. *Calyx* minimus patelliformis, vix lobatus, extra dense lepidotus et pilis debilibus circiter 3 mm. longis marginatus. *Corolla* alba, alabastro rosea (Henry), tubuloso-infundibuliformis, basin versus angusta, circiter 7 cm. longa, extra ubique loborum marginibus exceptis lepidota; tubus 3.5–4 cm. longus, extra basi molliter pubescens; lobi 5, rotundato-oblongi, circiter 2.5 cm. lati. *Stamina* 10, ad loborum medium exserta; filamenta in quadrante inferiore molliter pubescentia; antherae 5 mm. longae. *Ovarium* 6-loculare, 5 mm. longum, lepidotum, basi disco molliter tomentoso cinctum, apice rotundato-truncatum; stylus corollae fere aequalis, in partibus duabus inferioribus lepidotus, stigmate lobulato coronatus. *Capsula* non visa.

broad. *Stamens* 10, exserted to about the middle of the lobes; filaments softly pubescent in the lowermost $\frac{1}{4}$; anthers 5 mm. long. *Ovary* 6-celled, 5 mm. long, lepidote, girt with a softly tomentose disk at the base, rounded truncate at the top; style nearly as long as the corolla, lepidote in the lower $\frac{3}{4}$, crowned by a fist-like lobulate stigma. *Capsule* not seen.

S.W. YUNNAN. Szemao Hills, 4800 ft., shrub 3 ft., fls. white (buds pink), 9th May, A. Henry, 11983.

26. **Rhododendron Scottianum,** Hutchinson, n. sp.*

A shrub up to 12 ft. high; one-year-old branchlets rather densely lepidote with small scales, pale straw-coloured or brownish when dry, not strigose (so far as observed); young branchlets densely lepidote; axillary leaf-buds mostly already well elongated at the time of flowering, the scales slightly lepidote on the back and fringed with rather short white soft hairs. *Leaves* obovate or more rarely elliptic-obovate, slightly narrowed to a broadish base, with a more or less rounded-triangular subacutely mucronate apex, 6–10 cm. long, 2.5–4 cm. broad, rather rigidly coriaceous, at first lepidote above but soon glabrous and faintly reticulate on the upper surface, ferruginous below with dense scales, the scales often nearly contiguous and never

* *Rhododendron Scottianum*, Hutchinson, sp. nov.; affinis *R. ciliicalyci*, Franch., sed foliis plerumque obovatis infra squamis fere contiguis corollae tubo extra dense lepidoto, stylo in partibus duabus inferioribus lepidoto differt.

Frutex usque ad 4 m. altus; ramuli annotini subdense lepidoti, squamulis parvis, sicco pallide straminei vel brunnei, non strigosi; ramuli juniores dense lepidoti. *Gemmae* foliiferae axillares sub anthesin jam elongatae, squamis dorso leviter lepidotis pilis brevibus albidis mollibus marginatis. *Folia* obovata vel rare elliptico-obovata, ad basin sublatum leviter angustata, apice triangularia et subacute mucronata, 6–10 cm. longa, 2.5–4 cm. lata, rigide coriacea, primum supra lepidota mox glabra et inconspicue reticulata, infra squamis densis ferruginea, inter squamas densissime papillosa, papillis conspicuis lineatis; petioli 0.5–1 cm. longi, verrucosi et lepidoti, supra canaliculati, primum cum foliorum marginibus setoso-ciliati, demum eciliati. *Inflorescentia* terminalis, folia superans, 2–4-flora, pedicellis umbellatis; cicatrices squamarum gemmarum delapsarum laxae, labrosae transverse lineares, stramineae; pedicelli 1–1.5 cm. longi, circiter 2.5 mm. crassi, squamis contiguis vel imbricatis densissime lepidoti. *Calyx* plerumque parvus et plus minusve patelliformis, obscure lobatus vel rare lobo uno elongato et circiter 1 cm. longo, lobis normalibus extra dense lepidotis et marginibus pilis longissimis marginatis (in floribus paucis rare subeciliatis). *Corolla* alba, interdum externe rosea suffusa, intra basin flava (Forrest), e basi latissime infundibuliformis, extra praesertim in tubo dense lepidota; tubus lobis paullo brevior, 3–3.5 cm. longus, extra basin molliter et breviter pubescens; lobi 5, rotundati, 4 cm. longi, crenulati, extra lepidoti. *Stamina* 10–11, circiter ad medium corollae loborum extensa, leviter inaequalia; filamenta gracilia, in quadrante inferiore dense et molliter pilosa; antherae 4–4.5 mm. longae. *Ovarium* 5–7-loculare, 6 mm. longum, dense lepidotum; stylus curvatus, corollae aequalis, in partibus duabus inferioribus lepidotus, nec pubescens, stigmate viscido lobulato circiter 3.5 mm. lato coronatus. *Capsula* non visa.

more than half their own diameter apart, the epidermis very densely covered between the scales with conspicuous rod-like papillae; petioles 0.5–1 cm. long, wrinkled and lepidote, with a groove on the upper side, setose-ciliate like the leaf-margins when quite young, soon not setose. *Inflorescence* tending to obscure the leaves, 2–4-flowered, the pedicels arising from approximately the same level; scars of the fallen bud-scales rather lax and rim-like, transversely linear, straw-coloured; pedicels 1–1.5 cm. long, about 2.5 mm. thick, very densely lepidote with contiguous or overlapping scales. *Calyx* mostly small and saucer-shaped, obscurely lobed or rarely one lobe elongated to about 1 cm. long, the normal lobes densely scaly outside and fringed with long hairs on the margin (in some flowers these hairs are poorly developed). *Corolla* white occasionally flushed with rose outside, with a yellow blotch inside at the base (Forrest), very widely funnel-shaped from the base, rather densely scaly outside especially on the tube; tube a little shorter than the lobes, 3–3.5 cm. long, softly and shortly pubescent outside the base; lobes 5, rounded, 4 cm. long, crenulate, lepidote outside. *Stamens* 10–11, reaching to about the middle of the lobes, slightly unequal; filaments slender, densely and softly pilose on their lower $\frac{1}{4}$; anthers 4–4.5 mm. long. *Ovary* 5–7-celled, 6 mm. long, densely lepidote; style curved, about as long as the corolla, lepidote in its lower $\frac{2}{3}$ or slightly higher, not hairy as well, crowned by the distinctly lobulate viscid stigma about 3.5 mm. broad. *Capsule* not seen.

WESTERN YUNNAN. Hills to the north-west of Tengyueh, lat. 25° N., faces of cliffs and amongst scrub on rocky slopes, 6000 ft., shrub 3–12 ft., flowers exterior white or flushed with rose, interior white with a faint tinge of canary-yellow towards the base, fragrant, May 1912, G. Forrest, 7516. Hills north-west of Tengyueh, lat. 25° 10′ N., open rocky situations on cliffs, etc., 8000 ft., shrub 2–3 ft., flowers white, flushed crimson exterior, fragrant, May 1913, G. Forrest, 11877. Hills west of Chutong, lat. 25° 25′ N., amongst scrub, 6000–7000 ft., shrub 3–5 ft., flowers white, flushed with rose exterior, May 1913, G. Forrest, 9994. Head of the Hsin-kuan Valley, lat. 25° 35′ N., on cliffs and amongst scrub, 6000 ft., shrub 2–4 ft., flowers white, occasionally flushed with rose outside, with a blotch of yellow at the base inside, May 1913, G. Forrest, 10008 (type).

This beautiful species will probably prove to be the gem of the *ciliicalyx* alliance. It is named in honour of my late friend and colleague, Munro Briggs Scott, who was killed at the battle of Arras in April 1917 (*cf.* Kew Bull. 1917, 210).

27. **Rhododendron pilicalyx,** Hutchinson, n. sp.*

A shrub 1.25 m. high ; two-year-old branchlets covered with smooth grey bark, the one-year-old ones brownish and finely lepidote ; axillary leaf-buds just beginning to elongate at the time of flowering, the scales very small, lepidote outside, and fringed with soft white hairs. *Leaves* obovate or obovate-elliptic, acutely triangular-acuminate at the apex, a little narrowed to an obtuse or somewhat cuneate base, 5–10 cm. long, 2–4 cm. broad, coriaceous, glabrous and dull on the upper surface when mature, very densely lepidote below with reddish or purplish-brown scales, the scales contiguous, very small, with a few larger and blacker ones scattered here and there, the epidermis between the scales densely papillous ; midrib impressed above prominent and lepidote below ; lateral nerves 6–7 on each side of the midrib, diverging from it at an angle of about 45°, slightly prominent below when dry, fading towards the margin ; petiole 0.8–1.3 cm. long, grooved above, lepidote, ciliate (the hairs eventually falling off). *Inflorescence* 3–5-flowered ; pedicels arising from approximately the same level, 0.8–1.3 cm. long, densely lepidote. *Calyx* unequally 5-lobed, the dorsal (adaxial) lobe the longest, up to 4 mm. long, lobes ovate-triangular, rounded at the apex, lepidote outside, closely fringed with rather stiff long hairs. *Corolla* white with a little pink (Henry), 6–7 cm. long, 5-lobed, lepidote all over the outside except towards the margins of the lobes ; tube funnel-shaped, 2.5–3.5 cm. long, minutely pubescent outside the base, rather

* *Rhododendron pilicalyx,* Hutchinson, sp. nov. ; affinis *R. Surasiano,* Balf. f. et Craib, sed squamis foliorum minoribus subcarnosis purpureo-brunneis antheris longioribus differt.

Frutex 1.25 m. altus ; ramuli biennes cortice cinereo levi obtecti, annotini brunnescentes et lepidoti ; gemmae foliiferae axillares sub anthesin leviter productae, perulis minimis, lepidotis, pilis mollibus albidis marginatis. *Folia* obovata vel obovato-elliptica, apice acute triangulari-acuminata, ad basin obtusum vel parum cuneatum angustata, 5-10 cm. longa, 2–4 cm. lata, coriacea, supra maturitate glabra et opaca, infra densissime squamis contiguis vel imbricatis rubro-brunneis lepidota, epidermide dense papillosa ; costa media supra impressa, infra prominens et lepidota ; nervi laterales utrinsecus 6–7, a costa sub angulo 45° abeuntes, sicco infra prominuli, marginem versus evanidi ; petioli 0.8–1.3 cm. longi, supra canaliculati, lepidoti, ciliati, pilis deciduis. *Inflorescentia* 3–5-flora ; pedicelli subumbellati, 0.8–1.3 cm. longi, dense lepidoti. *Calyx* inaequaliter 5-lobatus, lobo adaxiali longissimo, usque ad 4 mm. longus, lobis ovato-triangularibus apice rotundatis extra lepidotis pilis rigidis longis crebre marginatis. *Corolla* alba et leviter rosea, 6–7 cm. longa, 5-lobata, extra ubique loborum marginibus exceptis lepidota ; tubus infundibuliformis, 2.5–3.5 cm. longus, basi extra minute pubescens, dense lepidotus ; lobi rotundati, marginibus undulatis. *Stamina* 11–13, ad loborum medium exserta ; filamenta in triente vel quadrante inferiore molliter pubescentia ; antherae 5 mm. longae. *Ovarium* 5-loculare, lepidotum ; stylus corollae fere aequilongus, in partibus duabus inferioribus lepidotus stigmate magno depresso lobulato coronatus. *Capsula* non visa.

densely lepidote ; lobes rounded, with wavy margins. *Stamens* 11–13, exserted, reaching to about the middle of the lobes ; filaments softly hairy in the lower ⅓ or ¼ ; anthers 5 mm. long. *Ovary* 5-celled, lepidote ; style nearly as long as the corolla, lepidote in the lower ⅔ crowned by a large depressed lobulate stigma. *Capsule* not seen.

S.E. YUNNAN. Mengtsz, northern mountain forests, 8000 ft., fls. white, with a little pink, A. Henry, 10524.

28. **Rhododendron Surasianum**, Balf. f. et Craib in Notes, Roy. Bot. Gard. Edinb. x. 160 (1917).

A spreading shrub about 4 m. high ; branchlets short, laxly leafy towards the apex, the older ones covered with smooth grey bark ; young branchlets finely lepidote, about 2.5 mm. thick, apparently not bristly ; axillary leaf-bearing buds very small, and dormant at the time of flowering. *Leaves* elliptic-obovate or oblong-obovate, rounded to a very shortly cuneate base, acutely acuminate at the apex, 6–10 cm. long, 2.3–4 cm. broad, coriaceous, glabrous above when mature and slightly shining, slightly bullately reticulate, densely lepidote below, the scales pale brown and contiguous or overlapping, with a few larger ones scattered here and there, the body of the scales somewhat dry and depressed in the middle, with a narrow membranous fringe, the epidermis between the scales rather laxly papillous ; midrib impressed above, prominent below and rather densely lepidote ; lateral nerves 6–7 on each side of the midrib, a little impressed above, straw-coloured and flexuous below, obscurely looped and branched towards the margin ; petiole about 1 cm. long, grooved above, lepidote. *Flower bud-scales* thinly coriaceous, slightly keeled and densely lepidote towards the apex, apiculate, fringed with soft white hairs. *Inflorescence* 2–3-flowered, umbellate ; pedicels nearly 1.5 cm. long, densely lepidote with rather dry flake-like scales. *Calyx* saucer-like, undulately lobed, about 2 mm. long, densely lepidote outside and bristly with rather short stiff hairs on the margin. *Corolla* pale pink, about 7.5 cm. long ; tube about 4 cm. long, infundibuliform, fairly narrow at the base, rather densely lepidote outside, and very finely pubescent towards the base ; lobes 5, broadly oblong, about 3 cm. long, lepidote outside except towards the margin. *Stamens* 10, unequal, exserted ; filaments pubescent towards the base ; anthers 6–7 mm. long. *Ovary* 5-celled, 7 mm. long, very densely lepidote ; style as long as the corolla, rather densely lepidote in the lower ⅔, crowned by a large deeply lobulate stigma. *Capsule* not seen.

NORTHERN SIAM. Chiengmai, Doi Sutep, 4500 ft., spreading

shrub about 12 ft. high, fls. pale pink, on rocky ground in open evergreen jungle, 7th June 1914, A. F. G. Kerr, 3238.

This species is almost a counterpart of my *R. pilicalyx* from South-East Yunnan. But the scales on the lower leaf-surface of the latter are smaller and more fleshy in the middle, and the epidermis is fairly clearly visible between them. The anthers too are decidly longer, about 5 mm. long in *R. pilicalyx* and 7 mm. long in *R. Surasianum*. These taken into consideration with the widely separated distribution leave very little doubt in my mind that the two are distinct species.

29. **Rhododendron supranubium,** Hutchinson, n. sp.*

Shrub 1½–4 ft. high; branches twiggy, short; one-year-old branchlets more or less straw-coloured, laxly lepidote, about 3 mm. thick; young branchlets densely lepidote, the scale-leaves in the lower part gradually changing into foliage leaves; leaf-bearing axillary buds mostly just elongating at the time of flowering, the bud-scales broadly ovate-orbicular, subobtusely

* *Rhododendron supranubium*, Hutchinson, sp. nov.; affinis *R. ciliicalyci*, Franch., sed petiolis brevioribus, foliis plerumque obovato-oblanceolatis minoribus squamis infra densioribus, corollae tubo extra dense lepidoto differt.

Frutex usque ad 1.25 m. altus; rami breves; ramuli annotini plus minusve straminei, laxe lepidoti, circiter 3 mm. crassi, juniores dense lepidoti, foliis squamiformibus inferioribus ad folia normalia transeuntibus; gemmae foliiferae sub anthesin plerumque modo elongatae, squamis late ovato-orbicularibus subobtuse apiculatis coriaceis squamularum lineis duabus dorso ornatis, marginibus pilis albidis mollibus instructis. *Folia* oblanceolata vel obovato-oblanceolata, rare elliptica, breviter et abrupte obtuse acuminata, 3.5–9 cm. longa, 1.3–3.3 cm. lata, rigide coriacea, supra juventute dense lepidota et ciliata, maturitate glabra et leviter nitida, infra glauca et dense lepidota, squamis aureo-brunneis inaequalibus spatium diametro suo minus distantibus, epidermide inter squamas dense papillosa; petioli 0.5–1 cm. longi, squamis parvis subdense obtecti, frequenter setis paucis marginati, supra canaliculati. *Inflorescentia* usque ad 3-flora, saepe 1-flora, pedicellis umbellatis, infra basin pilis mollibus albidis circumdatis; cicatrices squamarum delapsarum subdensae, labroses; squamae exteriores ovato-orbiculares, breviter obtuse acuminatae, circiter 1.5 cm. longae, tenuiter coriaceae in parte media lata lepidotae, pilis brevibus mollibus albidis marginatae; bracteolae fere filiformes, apicem versus paullo spatulatae, circiter 2.5 cm. longae, extra pilis albidis mollibus indutae; pedicelli 1 cm. longi, circiter 2 mm. crassi, dense lepidoti. *Calyx* plus minusve cupularis vel patelliformis, plerumque distincte sed interdum obscure lobatus, usque ad 2 mm. longus et 3 mm. latus, extra lepidotus, pilis longis ciliatus vel rare eciliatus. *Corolla* opaco-alba externe roseo suffusa (Forrest), e basi late infundibuliformis; tubus lobis aequalis vel paullo longior, uno latere circiter 3 cm. longus, basi circiter 5 mm. diametro, apice 4.5 cm. latus (siccus et complanatus), extra dense lepidotus, basin versus molliter pubescens; lobi 5, circiter 3 cm. longi et 2.3 cm. lati, extra lepidoti, marginibus crenulato-lepidotis. *Stamina* 10, inaequalia, supra medium corollae loborum pertinentia; filamenta in dimidio inferiore dense pilosa; antherae 4.5 mm. longae, sicco brunneae. *Ovarium* 6-loculare, 7 mm. longum, dense lepidotum; stylus corolla paullo brevior, in dimidio inferiore dense lepidotus, stigmate disciformi viscido coronatus. *Capsula* non visa.

apiculate, coriaceous, with two or three lines of small golden scales down the back, fringed with soft white hairs. *Leaves* oblanceolate or obovate-oblanceolate, rarely elliptic, shortly and rather abruptly obtusely acuminate, 3.5–9 cm. long, 1.3–3.3 cm. broad, rigidly coriaceous, when young rather densely

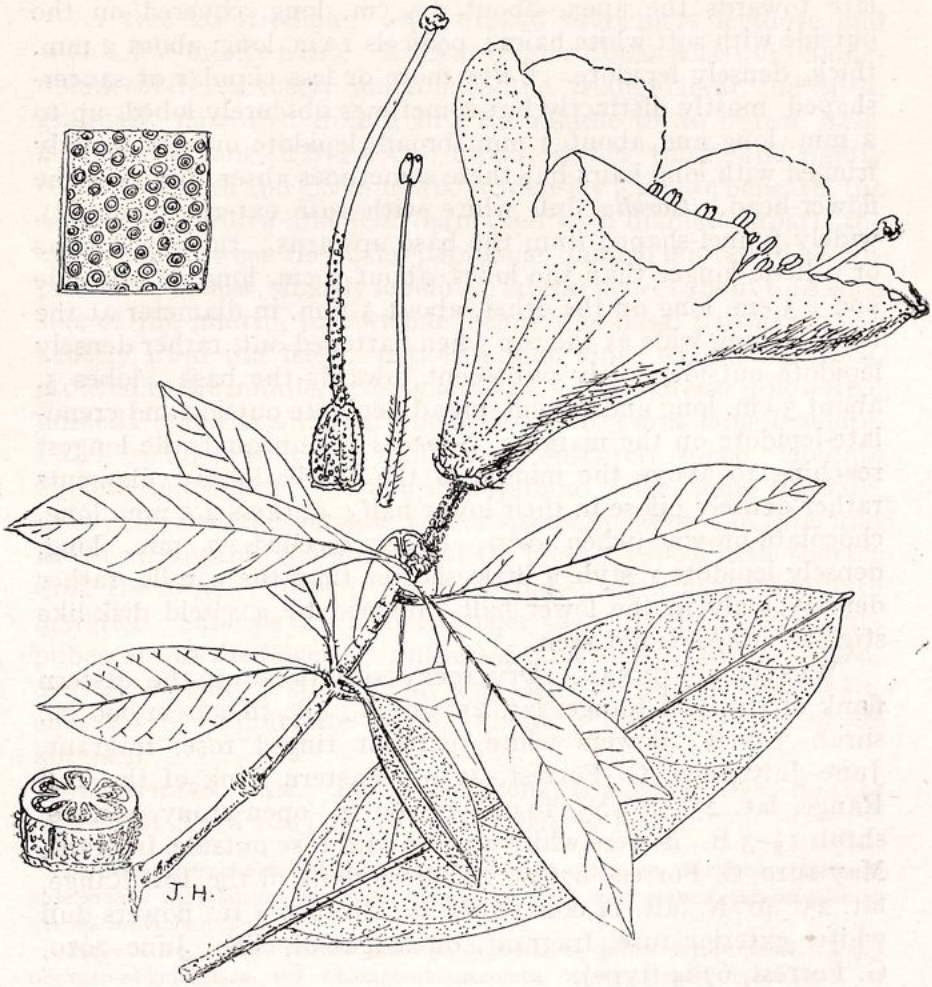

FIG. 9.—*Rhododendron supranubium*, Hutchinson, n. sp. Nat. size.

scaly above and ciliate, quite glabrous and slightly shining when mature, glaucous below and rather densely lepidote, the scales a golden brown and somewhat unequal in size and less than their own diameter apart, the epidermis between the scales densely covered with milky-white rod-like papillae; petiole 0.5–1 cm. long, rather densely covered with small scales, frequently with a few bristles on each side, with a fairly wide groove on the upper side. *Inflorescence* up to 3-flowered, often

1-flowered, the pedicels arising from the same level, with a fringe of soft white hairs below the base of each; scars of the fallen bud-scales rather dense, rim-like; outer bud-scales ovate-orbicular, shortly obtusely acuminate, about 1.5 cm. long, thinly coriaceous, lepidote up the broad middle portion, fringed with short soft white hairs; bracteoles almost filiform, a little spathulate towards the apex, about 2.5 cm. long, covered on the outside with soft white hairs; pedicels 1 cm. long, about 2 mm. thick, densely lepidote. *Calyx* more or less cupular or saucer-shaped, mostly distinctly but sometimes obscurely lobed, up to 2 mm. long and about 3 mm. broad, lepidote outside, mostly fringed with long hairs but these sometimes absent on the same flower-head. *Corolla* dull white with rose exterior (Forrest), widely funnel-shaped from the base upwards; tube as long as or a little longer than the lobes, about 3 cm. long on one side and 2.5 cm. long on the other, about 5 mm. in diameter at the base, 4.5 cm. wide at the top when flattened out, rather densely lepidote outside, softly pubescent towards the base; lobes 5, about 3 cm. long and 2.3 cm. broad, lepidote outside and crenulate-lepidote on the margin. *Stamens* 10, unequal, the longest reaching to above the middle of the corolla lobes; filaments rather densely pilose in their lower half; anthers 4.5 mm. long, chocolate-brown (when dry). *Ovary* 6-celled, 7 mm. long, densely lepidote; style a little shorter than the corolla, rather densely scaly in the lower half, crowned by a viscid disk-like stigma. *Capsule* not seen.

WESTERN YUNNAN. Dry rocky situations on the eastern flank of the Tali Range, lat. 25° 40′ N., alt. 10,000–11,000 ft., shrub 3–6 ft., flowers white, exterior tinged rose, fragrant, June–July 1906, G. Forrest, 4159. Eastern flank of the Tali Range, lat. 25° 40′ N., 10,000–11,000 ft., open stony pasture, shrub 1½–3 ft., flowers white washed with rose outside, fragrant, May 1910, G. Forrest, 6764A. Eastern flank of the Tali Range, lat. 25° 40′ N., alt. 11,000–12,000 ft., shrub 2–4 ft., flowers dull white, exterior rose, fragrant, on ledges of cliffs, June 1910, G. Forrest, 6764 (type).

This may be regarded as a near alpine relation of *R. ciliicalyx*, Franch. Besides occurring at a much higher altitude, however, it differs from that species in its shorter petioles, smaller leaves, much more densely arranged scales, by its flowers tending to become solitary, and by the densely lepidote corolla.

Mr J. C. Williams has this species in cultivation at Caerhays Castle, Cornwall, under Forrest's number 6764. He has very kindly sent me a leafy shoot grown out of doors, and on the leaves I find the papillae characteristic of the wild specimens. Occurring at such a high altitude in Yunnan, 10,000–12,000 ft.,

the species should prove hardy in this country, although probably susceptible to late spring frosts. It will no doubt be suitable for planting in the rock garden.

30. **Rhododendron Smilesii,** Hutchinson, n. sp.*

A tree 20 ft. high; one-year-old branchlets lepidote and with a few bristly hairs. *Leaves* obovate-oblanceolate or oblong-oblanceolate, obtusely mucronate and triangular at the apex, gradually narrowed from about the middle to an obtuse base, 4.5–6.5 cm. long, 1.8–2.5 cm. broad, rather thinly and rigidly coriaceous, dull and glabrous above, densely lepidote beneath, the scales dark brown and less than their own diameter apart, the epidermis between the scales papillous; midrib impressed above, prominent below, slightly lepidote; lateral nerves about 6 on each side of the midrib, just visible below, the basal pair ascending acutely from the base; petiole 5 mm. long, widely V-shaped, grooved in the middle, densely lepidote. *Inflorescence* 3-flowered, umbellate, the axis villous; pedicels about 3 mm. long, lepidote. *Calyx* small, about 1.5 mm. long, obscurely lobed, lepidote outside, not ciliate. *Corolla* small, about 4 cm. long, lepidote, nearly all over the outside, rather sparingly so on the tube and not at all towards the margins of the lobes; tube a little shorter than the lobes; lobes 5, elliptic-rounded, with finely undulate margins. *Stamens* 10, a little longer than the tube; filaments pubescent in the lower ¼; anthers 4 mm. long. *Ovary* 5-celled, densely lepidote; style 3 cm. long, lepidote in the lower half, crowned by a lobulate stigma about 3 mm. wide. *Capsule* not seen.

NORTHERN SIAM. Pu Sai Lai Leng, tree 20 ft. high, flowers white, 1st April 1893, F. H. Smiles (Herb. Kew).

* *Rhododendron Smilesii*, Hutchinson, sp. nov.; species siamensis affinis *R. supranubio*, Hutchinson, sed foliis minoribus infra non glaucis calyce eciliato corolla breviore differt.

Arbor 6 m. alta; ramuli annotini lepidoti et parce setoso-pilosi. *Folia* obovato-oblanceolata vel oblongo-oblanceolata, apice obtuse mucronata et triangularia, e medio ad basin obtusum sensim angustata, 4.5–6.5 cm. longa, 1.8–2.5 cm. lata, tenuiter et rigide coriacea, supra opaca et glabra, infra dense lepidota, squamis atrobrunneis spatium diametro suo minus distantibus, epidermide papillosa; costa media supra impressa, infra prominens et leviter lepidota; nervi laterales utrinsecus circiter 6, infra vix prominuli, basales acute ascendentes; petioli 5 mm. longi, supra canaliculati, dense lepidoti. *Inflorescentia* 3-flora, umbellata, axe villoso; pedicelli circiter 3 mm. longi, lepidoti. *Calyx* parvus, circiter 1.5 mm. longus, obscure lobatus, extra lepidotus, eciliatus. *Corolla* parva circiter 4 cm. longa, fere ubique lepidota; tubus lobis paullo brevior; lobi 5, elliptico-rotundati, marginibus undulatis. *Stamina* 10, tubo paullo longiora; filamenta in quadrante inferiore pubescentia; antherae 4 mm. longae. *Ovarium* 5-loculare, dense lepidotum; stylus 3 cm. longus, in dimidio inferiore lepidotus, stigmate circiter 3 mm. lato coronatus. *Capsula* non visa.

31. **Rhododendron carneum,** Hutchinson in Bot. Mag. t. 8634 (1915).

A shrub about 1 m. high; twigs densely brown-lepidote. *Leaves* elliptic-obovate, subacute, base obtuse or slightly cuneate, 5–11 cm. long, 3–4 cm. broad, coriaceous, deep green above, closely reticulate, glabrous, glaucous and lepidote with yellow scales beneath; midrib raised beneath, with 5–8 lateral nerves along each side which are visible on both surfaces, are somewhat curved, and become very slender towards the margin of the leaf; petiole 0.8–1.4 cm. long, densely lepidote. Bud-scales widely ovate, bluntly mucronulate, lepidote outside, densely fringed with soft short white hairs. *Calyx* well-developed, 5-lobed, two segments rounded-ovate, ciliate at the tip with long hairs and densely lepidote outside. *Corolla* flesh-coloured; tube 3.5–4 cm. long, 1 cm. across at the base, 3 cm. across at the mouth, sparingly lepidote outside, glabrous within; lobes spreading, oblong, truncate or rounded, 3 cm. long, 3–3.5 cm. wide. *Stamens* usually 12, unequal, slightly exserted; filaments slender, with spreading hairs in their lower half, up to 4.5 cm. long; anthers 4 mm. long. *Ovary* 6-celled, densely lepidote; style exserted, 6 cm. long, densely lepidote, pink upwards; stigma capitate, brown, viscid, 3 mm. across.

UPPER BURMA. This very beautiful Rhododendron is a native of Northern Burma, where it was met with at an altitude of about 7500 ft. in the Northern Shan States by Major C. W. Browne, of the Survey of India, by whom a supply of seed was sent to Colonel F. B. Longe, Holly Lodge, Thorpe, Norwich. One of the plants raised from these seeds was sent to Kew for determination, and was figured in the Botanical Magazine. According to Colonel Longe, this species in its native country grows on open grassy hillsides away from any large trees, prefers western slopes, and grows to a height of about 3 ft.

In wild specimens the flowers are of a crimson-pink, which gradually turns to a delicate white, or to white suffused with pink.

32. **Rhododendron Johnstoneanum,** Watt, MSS.* *R. formosum*, var. *Johnstonianum*, Brandis, Ind. Trees, 411 (1906).

A rather large bush, much branched; older branches covered with grey shining bark; one-year-old branchlets finely lepidote

* *Rhododendron Johnstoneanum*, Watt, ined.; sp. nov.; affinis *R. Veitchiano*, Hook., sed ramulis annotinis dense setosis, foliorum squamis infra densioribus, corolla rubro suffusa differt.

Frutex multo ramosus; rami vetustiores cortice cinereo nitido obtecti; ramuli annotini minute lepidoti et setoso-pilosi, hornotini setosi sub anthesin jam elongati.

and bristly with hairs; young branchlets already elongating at the time of flowering, bristly. *Leaves* elliptic or slightly obovate-elliptic, a little narrowed to an obtuse base, rounded to an obtuse callous mucro at the apex, 5–10 cm. long, 2–4 cm. broad, rigidly coriaceous, bristly ciliate when young, green on both sides, with reddish nerves when young, densely lepidote but soon becoming glabrous above, lepidote below, the scales very dense and nearly contiguous with a broad fringe, the epidermis minutely papillous between the scales; midrib impressed above, prominent beneath, lepidote; lateral nerves slender, about 8 on each side of the midrib, fairly distinct on the lower surface; petioles 0.5–1.3 cm. long, ciliate, closely lepidote, grooved on the upper side. *Inflorescence* about 4-flowered, the pedicels arising from about the same level; bud-scales broadly rounded and fringed with soft white hairs; pedicels about 1 cm. long, densely lepidote. *Calyx* oblique, very short, not or scarcely lobed, with a dense fringe of long hairs. *Corolla* funnel-shaped, 6 cm. long, white, spotted with red inside the adaxial lobe, which has a yellow blotch at the base on each side; tube flushed with pink outside, lepidote and softly pubescent outside; lobes 5, broadly ovate, a little apiculate, lepidote towards the middle outside. *Stamens* 10, unequal, exserted; filaments pubescent in their lower half; anthers 5 mm. long. *Ovary* 6-celled, lepidote; style rather slender, overtopping the corolla, lepidote in its lower two-thirds, crowned by a disk-like stigma. *Capsule* 6-celled, broad, about 2 cm. long, lepidote (after Watt's drawing).

ASSAM. Manipur: Sirhoifurar, 6000–7500 ft., fls. 11th April 1882, G. Watt, 6401 (type).

This was named in manuscript by Sir George Watt, who sent seeds of the species to Kew in January 1882. The seedlings however, eventually all died off. It is named after Mrs John-

Folia elliptica vel leviter obovato-elliptica, ad basin obtusum paullo angustata, apice rotundata et obtuse calloso-mucronata, 5–10 cm. longa, 2–4 cm. lata, rigide coriacea, juniora setoso-ciliata et nervis rubris, supra dense lepidota sed mox glabra, infra lepidota, squamis densissimis et fere contiguis marginibus latis, epidermide minute papillosa; costa supra impressa, infra prominens, lepidota; nervi laterales graciles, utrinsecus circiter 8, infra satis distincti; petioli 0.5–1.3 cm. longi, ciliati, crebre lepidoti, supra canaliculati. *Inflorescentia* terminalis, circiter 4-flora, pedicellis subumbellatis; squamae gemmarum floriferarum late rotundatae, pilis albidis mollibus marginatae; pedicelli circiter 1 cm. longi, dense lepidoti. *Calyx* obliquus, brevissimus, haud vel vix lobatus, pilis densis longis marginatus. *Corolla* infundibuliformis, 6 cm. longa, alba, intra lobum adaxialem rubro-maculata et utrinque flava; tubus extra roseo suffusus, extra lepidotus et molliter pubescens; lobi 5, late ovati, subapiculati, medium versus extra lepidoti. *Stamina* 10, inaequalia, exserta; filamenta in dimidio inferiore pubescentia; antherae 5 mm. longae. *Ovarium* 6-loculare, lepidotum; stylus gracilis, stigmate disciformi coronatus. *Capsula* 6-locularis, circiter 2 cm. longa, lepidota (ex Watt icon.).

stone, the wife of Colonel Johnstone, Political Agent in Manipur in 1882. Judging from Sir G. Watt's notes, the species must be extraordinarily variable. I have therefore described only that specimen (Watt, 6401) which corresponds with the collector's coloured figure in the Kew collection. That there is great variation is shown in Sir George's field notes in the Edinburgh Herbarium, which seem worth reproducing in detail. They are as follows :—

G. Watt, No. 6401 (type) : " Sirhoifurar, 6–7500 ft., April 11th, 1882 ; a largish bush, much branched ; leaves oblong, mucronate on short petioles, which have long black hairs, under-surface coated with brown circular scales ; leaf-buds long, scales with white ciliae ; flower-buds round with scales also having white fringe ; flowers large white with rose-purple flush along midrib of petals especially on outside, sweetly scented ; peduncles $\frac{1}{4}$–$\frac{1}{2}$ in. long, scarlet with white spots ; calyx reduced to a ring having a fringe of long white hairs ; corolla 2 in. long by 3 in diameter, wide gaping, upper and odd petal with a yellow mark at sinus on either side and in middle and within tube spotted orange-red into streaks ; others all pure white with a purple flush on outside ; style yellow, subglandularly spotted ; stigma corrugated."

G. Watt, No. 5961 : " On the grassy summit of Seripharai, 10–11,000 ft., Jan. 17, 1882 ; a small bush much branched at its extremities ; leaves elliptic when young covered with curious circular scales which on dehiscing leave brownish pits all over the under surface and petiole ; when young also ciliate but when mature with hairs on petiole only about 2 in. long and on brow petiole $\frac{1}{4}$ inch ; flower-buds globular with broad ovate acuminate scales having a fringe of pure white hairs ; fruits 6-angled with only partial dehiscence, tubercled ; seeds sent to Kew Jan. 31st, 1882."

G. Watt, No. 6213 : " Summit of Japvo, 10,000 ft., March 9th, 1882 ; a small distorted plant, seems same as species collected on Shiruriphari ; leaves dotted, petiole and margin with long straggling hairs."

G. Watt, No. 6402 : " Sirohifurar, 6–7500 ft., April 11th, 1882 ; same species as preceding only a yellowish-white variety with no trace of rose-pink and smaller less hairy leaves ; flowers quite yellow in bud whereas former are rose-coloured ; young leaves of both sweetly scented and pale moss green."

G. Watt, No. 6475 : " Summit of Sirohifurar, 8000 ft., April 12th, 1882 ; not in flower at higher points, all in flower-bud ; flowering freely at 7000 feet along the margins of forests where grassy slopes commence ; leaf-buds small, slim, erect, 1 inch long ; leaves large, ovate, erect, leaves in flowering plants

drooping, 2–4 on extremities of twigs; young leaves pale moss green, soft, sweetly scented, hairy when a little older, horizontal with hairs on margin and petiole, also extremity of twig black-woolly."

G. Watt, No. 6701: "Keyang, 3rd Peak N.E. of Ching Sow, 9000 ft., April 22nd, 1882; common on summit, pink and white varieties both."

G. Watt, No. 6881: "Japvo, 9800 ft., May 15th, 1882; a small bush; leaves when young hairy but glabrous when old; flowers white, yellow dotted on outside, side gaping, sweetly scented; calyx a small green ring; ? same as Sirohifurar plant; flowers smaller, more gaping, always white, leaves quite glabrous except when young and calyx glabrous; if same, it is the yellow variety which I now regard as worthy of a name."

33. **Rhododendron inaequale**, Hutchinson, n. sp.*

R. formosum, var. *inaequalis*, C. B. Clarke in Hook. f. Fl. Brit. Ind. iii. 473 (1882).

A shrub 1–2 m. high; branches more or less umbellate, the older ones stout, covered with grey bark; one-year-old branchlets sparingly lepidote, sometimes also a little strigose towards the top; young branchlets lepidote and sparingly strigose-pubescent; axillary leaf-bearing buds very small, and quite dormant at the time of flowering. *Leaves* lanceolate or elliptic-oblanceolate, acuminate to an obtuse mucronate apex, acute or subacute at the base, 6–12 cm. long, 1.5–4 cm. broad, rather rigidly coriaceous, at first a little scaly on the upper surface, soon becoming quite glabrous and reticulate, lepidote below, the scales slightly unequal in size and 2–3 times their own diameter apart, the epidermis between the scales fairly densely papillous; midrib impressed above, prominent below, minutely lepidote; lateral nerves about 6–8 on each side of the midrib,

* *Rhododendron inaequale*, Hutchinson, sp. nov.; affinis *R. formoso*, Wall., capsula longiore basi valde obliqua differt.

Frutex 1–2 m. altus; rami plus minusve umbellati, vetustiores robusti, cortice cinereo obtecti, annotini parce lepidoti, interdum etiam apicem versus parce strigosi, hornotini lepidoti et strigoso-pubescentes; gemmae foliiferae axillares sub anthesin minimae haud productae. *Folia* lanceolata vel elliptico-oblanceolata, ad apicem obtusum mucronatum acuminata, basi acuta vel subacuta, 6–12 cm. longa, 1.5–4 cm. lata, rigide coriacea, supra primum parce lepidota, mox glabra et reticulata, infra lepidota, squamis leviter inaequalibus spatium diametro suo duplo vel triplo majus distantibus, epidermide inter squamas subdense papillosa; costa supra impressa, infra prominens, minute lepidota; nervi laterales utrinsecus 6–8, a costa media sub angulo 45°–65° abeuntes, infra graciles et leviter prominentes; petioli 1–1.5 cm. longi, punctato-lepidoti, supra canaliculati. *Inflorescentia* terminalis, circiter 6-flora, pedicellis subumbellatis; gemmae floriferae ovoideo-globosae, circiter 2 cm. longae, squamis late rotundatis apiculatis coriaceis extra medium versus lepidotis, pilis mollibus albis marginatae;

diverging from it at an angle of 45°–65°, slender and slightly prominent on the lower surface; petioles 1–1.5 cm. long, punctate-lepidote, grooved on the upper surface. *Inflorescence* about 6-flowered, the pedicels arising from approximately the same level; flower-bearing buds ovoid-globose, about 2 cm. long, the scales broadly rounded, apiculate, leathery, lepidote towards the middle outside and fringed with short soft white hairs; pedicels 1–1.5 cm. long, lepidote. *Calyx* very oblique, saucer-shaped, about 2 mm. long, undulately lobed, lepidote outside. *Corolla* seen only in a withered condition, laxly scaly all over the outside. *Stamens* probably 10; filaments rather densely pubescent in the lower third; anthers 2.5 mm. long. *Ovary* 6-celled, oblique, about 1 cm. long, ribbed, closely lepidote; style very long, persistent in fruit, 7–8 cm. long, laxly lepidote in the lower half, crowned by a deeply rugose-lobulate stigma. *Capsule* 6-valved, very oblique, about 3 cm. long, densely lepidote, the style persisting for some time on the central axis.

ASSAM. Khasia Hills; summit of Kollong Rock, 1835, Griffith, 978. Kollong Rock, 5000 ft., 8th July, 23rd October 1850, fr., J. D. Hooker and T. Thomson. Kollong, 6000 ft., shrub 3 ft., 23rd August 1885, fr., C. B. Clarke, 40025. Kollong, 5600 ft., 24th May 1886, bush 6 ft., withered fls. and young fr., C. B. Clarke, 43985A. Shillong, 4000 ft., 28th July 1886, fr., C. B. Clarke, 44324.

For remarks on the habitat of this species see p. 15.

34. **Rhododendron Veitchianum,** Hook. Bot. Mag. t. 4992 (1857); Millais, Rhododendrons, 257 (1917). *R. formosum,* Kurz, For. Fl. Brit. Burma, ii. 94 (1877), non Wall. *R. formosum,* var. *Veitchianum,* Kurz in Journ. As. Soc. 1877, ii. 216; Hosseus in Beihefte Bot. Centralbl. xxvii. 505 (1910).

A shrub 2.75 m. high or more growing on rocks or epiphytic on trees; older branches covered with loose crustaceous bark; one-year-old branchlets finely lepidote, apparently not setose; axillary leaf-bearing buds very small and still dormant or just

pedicelli 1–1.5 cm. longi, lepidoti. *Calyx* valde obliquus, patelliformis, circiter 2 mm. longus, undulate lobatus, extra lepidotus. *Corolla* in statu marcido tantum visa, extra ubique laxe lepidota. *Stamina* probabiliter 10; filamenta in triente inferiore subdense pubescentia; antherae 2.5 mm. longae. *Ovarium* 6-loculare, obliquum, circiter 1 cm. longum, costatum, crebre lepidotum; stylus longissimus, in fructu persistens, 7–8 cm. longus, in dimidio inferiore lepidotus, stigmate profunde rugoso-lobulato coronatus. *Capsula* valde obliqua, circiter 3 cm. longa, dense lepidota, axe centrali stylo persistente ad breve tempus coronato.

beginning to develop at the time of flowering, the scales leathery and obtusely apiculate. *Leaves* obovate-oblanceolate or elliptic-obovate, narrowed to the base, obtusely triangular-acuminate at the apex, 5–10 cm. long, 2–4 cm. broad, coriaceous, lepidote above when young, soon glabrescent and a little reticulate, glabrous below and lepidote, the scales rather unequal and from 1–1½ times their own diameter apart, rusty-brown, fringed with a narrow membranous collar, the epidermis closely papillous below; midrib impressed above, prominent below, laxly lepidote; lateral nerves about 6 on each side of the midrib, slender, arcuate, slightly raised below; petiole 0.5–1 cm. long, closely lepidote, with a narrow groove on the upper side. *Inflorescence* up to 5-flowered, the pedicels arising from approximately the same level; flower-bearing buds ovoid, subacute, 2 cm. long, the scales broadly ovate or rounded, apiculate, leathery, closely lepidote outside and densely fringed with soft short hairs; scars of the fallen bud-scales in about 8 rows, straw-coloured; pedicels 5–7 mm. long, lepidote. *Calyx* rather variable, unequally lobed, up to 2 mm. long, the lobes broad and frequently with a few (3 or 4) long slender hairs on the margin, lepidote outside especially towards the base. *Corolla* 6–7 cm. long, white inside, slightly tinged outside with green; tube widely funnel-shaped, a little longer than the lobes, lepidote mainly on the dorsal (adaxial) side, often softly pubescent towards the base; lobes 5, spreading, with strongly crinkled undulate margins, very sparingly scaly outside towards the middle. *Stamens* 10, unequal, nearly twice as long as the corolla tube; filaments pubescent towards the base; anthers 4–5 mm. long. *Ovary* 5-celled, densely lepidote; style longer than the corolla, lepidote in the lower half, crowned by a deeply lobulate disk-like stigma. *Capsule* straight, 3 cm. long, about 1.3 cm. thick, rugose-lepidote.

BURMA. Central Burma: Tiddim, Chin Hills, 6000 ft., April 1916, V. H. T. Fields Clarke, 35 (Herb. Edinb.). Southern Shan States: Lakat Taung, Molye, 5000 ft., in open scrub forests, epiphytic, fls. white, 25th February 1910, W. A. Robertson, 130. Moolee-it, 7000 ft., 7–8 ft. high or more, sometimes epiphytical on trees, Parish, 418, 419. Expedition to Nat-toung, Parish. Lower Burma: Mulegit and below Dawna Range, 6000 ft., fls. 27th January 1912 (seen also on the Ta-u plateau near the Lampa Chaung down to 2500 ft.), J. H. Lace, 5632. Tenasserim: a shrub on rocks (never in ground) at 6000 ft., epiphytic on tall tree, at 4000 ft., fls. white, lower petal deep yellow, Col. Beddome, 105. Without definite locality, Lobb.

SIAM. Doi Sootep, 4800–4920 ft., fls. white, 12th Decem-

ber 1904, C. C. Hosseus, 201 ; 4500–5500 ft., epiphytic, growing into a spreading shrub about 12 ft. high, common in evergreen jungle near the top of Doi Sootep, 2nd January 1909, A. F. G. Kerr, 512 ; fr. 14th April 1909, A. F. G. Kerr, 512.

Rhododendron Veitchianum is a fine species inhabiting the warmer parts of Burma and in Siam. It was first imported from Moulmain by the Veitchian firm of Exeter, after whom it was named by Hooker in the Botanical Magazine. The plant figured in the magazine was exhibited at the Horticultural Society's meeting in London on the 6th May 1857. There is no specimen of this particular plant in the dried collections at Kew.

It is not always easy to distinguish *R. Veitchianum* from broad-leaved examples of *R. formosum*, Wall. The latter, however, has nearly always some long hairs on the petioles, leaf margins, and on the one-year-old leafy shoots, characters which appear to be lacking from *R. Veitchianum* ; the latter too has a much larger fruit than has *R. formosum*. Then *R. Veitchianum* seems confined to Central and Lower Burma and Siam, whilst *R. formosum* is so far known only from the Khasia Hills, Assam.

35. **Rhododendron Cubittii,** Hutchinson, n. sp.*

Habit ? One-year-old branchlets covered with pale almost elepidote bark, about 4 mm. thick ; young branchlets purplish-

* *Rhododendron Cubittii*, Hutchinson, sp. nov. ; affinis *R. Veitchiano*, Hook., sed ramulis junioribus et foliis et petiolis setoso-ciliatis, foliis elongato-oblongo-ellipticis differt.

Ramuli annotini cortice pallido fere elepidoto obtecti, circiter 4 mm. crassi, juniores purpureo-brunnei, parce lepidoti, pilis rigidis paucis muniti ; gemmae foliiferae axillares sub anthesin jam elongatae, squamis subpersistentibus inferioribus ovatis minute ciliolatis extra inconspicue lepidotis, superioribus subspatulatis et tenuioribus basin versus pilis longis marginatis apicibus molliter et dense ciliolatis. *Folia* elongato-oblongo-elliptica, basi obtusa, ad apicem longe mucronatum sensim attenuata, 10–11 cm. longa, 3–3.5 cm. lata, rigide sed subtenuiter coriacea, juniora supra laxe lepidota, mox fere glabra et reticulata, infra glauca et lepidota, squamis leviter inaequalibus spatium diametro suo paullo majus distantibus, epidermide crebre papillosa ; costa media supra anguste impressa, infra subprominens, parce lepidota ; nervi laterales utrinsecus circiter 8, infra inconspicui ; petioli 1–2 cm. longi, supra canaliculati, pilis rigidis paucis ciliati, punctato-lepidoti. *Inflorescentia* biflora ; gemmae floriferae non visae ; pedicelli 5 mm. longi, robusti, squamis flavidis dense lepidoti. *Calyx* obliquus, in latere dorsali 3 mm. longus, undulate lobatus, extra dense lepidotus, eciliatus. *Corolla* circiter 7 cm. longa, 5-lobata, sublate infundibuliformis ; tubus usque ad 4 cm. longus, in latere dorsali lepidotus, basin versus molliter pubescens ; lobi margine undulati, extra laxe lepidoti. *Stamina* 10, corollae fere aequilonga ; filamenta inferne pubescentia ; antherae 5 mm. longae. *Ovarium* 6-loculare, 6 mm. longum, in stylum abrupte contractum, dense lepidotum ; stylus staminibus leviter longior, in triente inferiore laxe lepidotus, stigmate disciformi lobulato coronatus. *Capsula* non visa.

brown, sparingly lepidote, with a few long stiff hairs; axillary leaf-bearing buds already elongated at the time of flowering, scale-leaves subpersistent, the lowermost ovate and very minutely ciliolate, inconspicuously lepidote outside near the middle, the upper ones more spathulate and thinner and fringed with long hairs towards the base, the tips softly and densely ciliolate. *Leaves* elongate-oblong-elliptic, obtuse at the base, gradually narrowed to a rather long mucronate apex, 10–11 cm. long, 3–3.5 cm. broad, rigidly but rather thinly coriaceous, loosely lepidote above when quite young, soon becoming nearly glabrous and reticulate, probably somewhat glaucous below and lepidote, the scales slightly more than their own diameter apart, somewhat unequal, the epidermis between the scales closely papillous; midrib narrowly impressed above, fairly prominent below, sparingly lepidote; lateral nerves about 8 on each side of the midrib, faint below; petioles 1–2 cm. long, grooved above, and with a few long stiff hairs on the margin, punctate-lepidote. *Inflorescence* 2-flowered; flowering buds not seen; pedicels 5 mm. long, stout, densely lepidote with yellowish scales. *Calyx* oblique, about 3 mm. long on the dorsal (adaxial) side, undulately lobed, densely lepidote outside, apparently not ciliate. *Corolla* (colour ?) about 7 cm. long, 5-lobed, fairly widely funnel-shaped; tube up to 4 cm. long, lepidote only on the dorsal (adaxial) side, softly pubescent towards the base; lobes with undulate margins, laxly lepidote outside. *Stamens* 10, nearly as long as the corolla; filaments pubescent in their lower part; anthers 5 mm. long. *Ovary* 6-celled, 6 mm. long, abruptly contracted into the style, densely lepidote; style slightly longer than the stamens, rather laxly scaly in the lowermost $\frac{1}{3}$ of its length, crowned by a discoid lobulate stigma. *Capsule* not known.

NORTH BURMA. Bhamo Division: Maru-kahtaung (Sindum), 5500 ft., March 1909, G. E. S. Cubitt, 385 (Herb. Edinb.).

The above description has been drawn up from the single flowering specimen quoted. The species may be regarded as a northern outlier of *R. Veitchianum*, Hook., and in many respects it is intermediate between that species and *R. formosum*, Wall., from the Khasia Hills. It has the bristly shoots, leaf margins, and petioles of *R. formosum*, and flowers like *R. Veitchianum*. The elongated leaves are not at all obovate as in both the other species.

36. **Rhododendron formosum,** Wallich, Plant. Asiat. Rar., iii. 3, t. 207 (1832); G. Don, Gen. Syst. iii. 845 (1834); DC. Prodr. vii. 721 (1839); Bot. Mag. t. 4457 (1849); C. B. Clarke in Hook. f. Fl. Brit. Ind. iii. 473 (1882); Millais, Rhododendrons, 168 (1917), excl. var. *Johnstoneanum*. *R. Gibsonii*, Paxton, Mag. of Bot. viii. t. 217 (1841); Fl. des Serres, i. t. 18 (1845).

A much branched shrub; branches spreading, leafy, shining, the younger parts finely lepidote. *Leaves* crowded, very variable, oblanceolate to obovate, usually subacute or acute-acuminate at the apex, mucronate, gradually narrowed to the base, 3–7 cm. long, 1–3 cm. broad, papery or thinly coriaceous, laxly lepidote above when young, soon becoming glabrous or nearly so, fringed with long white hairs on the margin especially when young (sometimes not fringed), more densely lepidote and glabrous beneath, the scales 1–1½ times their own diameter apart, reddish-brown, and slightly unequal in size, the epidermis densely covered with short rod-like papillae; midrib impressed above, prominent beneath, rather sparingly lepidote; lateral nerves mostly scarcely visible, 6–8 on each side of the midrib; petiole 5–8 mm. long, lepidote, grooved above, often fringed with long hairs. *Inflorescence* 2–3-flowered, the pedicels arising from about the same level; flower-bearing buds narrowly ellipsoid, acute, the outer scales gradually changing into leaves, acuminate, a little lepidote on the back, fringed with soft short hairs; pedicels up to 1.3 cm. long, rather densely scaly. *Calyx* very small, undulate, densely lepidote outside, occasionally with one or two long hairs on the margin. *Corolla* white, tinged with yellow and rose, with 5 external red stripes, funnel-shaped, about 6 cm. long; tube about as long as the lobes, lepidote outside, softly pubescent towards the base; lobes 5, broadly ovate, rounded at the apex, about 2.5 cm. long and broad. *Stamens* 10, unequal in length, ¾–1½ times as long as the tube; filaments densely pubescent in their lower half; anthers 5 mm. long. *Disk* tomentose. *Ovary* 6-celled, about 5 mm. long, densely lepidote; style as long as or longer than the corolla, lepidote in the lower half or three-quarters, rather slender, crowned with a broad capitate stigma. *Capsule* straight, 1.5–2 cm. long, about 8 mm. thick, strongly ribbed, densely lepidote. *Seeds* brown, 2 mm. long, sharply pointed at one end.

ASSAM. Khasia Hills; without precise locality, Smith (fide Wallich, l.c.), type. Between Moflong and Myrung, 9th November 1835, fls., Griffith (Kew Distrib., No. 3506); towards Kala Panee, 3rd November 1835, fr., Griffith, 770 (Kew Distrib.,

No. 3506). Kala Panee, 5000 ft., 27th June, 5th August, 28th October 1850, fr., J. D. Hooker and T. Thomson. Boja-Panee, 5000 ft., 29th June 1850, spec. sterile, J. D. Hooker and T. Thomson. Boja-Panee, 5000 ft., 27th October 1850, J. D. Hooker and T. Thomson. Pomrang, 4000 ft., 16th September 1850, fls., J. D. Hooker and T. Thomson. Bor-Panee, Simons, 10. Lailankote, 5500 ft., 26th September 1886, fr., C. B. Clarke, 45563.

For further notes on this species and its varieties described in the Flora of British India see p. 14.

G. Don (l.c.) gives Nepal as the habitat of *R. formosum*, but this is obviously a mistake. There are always 6 cells in the ovary and not 10 as stated by Don; perhaps he assumed there were 10 cells from Wallich having described the ovary as being "10-furrowed."

Kurz (For. Fl. Burma, ii. 94) records *R. formosum* from Martaban, but his description seems to indicate a mixture of *R. formosum* and *R. Veitchianum*. I have seen only the latter species from this region, and it is extremely unlikely that *R. formosum* should occur there, as we know it only from the Khasia Hills.

R. formosum is a favourite greenhouse shrub, with deliciously scented flowers. According to Millais (l.c.) it grows well and flowers freely out of doors in Cornwall, the West of Scotland, and in Guernsey, but does best even in those mild climates when given the shelter of a wall. There is a beautiful drawing by Fitch in the Botanical Magazine at t. 4457.

37. **Rhododendron burmanicum,** Hutchinson in Kew Bull. 1914, 185.

A branched shrub; one-year-old branchlets elongated, rusty-brown, lepidote, very densely so towards the top and strigose pilose here and there. *Leaves* crowded, numerous, oblanceolate to obovate, more or less shortly triangular at the apex with a knob-like mucro, cuneate at the base, 6–8 cm. long, 1.75–4 cm. broad, subcoriaceous, densely lepidote on both surfaces, the younger ones thinly ciliate especially towards the base, the scales both above and below much less than their own diameter apart, sometimes contiguous or slightly overlapping, with a few larger ones scattered here and there, the epidermis shortly papillous between the scales; midrib impressed above, prominent below, lepidote; lateral nerves 9–11 on each side of the midrib, diverging from it at an angle of 45° or more, arcuate, slender, slightly prominent below; petioles stout, 0.5–1 cm. long, grooved above, about 3 mm. thick, densely brown-lepidote, ciliate. *Inflorescence* terminal, 5–6-

flowered; outer bud-scales broadly ovate, long-caudate acuminate, submembranous, densely lepidote outside, long-ciliate, the inner ones suborbicular, mucronate, villous with white hairs on the margin, sparingly lepidote outside; pedicels 0.5–2 cm. long, arising from about the same point, slender, about 1 mm. thick, lepidote. *Calyx* very small, long-pilose-ciliate. *Corolla* sweet-scented, greenish-white or yellowish, narrowly funnel-shaped, about 4.5–5 cm. long, lepidote all over the outside; tube 3 cm. long, slightly pubescent towards the base outside; lobes 5, ovate-rounded, about 2 cm. long and broad. *Stamens* 10, slightly exserted; filaments white-villous in the lower part; anthers 4–5 mm. long. *Disk* fleshy, lobulate. *Ovary* 6-celled, oblong, densely lepidote; style early exserted, 4 cm. long, sparingly lepidote in the lower half, crowned by a stigma about 3 mm. in diameter.

SOUTH-WEST BURMA. Mt. Victoria, Lady Wheeler Cuffe (originally described from a plant grown in the Glasnevin Botanic Gardens, Dublin).

38. **Rhododendron pachypodum,** Balf. f. et W. W. Smith in Notes, Roy. Bot. Gard. Edinb. ix. 254 (1916).

A shrub 1.5 m. high; older branchlets covered with smooth grey bark; one-year-old branchlets reddish-brown, lepidote; young branchlets clothed towards the base with the briefly persistent scale leaves, densely lepidote; axillary buds probably fairly well advanced at the time of flowering, the scales ovate acuminate, lepidote outside, keeled, the inner ones fringed with soft white hairs. *Leaves* oblanceolate or elliptic-oblanceolate, long and obtusely triangular-acuminate at the apex, gradually narrowed to the base, up to 10 cm. long and 3.5 cm. broad, rigidly coriaceous, sparingly lepidote above or at length glabrous, reticulate, very densely lepidote and glaucous beneath, the scales rather small and about half their own diameter apart, reddish-brown, the epidermis between the scales densely papillous; midrib impressed above, prominent beneath, straw-coloured and lepidote, thick and broad towards the base; lateral nerves slender and distinct below, a little flexuous, about 6–7 on each side of the midrib; petiole 0.5–1 cm. long, lepidote, grooved above, occasionally with a few weak hairs on each side when young. *Inflorescence* about 3-flowered or less; pedicels about 1 cm. long, stout, wrinkled and densely lepidote. *Calyx* oblique, with 5 more or less triangular lobes about 2 mm. long, lepidote outside, and fringed with hairs. *Corolla* yellow (Forrest), all over the outside, about 3–5 cm. long; tube minutely pubescent towards the base outside;

lobes 5, oblong-rounded, about 1.5 cm. long. *Stamens* 10, included ; filaments pubescent in the lower half ; anthers 4 mm. long. *Ovary* 6-celled, densely lepidote ; style about 2.5 cm. long, at length about 5 cm. long in nearly mature fruit, lepidote in its lower ⅔ crowned by a fist-like lobulate stigma. *Capsule* oblique at the base, 2 cm. long, 6-ribbed, densely covered with golden scales.

W. YUNNAN. Western flank of the Tali Range, lat. 25° 40′ N., open stony pasture and amongst scrub, 9000–10,000 ft. ; shrub 2–5 ft., in fruit August 1913, G. Forrest, 11547 (Herb. Edinb.). Tali Range, side valleys, lat. 25° 40′ N., in open scrub, 10,000 ft., shrub 3–4 ft., fls. yellow, August 1914, G. Forrest, 13512 (Herb. Edinb.).

This is a yellow-flowered species very close indeed to my *R. carneum*, which has flesh-coloured flowers. The calyx lobes of *R. carneum* are perhaps much more rounded than in *R. pachypodum* ; the material of both species is, however, as yet very inadequate.

39. **Rhododendron iteaphyllum,** Hutchinson, n. sp.* *R. formosum*, var. *salicifolium*, C. B. Clarke in Hook. f. Fl. Brit. Ind. iii. 473 (1882), non *R. salicifolium*, Becc. (1878).

An erect shrub up to 2 m. high ; branchlets rather densely leafy, the one-year-old ones rather densely lepidote and sparingly setose-pilose. *Leaves* linear or linear-oblanceolate, narrowed to an acute base, subacutely triangular at the apex, 5–9 cm. long, 0.7–1.5 cm. broad, chartaceous, slightly ciliate when

* *Rhododendron iteaphyllum*, Hutchinson, sp. nov. ; affinis *R. formoso*, Wall., sed foliis linearibus vel lineari-oblanceolatis 0.7–1.5 cm. latis differt.

Frutex erectus usque 2 m. altus ; ramuli dense foliati, annotini dense lepidoti et parce setoso-pilosi. *Folia* linearia vel lineari-lanceolata, ad basin acutum angustata, apice subacute triangularia, 5–9 cm. longa, 0.7–1.5 cm. lata, chartacea, juniora leviter ciliata demum eciliata, parce lepidota et interdum supra parce setosa, infra lepidota, squamis circiter diametrum suum vel paulo minus distantibus, epidermide inter squamas crebre papillosa ; costa supra leviter impressa, infra prominens et parce lepidota, basi circiter 1 mm. lata ; nervi laterales vix evoluti, utrinsecus 8–10 ; petioli 0.5–1 cm. longi, lamina decurrente, anguste alati, ciliati, supra profunde canaliculati, lepidoti. *Inflorescentia* terminalis, umbellatim circiter 3-flora ; squamae gemmarum floriferarum apicem versus extra molliter et breviter pubescentes, elepidotae, pilis brevibus marginatae ; pedicelli circiter 6 mm. longi, subdense lepidoti. *Calyx* minimus, elobatus, circiter 0.5 mm. longus, extra lepidotus. *Corolla* e basi late infundibuliformis, circiter 5–6 cm. longa, extra ubique parce lepidota ; tubus circiter 3.5–4 cm. longus, extra non pubescens ; lobi 5, rotundati, medium versus lepidoti. *Stamina* 10, paullo exserta ; filamenta inferne dense pubescentia ; antherae 4.5 mm. longae. *Ovarium* 6-loculare, dense lepidotum ; stylus in dimidio inferiore parce lepidotus, corollam paullo superans, gracilis, stigmate magno lobulato coronatus. *Capsula* recta, 1.6 cm. longa, axi centrali styli basi persistente coronato. *Semina* brunnea, 2 mm. longa, apice caudata.

young, at length eciliate, sparingly lepidote and sometimes a little bristly on the upper surface, lepidote below, the scales about their own or less than their own diameter apart, closely papillous between the scales; midrib slightly impressed above, prominent and sparingly lepidote below, about 1 mm. broad at the base, gradually tapered to the apex; lateral nerves scarcely evident, about 8–10 on each side of the midrib; petioles 0.5–1 cm. long, winged with the decurrent leaf blade, ciliate, deeply grooved on the upper side, lepidote. *Inflorescence* terminal, about 3-flowered, the pedicels arising from the same level; flower bud-scales softly and shortly pubescent outside towards the apex, not lepidote, fringed with short hairs; pedicels about 6 mm. long, rather densely lepidote. *Calyx* very small and not lobed, about 0.5 mm. long, lepidote outside. *Corolla* rather widely funnel-shaped from the base, about 5–6 cm. long, sparingly lepidote all over the outer surface; tube about 3.5–4 cm. long, not hairy outside; lobes rounded, lepidote towards the middle. *Stamens* 10, a little exserted; filaments densely pubescent in the lower half; anthers 4.5 mm. long. *Ovary* 6-celled, densely lepidote; style sparingly lepidote in the lower half, a little longer than the corolla, slender, crowned by a large lobulate stigma. *Capsule* straight, 1.6 cm. long, the central axis tipped with the persistent base of the style. *Seeds* brown, 2 mm. long, tailed at one end.

ASSAM. Khasia Hills: rocks of Bor-Panee, 2000 ft., 24th July 1850, erect bush 6 ft. high, fr. 2nd October 1850, J. D. Hooker and T. Thomson. Along the stream at the same place, fls., Simons. Without definite locality, T. Lobb, No. 3; G. Mann.

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