A review of Rhododendron giganteum and its associated species

BY

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The subject of discussion

The introduction to cultivation of " Rhododendron giganteum " in the year 1919 was an event of note in horticultural history. In September of that year, George Forrest, when collecting on the N'Maikha-Salwin Divide north of Tengyueh, had found this magnificent Rhododendron. Never before had he seen one of such size, a tree 80 ft. high and over 7 ft. in girth, to which there and then he gave the name " Rhododendron giganteum." Presumably his new discovery was a rare plant, for after a prolonged search he found only three trees ; none was in flower but a plentiful supply of seed was obtained.

After seventeen years " R. giganteum " flowered for the first time in this country, in the garden of Sir Bruce and Lady Campbell at Arduaine near Oban in Argyll (plate I). Thereafter similar records were slow to follow from elsewhere, but within the last year or two the flowering of " R. giganteum " has become an almost commonplace event in gardens all along the west coast of Britain, from Cornwall to Argyll. Nevertheless, plants which recently have come into bloom are not all raised from Forrest's original seed ; some are from seed which Forrest subsequently collected and others from Ward's seed.

As the seedlings have slowly matured it has been interesting to observe that they are not all alike, although they differ only in certain minor features. Those which have grown to plants at flowering stage all agree in having enormous flowers, which are crimson-rose or of a delicate purplish-crimson ; and furthermore the growing foliage buds are similar and unmistakable—very long (10–15 cms.), pointed, and covered with dark crimson bud-scales. But they disagree first as to average leaf-size and then as regards the presence or absence of indumentum on the underside of the leaf. A distinction may be made between those that have larger leaves and those that have smaller ; this is evident although the size of the leaves on any one plant is very variable, as is shown by the photograph of *R. magnificum* (plate II), and although as the tree gets older its leaves tend to be smaller. Furthermore, while some plants have glabrous leaves, glabrous to the eye and green on the under sides, others have a definite indumentum—the under side of the leaf is grey. While these are the most obvious distinctions the flowers also vary somewhat in colour and in size.

Unfortunately, because most of the original labels have been lost, the origin and history of plants in gardens cannot be accurately traced. Even when labels are present, identifications are not easily checked. Frequently plants in cultivation do not match the herbarium specimens of the same name and number ; moreover dissimilar plants often bear the same name and number ; there is confusion also because similar plants appear under

different names—" R. giganteum," " Forrest's giganteum," " Ward's giganteum," " R. sinogrande," " R. protistum " and " R. magnificum."

I have been asked to clarify the position and in trying to do this have made a careful survey not only of plants in cultivation but also of the original dried material brought by collectors from Burma, Tibet and China.

This investigation shows that there is still much to be learnt and that, until our knowledge can be supplemented by the acquisition of further material from China, it would be rash to attempt to arrive at any final conclusions. The truth is that the herbarium material is too scant and too imperfect to give a true picture of the plants with which we are concerned, but some interesting facts have come to light which I propose to record.

In this inquiry we have to consider three closely allied species *R. giganteum* Forrest ex Tagg, *R. protistum* Balf. f. et Forrest and *R. magnificum* Ward, and upon our interpretation of these " species " the names to be assigned to plants in cultivation will depend. Do these names, which have been validly published, represent three distinct species or, as has been suggested, has a single species acquired a multiplicity of names ?

Enough material of *R. giganteum* was collected by Forrest to enable us to recognize this species and to understand its characteristics, but our knowledge of the other two is very incomplete ; only one herbarium specimen of *R. protistum* bears a flower, while *R. magnificum* is represented by one imperfect sheet, badly damaged by fire in the British Museum during the war.

The inadequacy of herbarium material has been a source of confusion. The consequent misapplication of names is reflected in plants in cultivation and our limited knowledge makes it difficult to decide whether names have been wrongly applied or labels have been accidently mixed. Before further discussion we must, however, turn our attention to the material at our disposal, first of wild plants as represented by herbarium specimens, and then of living plants in gardens.

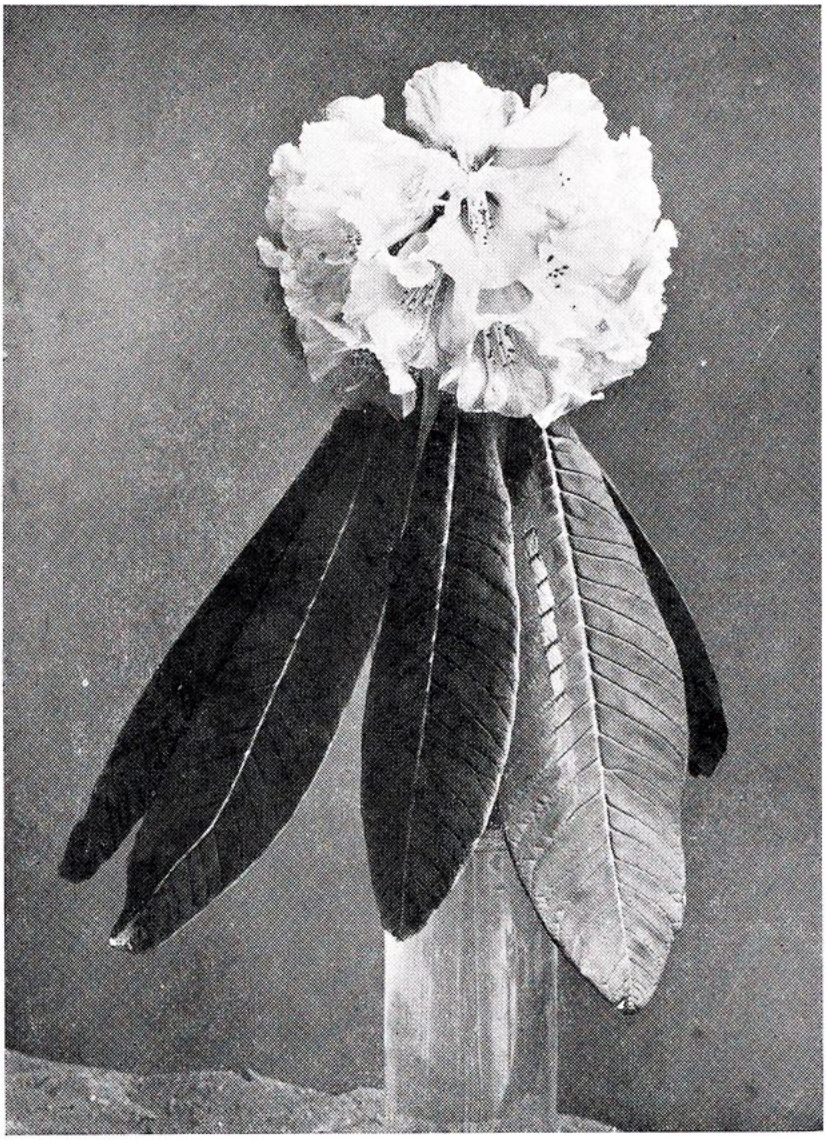
The herbarium specimens of various collectors

R. GIGANTEUM FORREST EX TAGG

An account of the discovery of " R. giganteum," in 1919, was given by Forrest himself in a lecture to the Royal Horticultural Society (reported in the Rhododendron Society Notes, ii, 9 : 1920) :

> " Last autumn on one of our last journeys to the foothills of the N'Maikha —Salwin divide we found what is at present the tallest known species in the genus now named *R. giganteum*. Only a few specimens were seen though possibly it may yet be found in greater numbers in other areas. The largest tree was measured. The height just reached 80 feet, the spread of branch over 40 feet, whilst the trunk at five feet from the ground was 7 feet 9 inches in girth. The bark is rough for a Rhododendron and of a light greyish-red colour. The largest leaves run to about 13 to 14 inches. Unfortunately the species being apparently an early flowerer, as many of that region are, we only secured specimens in fruit, leaf and flower-bud, the latter too immature to give even a hint as to the colour or form of the flower. A fair quantity of seed was collected."

PLATE I



Rhododendron giganteum ; the first flower-truss produced in cultivation at Arduaine in 1936

The specimens collected by Forrest on this occasion are his Nos. 18458 and 18811, leaf and fruit only, N'Maikha—Salwin Divide, lat. 25° 45′, alt. 9,000 ft.

Nothing was known of the flowers until two years later when Forrest returned to the same site. Writing in the Journal of the Royal Horticultural Society (xlix, 27 : 1924) he states :

> " early in 1921 whilst passing through the latter district (Tengyueh) a short journey was made north to secure flowering material of R. giganteum Forrest. It is assuredly a magnificent species and exceedingly rare, for, though extensive search was made only the three trees originally discovered in 1919 were seen.

He now obtained herbarium specimens with flowers, No. 19355, which became the type of the species.

For some years the name " R. giganteum," although applied to plants in cultivation, was to remain a *nomen nudum*, but it became " valid " in 1926 by the publication of a full description by Tagg (in the Notes from the Royal Botanic Garden, Edinburgh, xv, 106 : 1926).

Meanwhile, Forrest had found " R. giganteum " again, in 1924, in two new localities, roughly about 100 miles north of the original site, on the Salwin—Kiu-Chiang divide, lat. 27°, long. 98° 35′, alt. 13–14,000 ft., Nos. 25684 and 25825, and in N.E. Upper Burma, lat. 26°, long. 98° 40′, alt. 11,000 ft., No. 25969, (all these numbers are foliage and fruit only) ; and then in 1925 on the Shweli—Salwin divide, lat. 25° 50′, long. 98° 45′, alt. 9–11,000 ft., Nos. 26311, 27355, 27730, 27793 ; in 1931 he collected from the last named locality his Nos. 29396, 29398, 29399, 29400, 29465 and 29466. Many of these later specimens include a full truss.

As is shown by these specimens, one of the striking features of " R. giganteum " is the dense, rather woolly, buff coloured indumentum covering the whole under surface of the leaf.

In one specimen, however, No. 19338 collected in 1921 from the locality which yielded the type, the indumentum is present only near the leaf margin. Within a woolly buff coloured band, 0·5–2·5 cm. wide, the leaf is apparently glabrous, though magnification shows it is actually " clothed with a soft scattered cobweb-like tomentum, which is open and does not conceal the epidermis." Tagg made this a distinct variety, *R. giganteum var. seminudum* (Notes Roy. Bot. Gard. Edinb. xv, 108 : 1926). Forrest's No. 26311A collected in 1925 is similar.

R. PROTISTUM BALF. F. ET FORREST

In 1918, one year previous to the discovery of " R. giganteum," Forrest had collected specimens (with a single flower) of a small tree—20–30 ft. high—which was named *R. protistum* Balf. et Forrest (in Notes Roy. Bot. Gard. Edinb. xii, 181 : 1920 ; Forrest No. 16351—type). This also came from the Mekong—Salwin Divide, lat. 28°, alt. 13,000 ft., some 100 miles in a direct line from the locality where, later, he was to find *R. giganteum*. Other specimens, named *R. protistum*, were collected in 1919, 1924 and 1925 from across the border in Upper Burma—Nos. 17905, 18393, 18394, 18548, 24775, 26429 and 27614 and others again from as far north as Tsarong in Tibet in 1921, Nos. 20106, 20863, 21719. These are fruiting and leaf specimens, but they seem to agree with the type.

In June 1920 Farrer also collected from Shing Hong in Upper Burma a plant which had been named *R. protistum* (No. 1631). The leaves are glabrous but in shape are like those of typical *R. giganteum*.

In his field notes Farrer states :

" Fragment only, all trace of blossom having gone by April 25, when the plant was first seen. Both in habit and in foliage it precisely copies F. 1519 (this appears to be *R. sinogrande*), but of course the thin green naked foliage has no affinity at all. It occurs at slightly lower elevations in the highest rain forest, and appears to be extremely free in flower. The fattening pods are densely clothed in tawny fur."

He appends a further note :

" F. V. Clerk, Assistant Superintendent of the Htawgaw District (a creditable observer) who came up the Akhyang Valley in March '90— ? on the Expedition which annexed it from China, speaks of a Rhododendron in the valley, of a " magnificent royal purple " blossom. No trace of this was seen by me in the last week of April, nor any Rhododendrons out of bloom except F. 1631."

There is no doubt that *R. protistum* and *R. giganteum* are closely allied and possibly two names have been applied to variants of a single species. If this view is correct *R. giganteum* becomes a synonym of *R. protistum* the earlier published name. It must be remembered, however, that Tagg, with all the material before him and recognising the close affinity, felt justified in publishing the new species *R. giganteum*.

In manuscript notes he sets out the main distinctions, which are readily observed when typical specimens are compared.

" I find a number of minor features that differentiate the two. Forrest says of *R. protistum* ' Flowers fleshy creamy white flushed rose ' ; of his *R. giganteum*, ' Flowers deep rose crimson without markings but a slight blotch of deep crimson at base.' The flower of *R. giganteum* is larger than that of the type *R. protistum* with a corolla from 0·5 to as much as 1·5 cm. longer, moreover, as far as one can judge from dried herbarium specimens, there is a difference in corolla shape. *R. protistum* appears to have a distinctly campanulate corolla, while the corolla tube of Forrest's 19355 (*R. giganteum*) is remarkably straight, widening gradually from a broader base, giving a corolla shape, trumpet or funnel-like. There are differences also in foliage. . . . The leaves of the type *R. protistum* are more gradually narrowed to the base, that for the most part when leaves of equal length are compared, those of *R. protistum* are narrower, and that the broadest part of the leaf is nearer the leaf apex than in *R. giganteum*. The conspicuous difference is in the indumentum of the leaf under surface. All the leaves of the specimens cited under *R. giganteum* have a dense buff or pale cinnamon indumentum covering the whole of the leaf under surface, the primary veins and midrib included although on these the indumentum is less dense. The leaves of Forrest's No. 16351 (*R. protistum* type) are a mat green on the underside, the epidermis not at all concealed or veiled only by a light thin indumentum of scattered hairs, between the trailing cobweb-like branches of which the epidermis is clearly visible under magnification."

In 1930 when Tagg described *R. giganteum* in the Species of Rhododendron he seemed less certain of the distinctions. He writes under *R. giganteum*:

> " This species resembles *R. protistum* in most of its details. Its chief and perhaps only marks of distinction are the uniform brown indumentum which clothes the under surface of the leaves and the deep crimson corolla."

Ward also collected a plant which was named " R. protistum," in the Delei Valley in 1928, K.W. No. 8069. His specimen consists of leaves only and appears to have no indumentum, yet his field notes state that the leaves are silvery beneath.

R. MAGNIFICUM WARD

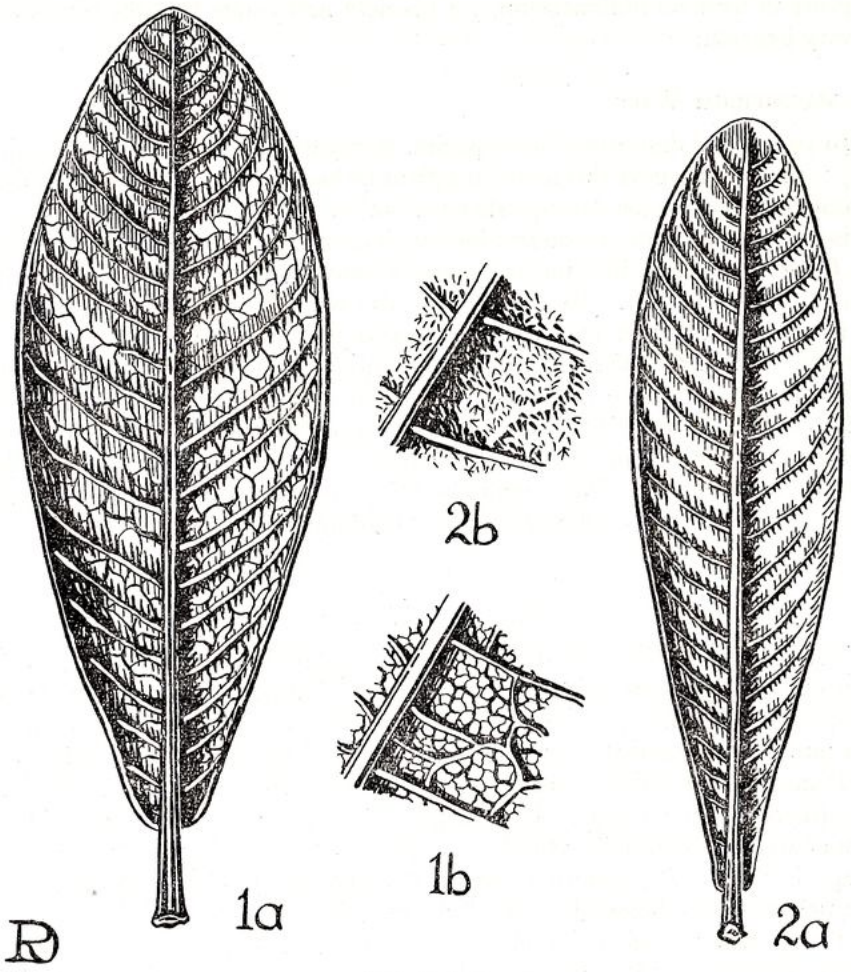
In 1935 Ward described a new species, *R. magnificum* (Journ. of Bot. lxxiii, 247 : 1935). He gave this name to a plant he had found on the Burma-Tibet Frontier in 1931 in the Adung valley, 28° 10′ N., 97° 40′ E. at 6,000–8,000 ft. It is a tree, he records, 40–60 feet high with rosy-purple flowers, closely allied to *R. protistum* but differing in having a cobweb-like indumentum on the under side of the leaf. He compares it also with *R. sinogrande* from which it is said to differ in its somewhat sparse indumentum and rosy-purple corolla. The type, Ward No. 9200, the only specimen I saw in the British Museum, is, as I have remarked, imperfect, as is the material we have in Edinburgh. *R. magnificum* is obviously closely connected with the other two species. Ward, in fact, in a letter to me written in 1948 questioned the validity of the species, but a name is undoubtedly required for plants with these rather distinctive characteristics in combination.

Plants in cultivation

Turning from the herbarium to an independent review of plants in cultivation it may be affirmed that, in a preliminary classification, those which belong to the *R. giganteum—R. protistum—R. magnificum* commixture fall into one or other of seven different categories which are listed below.

1. Plants with a number and the name " *R.* giganteum." Nos. 18458 at the Royal Botanic Garden, Edinburgh and No. 27730 at Brodick. These plants were undoubtedly raised from seed of " R. giganteum." The leaf shape is that of *R. giganteum* Forrest ex Tagg but indumentum is absent, the under surface being glabrous to the eye (fig. 1).
2. Plants without label, which exactly match those cited above. Those plants grown as " R. giganteum " are presumably raised from Forrest's seed. The Arduaine plant and plants from Trengwainton and the Trereham Nurseries in Cornwall fall into this group.
3. Plants labelled " R. protistum " which exactly match those cited above, one without number at Brodick, one at Mount Stewart grown as K.W. 7427 ?
4. A plant grown at the Royal Botanic Garden, Edinburgh, under Ward's No. 9200 (the type of *R. magnificum*). The leaves are broad and to the eye glabrous.
5. Plants with no labels, leaves glabrous, tending to be somewhat narrower than those of plants cited above. Several plants at Brodick.
6. Plants grown as " Grande Series " and as " R. sinogrande " under Ward No. K.W. 6782 (listed in Ward's Field notes as " R. giganteum var." and in

the Rhododendron Year Book as *R. sinogrande*) also plants grown as " Grande Series " or " R. sinogrande " under K.W. 7642. Leaf shape in all these plants, as in *R. protistum*, distinctly narrower than in " R. giganteum " and *R. sinogrande* ; the under sides of the leaves covered with a thin grey cobweb-like indumentum, not glabrous, but by no means densely covered and not silvery as in *R. sinogrande*. Several plants under these numbers have flowered at Brodick.



Figs. 1 & 2

1. Rhododendron giganteum (category 1) ; 1a, leaf seen from below, X$\frac{1}{6}$; 1b, part of lower surface, X3. 2. Rhododendron magnificum (category 7, from Mount Stewart) ; 2a, leaf seen from below, X$\frac{1}{6}$; 2b, part of lower surface, X3.

7. Plants with no name or number which match those cited as (5) above. There are many at Mount Stewart (plate 2 and fig. 2) fairly constant in leaf shape but showing great variation in leaf size ; others at Brodick, Corsewall and elsewhere.

All plants I have seen fall into one or other of the above categories ; but I have not cited every garden where they are found, only examples when specimens have been preserved.

PLATE II

Rhododendron magnificum from Mount Stewart, showing variation in size of leaf

These seven categories have been set out for the sake of clarity, but it will be evident that plants in categories 1, 2, 3 and 4 are all exactly alike. Possibly some may be more frost tender than others, such as a large batch of " R. giganteum " which was planted at Benmore before the war of which none has survived, and one or two plants seen at Brodick which had had leaves damaged by frost and were stunted in growth. The leaves of the plant in category 4 are broad, resembling exactly those of plants in category 1. I have noticed for the first time this year what seem to be a few traces of a very thin greyish indumentum on one or two leaves.

Furthermore, I can draw no definite line of distinction between plants in the categories 1, 2, 3 and 4 and those in category 5. As already mentioned the leaves of any one plant are very variable in size; the inner leaves of a whorl are often small; leaves on the lower shaded branches tend to be smaller than those on the upper, fully exposed shoots.

Plants in categories 6 and 7 are alike, but are readily distinguished from those in categories 1, 2, 3, 4 and 5 by the presence of the greyish cobweb-like indumentum on the under side of the leaf. There is again considerable variation in leaf size, but on the whole the leaves are distinctly narrower than in categories 1, 2, 3 and 4. Some plants with larger leaves scarcely differ in leaf shape from plants in category 5; others again have leaves less than the average size.

Some of these plants in various categories have flowered and slight variation may be observed in size of flower and depth of colour, but there is no significant difference. The growing foliage buds which are characteristic for the group show little variation.

It would, therefore, appear that the only significant distinction as regards plants in cultivation is between (*a*) those that have larger, broader, glabrous leaves and (*b*) those with smaller, narrower leaves clothed with a grey- cobweb indumentum (see figs. 1 and 2).

Assessment of the Investigation

If now the herbarium material and cultivated plants are considered together, the whole material can be rearranged to give the six following groups.

A. Typical *R. giganteum* Forrest ex Tagg, with large broad leaf, with dense buff indumentum. Represented in the herbarium by the type of *R. giganteum* and other sheets. Not represented in cultivation.

B. *R. giganteum var. seminudum*, with indumentum confined to a strip round the leaf margin. Not in cultivation. An unimportant modification.

C. " R. giganteum " of cultivation (categories 1, 2, 3, 4 and 5) with large broad leaves (as in A and B) but without indumentum, to the eye glabrous. Represented in the herbarium only by Farrer No. 1631. To be included here are plants raised from Forrest's seed No. 18548 (syntype of *R. giganteum*) and from Ward's No. 9200 (type of *R. magnificum*).

D. *R. protistum* Balf. & Forrest, with less broad, glabrous leaves. Represented in the herbarium, but not (or doubtfully) in cultivation. Possibly some cultivated plants in category 5 might, on leaf size and shape, be identified with *R. protistum*, but those I have seen tend rather to *R. giganteum*. The flower on the authentic herbarium sheet of *R. protistum* is smaller than the flowers of cultivated plants.

E. Plants with the narrower leaves of *R. protistum*, but not glabrous, covered with a grey cobweb-like indumentum. As far as one can judge in the absence of adequate material these plants correspond to *R. magnificum* Ward. The flowers of K.W. 9200 in the Herbarium (British Museum) are smaller than those of cultivated plants. Well represented in cultivation (categories 6 and 7).

The curious fact that plants of the same name and number should be so strikingly different in the herbarium and in cultivation requires some explanation. How is it that Forrest's Nos. 18458 and 27730 in the herbarium have a dense buff indumentum, while equivalent plants in cultivation are without indumentum ?

Again why should the grey cobweb-like indumentum, obvious in the dried specimen of Ward's No. 9200 (type of *R. magnificum*) be absent from the leaves of the growing plant under this same number ?

Sir George Watt suggested that as a Rhododendron became older, its leaves might acquire an indumentum ; Ward to whom I wrote with regard to *R. magnificum* thought this might be possible. Whether or not this is true, in the meantime, can neither be proved nor disproved. Just as this paper is going to press I have received some very interesting and pertinent observations from Mr. G. Graham, Gardener at Mount Stewart, Newtownards. He writes :

> " I can certainly assure you that all three types of leaf can occasionally be found on one plant though it only seems to happen when a *young growth arises from the main trunk* of a plant that has borne flowers. The young growth then has the green foliage, the flower bearing branch has the buff foliage and usually lots of branches have the silvery intermediate type. It is fairly common here to find the two types of foliage on one plant, *i.e.* silver and green on plants not yet flowered and silver and buff on flowering plants. I have a suspicion that as the trees get older the indumentum will get browner and more woolly and will then match more closely with the herbarium specimens, as I suspect these would be obtained from mature trees. I would certainly describe the green underleaf as juvenile, silver undersurface the intermediate stage and the buff colouring when the plant has reached maturity. The green leaf stage in the foliage changes seems to pass more quickly than the change from silver to buff."

It is no less difficult to explain why the leaves of the cultivated *R. magnificum* (K.W. 9200) should be broad like those of *R. giganteum* and not narrower like the leaf of Ward's herbarium sheet (K.W. 9200).

What is the real significance of these differences in leaf shape ?

Is the *R. giganteum—R. protistum—R. magnificum* complex one in which three distinct species and one variety are involved, as the nomenclature suggests, or would it be more correctly interpreted as variations of a single species, or does the answer lie between these extremes ? I have little doubt that the observed differences are less fundamental than the nomenclature would presuppose.

Variation in size and shape of leaf may possibly be largely a matter of age. In the Grande Series young plants often have very large leaves, and as the plant matures succeeding leaves are noticeably smaller and narrower. This tendency may be observed in *R. sinogrande* and other species as well as in *R. giganteum*. Yet if it is maintained that the names *R. giganteum*, *R*

protistum and *R. magnificum* represent only a single species, then it must be allowed that some plants retain their juvenile characteristics for a much longer period than others and perhaps throughout their whole lifetime, while others develop adult features precociously.

As to the presence or absence of indumentum it is significant that the indumentum of *R. giganteum* is bistrate, consisting of an upper layer of shaggy (dendroid) hairs above a lower stratum of flattened rosulate hairs. Can the difference between the " species " be explained by the fact that the bistrate condition gives a buff indumentum (as seen in *R. giganteum*), the loss of the upper layer of dendroid hairs leaves a unistrate thin cobweb-like indumentum of rosulate hairs only (as in *R. magnificum*), while the loss of both layers results in a glabrous leaf (as in *R. protistum*). A tendency towards an evanescent indumentum is indicated by the variety *R. giganteum* var. *seminudum*. Moreover a similar variation is observed within the limits of a single species in the case of *R. arboreum*, where the under surface of the leaves is either woolly or with a thin and plastered indumentum, depending on whether the upper layer of the bistrate indumentum (which masks the lower layer) is present or absent. A tendency for the upper layer to be transitory is a feature of various members of the Grande Series (Cowan, The Rhododendron Leaf, 43–44, 54–55 : 1950).

It may be suggested that a genetical make-up permitting a certain juvenile/adult fluidity and a selective capacity in respect of trichome density might account for all the variations within the complex. The facts would indicate that from the seed of one " species " we can raise seedlings of another.

Nomenclature—a practical working arrangement

With regard to nomenclature, if the complex is taken to represent a single species, then the name *R. protistum* Balf. f. et Forrest, having priority of publication, must be used. It may be claimed that there is no case for the retention of the two other specific names. On the contrary, reduction to synonymy is a course which is not so decisive as at first sight appears, because *R. protistum*, in the wider sense, is a variable species and a need for supplementary subspecific or varietal names can well be maintained. Any opinion as to the number and status of these subordinate taxa, expressed at the present time, can, however, only be tentative, based as it is upon partial and inconclusive evidence, and, therefore, any immediate revision of the nomenclature is subject to the objection that it is liable to remodification as soon as further information is forthcoming. Moreover, mere alteration of the present nomenclature will add nothing to our knowledge of these closely associated species.

Accordingly I propose to alter neither the status of the " species " nor the nomenclature, but to retain the three specific names and as a provisional and working arrangement to apply them in the following manner.

R. GIGANTEUM Forrest ex Tagg. Leaves broad as in fig. 1, with dense woolly indumentum or without indumentum. Herbarium material cited as A, B and C. Cultivated plants cited as categories 1, 2, 3, 4 and 5.

R. PROTISTUM Balf. f. et Forrest. Leaves narrow as in fig. 2, glabrous. Herbarium material cited as D. Not in cultivation (but possibly some plants which may be found in cultivation and which would be cited as category 5 might properly be placed here).

R. MAGNIFICUM Ward. Leaves narrow as in fig. 2, with a thin cobweb-like indumentum. Herbarium material E. Cultivated plants in categories 6 and 7.

The above arrangement has the advantage that it involves no considerable change of names and the retention of the name *R. giganteum* Forrest ex Tagg is justified assuming that stress is laid on differences of leaf-shape rather than on the presence or absence of indumentum. Moreover it has been shown that equivalent numbers of *R. giganteum* have glabrous leaves or leaves with an indumentum. It will be necessary to alter the names on a few plants grown as *R. protistum* (so named because the leaves are glabrous), but this will entail much less disturbance than would be involved by referring to *R. protistum* the many plants grown as *R. giganteum*.

Since the type specimen of *R. magnificum* is so unsatisfactory, and since, too, the one plant of the same number cited from cultivation (category 4) is referred to *R. giganteum*, it might seem desirable to leave the name *R. magnificum* on one side as *nomen dubium*. It would then be necessary to propose a new name for plants in categories 6 and 7. There is, however, no conflict between the original description of *R. magnificum* and the cultivated plants to justify this action, which might be proved superfluous as soon as better wild material of *R. magnificum* became available.