

Rhododendrons of the *Rh. sanguineum* Alliance

BY

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Rhododendrons allied to *Rh. sanguineum* Franch. have been grouped together in "The Species of Rhododendron" as the Sanguineum Subseries of the Neriiflorum Series. This subseries is one of the most distinctive in the genus, but, at the same time, one of the most complex; the species intergrade and overlap in bewildering confusion; among elepidote Rhododendrons no other assemblage of plants is so difficult to arrange in phyletic sequence. Accordingly, the present investigation was undertaken with the object of solving some of the problems of classification, and of simplifying the practical business of naming plants in the *Rh. sanguineum* alliance.

In point of time research need not be carried further back than the year 1898, when Franchet gave the name *Rh. sanguineum* to a plant which had been found by Soulié in Western Yunnan. When Forrest began collecting in Western China in 1904 this was the only Rhododendron of its kind that was known. However, during the twenty-five years which followed, he and other collectors discovered many plants similar to Franchet's species but obviously not identical. From time to time many of these were given distinctive specific names, and when "The Species of Rhododendron" was published in 1930 nearly thirty species allied to *Rh. sanguineum* had been described. All the described species were not, however, even then regarded as distinct, and several names appear in synonymy. A large number of specimens had been collected, and gaps which had seemed to exist when little material was available were now no longer apparent. Although the descriptions of new species were detailed and accurate the criteria of distinction in fact did not serve to segregate distinctive units. Recent investigation shows that the intergrading between so-called species goes much further than was supposed. For reasons which will be given, many plants in this subseries cannot now be definitely or correctly named, often it is impossible even to assign them to one of the distinct sections into which the subseries has been divided. For some time it has been obvious that the nomenclature must be revised, and as the subseries is now well represented by herbarium specimens (there are some eight hundred housed at the Royal Botanic Garden, Edinburgh, alone), and is extensively cultivated there is ample material for a further review.

Problems of Classification and Nomenclature.

Why should it be especially difficult correctly to name a Rhododendron in the Sanguineum group? One possible answer to this question became evident in the course of this investigation—because of a natural reluctance still further to multiply specific names.

The various criteria which have been used for distinguishing these closely allied species are : habit, dwarf and compact or less dwarf and compact ; leaf shape ; indumentum, thin, woolly or none ; bud scales, persistent or deciduous ; bristles, present or absent ; flower colour ; texture of the corolla, thin or fleshy ; calyx, large or small ; ovary, eglandular or glandular ; and stamens, with filaments glabrous or puberulous—and all these characters can be combined in a great many different ways. With various combinations the thirty species already mentioned have been described, but this is a number which comes far short of exhausting the possible combinations. It has been found that difficulty in naming arises when any plant, which we may call *X*, is found on close examination, to have a set of characters which does not correspond exactly to one of the sets related to a definite name. Such a plant, agreeing in part with several so-called species, may with equal appropriateness be given one of several specific names. Whether it be named Rh. a, Rh. b, or Rh. c (using a, b, c, to represent different specific names) depends upon which character is considered to be the more outstanding ; but this is a matter of opinion and not fixed, and with varying opinions there has been no stability in nomenclature. Assuming that the various characters used to discriminate between species are all important, it is necessary to provide a new name for plant *X* with a new combination of characters. A natural reluctance to give new names has led to ambiguity, because we find that plant *X*, with definite characteristics, has, instead of receiving a new name, been at different times and by different people called Rh. a, Rh. b, or Rh. c, possibly with the postscript "vel aff."; but none the less three names for one plant. It cannot be said that any one of these names is the correct one to use, and that the others are wrong. The plant *X* should have been given a new name, because the criteria used to distinguish species have set up a standard which, if it applies to any, must apply to all the closely allied plants in the group. Furthermore, it is now clear that upon this standard, instead of thirty names given to certain variants, some two hundred names will be needed to distinguish all those that are now likely exist. To attempt to make thirty names, in effect given at random, do duty for two hundred, leads inevitably to confusion. It is important to note that having adopted a standard for a species this standard must be maintained for a whole group of very closely allied plants. If the thirty existing names were to be used the standard for the species must be altered. Unless the descriptions of the existing "species" are modified, and the limits of

variation to be recognised under each is clearly defined, there is sure to be ambiguity—the confusion in the Sanguineum Series is already great.

One or two actual examples using only a few characters will illustrate how this unsatisfactory state of affairs has come about.

Typical *Rh. sanguineum* has crimson flowers and glabrous stamens, typical *Rh. haemaleum* (i.e. as first collected) has black-crimson flowers and puberulous stamens. The two species were easily separated by these criteria when *Rh. haemaleum* was described in 1919 and only one or two specimens were known. Since then similar plants have been discovered, some with crimson flowers and puberulous stamens, and others with black-crimson flowers with glabrous stamens. Each of these new forms may be given either specific name, the one to be preferred will depend upon whether the flower colour or the anatomical character is to be considered the more significant.

Again, typical *Rh. haemaleum* with a tomentose eglandular ovary and deciduous winter bud-scales was, and is, easily distinguishable from typical *Rh. didymum* (of dwarfer growth) with glandular ovary and persistent bud-scales. But now we have a range of plants of varying habit, some with a tomentose ovary and persistent bud-scales, some with a glandular ovary and deciduous bud-scales. With existing nomenclature either one or both of the newer plants may be called *Rh. didymum*, and either one or both may be called *Rh. haemaleum*, and the name used will depend upon the character which is considered the more worthy of emphasis. There is no correct view, and one individual is even liable to alter his opinion from time to time. The result has been that under the name *Rh. haemaleum* and under the name *Rh. didymum*, very mixed collections of plants are included, and identical plants are found under both names.

From a different angle we may take a further illustration to show how, both in herbaria and in gardens, many plants with like characters have been placed under different names. Take, for example, a plant with yellow flowers, a thin greyish indumentum, a glandular ovary and persistent bud-scales. This plant is distinct from any described species but is near several—near *Rh. himertum*, *Rh. citriniflorum*, and *Rh. fulvastrum* which have yellow flowers; near *Rh. roseotinctum* with a glandular ovary; and near *Rh. didymum* and *Rh. horaeum* which have persistent bud-scales. It may with equal propriety be given any one of the above names, for the species are all very closely inter-related. In practice there has been no constancy in naming specimens, and frequently identical plants are to be found not merely under two different specific names but even under four or five.

Examples of this kind might be greatly multiplied, but those that have been given will be sufficient to indicate that, with the nomenclature as it stands, a high percentage of plants in this group cannot be definitely and correctly named. Nature has presented us with a very complex assemblage of plants, and has not been very helpful, providing

few gaps to mark distinctive forms, and to divide this assemblage into a number of specific or other units tends to create breaks where none exist. And yet plants some distance apart in the series seem distinctive enough to merit distinguishing names.

Before deciding upon any classification it will be well to give further consideration to the criteria which have actually been used for distinguishing the allied species, so as to assess their value and to decide which may be the more useful for our purpose. We may take each character in turn.

1. *Habit*.—All are dwarf under-shrubs often rather flat on the top, usually from 1–3 feet in height, with numerous branches, and with the upper leaves often in rosettes.

While the habit is characteristic of the group, it is of little or no importance in distinguishing species. For example, although we are accustomed to regard *Rh. aperantum* as a dwarf plant from 6–18 inches high (this is the typical form in gardens), Rock has collected specimens of *Rh. aperantum* which are recorded as coming from plants 5–6 feet high, other specimens are taken from plants of intermediate size.

2. *Leaf Shape*.—If a few species are excepted, the leaf shape is again very characteristic of the group, and constant. The leaves are small, narrowly obovate or oblanceolate, leathery, generally more or less pointed at the apex, and obtuse at the base. Leaf shape in the sections Sanguineum, Cloiophorum, Citriniflorum, Eudoxum, and Aperantum is very constant, showing little more variation throughout than may be found in a single plant. The section Dichroanthum is, however, an exception to the general rule. The three species, *Rh. dichroanthum*, *Rh. apodectum*, and *Rh. scyphocalyx* have leaves which are broadly obovate, oblong-elliptic or oblanceolate (in *Rh. apodectum*, rounded at the base), larger than those of *Rh. sanguineum* and broader towards the apex with a somewhat different texture. The true *Rh. scyphocalyx* of Forrest (No. 18050), a plant 4–5 feet high, has a large and very broadly obovate leaf, almost auricled at the base. Many plants grown under this name in gardens have, however, a typical *Rh. sanguineum* leaf. In this respect they agree also with typical *Rh. herpesticum*.

3. *Indumentum*.—Several important distinctions should be noted.

Certain plants have a continuous, fawn or greyish, more or less plastered, compact, thin indumentum, composed of minute irregular star-like hairs, sometimes also with a few branched hairs. This indumentum is characteristic of *Rh. sanguineum*, of *Rh. dichroanthum*, and of many other species.

Some have a continuous, thick, woolly indumentum of branched hairs as is seen in *Rh. horaeum* and *Rh. citriniflorum*. This woolly type of indumentum recalls the prevalent indumentum of the Haematodes Subseries, and may also be observed in several species of the Neriiflorum Subseries.

In contradistinction to plants with a continuous indumentum there are many like *Rh. eudoxum* and *Rh. fulvastrum* which have an interrupted, sparse, mealy or weblike indumentum. Here again the hairs are branched. The covering is discontinuous and there is no pronounced development of waxy pegs or papillae.

Again the leaves of other species are glabrous with or without papillae. The underside of the leaves of *Rh. aperantum* and *Rh. parmulatum* have a covering of waxy pegs and are quite glabrous or rarely there is a trace of floccose hairs. The papillae are of the same sort as in *Rh. neriiflorum*.

4. *Bud-scales*.—The presence or absence of persistent bud-scales on the shoots has been used as a diagnostic mark, but whether or not this should be regarded of importance as a specific character is a matter open to question—probably it is of no great significance. In typical *Rh. aperantum* bud-scales persist. *Rh. sanguineum* var. *didymoides* differs from *Rh. sanguineum* by the presence of persisting perulae (and a glandular ovary)—this variety might better have been regarded as a colour variety or form of *Rh. didymum*, in which bud-scales persist and the ovary is glandular.

5. *Bristles*.—The presence of bristles on the young stems has been used to distinguish the species *Rh. trichomiscum*. To regard the presence of a few bristles as a sufficient specific criterion in all cases would necessitate a considerable and probably needless multiplication of names. Plants, with and without bristles in various forms, but otherwise very similar, have been found throughout the whole alliance.

6. *Flower Colour*.—The colour of the flowers in the subseries is variable, black-crimson, crimson, rose-pink, white-margined rose, white, yellowish-red, orange or yellow. The stress laid upon flower colour as a distinguishing mark has, however, varied greatly throughout the subseries.

The name *Rh. aperantum* has been applied to all plants with very distinct waxy papillae and persistent bud-scales, and the species is presumed to be a variable one as to the colour of the flower.

On the other hand, distinct specific names have been given to plants which differ from *Rh. sanguineum* only in the colour of the flowers and in other very minor details. *Rh. haemaleum* with dark crimson flowers and puberulous stamens is regarded as a species distinct from *Rh. sanguineum* with crimson flowers and glabrous stamens. Again *Rh. himertum* differs from *Rh. sanguineum* in the same manner as *Rh. haemaleum*, but has yellow flowers, while *Rh. leucopetalum* has white flowers and *Rh. cloiophorum* pink flowers. It is convenient for gardeners to have distinctive names for different colour forms, but flower colour is, of course, of less diagnostic significance than an anatomical difference.

7. *Texture of the Corolla*.—Some species have a fleshy corolla, other species have a thin corolla: by this means the Dichroanthum Section

may be distinguished, but, especially when working with dried specimens, this is an uncertain character to use.

8. *Calyx*.—A criterion of more importance as a specific mark, although very inconstant, is the size of the calyx. Within a group of similar plants there may be a very considerable variation in calyx size, from large to small with every intermediate degree.

Typical *Rh. roseotinctum* has a small calyx, 2-4 mm. long, typical *Rh. mannophorum* a large calyx, 1 cm. long, but there are intermediate forms. In other characters those plants agree, and, if we are to regard them as specifically distinct, then we must acknowledge that many parallel forms have an equal claim to specific rank. In the *Dichroanthum* Section and in *Rh. parmulatorum*, however, the calyx takes the form of a large fleshy cup or shield.

9. *Ovary*.—The ovary and pedicels are often tomentose, but the ovary, or the pedicels, or sometimes both, may be glandular as well as tomentose. As a diagnostic mark the presence or absence of glands has been relied upon throughout the whole of the genus *Rhododendron* in distinguishing different species or varieties. This is a useful diagnostic character, but as used in the *Sanguineum* Subseries has led to much ambiguity. For example, a plant having a glandular ovary, a thin indumentum and yellow flowers, for which there is no distinctive name, has been called *Rh. himertum* (which has yellow flowers and a tomentose ovary), or *Rh. roseotinctum* (which has pink flowers and a glandular ovary), or *Rh. citriniflorum* (which has pink or yellow flowers, glandular ovary and a woolly indumentum).

10. *Stamens*.—The filaments are either glabrous or pubescent. The function the hairs fulfil when they are present is difficult to guess, but of all the criteria used to distinguish species this is undoubtedly the least important.

Basis of Classification and Revision of Nomenclature.

In "The Species of *Rhododendron*" it is stated that there is "abundant evidence of the distribution of these characters upon Mendelian lines." An examination of plants, both living and dried, shows that many of the possible combinations do occur in nature. Upon the present standard of nomenclature some one hundred and twenty specific names would be required for the known variants, and it is possible to predict the discovery of some seventy new species and to describe them in advance of their discovery. Even if all these variants can rightly be regarded as species, the multiplication of specific names to this extent is so obviously undesirable that one turns at once to the alternative course of modifying the standard. It is equally undesirable to regard all the plants within this group as forms of a single very variable species, a not unreasonable point of view, but they differ too widely.

Accordingly, I have examined all the available material very carefully—several thousand living plants and herbarium specimens—in

order to determine the points where the more distinctive breaks in the series occur. I find that *Rh. dichroanthum* (with *Rh. scyphocalyx* and other very closely allied species) and *Rh. parmulatum* are fairly easily distinguished from other members of the group by the shape of the calyx, texture and colour of the flowers, and also to some extent by the shape and size of the leaves. And again, *Rh. dichroanthum* (with the other species), in which the undersurface of the leaves is covered with a continuous indumentum, cannot be confused with *Rh. parmulatum* in which the leaves are glabrous with distinct waxy papillae.

The great assemblage of forms which remains can be segregated into relatively distinct groups by the character of the indumentum on the undersides of the leaves. In the first group the indumentum is continuous, thin and plastered, as in typical *Rh. sanguineum*. Many forms with similar indumentum differ in flower colour, in the presence or absence of glands on the ovary and in other respects. The indumentum in the second group is discontinuous, thin and mealy, as in *Rh. eudoxum*, or web-like or arachnoid as in *Rh. fulvastrum*, two distinct types each again with its parallel series of varying forms. In another group the indumentum is continuous and thick and woolly, as in *Rh. citrinifolium* or *Rh. horaeum*. The next group is without indumentum, but the undersides of the leaves are covered with distinct waxy papillae as in *Rh. temenium* and *Rh. aperantum*. From other members of this group typical *Rh. aperantum* stands apart and is easily recognisable by the persistent bud-scales—although it is not only in *Rh. aperantum* that bud-scales persist. In both divisions of this group and in the third group there are again varying forms.

It is thus possible to segregate the many forms into eight definite groups, and I am convinced by repeated experiment that the use of other criteria, such as the presence or absence of glands on the ovary, or of persistent or deciduous bud-scales, leads to a less useful and more artificial segregation.

It must now be decided whether each of these groups is to be regarded as a single variable species or as a section including a number of specific units. This is largely a matter of convenience, but a division into sections tends to accentuate differences which are in fact small. I therefore propose to recognise eight distinct polymorphic species. That is to say, I take a variable species like *Rh. aperantum* as a standard of the species instead of basing the standard upon restricted species like *Rh. cloiophorum*.

The choice of names is determined by the rule of priority—*Rh. sanguineum*, *Rh. citriniflorum*, *Rh. eudoxum*, *Rh. fulvastrum*, *Rh. temenium*, *Rh. aperantum*, *Rh. parmulatum*, and *Rh. dichroanthum*—eight species which can be clearly defined, so that every plant with certain definite characters comes under one specific name, and cannot come under any other. It is essential that the limits of variation be clearly stated in order to dispel the present dubiety in naming—a

matter of first importance. Coming now to variants of the species, I propose to recognise a number of subspecies, because it is of no great consequence whether these be called subspecies, varieties or forms, and already many have been given specific names. Although these names are based largely upon flower-colour they are of value to horticulturists and familiar to them. Moreover, I consider it desirable to cause as little disturbance as possible to existing nomenclature.

To leave the nomenclature unchanged is, however, not possible. Existing names are not only inconsistent in value, but they do not discriminate with any regularity. At present all the variant forms of *Rh. aperantum* come under one specific name. Under *Rh. sanguineum* there are thirteen specific names; for the corresponding species, *Rh. fulvastrum*, six names; for *Rh. temenium*, and for *Rh. citriniflorum*, three names; and all have parallel series of variants.

The same inconsistency is evident within the limits of a single species. In *Rh. sanguineum*, as now defined, among forms with deciduous bud-scales there are two series of corresponding variants, one series in which the ovary is tomentose, the other with the ovary tomentose-glandular. The eglandular series includes *Rh. haemaleum* with black-crimson flowers, *Rh. cloiophorum* and *Rh. asmenistum* with rose-pink flowers, *Rh. leucopetalum* with white flowers, and *Rh. himertum* (also *Rh. poliopeplum* and *Rh. nebrates*) with yellow flowers—eight names. The parallel glandular series includes only three names, *Rh. roseotinctum*, *Rh. torquatum* and *Rh. mannophorum*, all with rose-pink flowers. These names have been given to forms with crimson, black-crimson or yellow flowers, or to forms differing from each other in having glabrous or puberulous filaments. The need for adjustment is obvious.

In making adjustments it has been necessary at some points where there are wide gaps in existing nomenclature to give new names to more distinctive forms. I have not, however, thought it necessary to increase the names to such an extent as to bring all subspecies to an equivalent standard. Thus, while I have thought it wise to distinguish between typical *Rh. sanguineum haemaleum*, and its glandular equivalent, *Rh. sanguineum atrorubrum*, I have not distinguished between glandular and eglandular forms of *Rh. fulvastrum*, but allow the existing name, *Rh. fulvastrum*, to cover both. Moreover it must be understood that the species vary within the widest limits in characters not taken as diagnostic. The same argument applies, even with greater force, to the subspecies.

Descriptions and Key—Explanatory Notes.

In drawing up a classification, by taking the more constant characters I have divided the whole subseries into a small number of specific units (8) which, although somewhat artificial, give a relatively true

picture of the group. No distinguishing marks are infallible, but on the whole those that have been chosen provide a practical and convenient classification while retaining an approximate equivalent value for the species. Having accepted only a limited number of species the number of diagnostic characters, regarded as of specific significance, must also be limited. Each additional character used increases the necessary number of names in geometrical progression. The choice of names is determined by the "International Rules of Nomenclature" and the species with their distinguishing criteria are shown in the following key.

It is unnecessary to repeat here descriptions which are very fully given in "The Species of Rhododendron," but it is important that the scope of each variable species should be clearly defined. In notes which follow the Key, attention is drawn to any emendation or amplification of the original description which may be required. In the same way the criteria which have been used for subspecies are shown in the Key, and again, in the notes attention is directed to essential points and to any modification of the original description that may be needed. It is agreed that to regard variants, which are often little more than colour forms, as subspecies is still to over-emphasise unimportant differences, but this has been done for the sake of greater simplicity, and to avoid the use of multiple names, as well as for other reasons already given. Those who grow the many different forms require names to discriminate between them. In gardens these forms are mostly 'under collectors' numbers, and to facilitate naming I have given separately under each subspecies a list of the numbers of the specimens I have seen. The numbers in brackets indicate specimens which are incomplete, but which have been placed under a definite name, because this can be done without much likelihood of error. A separate list, added as an appendix, records specimens which, because of the inadequacy of material, cannot be given a definite name, but certainly belong to the Sanguineum Subseries.

It should be noted that all numbers quoted refer to herbarium specimens, which are the plants to which the names were first given. For various reasons the numbers on plants in cultivation do not invariably correspond to the herbarium numbers.

Where numbers of specimens are equated in the following lists, the information is on the authority of the collector.

KEY TO THE SPECIES AND SUBSPECIES IN THE SANGUINEUM SUBSERIES.

- A. Calyx small or large, not fleshy, cup-shaped nor shield-shaped, corolla thin, rarely orange to orange-crimson, leaf-shape as in *Rh. sanguineum*.

B. Indumentum on the undersurface of the leaves continuous.

C. Indumentum thin, plastered or somewhat spongy,
grey to fawn **Rh. sanguineum**

KEY TO THE SUBSPECIES OF RH. SANGUINEUM.

Flowers crimson.

Foliage bud-scales deciduous.

Ovary tomentose eglandular—

(a) typical SANGUINEUM

Ovary tomentose glandular—

(b) CONSANGUINEUM

Foliage bud-scales persistent—(c) SANGUINEOIDES

Flowers black-crimson.

Ovary tomentose eglandular.

Foliage bud-scales deciduous—(d) HAEMALEUM

Foliage bud-scales persistent— (e) MESAEUM

Ovary tomentose glandular.

Foliage bud-scales deciduous—(f) ATRORUBRUM

Foliage bud-scales persistent— (g) DIDYMUM

Flowers rose or yellowish-red but not
white, yellow nor crimson.

Foliage bud-scales deciduous.

Ovary tomentose eglandular—(h) CLOIOPHORUM

Ovary tomentose glandular—(i) ROSEOTINCTUM

Foliage bud-scales persistent— (k) DIDYMOIDES

Flowers yellow.

Foliage bud-scales deciduous.

Ovary tomentose eglandular— (l) HIMERTUM

Ovary tomentose glandular— (m) MELLEUM

Foliage bud-scales persistent— (n) AIZOIDES

Flowers white (o) LEUCOPETALUM

CC. Indumentum thick, woolly, fawn to reddish or
greyish-brown **Rh. citriniflorum**

KEY TO THE SUBSPECIES OF RH. CITRINIFLORUM.

Flowers yellow, yellowish-red or rose, but not
crimson.

Ovary tomentose glandular—

(a) typical CITRINIFLORUM

Ovary tomentose eglandular—

(b) AUREOLUM

Flowers crimson.

Ovary tomentose glandular—

(c) RUBENS

Ovary tomentose eglandular—

(d) HORAEUM

BB. Indumentum on the undersurface of the leaves discontinuous or none, with or without waxy papillae.

C. Indumentum discontinuous, very thin, mealy or arachnoid, waxy papillae inconspicuous, poorly developed or none.

D. Indumentum mealy **Rh. eudoxum**

KEY TO THE SUBSPECIES OF RH. EUDOXUM.

Ovary tomentose glandular—

(a) typical EUDOXUM

Ovary tomentose eglandular—

(b) BRUNNEIFOLIUM

DD. Indumentum arachnoid **Rh. fulvastrum**

KEY TO THE SUBSPECIES OF RH. FULVASTRUM.

Flowers yellow— (a) typical FULVASTRUM

Flowers crimson— (b) TRICHOPHLEBIUM

Flowers rose or yellowish-red,
but not yellow nor crimson.

Ovary tomentose eglandular—(c) MESOPOLIUM

Ovary tomentose glandular.

Stems thickly covered with bristles

(d) TRICHOMISCUM

Stems without bristles—

(e) EIPASTUM

CC. Indumentum none or very sparse, the underside of the leaf covered with distinct waxy papillae.

D. Foliage bud-scales deciduous **Rh. temenium**

KEY TO THE SUBSPECIES OF RH. TEMENIUM.

Flowers crimson.

Ovary tomentose glandular—

(a) typical TEMENIUM

Ovary tomentose eglandular— (b) POTHINUM

Flowers rose or yellowish-red, but not crimson,
yellow nor white.

Ovary tomentose glandular— (c) RHODANTHUM

Ovary tomentose eglandular— (d) GLAPHYRUM

Flowers yellow.

Ovary tomentose glandular— (e) GILVUM

Ovary tomentose eglandular—

(f) CHRYSANTHEMUM

Flowers white.

Ovary tomentose glandular— (g) ALBIPETALUM

Ovary tomentose eglandular— (h) DEALBATUM

- DD. Foliage bud-scales persistent . . . **Rh. aperantum**
 Leaves glabrous— . . . typical APERANTUM
 Leaves sparsely and interruptly hairy—
 . . . var. SUBPILOSUM

AA. Calyx large, fleshy, cup-shaped or shield-shaped, corolla fleshy, orange to orange-crimson or bronze or cream with purple spots, leaf shape variable.

- B. Indumentum on the underside of the leaves none, the undersurface covered with waxy papillae; flowers cream spotted purple; leaves as in *Rh. sanguineum*

Rh. parmulatum

- BB. Indumentum of the undersurface of the leaves continuous, thin plastered or felt-like, grey to fawn; leaves (except in *septrionale* and *herpesticum*) longer or broader than in *Rh. sanguineum*

Rh. dichroanthum

KEY TO THE SUBSPECIES OF RH. DICHROANTHUM.

Ovary tomentose eglandular.

Leaves broadest at the middle, cuneate at the base; indumentum thin, plastered—

(a) typical DICHROANTHUM

Leaves broadest above the middle, rounded at the base, very thick; indumentum thin, plastered or felt-like (b) APODECTUM

Leaves broadest above the middle, cuneate at the base, shape and indumentum as in *Rh. sanguineum*

(c) SEPTENTRIONALE

Ovary tomentose glandular.

Leaves as in *Rh. sanguineum* and in subspecies *septrionale* (d) HERPESTICUM

Leaves broadly rounded at the apex, more or less auriculate at the base, larger than in *Rh. sanguineum* (e) SCYPHOCALYX

SPECIES AND SUBSPECIES.

RH. SANGUINEUM.

1. **Rh. sanguineum** Franch. in Journ. de Bot. xii (1898), 259, emend. sp. polymorph.

A full description of *Rh. sanguineum* is given in "The Species of Rhododendron," the outstanding characters being dwarfness of stature, leaves leathery obovate, oval or narrowly oblong, apex rounded, or obtuse; base obtuse prolonged on the petiole, about 3-6 cm. long 1.5-3 cm. broad; upper surface dark green, glabrous, midrib and prim-

ary nerves distinctly impressed; undersurface grey-white with a thin skin of indumentum, midrib and primary nerves prominent; petiole about 1 cm. long; inflorescence an umbel of 3-4 flowers; pedicels about 1.5 cm. long; corolla funnel-tubular-campanulate, about 3.5 cm. long, lobes 5, broad; stamens 10, subequal; ovary cylindric-conoid; style glabrous.

The description is now amplified to include subspecies or forms very variable in flower colour, with glandular as well as eglandular ovaries, with persistent as well as deciduous bud-scales, rarely with a few bristles on the stem, with calyx of varying size and with puberulous as well as glabrous stamens.

The colour of the flower varies from typical deep crimson to black crimson, pink, yellowish-pink, orange, yellow and white. Under these various colour forms there are parallel series of forms differing from each other to a lesser or greater degree and exhibiting almost every possible combination of the above mentioned characters. Anything less than a complete segregation of each variant must lead to a somewhat arbitrary arrangement. Flower-colour is the most conspicuous character and already many colour forms have names which it is convenient to retain as the plants have long been recognised in gardens. I have recognised thirteen subspecies and the distinctions between them are clearly set out in the key. It will be noted that I have entirely neglected differences in the stamens, and differences in the size of calyx. Franchet in his description of *Rh. sanguineum* states that the calyx is a mere rim ("lobi vix evoluti") but calyces of different size varying from a mere rim to about 1 cm. may be found, not in one subspecies only but in almost all. On listing the subspecies the significance of the older specific names has been retained as far as possible, thus where there is a name for a definite combination of characters, e.g. *Rh. didymum* Balf. f. et Forrest, with black-crimson flowers, persistent bud-scales and glandular ovary, a name—*Rh. mesaeum* Balf. f. MS.—has been retained for the corresponding form in which the ovary is tomentose eglandular. But where discrimination has not been carried so far I have allowed a single name to do duty for a wider range of variants. Thus for the subspecies *didymoides*, where the ovary is usually glandular ("ovario saepe bene glanduloso"), but may be tomentose not glandular the name is taken to include both forms. In the only specimen of a white form of *Rh. sanguineum*—*Rh. leucopetalum* Balf. f. et Forrest—the ovary is glandular.

The constant character which separates the variable *Rh. sanguineum* from its close allies, similar in habit, leaf, inflorescence and flower and with similar series of variants, is found in the indumentum. In *Rh. sanguineum* the indumentum is thin, continuous and plastered, composed of irregular star-like hairs—not woolly as in *Rh. citriniflorum* Balf. f. et Forrest and not mealy or arachnoid as in *Rh. eudoxum* Balf. f. et Forrest or in *Rh. fulvastrum* Balf. f. et Forrest, and there are no

papillae on the underside of the leaf. From *Rh. dichroanthum* with a similar indumentum the texture of the corolla and shape of the calyx, are a sufficient distinction.

Distribution: Western China; very common in the province of Yunnan and extending into the province of Szechuan and to Tibet and Burma.

SUBSPECIES.

1(a) *sanguineum* Franch. (typical) emend.

In typical *Rh. sanguineum* the flowers are crimson, deep rose-crimson, crimson-scarlet, red or carmine; the bud-scales are deciduous; the ovary is tomentose eglandular. Forms are included with varying size of calyx from a mere rim to 1 cm. in length and with both glabrous and puberulous stamens.

Soulé 1015 (type of *Rh. sanguineum* Franch. "Tibet, Sela. Juin 1895").

Forrest 503, 14012, 14498, 14533, 16490, 16710, 18630, 19167, 19171, 19197, 19217, 23088, 25518=25906, 25543, (25906)=25518; Monbeig, 168; Ward 575, (5416); Rock 8911=10894, 8924, (9092), 9118=11002, 9131=10926, 9209=11018, 9214=(11029), 9215=(11039) 9220=(11024), 9369, 10064=(10928), 10065, (10216), 10218, (10254), 10278, 10292, 10311, 10314 pro parte, (10894)=8911, (10926)=9131, (10928)=10064, (11002)=9118, (11018)=9209, (11024)=9220 (11029)=9214, (11039)=9215, 22198, 22201, 22913, 22935, 23222, 23225.

Distribution: N.W. Yunnan and S.E. Tibet; Mekong-Yangtze divide, Chienchuan-Mekong divide, Bei-ma-shan, Mekong-Salwin divide, Ka-gwr-pu, Salwin-Kiu chiang divide, Doker-la, Kari Pass, Salwin-Irrawaddy divide.

1(b) *consanguineum* subsp. nov.

A typo ovario et tomentoso et glanduloso recedit.

The presence or absence of glands on the ovary is throughout the genus *Rhododendron* regarded as an important diagnostic mark. It is in the presence of these glands that this subspecies differs from the typical plant. The flowers are crimson, dark brownish-crimson, red or carmine. The calyx is again variable and the stamens are either glabrous or puberulous.

Forrest 25507 (type of subsp. *consanguineum*. "N.W. Yunnan, Mekong-Yangtze divide, east of A-wa. Lat. 27° 25' N. Long. 98° 18' E. Alt. 14,000 ft. Shrub of 2 ft. Flowers dark brownish-crimson. On rocky slopes and meadows. June 1924.")

Rock 10277=(10904), 10314 pro parte, (10904)=10277, 23234, 23237; Ward 6831.

Distribution: N.W. Yunnan and S.E. Tibet; Mekong-Yangtze divide east of A-wa, Mts. of Londre, Seinghku-wang.

1(c) *sanguineoides* subsp. nov.

A typo perulis persistentibus differt.

While this subspecies agrees very closely with the typical form of the species it may be distinguished by the persistent bud-scales. The distinctive name removes doubt as to whether this form should be placed under the typical form or under subsp. *didymum*, forms with both glandular and tomentose glandular ovaries are in this instance included. The flowers are crimson-red.

Rock 22203 (type of subsp. *sanguineoides*. "S.E. Tibet, Tsarong, northern slopes of Mt. Kenyichunpo, north of Sikitung, Upper Salwin River. Shrub 2 ft. Flowers red, alpine regions. Alt. 13,000 ft. May-June 1932.").

Rock (10105), (10259), 22204, (22576), (22577), (22578), (22579), (22581), (22582), (22583), (22984).

Distribution: S.E. Tibet; Tsarong, northern slopes of Mt. Kenyichunpo, N. of Sikitung, Upper Salwin River.

1(d) *haemaleum* comb. nov. emend.

Rh. haemaleum Balf. f. et Forrest in Notes R.B.G. Edin. xi (1919), 71.

Very closely allied to typical *Rh. sanguineum* Franch., the subspecies *haemaleum* differs in having black-crimson or dark crimson flowers. The original description is modified to include forms with glabrous as well as with puberulous stamens. This modification is necessary, as has been shown, to avoid ambiguity in naming forms with crimson flowers and puberulous stamens and those with black crimson flowers and glabrous stamens. From the horticultural stand-point the subspecies *haemaleum* is a distinctive plant very similar to the subspecies *mesaeum* Balf. f. MS. in which, however, the bud-scales are persistent.

Forrest 5073 (type of *Rh. haemaleum* Balf. f. et Forrest. "S.E. Tibet. Mekong-Salwin divide, N.W. of Tsekou. Lat. 28° 15' N. Alt. 11,000 ft. Shrub of 3-5 ft. Flowers black-crimson. Open, rocky situations in side valleys. August 1904.").

Forrest 14166, 16736, 18684, 18934, (19012), 19196, 19223, 19914, 21732, 21819, 21823, 21907, 21915, (22726); Rock 8725, 8912, 9210=(11049), 9211, 9212, 9221=11046, 9235, 10098, 10164, 10201, 10272, 10275, 10276=10911, 10291, 10294, 10295, 10312, 10313, (10911)=10276, (11046)=9221, (11049)=9210, 22236, 22293, (22452), (22637), 23166, 23191, 23201, 23212, 23224, 23233; Ward 8240, 8364.

Distribution: Yunnan and S.E. Tibet; Doker-la, Salwin-Irrawaddy divide, Mt. Kenyichunpo, Mekong-Salwin divide, Salwin-Kiu Chiang divide, Ka-gwr-pu.

1(e) *atrorubrum* subsp. nov.

A typo floribus atrokermesinis, ovario glanduloso differt; a subsp.

haemaleo ovario eglanduloso, a subsp. *didymo* perulis mox deciduis recedit.

In this subspecies the flowers are black crimson, the ovary is tomentose glandular, the bud-scales do not persist.

Forrest 18675 (type of subsp. *atrorubrum*. "S.E. Tibet, Tsarong. Duplicate of 1917. 1919.").

Forrest 19204; Rock 10293, 10315.

Distribution: S.E. Tibet; Tsarong, Salwin-Kiu chiang divide, Mts. of Londre.

1(f) *mesaeum* comb. nov.

Rh. mesaeum Balf. f. MS.

Subspecies *R. sanguinei* Franch. floribus atrokermesinis perulis persistentibus notata; a subsp. *didymo* ovario tomentoso haud glanduloso distinguenda.

While closely adhering to the general form of the species, this plant is distinctive because of the black crimson flowers and persistent bud-scales, it may be recorded as the eglandular equivalent of subspecies *didymum*. From subspecies *haemaleum* it differs in having bud-scales which persist for several seasons.

Forrest 19958 (type of *Rh. mesaeum* Balf. f. MS. "S.E. Tibet, Salwin-Kiu chiang divide. Lat. 28° 20' N. Long. 98° 27' E. Alt. 14,000 ft. Shrub of 2 ft. Flowers black-crimson. Rocky moist slopes in side valleys. August 1921.").

Forrest, 19902, 19961, 21735=(22677), 21740=(22687), 21915A=(22682), (22677)=21735, (22681)=21915A, (22682)=21915A, (22687)=21740; Rock 10101, 10171, (10258), 21993, 22034, 22238, (22638).

Distribution: S.E. Tibet; Salwin-Kiu chiang divide, Kenyichunpo, Salwin-Irrawaddy divide, Solo-la.

1(g) *didymum* comb. nov.

Rh. didymum Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1922), 256.

The typical plant is a dwarf shrub only about 1 ft. to 1 ft. 6 ins. high, but Rock's specimens are recorded as having been taken from plants 4-5 ft. in height. Black crimson flowers, persistent bud-scales and a glandular ovary separate this form from those that are closely allied.

Forrest 20220 (type of *Rh. didymum* Balf. f. et Forrest. "S.E. Tibet: Tsarong, Salwin-Kiu chiang divide, 14-15,000 ft. Lat. 28° 24' N. Long. 98° 24' E. Shrub of 12-18 ins. Flowers black-crimson. On moist stony alpine meadows and slopes. Sept. 1921.").

Forrest (2020A), 20239, (20888), (21750)=(22852), (22852)=(21750); Rock (11216), 22183.

Distribution: S.E. Tibet; Tsarong, Salwin-Kiu chiang divide, Kenyichunpo, Salwin-Irrawaddy divide.

1(h) *cloiophorum* comb. nov. emend.

Rh. cloiophorum Balf. f. et Forrest in Notes R.B.G. Edin. xi (1919), 37.

Rh. asmenistum Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 29. *Rh. cloiophorum* Balf. f. et Forrest subsp. *asmenistum* in The Species of Rhododendron (1930), 545.

The flowers of *Rh. sanguineum cloiophorum* are rose with various modifications—rose yellowish towards the base, yellowish flushed rose, white tinged and margined rose, and I have also cited here a few specimens in which the flowers are described as yellowish red, and orange. The flowers of *Rh. cloiophorum* are described as funnel-campanulate instead of tubular-campanulate as in typical *Rh. sanguineum* Franch. While this distinction is evident when the two typical specimens are examined side by side it disappears when the mass of material now available is scrutinised, every possible gradation between funnel-campanulate and tubular-campanulate can be observed. Moreover there is a certain variation in the texture of the corolla but this is again an elusive character. The large calyx of *Rh. asmenistum* Balf. f. et Forrest does not sufficiently distinguish this species. The subspecies *cloiophorum* is the eglandular equivalent of subspecies *roseotinctum*, varying to the same degree as the typical subspecies.

Forrest 14269 (type of *Rh. cloiophorum* Balf. f. et Forrest. "Yunnan Mekong-Salwin divide. Lat. 28° 12' N. Alt. 11,000 ft. Shrub of 4 ft. Flowers rose, darkest round margins, yellowish towards base, on open rocky slopes. July 1917.")

Forrest 14502, 16708, 18638, 18650, 18659, 18670, 19169, 19205, 19534, 21739, 21847, 23090, 25521=25943, 25541, (25943)=25521; Rock 8740, 9206, 9280, 9281, 10099, 10173, 10220, 10306=10899, 10307, (10899)=10306, 22064, 22202, 22980, 23250.

Distribution: Yunnan and S.E. Tibet; Mekong-Salwin divide, Tsarong, Ka-gwr-pu, Doker-la, Salwin-Kiu chiang divide, Mekong-Yangtze divide, Mts. above Tsekou.

1(i) *roseotinctum* comb. nov. emend.

Rh. roseotinctum Balf. f. et Forrest in Notes R.B.G. Edin. xi (1919), 124. *Rh. cloiophorum* Balf. f. et Forrest subspecies *roseotinctum* in The Species of Rhododendron (1930), 545.

Rh. mannophorum Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 51. *Rh. cloiophorum* Balf. f. et Forrest subspecies *mannophorum* in The Species of Rhododendron (1930), 545.

Rh. torquatium Balf. f. et Farrer in Notes R.B.G. Edin. xiii (1922), 303.

The characteristics of *roseotinctum* (besides the typical habit, and leaf with grey plastered indumentum) are the glandular tomentose ovary with flowers described as creamy-white margined deep rose-carmine, white stained and margined rose, dull soft rose, pale rose

margined a deeper shade, lemon yellow tipped and flushed rose, crimson on an orange base, pink or yellow-red; the bud-scales are deciduous. *Rh. mannophorum* Balf. f. et Forrest, shown in "The Species of Rhododendron" as a subspecies of *Rh. cloiophorum* is a form with a large calyx. Farrer's plant to which the name *Rh. torquatum* was given does not appear to be distinct.

Forrest 14211 (type of *Rh. roseotinctum* Balf. f. et Forrest. "Yunnan: Mekong-Salwin divide. Lat. 28° 12' N. Alt. 12,000 ft. Shrub of 2-3 ft. Flowers creamy-white, beautifully margined deep rose-crimson. Open pasture and amongst boulders. July 1917.")

Forrest 14268, 16709, 19163, 19569, 21747=22669, 21748=(22684), 21748A, 21783, 21856, (22669)=21747, (22684)=21748, 25788; Farrer 1775; Rock 8910, 10265, 10279, 10283=10953, 10284, 10305, 10309, 10310, 10953=10283, 22982, 23236=(23636), (23636)=23236.

Distribution: Yunnan and S.E. Tibet; Mekong-Salwin divide, Doker-la, Tsarong, Salwin-Kiu chiang divide, Moku-ji Pass.

1(k) *didymoides* comb. nov.

Rh. sanguineum Franch. var. *didymoides* Tagg et Forrest in Notes R.B.G. Edin. xvi (1931), 208.

This subspecies with flowers which are typically rose, but may be red with a yellowish tinge or yellow flushed and margined crimson, was regarded as a variety of *Rh. sanguineum* Franch. which could, however, have been equally well placed under *Rh. didymum* Balf. f. et Forrest. The bud-scales persist, otherwise this plant is similar to subspecies *cloiophorum* and *roseotinctum*. The ovary is described as "*saepe bene glanduloso*" but is sometimes tomentose eglandular.

Forrest 19982 (type of *Rh. sanguineum* Franch. var. *didymoides* Tagg et Forrest. "S.E. Tibet, Tsarong, Salwin-Kiu chiang divide. Lat. 28° 24' N. Long. 98° 24' E. Alt. 14,000 ft. Shrub of 2-3 ft. Flowers rose. In rhododendron and cane thickets. July 1921.")

Forrest 19992, 21746 = 22667, 21765 = (22685), (22667) = 21746, (22685) = 21765; Rock (10215), (22455).

Distribution: S.E. Tibet; Salwin-Kiu chiang divide, Kenyichunpo, Salwin-Irrawaddy divide.

1(e) *himertum* comb. nov.

Rh. himertum Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 48.

Rh. nebrites Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 53. *Rh. himertum* Balf. f. et Forrest subspecies *nebrites* in The Species of Rhododendron (1930), 553.

Rh. poliopeplum Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 56. *Rh. himertum* Balf. f. et Forrest subspecies *poliopeplum* in The Species of Rhododendron (1930), 553.

Various forms with yellow flowers—yellow, bright yellow and pale and dull yellow—to which distinctive names had been given are included under *Rh. himertum* Balf. f. et Forrest in "The Species of Rhododendron." The subspecies has the characteristic indumentum of *Rh. sanguineum* Franch. the ovary being eglandular.

Forrest 16728 (type of *Rh. himertum* Balf. f. et Forrest. "S.E. Tibet, Tsarong. Flowers yellow. Duplicate of 1917. July 1918.")

Forrest 19153, 19175, 21782=22689, (22689)=21782; Rock 10266, 10289, 23193.

Distribution: S.E. Tibet; Tsarong, Salwin-Kiu chiang divide, Londre, Doker-la.

1(m) *melleum* subsp. nov.

A typo floribus luteis, ovario et tomentoso et glanduloso distincta; a subsp. *himerto* ovario glanduloso, a *Rh. citrinifloro* Balf. f. et Forrest indumento haud lanato differt.

This species is recognised by its yellow flowers and glandular ovary. Formerly several of the numbers quoted here were under *Rh. citriniflorum*, Balf. f. et Forrest, others were under *Rh. himertum* Balf. f. et Forrest, from the former the indumentum is a sufficient distinction and from the latter the presence of glands on the ovary.

Forrest 16727 (type of subsp. *melleum*. "S.E. Tibet, Tsarong. Duplicate of 1917. Flowers yellow. July 1918.")

Forrest 18642, 18644, 18662, 18686, 19164, 19213; Rock 8914=(10906), (10109), 10282, 10299, 10308, (10906)=8914, 22215, 22278, 22979=(23564), 23143=(23638), (23564)=22979, (23638)=23143.

Distribution: S.E. Tibet; Tsarong, Salwin-Kiu chiang divide, Mekong-Salwin divide, Mts. of Londre, Kenyichunpo, Salwin-Irrawaddy divide, Solo-la, Doker-la, Ka-gwr-pu, Yundshi Mt.

1(n) *aizoides* subsp. nov.

Inter socios ob flores luteos et perulas persistentes recognoscenda.

The yellow flowers and persistent bud-scales are the outstanding characters of this easily recognisable subspecies.

Rock 10108 (type of subsp. *aizoides*. "S.E. Tibet: Mt. Kenyichunpo, region of Champutong, Salwin-Irrawaddy watershed. 1923.")

Rock (22584).

Distribution: S.E. Tibet; Mt. Kenyichunpo, Champutong, Salwin-Irrawaddy divide.

1(o) *leucopetalum* comb. nov.

Rh. leucopetalum Balf. f. et Forrest in Notes R.B.G. Edin. xi (1919), 86.

Rh. cloiophorum Balf. f. et Forrest subspecies *leucopetalum* in The Species of Rhododendron (1930), 545.

Only one specimen of a white form has been collected, to this the name *Rh. leucopetalum* was given.

Forrest 14270 (type of *Rh. leucopetalum* Balf. f. et Forrest. "Yunnan, Mekong-Salwin divide. Lat. 28° 12' N. Alt. 12-13,000 ft. Shrub 2-3½ ft. Flowers pure white. Open rocky slopes and ledges of cliffs, July 1917.")

Distribution: Yunnan; Mekong-Salwin divide.

RH. CITRINIFLORUM.

2. *Rh. citriniflorum* Balf. f. et Forrest in Notes R.B.G. Edin. xi (1919), 35, emend. sp. polymorph.

Rh. citriniflorum is here regarded as a variable species resembling the polymorphic species *Rh. sanguineum*, with the same habit, the same characteristic leathery, obovate, oval or oblong-ovate leaves, glabrous or glabrescent above with the nerves impressed, an umbel of 3-4 flowers, a funnel-tubular-companulate corolla, 10 stamens, the ovary cylindric-conoid and the style glabrous.

The two species differ markedly, however, in the indumentum on the underside of the leaf, which in *Rh. citriniflorum* is woolly or spongy, fawn or greyish-brown, composed of densely matted, branched hairs, not thin and plastered as in *Rh. sanguineum*.

In both species there is a closely corresponding range of variants, and the original description of *Rh. citriniflorum* Balf. f. et Forrest must be modified to include a wider range of colour forms—crimson, crimson-red, yellowish-red, deep yellowish-crimson, yellow heavily margined crimson, yellowish flushed rose, and pale rose margined deeper—to include also forms with eglandular as well as glandular ovaries, forms in which the bud-scales are entirely deciduous as well as more or less persistent, forms with and without bristles on the stem, with varying size of calyx and with glabrous as well as puberulous stamens.

It is quite evident that the various forms of the polymorphic *Rh. citriniflorum* correspond very closely, both in number and in complexity, to those that have been noted under *Rh. sanguineum*, although fewer forms of *Rh. citriniflorum* are actually known. Moreover, as regards *Rh. citriniflorum*, discrimination between different forms has not been carried very far; only two variants have already been segregated under specific names. It is proposed, therefore, under *Rh. citriniflorum* to recognise only four subspecies, noting, however, that the subspecies of this species are not strictly comparable to those described above. The differences between them are clearly set out in the key.

Distribution: Western China, in the province of Yunnan, especially in the north, and in the adjoining territories of Burma and Tibet.

SUBSPECIES.

2(a) *citriniflorum* Balf. f. et Forrest (typical) emend.

Rh. chlanidotum Balf. f. et Forrest in Notes R.B.G. Edin.
xiii (1920), 38.

Rh. citriniflorum is described as having bright lemon-yellow flowers, but several sheets are cited with the original description, the flowers in one instance being "soft rose without markings." Indeed every shade of colour from yellow to yellow-crimson is to be found. In the typical plant the ovary is glandular as well as densely tomentose. The bud-scales are described as more or less persistent, sometimes they fall off early, rarely some bristles may be observed on the young shoots. The calyx varies from small to large, and the stamens described as puberulous may also be glabrous.

Forrest 14721 (type of *Rh. citriniflorum* Balf. f. et Forrest. "Yunnan: Mekong-Salwin divide. Lat. 28° 12' N. Alt. 13,000 ft. Shrub of 2 ft. Flowers soft rose, without markings. On rocks and cliffs. July 1917.")

Forrest 14272, 14274, 14356, 14416, 16714, (17478), 18938, 20090, 21751=(22678), 21752=(22679), 21859, (22678)=21751, (22679)=21752; Rock 10264=(10946), 10280, (10946)=10264, 22191, 22194, 22277, (22562) (22565), 22981=(23581), 23232=(23647), (23581)=22981, (23647)=23232.

Distribution: Yunnan and S.E. Tibet; Mekong-Salwin divide, Ka-gwr-pu, Salwin-Kiu chiang divide, Londre, Kenyichunpo and Mts. of Yundshi.

2(b) *aureolum* subsp. nov.

A typo ovario eglanduloso divergit.

There has been some confusion in the naming of plants similar to *Rh. citriniflorum* Balf. f. et Forrest, but lacking glands. They have been placed under various names—*Rh. citriniflorum* Balf. et Forrest, when stress has been laid upon the character of the indumentum; *Rh. himertum* Balf. f. et Forrest or *Rh. fulvastrum* Balf. f. et Forrest, when the absence of glands has been regarded as more significant. In *aureolum* there is variation to the same degree as in typical *Rh. citriniflorum*.

Forrest 14503 (type of subsp. *aureolum*. "S.E. Tibet, Tsarong on Ka-gwr-pu, Mekong-Salwin divide. Lat. 28° 25' N. Alt. 14,000 ft. Shrub of 2½ ft. Flowers yellowish flushed rose. In open cane brakes. July 1917.")

Forrest 20250, 21852, 21854, 21860, 25595; Rock 10106, 10107, 10111, 10174, (10219), 10239, (22150), 22172, (22182), 22189, 22196.

Distribution: S.E. Tibet; Tsarong, Mekong-Salwin divide, Ka-gwr-pu, Salwin-Kiu chiang divide, Kenyichunpo, Londre.

2(c) *rubens* subsp. nov.

A typo floribus kermesinis, a subsp. *horaeo* ovario glanduloso-recedit.

These plants, collected by Rock in S.E. Tibet, are intermediate between *Rh. citriniflorum* Balf. f. et Forrest and *Rh. horaeum* Balf. f. et Forrest. The flowers are red or crimson, the ovary is glandular, and, on the specimens seen, the bud-scales are completely deciduous and the calyx is shortly lobed.

Rock 23245=23669 (type of subsp. *rubens*. "S.E. Tibet, Mts. west of Ka-gwr-pu, Doker-la and Yundshi. Shrub of 2-3 ft. Flowers red, alpine region. Alt. 13,500 ft. May-June 1932.")

Rock 22206, (23669)=23245.

Distribution: S.E. Tibet, Tsarong, Mts. west of Ka-gwr-pu, Doker-la and Yundshi, Kenyichunpo.

2(d) *horaeum* comb. nov. (descript. emend.)

Rh. horaeum Balf. f. et Forrest in Notes R.B.G. Edin. vol. xiii (1922), 264, emend.

Typical *Rh. horaeum* Balf. f. et Forrest is a dwarf shrub $\frac{1}{2}$ -1 ft. high, with persistent perulae, a thick, woolly, brownish indumentum on the undersurface of the leaves, deep crimson flowers with a large calyx, puberulous stamens and a tomentose eglandular ovary. In this subspecies we may, however, include similar plants up to 3 ft. in height, rarely with deciduous perulae, with calyx of varying size and with glabrous stamens, and accordingly amplify the description.

Forrest 20287 (type of *Rh. horaeum* Balf. f. et Forrest. "E. Tibet: Tsarong, Salwin-Kiu Chiang divide. Lat. 28° 24' N. Long. 98° 24' E. Alt. 13,000 ft. Shrub $\frac{1}{2}$ -1 ft. Flowers deep crimson. On cliffs and rocky slopes (also orange-crimson. Note large calyx). Sept. 1921.")

Forrest 21754, 21850, 21851, 21855; Rock 22193, 22205, 22207, 22208, 22983.

Distribution: S.E. Tibet; Salwin-Kiu Chiang divide. Mt. Kenyichunpo, Ka-gwr-pu, Doker-la.

RH. EUDOXUM.

3. *Rh. eudoxum* Balf. f. et Forrest in Notes R.B.G. Edin. xi (1919), 62. (Descript. ampl.)

While *Rh. eudoxum* is closely akin to other species in the Sanguineum Subseries, the general aspect of this plant is not (like so many others in the group) that of typical *Rh. sanguineum* Franch. The leaves are less leathery and tend to be oblong-oval, broadest about the middle or just above the middle, and less seldom obovate, the apex is rounded with a pronounced mucronate tip. *Rh. eudoxum* has in fact many of the characteristics of certain species in the Selense Subseries of the Thomsonii Series and may well be regarded as forming a link between

the two Series. Although forms with tomentose glandular and tomentose eglandular ovaries have been found, *Rh. eudoxum* appears to be less variable than most other species in the group. The feature by which it may best be distinguished is the very thin discontinuous mealy indumentum composed of branched or star-like hairs (with short, broad, irregular, radiating branches) scattered over the undersurface of the leaf. At the same time the undersurface of the leaf is very minutely papillate and has a greenish-brown appearance. The waxy papillae are not well developed as in *Rh. aperantum* Balf. f. et Ward and cannot be seen without the aid of a microscope.

The description is here amplified to include shrubs from 2-6 ft. high with an umbel of 3-6 flowers, calyx of varying size, stamens puberulous or glabrous with the ovary tomentose or tomentose glandular.

Distribution: S.E. Tibet; Tsarong, Ka-gwr-pu, Mekong-Salwin divide, Doker-la.

SUBSPECIES.

3(a) *eudoxum* Balf. f. et Forrest (typical).

The original description of *Rh. eudoxum* Balf. f. et Forrest is very complete and the specimens I have examined show a constancy in character unusual in the group. The flowers are pink, crimson or magenta rose, the calyx is of medium size (5-7 mm. long), the stamens are puberulous and the ovary is tomentose glandular.

Forrest 14245 (type of *Rh. eudoxum* Balf. f. et Forrest. "Yunnan, Mekong-Salwin divide. Lat. 28° 12' N. Alt. 11,000 ft. Shrub of 6 ft. Flowers deep clear crimson-rose, with no markings. In open rhododendron thickets. July 1917.")

Forrest 14456, (14774), 16301, 16711, 19018, 21738, 21767, 21827; Rock 8715, 10274, 10302, 10303, 23136.

Distribution: Yunnan and S.E. Tibet, Mekong-Salwin divide, Tsarong, Doker-la, Ka-gwr-pu, Salwin-Kiu chiang divide, Tsekou and Londre.

3(b) *brunneifolium* comb. nov. emend.

Rh. brunneifolium Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 33.

Rh. eudoxum Balf. f. et Forrest subspecies *brunneifolium* in The Species of Rhododendron (1930), 549.

Very closely akin to typical *Rh. eudoxum*, this subspecies differs in the absence of glands on the ovary, which is tomentose eglandular. The calyx described as small, cup-like is variable in size (never a large cup as in *Rh. dichroanthum* Diels) and in one specimen the filaments of the stamens are glabrous instead of puberulous.

Forrest 19025 (type of *Rh. brunneifolium* Balf. f. et Forrest. "S.E.

Tibet, Tsarong, Salwin-Kiu chiang divide. Lat. $28^{\circ} 40'$ N. Long. $98^{\circ} 15'$ E. Shrub of 3 ft. Flowers rose-crimson without markings, In cane brakes and margins of thickets. July 1919.")

Rock (10301).

Distribution: S.E. Tibet; Tsarong, Salwin-Kiu chiang divide, Londre.

RH. FULVASTRUM.

4. *Rh. fulvastrum* Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 45, emend. sp. polymorph.

The composite species *Rh. fulvastrum* can readily be distinguished from other species in the Sanguineum alliance by the thin, discontinuous, arachnoid indumentum on the undersides of the leaves. This is composed of scattered, closely matted, rather long, branched hairs, giving the undersurface of the leaf the appearance of being covered with a thin cobweb-like veil, and not with a brownish meal as in *Rh. eudoxum* Balf. f. et Forrest. Waxy papillae are never well developed as in *Rh. temenium* Balf. f. et Forrest, in which they are very distinct. Although these distinctions may sometimes be difficult to observe by the naked eye, they are clearly recognisable under the low power of a microscope. In habit, leaf shape, and shape of flower *Rh. fulvastrum* conforms to the ordinary type of the Sanguineum group, at the same time varying within the limits already described for the several polymorphic species. The original description of *Rh. fulvastrum* requires modification to include forms of taller stature (2-6 ft.) with or without glandular bristles on the stem, with an umbel of 3-6 flowers, with a calyx varying from a mere rim to 1 cm. long, with flowers of varying colour, crimson and rose as well as yellow, and with a tomentose-glandular as well as tomentose-eglandular ovary. Several variant forms listed as subspecies of *Rh. eudoxum* Balf. f. et Forrest in "The Species of Rhododendron" are here included under *Rh. fulvastrum*.

Distribution: S.E. Tibet; Tsarong, Salwin-Kiu chiang divide.

SUBSPECIES.

- 4(a) *fulvastrum* (typical).

With the main features already described, the typical plant has pale lemon flowers. The ovary is tomentose-eglandular in both Forrest's and Rock's gatherings from Tsarong and Londre adjoining S.E. Tibet.

Forrest 19023 (type of *Rh. fulvastrum* Balf. f. et Forrest. "S.E. Tibet; Tsarong, Salwin-Kiu chiang divide. Lat. $28^{\circ} 40'$ N. Long. $95^{\circ} 15'$ E. Shrub of 2 ft. Flowers pale lemon-yellow without markings, on rocky slopes and ledges of cliffs in ravines. July 1919.")

Rock 10304, (22642), (22644), (22646).

Distribution : S.E. Tibet ; Tsarong, Salwin-Kiu chiang divide, Londre.

4(b) **trichophlebium** comb. nov.

Rh. trichophlebium Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 62.

The subspecies *trichophlebium*, an imperfectly known plant only once collected by Forrest, agrees with *Rh. fulvastrum* as regards indumentum, but has small leaves, small crimson flowers, and glands on the ovary.

Forrest 18632 (type of *Rh. trichophlebium* Balf. f. et Forrest. "S.E. Tibet, Tsarong. Duplicate of 1917. Possibly sp. nov. 1917.")

Distribution : S.E. Tibet, Tsarong.

4(c) **mesopolium** comb. nov. emend.

Rh. mesopolium Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 51. *Rh. eudoxum* Balf. f. et Forrest subspecies *mesopolium* in The Species of Rhododendron (1930), 549.

Rh. asteium Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1922), 235. *Rh. eudoxum* Balf. f. et Forrest subspecies *asteium* in The Species of Rhododendron (1930), 549.

This subspecies agrees with typical *Rh. fulvastrum* in the thin web-like or arachnoid indumentum distinguishing it from *Rh. temenium glaphyrum* with glabrous, very distinctly papillate leaves. The flowers are rose, yellowish-red, pink, bright rose to crimson, deep rose on margins shaded to white at the base ; the calyx is variable in size, the stamens glabrous or puberulous ; the ovary is tomentose-eglandular. The name *Rh. asteium* was given to a form with a large calyx (1 cm. long).

Forrest 16751 (type of *Rh. mesopolium* Balf. f. et Forrest. "S.E. Tibet, Tsarong, on Doker-la, Mekong-Salwin divide. Lat. 28° 25' N. Alt. 13-14,000 ft. Shrub of 2 ft. Flowers pale rose. Open dry bouldery pasture. July-Aug. 1918.")

Forrest 18937, 21737=(22632), 21764, 21845, (22632)=21737 ; Rock 10267, 10273.

Distribution : S.E. Tibet, Doker-la, Mekong-Salwin divide, Salwin-Kiu chiang divide, Londre.

4(d) **trichomiscum** comb. nov.

Rh. trichomiscum Balf. f. et Forrest in Notes R.B.G. Edin. xii (1920), 169. *Rh. eudoxum* Balf. f. et Forrest subspecies *trichomiscum* in The Species of Rhododendron (1930), 549.

The presence of bristles on the stem is the outstanding characteristic of this form, a plant well known under the name *Rh. trichomiscum* Balf. f. et Forrest in cultivation. Otherwise *Rh. trichomiscum* Balf. f. et Forrest has the same characteristics as *Rh. epipastum* Balf. f. et

Forrest. It is the only known example of the species in which bristles have been observed, although it is not unlikely that further collecting will eventually reveal bristly forms of other subspecies.

Forrest 16826 (type of *Rh. trichomiscum* Balf. f. et Forrest. "S.E. Tibet, Tsarong on Ka-gwr-pu, Mekong-Salwin divide. Lat. 28° 40' N. Alt. 14,000 ft. Shrub 2-3 ft. Flowers pale rose-pink without markings. In cane brakes and Rhododendron thickets. July 1918.")

Rock 10290, 22645.

Distribution: S.E. Tibet; Tsarong, Ka-gwr-pu, Mekong-Salwin divide.

4 (e) *epipastum* comb. nov.

Rh. epipastum Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1922), 258. *Rh. eudoxum* Balf. f. et Forrest subspecies *mesopolium* form *epipastum* in The Species of Rhododendron (1930), 549.

Like *mesopolium* this variant of *Rh. fulvastrum* has typical arachnoid indumentum and rose-coloured flowers, but the ovary is glandular tomentose. The form *trichomiscum* might be included here, but is for the present kept separate.

Forrest 18645 (type of *Rh. epipastum* Balf. f. et Forrest. "S.E. Tibet, Tsarong. Duplicate of 1917. 1919.")

Rock 22060.

Distribution: S.E. Tibet; Tsarong, Salwin-Irrawaddy divide.

RH. TEMENIUM.

5. *Rh. temenium* Balf. f. et Forrest in Notes R.B.G. Edin. xi (1919), 146, emend. sp. polymorph.

Rh. eudoxum Balf. f. et Forrest sub-species *temenium* in The Species of Rhododendron (1930), 549.

The undersurface of the leaf of *Rh. temenium* is markedly papillate covered with minute projecting waxy pegs crowded very closely together. Occasionally a few floccose hairs are present but the mature leaf is usually quite glabrous. *Rh. temenium* is thus distinguished from *Rh. eudoxum* Balf. f. et Forrest and *Rh. fulvastrum* Balf. f. et Forrest which have no prominent waxy papillae and have a discontinuous but distinct either mealy or arachnoid indumentum. The presence of glandular-setose hairs or bristles on the young shoots is a notable feature of *Rh. temenium*, only very rarely in the typical form is the young stem glabrous. *Rh. temenium* is closely allied to *Rh. aperantum* Balf. f. et Ward and *Rh. parmulatum* Cowan both with waxy papillae on the undersides of the leaves, but in *Rh. aperantum* the young stems are invariably covered by the persisting bud-scales and are without bristles, while *Rh. parmulatum* is easily recognised by the shield-shaped

calyx and purple spotted cream-coloured flowers. In habit, leaf-shape, inflorescence, and corolla shape *Rh. temenium* closely resembles *Rh. sanguineum* Franch. The original description is here amplified to include a few specimens without bristles on the stem, to include variants with yellow, white, rose and crimson flowers, with calyx from a mere rim to 1 cm. in length, and with a tomentose eglandular and tomentose glandular ovary.

Distribution: S.E. Tibet; Tsarong, Ka-gwr-pu, Mekong-Salwin divide, Doker-la, Chamatong, Mt. Kenyichunpo, Salwin and Irrawaddy divides.

SUBSPECIES.

5(a) *Rh. temenium* Balf. f. et Forrest (typical).

The typical form has crimson or light to dark purplish crimson flowers and the ovary is tomentose glandular.

Forrest (14364) (type of *Rh. temenium* Balf. f. et Forrest. "S.E. Tibet, Tsarong, Ka-gwr-pu, Mekong-Salwin divide. Lat. 28° 25' N. Shrub of 2-3 ft. Flowers deep crimson on open moorland. July 1917.")

Forrest (14365), (20039); Rock (10288); Ward 5878.

Distribution: S.E. Tibet; Tsarong, Ka-gwr-pu, Mekong-Salwin divide, Londre, Doshong-la.

5(b) *pothinum* Balf. f. et Forrest comb. nov.

Rh. pothinum Balf. f. et Forrest in Notes R.B.G. Edin. xii (1920), 147.

A variant differing from the type only in the absence of glands on the ovary. With one exception the young shoots of the specimens cited are bristly.

Forrest 16702 (type of *Rh. pothinum* Balf. f. et Forrest. "S.E. Tibet, Tsarong, on Doker-la, Mekong-Salwin divide. Lat. 28° 25' N. Alt. 13-14,000 ft. Shrub 2-3½ ft. Flowers deep crimson. On open bouldery meadows. June 1918.")

Forrest 18631, (18935), 19156, 19162, 19166, 21734=(22696), 21809=(22732), (22696)=21734, (22732)=21809; Rock 8881=(10952), (10286), (10952)=8881, 22070, (22448), 23140=(23617), 23194, 23199=(23663), 23230, (23593), (23617)=23140, 23629, (23663)=23199.

Distribution: S.E. Tibet, Tsarong, Doker-la, Mekong-Salwin divide, Salwin-Kiu chiang divide, Londre, Ka-gwr-pu, Salwin-Irrawaddy, Kenyichunpo.

5(c) *rhodanthum* subsp. nov.

A typo floribus roseis, a subsp. *glaphyro* ovario glanduloso-tomentoso divergit.

This subspecies near *Rh. glaphyrum* Balf. f. et Forrest has a glandular ovary, the flowers are pink or pale orange-red. The lack of a name for this form, no less distinct than many others, led to its confusion

with *Rh. trichomiscum* Balf. f. et Forrest and with *Rh. citriniflorum* Balf. f. et Forrest, by no means the most nearly associated in the group.

Rock 10285 (type of subsp. *rhodanthum*. "N.W. Yunnan. Mts. of Londre, Mekong-Salwin divide, adjoining S.E. Tibet. 1923.")

Rock 22235.

Distribution: N.W. Yunnan and S.E. Tibet, Mekong-Salwin divide, Mts. of Londre.

5(d) *glaphyrum* comb. nov.

Rh. glaphyrum Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1920), 45. *Rh. eudoxum* Balf. f. et Forrest subspecies *glaphyrum* in The Species of Rhododendron (1930), 549.

The young stems are usually bristly. The flowers are rose, white-margined rose, flushed rose margined deeper, orange-red, creamy-white flushed rose, pale yellow flushed or margined pink; the ovary is eglandular.

Forrest 18936 (type of *Rh. glaphyrum* Balf. f. et Forrest. "S.E. Tibet, Salwin-Kiu chiang divide. Lat. 28° 40' N. Long. 98° 15' E. Shrub of 2 ft. Flowers flushed rose and margined deeper. Margins of Rhododendron thickets and on cliffs. July 1919.")

Forrest 19916, 19920, 19922, 19960, 20029, (20882), (20889), 21733=(22697), 21844=(22730), 21901, 21902=(22698), 21903=(22695), 21904=(22699), (22695)=21903, (22697)=21733, (22698)=21902, (22699)=21904, (22730)=21844, 23106; Rock 22195, 22270.

Distribution: S.E. Tibet; Salwin-Kiu chiang divide, Mt. Kenyichunpo, Solo-la.

5(e) *gilvum* subsp. nov.

A type floribus luteis divergit.

This subspecies agrees with the typical plant except in the colour of the flowers which are yellow.

Forrest 21914=(22701) (type of subsp. *gilvum*. "S.E. Tibet, Tsarong, Salwin-Kiu chiang divide. N.W. of Si-chi-to. Lat. 28° 45' N. Long. 98° 18' E. Alt. 13,000 ft. Shrub of 4 ft. Flowers pale yellow. Open rocky slopes in ravines and on ledges of cliffs. June 1922.")

Forrest (22701)=21914; Rock 8913, 22271, 22298.

Distribution: S.E. Tibet; Tsarong, Salwin-Kiu chiang divide, N.W. of Si-chi-to, Londre, Solo-la.

5(f) *chrysanthemum* subsp. nov.

A type floribus luteis, ovario tomentoso-eglanduloso, a *Rh. fulvastro* Balf. f. et Forrest foliis glabris infra papillis ceraceis notatis recedit.

A yellow-flowered form of *Rh. temenium* which has been confused with *Rh. fulvastrum* Balf. f. et Forrest, distinguished by waxy papillae on the underside of the leaf, the yellow corolla and eglandular ovary.

Rock 22272 (type of subsp. *chrysanthemum*. "S.E. Tibet, Tsarong, forests and alpine region of Solo-la. Shrub 3 ft. Flowers sulphur yellow. In moist forests. Alt. 13,000 ft. May-June 1932.")

Rock 22290, 22292, 23244=(23640), (23640)=23244.

Distribution : S.E. Tibet, Tsarong, Solo-la, Ka-gwr-pu, Doker-la, Yuinshi.

5(g) *albipetalum* subsp. nov.

A typo floribus albidis recedit.

A distinctive white-flowered form of *Rh. temenium* Balf. f. et Forrest in other characters conforming to the type.

Rock 22295 (type of subsp. *albipetalum*. "S.E. Tibet, Tsarong, forests and alpine regions of Solo-la. Shrub 3-4 ft. Flowers white; alpine region. Alt. 13,000 ft. May-June 1932.")

Distribution : S.E. Tibet ; Tsarong, region of Solo-la.

5(h) *dealbatum* subsp. nov.

A typo floribus albis ovario eglanduloso divergit.

This species with white flowers like *albipetalum* differs from it and from typical *Rh. temenium* Balf. f. et Forrest in the absence of glands on the ovary.

Forrest 19900 (type of subsp. *dealbatum*. "S.E. Tibet, Tsarong, Salwin-Kiu chiang divide. Lat. 28° 20' N. Long. 98° 27' E. Alt. 13-14,000 ft. Shrub of 2 ft. Flowers white without markings ; on rocky moorland. July 1921.")

Distribution : S.E. Tibet ; Tsarong, Salwin-Kiu chiang divide.

RH. APERANTUM.

6. *Rh. aperantum* Balf. f. et Ward in Notes R.B.G. Edin. xiii (1922), 231.

Rh. aperantum, although very obviously in the Sanguineum alliance, is easily distinguished from all other species by two characters—the leaves (rarely with a few patches of hairs) are thickly covered with waxy pegs or papillae which are very distinctly seen with the aid of a microscope, and the young shoots are covered with conspicuous persistent bud-scales. Moreover the lamina of the leaf is usually recurved at the margin. Plants with these characteristics, with white, white flushed or margined rose, rose, deep rose, yellow-flushed rose, orange and yellow flowers have all passed under the name *Rh. aperantum* Balf. f. et Ward. Typically *Rh. aperantum* is a plant 1-1½ ft. high, but several specimens of plants up to 4 and 5 ft. in height have been collected. There has been much less sub-division here than among the various forms that cling more closely round *Rh. sanguineum* Franch. No distinction has been drawn between specimens in which the ovary is glandular-tomentose and eglandular ; the glandular form is more usual.

In the Sanguineum Series there are only two species which, like *Rh. aperantum*, have waxy papillae, viz. *Rh. temenium* Balf. f. et Forrest and *Rh. parmulatum* Cowan; these, however, do not have persisting bud-scales.

Distribution: N.E. Upper Burma; Chawchi Pass, Chimili Alps, western spur of Imaw Bum, western flank of the N'Maikha-Salwin divide, Fu-chuan, S.W. of Wei-Hsi, Mekong-Salwin divide.

Farrer 1671 (type of *Rh. aperantum* Balf. f. et Ward. "Chawchi Pass. Alt. 12,000 ft. A small stiff spreading bush of 3-9 ins., with very large flowers, typically of a most beautiful clear rose-pink, but varying to all the adjacent shades. July 1920.")

Farrer 1184; Forrest 26925=(27597), 26926=(27587), 26930=(27651), 26931=(27474), 26933=(27590), 26934=(27584), 26936=(27467), 26937=(27480), 26938=(27604), 26964=(27636), 26964A=(27630), 27002=(27491), 27020=(27645), 27022=(27666), 27025=(27483), 27073=(27648), 27075=(27579), 27077=(27640), 27079=(27493), 27081=(27486), 27083=(27576), 27111=(27572), (27467)=26936, (27474)=26931, (27480)=26937, (27483)=27025, (27486)=27081, (27491)=27002, (27493)=27079, (27572)=27111, (27576)=27083, (27579)=27075, (27584)=26934, (27587)=26926, (27590)=26933, (27597)=26925, (27604)=26938, (27630)=26964A, (27636)=26964, (27640)=27077, (27645)=27020, (27648)=27073, (27651)=26930, (27666)=27022, (29938), 30534, 30536; Rock 16983, 16985, 16993, 17021, (18352), (18354) (18379), (22714), (23295); Ward 3301.

Distribution: N.E. Upper Burma; Chawchi Pass, Chimli Pass, N'Maikha-Salwin divide, Mekong-Salwin divide, S.W. of Wei-shi and Imaw Bum.

6(a) *aperantum* Balf. f. et Ward var. *subpilosum* var. nov.

A typo *Rh. aperanto* Balf. f. et Ward foliis infra hic illic indumento griseo lacerato-interrupto e pilis ramosis constructo praeditis distinguitur.

Four specimens with the characteristics of *Rh. aperantum* have in addition to the waxy papillae on the underside of the leaves a very sparse, irregularly developed indumentum of branched hairs covering a small proportion of the surface of the leaf—recalling the "half-flayed" leaf of *Rh. hemidartum* Balf. f. MS. (descript. Tagg). These are distinguished as var. *subpilosum*.

Forrest 25596=25757 (type of var. *subpilosum*. "N.E. Upper Burma, western flank of the Salwin-Kiu chiang divide. Lat. 27° 18' N. Long. 98° 40' E. Alt. 13,000 ft. Shrub of 3 ft. Flowers white flushed rose, deepest in bud. On open rocky alpine meadows. July 1924.")

Forrest 25563=(25878), 25757=25596, (25878)=25563.

Distribution: N.E. Upper Burma, W. flank of the Salwin-Kiu chiang divide.

RH. PARMULATUM.

7. *Rh. parmulatum* Cowan in Notes R.B.G. Edin. xix (1936), 182.

Rh. parmulatum has the papillae or waxy pegs characteristic of *Rh. aperantum* Balf. f. et Ward on the underside of the leaves; it, however, shows no trace of persisting foliage bud-scales. From *Rh. temenium* Balf. f. et Forrest it is easily separated by the fleshy and cup-shaped calyx. The flowers are unique in colour in the series, creamy-white with dark plum markings. The lack of an arachnoid indumentum, although a few floccose hairs may be present, is a further distinction between this species and *Rh. fulvastrum* Balf. f. et Forrest.

Distribution: E. Tibet, Doshong-la.

Ward 5875 (type of *Rh. parmulatum* Cowan. "Doshong-la. Alt. 11-12,000 ft. Flowers white, upper lobes speckled with crimson and with five crimson honey glands at the base of the long corolla. Scrub plant of 3-4 ft. with ascending stems, growing on steep rocky slopes amidst a dense growth of other species. Fairly abundant. The reddish papery bark peels off exposing the tawny smooth trunk. The corollas were filled with a struggling mass of small flies, sucking honey from the cup-shaped glands. In many flowers these glands had been bitten through as though pinched out all round the base. 29/6/24.")

Distribution: Doshong-la.

RH. DICHROANTHUM.

8. *Rh. dichroanthum* Diels in Notes R.B.G. Edin. v (1912), 212, sp. polymorph. emend.

Rh. dichroanthum is here regarded as a polymorphic species with a number of closely allied subspecies or forms linked by intermediates not always easily separable. The subspecies of *Rh. dichroanthum* show less variation in flower colour than is seen in other allied species, all having orange flowers or various shades of orange-pink or yellowish bronze. But greater variation than usual is observed in the shape and texture of the leaves. The indumentum on the underside of the leaves is thin, continuous and plastered, or somewhat woolly, greyish-white, dark grey-brown or fawn, thus differing from all species in the sub-series except *Rh. sanguineum*. From *Rh. sanguineum* Franch., *Rh. dichroanthum* is distinguished not only by the colour and fleshy texture of the flowers but also by the large fleshy cup-shaped calyx, often more or less split or lobed. From *Rh. parmulatum* Cowan, with somewhat similar calyx, the indumentum and flower colour are evident marks of distinction. Again from the allied *Rh. sanguineum* Franch. the leaf-shape may afford an additional diagnostic aid but the shape of the leaf of the composite species *Rh. dichroanthum* is variable. While the leaf of

septentrionale and of *herpesticum* closely resembles a typical *sanguineum* leaf that of *scyphocalyx* is larger, being very broadly rounded at the apex and more or less auricled at the base; again the leaf of *apodectum* is distinctly rounded at the base and very thick and leathery in texture; but that of typical *Rh. dichroanthum* is longer, oblong to oblanceolate and of thinner texture. The descriptions of *Rh. dichroanthum* in the "Notes of the Royal Botanic Garden, Edinburgh," and in "The Species of Rhododendron" require slight modification to include forms with leaves cuneate or rounded at the base, forms with glabrous and puberulous stamens and with a glandular as well as an eglandular ovary.

SUBSPECIES.

8(a) *dichroanthum* Diels (typical).

The typical *Rh. dichroanthum* is not difficult to recognise when seen as a living plant. It has the general aspect of *Rh. sanguineum* Franch. but is usually taller, 3-5 ft. in height, the flowers are clear orange flushed salmon rose, the corolla is thick and fleshy, and the leaves are oblong to oblanceolate, 4-10 cm. long, cuneate at the base, thus being longer and also more pointed and of a thinner texture than the leaf of a typical *Rh. sanguineum*. The absence of glands on the ovary distinguishes the typical form from *herpesticum* and *scyphocalyx*, the texture and shape of the leaf from *apodectum* and *septentrionale*, the leaf of *apodectum* being rounded at both ends and very leathery whereas the leaf of *septentrionale* is of the usual *sanguineum* type.

Forrest 4138 (type of *Rh. dichroanthum* Diels. W. Yunnan. Lat. 25° 40' N. Alt. 9-10,000 ft. Shrub of 2-4 ft. Flowers yellowish rose, corolla fleshy; moist, rocky, shady positions in side valleys on the eastern flank of the Tali Range. July 1906.)

Forrest, 4142, 4157, 4158, 4165, 6761, 6781, 11597, 11609, 13710, 13712, 28290, (28308), 30992.

Distribution: W. Yunnan; E. and W. flanks of the Tali Range, Shon-shi-shan.

8(b) *apodectum* comb. nov. ampl.

Rh. apodectum Balf. f. et W. W. Smith in Notes R.B.G. Edin. x (1917), 83.

Rh. jangtzwowense Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1922), 271.

Rh. liratum Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1922), 274.

The only modification necessary to the description given in "The Species of Rhododendron" is to include forms in which the filaments

of the stamens are glabrous. The ovary is glabrous, and the shape of the very thick, leathery, oblong to oblong-elliptic or obovate leaf rounded at both ends distinguishes this from the typical form and from *septrionale*.

Forrest (8987) (type of *Rh. apodectum* Balf. f. et Smith. Yunnan, western flank of the Shweli-Salwin divide. Lat. 25° 20' N. Alt. 10-11,000 ft. Shrub 4-8 ft. In fruit. Margins of rhododendron forest. August 1912.)

Forrest (9054), 11896, 11968, (12094), 15932, (16008), 16153, 17560, (17764), 18153, 18167, (18172), (18307), (18308A), (18320), (18322), (18453), (18823), (18824), (18858), (18859), (24113), 24302, 24305, (24306), 24328, 24331, 24712, 24728, 26728, 26785, (27359), 27800.

Distribution: Yunnan; western flank of the Shweli-Salwin divide, Jangtze shan.

8(c) *septrionale* comb. nov.

Rh. scyphocalyx Balf. f. et Forrest var. *septrionale* Tagg MS.

Both *herpesticum* and *septrionale* are forms of the species which approach most closely to *Rh. sanguineum* Franch., the leaves being of the same shape and texture, although usually somewhat larger. They are distinguished from each other by the presence or absence of glands on the ovary—*septrionale* is the eglandular form.

Forrest 25750 (type of *Rh. scyphocalyx* Balf. f. et Forrest var. *septrionale* Tagg MS. "N.E. Upper Burma; Western flank of the Salwin-Kiu Chiang divide. Lat. 27° 18' N. Long. 98° 40' E. Alt. 13-14,000 ft. Shrub of 3½-4 ft. Flowers yellowish, heavily flushed rose. On alpine meadows and moorland. July 1924.")

Forrest 25577=(25787), 25582, (25787)=25577.

Distribution: N.E. Upper Burma; W. flank of the Salwin-Kiu Chiang divide, Mekong-Salwin divide.

8(d) *herpesticum* comb. nov.

Rh. herpesticum Balf. f. et Ward in Notes R.B.G. Edin. x (1917), 114.

While *herpesticum* and *scyphocalyx* can be distinguished from other subspecies by the presence of glands on the ovary and pedicels it is difficult to discriminate between them. Typical *herpesticum* is a dwarf plant about 1-2 ft. high with bristly glandular shoots and leaves very similar to those of *Rh. sanguineum* Franch. whereas typical *scyphocalyx* is a comparatively tall plant, 4-5 ft. high with no bristles on the stem and with broadly obovate leaves, 6-9 cm. long, 2.5-4 cm. broad, more or less auricled at the base. Thus the extreme forms are quite distinct and can be recognised and separated, both as plants in cultivation and as dried specimens.

But most plants in cultivation and many herbarium specimens do not conform exactly to either subspecies. They are intermediate in

stature, with or without bristles, and one may observe every possible degree of variation in leaf shape between the larger, broader, thinner leaves of *scyphocalyx* and the smaller, thicker leaves of *herpesticum*. While retaining the two names for these distinctive forms I cannot, with certainty, assign herbarium specimens to one name or the other. All might be listed under the first published name *herpesticum* and the description modified accordingly. For those who wish to discriminate, I have, however, listed the names separately keeping the dwarfier forms with leaves similar to those of *Rh. sanguineum* Franch. with or without bristles under the name *herpesticum*.

Ward 1793 (type of *Rh. herpesticum* Balf. f. et Ward. "E.U. Burma. Nwai divide. Ridge of Naung-Chanung. Alt. 12-13,000 ft. Dwarf shrub forming tangled growths, covering a good deal of ground and rising to a height of about a foot. Amongst bamboo growth on the ridge near tree limit and amongst rhododendron carpet of the summit of the mountain (n. slope). Flowers dull yellow and orange-red. 16.7.14.")

Farrer 1731A; Forrest 24616, 24620, 25015, 25561, 25579=(25855), (25855)=25579, 26963=(27599), 26965=(27471), 26966=(27494), 26974=(27641), 26977=(27502), 27003=(27580), 27012=(27481), 27050=(27626), 27051=(27662), 27052=(27650), 27061=(27644), 27063=(27663), 27071=(27568), 27089=(27672) ?, 27093=(27646), 27095=(27654), 27097=(27499), 27099=(27570), 27113=(27496), 27116=(27613), (27471)=26965, (27481)=27012, (27485)=26927, (27494)=26966, (27496)=27113, (27499)=27097, (27502)=26977, (27568)=27071, (27570)=27099, (27573)=27019, (27580)=27003, (27599)=26963, (27613)=27116, (27626)=27050, (27641)=26974, (27644)=27061, (27646)=27093, (27650)=27052, (27654)=27095, (27657)=27115, (27662)=27051, (27663)=27063, (27672)=27089?

Distribution: E.U. Burma and N.W. Yunnan-Nwai divide, W. flank of the Chimli, Salwin-Kiu chiang divide, and N'Maikha-Salwin divide.

8(e) *scyphocalyx* comb. nov.

Rh. scyphocalyx Balf. f. et Forrest in Notes R.B.G. Edin. xiii (1922), 291.

This subspecies linked with *herpesticum* by a series of intermediate forms has already been described under the earlier name. The cup-shaped calyx so typical of plants in cultivation under this name is common to other subspecies in the *Rh. diachroanthum* alliance. Plants of taller stature, with larger broader leaves approaching typical *Rh. scyphocalyx* Balf. f. et Forrest are listed below.

Forrest 18050 (type of *Rh. scyphocalyx* Balf. f. et Forrest. "N.E. Upper Burma. Western flank of the N'Maikha-Salwin divide. Lat. 26° 25' N. Shrub of 4-5 ft. Flowers very dark yellowish crimson. In bamboo and mixed scrub. May 1919.")

Forrest (17855), 18178, (18308), (18769), (24532), 24544, 24546,

24603, 24606, 24683, (25006), 25018, (25065), 26767, 26924=(27585),
 26927, 26978=(27589), 27011=27487, 27018, 27019=(27477), 27054=
 (27583), 27057=(27461), 27059=(27633), 27115, 27132=(27665),
 27134=(27594), 27137=(27490), 27140=(27575), (27461)=27057,
 (27477)=27019, (27487)=27011, (27490)=27137, (27575)=27140,
 (27583)=27054, (27585)=26924, (27589)=26978, (27594)=27134,
 (27633)=27059, (27665)=27132; Farrer 1024.

Distribution: N.E. Upper Burma and Yunnan; Salwin divide,
 M'Maikha-Salwin divide, Shweli-Salwin divide, Hpimaw Pass, Chimli.

ADDENDA.

List of numbers of plants in the Sanguineum Subseries of which only incomplete material exists and which cannot therefore be identified with certainty. Where possible the specific name is given.

Forrest.

13304	Rh. sanguineum typical ?	20071	temenium subsp. ?
13542	" " ?	20218	citriniflorum subsp. ?
14752	probably Rh. citriniflorum.	20253	sanguineum subsp. ?
14769	eudoxum subsp. ?	20258	citriniflorum subsp. ?
14861	sanguineum subsp. ?	20883	" "
14971	Sanguineum subser.	20887	Sanguineum subser.
14972	" "	20891	sanguineum subsp. ?
14973	" "	20893	" "
15294	citriniflorum subsp. ?	20905	" "
15295	Sanguineum subser.	20910	" "
15296	temenium subsp. ?	20911	" "
15434	Sanguineum subser.	22675	citriniflorum subsp. ?
17024	sanguineum subsp. ?	22676 = 21739	sanguineum subsp. ?
17312	" "	22680 = 21852	citriniflorum subsp. ?
17314	citriniflorum subsp. ?	22686 = 21856	Sanguineum subser.
17316	" "	22693 = 21857	" "
17317	Sanguineum subser.	22694 = 21754	" "
17319	" "	22705 = 21732	sanguineum subsp. ?
17322	sanguineum subsp. ?	22707 = 21846	Sanguineum subser.
17323	Sanguineum subser.	22724 = 21819	sanguineum subsp. ?
17334	eudoxum subsp. ?	22725 = 21915	sanguineum subsp. ?
17336	" "	22727 = 21767	eudoxum subsp. ?
17348	Sanguineum subser.	22862 = 21759	citriniflorum subsp. ?
17468	sanguineum subsp. ?	25848	" "
18082	dichroanthum subsp. ?	25901	" "
19008	sanguineum subsp. ?	25913	" "
19009	" "	25957 = 25507	Sanguineum subser.
19151	" "	27809	dichroanthum apodectum ?
19159	" "	28259	" subsp. ?
19220	Sanguineum subser.	28283	" "
19221	" "	28348	" "
20052	eudoxum subsp. ?		

Rock.

8909 = 10938	Sanguineum subser.	10287 = 10945	Sanguineum subser.
9087	citriniflorum subsp. ?	10893	sanguineum subsp. ?
9099	citriniflorum subsp. ?	10897	sanguineum subsp. ?
9110	sanguineum subsp. ?	10898	eudoxum subsp. ?
10110	citriniflorum subsp. ?	10900 = 10281	Sanguineum subser.
10154	eudoxum subsp. ?	10901	Sanguineum subser.
10217	sanguineum subsp. ?	10902	sanguineum subsp. ?
10255	parmulatum ?	10903 = 10265	sanguineum subsp. ?
10268	fulvastrum subsp. ?	10905 = 8912	citriniflorum subsp. ?
10281 = 10900	Sanguineum subser.	10907	Sanguineum subser.

Rock—continued.

10909	Sanguineum subser.	22563	citriniflorum subsp. ?
10922=9281	sanguineum subsp. ?	22564	" "
10927	" "	22566	" "
10932	eudoxum subsp. ?	22568	" "
10934=10307	sanguineum subsp. ?	22580	sanguineum roseotinctum ?
10938=8909	" "	22595	citriniflorum subsp. ?
10940	" "	22639	sanguineum subsp. ?
10941	fulvastrum subsp. ?	22641	temenium subsp. ?
10945	Sanguineum subser.	22643	eudoxum subsp. ?
10947	sanguineum subsp. ?	22647	Sanguineum subser.
10950	" "	22648	citriniflorum subsp. ?
10951	Sanguineum subser.	22706	dichroanthum subsp. ?
11011	" "	22707	" "
11022	" "	22965	Sanguineum subser.
11047	sanguineum subsp. ?	23135=23645	Sanguineum subser.
11052	" "	23141	eudoxum subsp. ?
11082	" "	23149	" "
11154	citriniflorum subsp. ?	23219	fulvastrum subsp. ?
11157	" "	23303	dichroanthum subsp. ?
11161	sanguineum subsp. ?	23524	Sanguineum subser.
11176=10105	sanguineum subsp.	23529	sanguineum subsp. ?
11177	citriniflorum subsp. ?	23563	" "
11178	sanguineum subsp. ?	23578=22984	Sanguineum subser.
11181	" "	23579=22983	citriniflorum subsp. ?
11183	" "	23580	sanguineum subsp. ?
11186	citriniflorum subsp. ?	23622	" "
11199	sanguineum subsp. ?	23628	" "
11203	citriniflorum subsp. ?	23631	" "
11208	Sanguineum subser.	23635	" "
11214	temenium subsp. ?	23637	" "
16974	fulvastrum subsp. ?	23639	" "
17169	citriniflorum subsp. ?	23641=23237	" "
17177	Sanguineum subser.	23642	" "
17178=18464	" "	23643=23230	fulvastrum subsp. ?
18463	citriniflorum subsp. ?	23645=23135	Sanguineum subser.
18464=17178	Sanguineum subser.	23646=23225	fulvastrum subsp. ?
22212	citriniflorum horaeum ?	23649=23250	citriniflorum subsp. ?
22450	sanguineum subsp. ?	23650=23234	Sanguineum subser.
22560	citriniflorum subsp. ?	23664=23222	" "
22561	" "		

Ward.

5432	sanguineum subsp. ?	7185	sanguineum subsp. ?
5433	sanguineum subsp. ?	7500	" "
5435	temenium subsp. ?	8293	" typical.
5487	dichroanthum subsp. ?	8362	Sanguineum subser.,
7090	Sanguineum subser.		

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