# Notes from the Royal Botanic Garden Edinburgh

Volume 39 No. 1

**Revision of Rhododendron 1.**
**Subgenus Rhododendron sections Rhododendron & Pogonanthum**

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## NOTICE

Volume 39 of the *Notes R.B.G. Edinburgh* will be devoted to taxonomic revisions of the genus *Rhododendron*. The present part will be followed next year by a second consisting of a revision of subgenus Hymenanthes by Dr D. F. Chamberlain.

The present part of volume 39 has been published prior to the concluding part (or parts) of volume 38.

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# A REVISION OF RHODODENDRON

## 1. Subgenus Rhododendron sections Rhododendron & Pogonanthum

J. CULLEN

ABSTRACT. A revision of the lepidote (scaly) species of *Rhododendron* (Ericaceae), excluding those of the mainly subtropical section Vireya, is presented. Section Rhododendron is divided into 27 subsections, containing 149 species; section Pogonanthum contains 13 species, making a total of 162 in all. Distribution maps are provided for most of the species, and taxonomic characters, relationships of the subsections of section Rhododendron, and geographical distribution are all discussed separately.

CONTENTS



## GENERAL INTRODUCTION

The genus *Rhododendron* is an important one from many points of view: it is the largest genus in its family, and one of the largest genera in the flora of China and the Himalaya; and it is extremely important horticulturally, very many of its species having been introduced into cultivation. Its

taxonomic history has been well documented by Cowan (*Rhodo. Yearbook* 1949:29–58) and the Philipsons (*Notes R.B.G. Edinb.* 32:223–238, 1973) and is further elaborated in the forthcoming report of an international meeting on Rhododendron taxonomy held at the New York Botanical Garden in May 1978 (in press)*. This history will not be rehearsed again in detail here: it is sufficient to note that it is a history of tension between horticulturally-based and herbarium-based classifications.

The horticulturally-based classification, which was devised almost exclusively for those species hardy in the British Isles (i.e. excluding those species of the mostly subtropical section Vireya) began with the introductions of large numbers of species from western China in the early part of this century. The main collector of these was George Forrest, who had been an employee of the Edinburgh herbarium; and many of the living plants that he sent back from China were found to grow well in the Edinburgh garden. Under the influence of Forrest and his mentor, the then Regius Keeper, Professor Bayley Balfour, Edinburgh rapidly became the main centre of taxonomic work on the genus, and large and unrivalled collections of herbarium and living specimens were accumulated.

In order to cope with the flood of new material sent back by Forrest and other collectors, Bayley Balfour devised a classification based on *Series*—groups of related (or supposedly related) species, named after their best known representatives, and given equal status within the genus. This system was an *ad hoc* one, designed to cope with the special situation created by the vast quantities of new material. Bayley Balfour himself knew that it was only a temporary expedient, and he intended to revise it thoroughly when time was available. Unfortunately, he died before this could be accomplished. His successors did not take up the challenge, and the system, given its definitive form in *The Species of Rhododendron* (ed. Stevenson, 1930), ossified thereafter.

Being more or less horticulturally-based, this system included many species of doubtful origin: plants known only from garden material, often appearing as 'rogues' in seed pans of other species, were described as distinct species. The characters used in the recognition of the species were often extremely tenuous, and, in spite of the great general interest in exploration for new rhododendrons, geographical distribution seems to have played little part in the classificatory process. The supraspecific groups, the series themselves, were often nomenclaturally invalid or of dubious validity, and no attempt was made to group them into clusters of related series.

The Balfourian system has been very influential, at least in the English-speaking world. It forms the basis of the categories used in rhododendron shows in Britain, USA, Canada and elsewhere, and most popular books on rhododendron (of which there are very many) are based on it. Its inadequacies may be summed up as follows: a) it is based largely on cultivated, rather than wild material; b) the species concept used is extremely narrow; and c) classification above the species level is non-hierarchical. Also, it does not include a large part of the genus—the non-hardy species were more or less ignored by Bayley Balfour, and only a few of them are listed, without descriptions, in *The Species of Rhododendron*.

* Published May, 1980.

Bayley Balfour's successors (Tagg, Hutchinson, Cowan, and Davidian) accepted the system as it stood, making minor alterations but not attempting to provide the much-needed total revision, even though much new information (morphological, geographical, anatomical and chemical) became available after the publication of *The Species of Rhododendron*.

Long before the richness of the genus in eastern Asia was appreciated, various taxonomists had worked towards an acceptable classification of it. G. Don (*Gen. Hist. Dichlam. Pl.* 3:843–848, 1834), de Candolle (*Prodr.* 7:719–728, 1839), Nuttall (*Hooker's Kew Journ.* 5:353–367, 1854) and Maximowicz (*Rhodo. As. Or.*, 1870) had all produced taxonomically acceptable classifications, using the ranks of subgenus and/or section, by the last quarter of the nineteenth century. These systems were ignored by the horticultural school of rhododendron classification, even though, at the same time, modifications of them were produced (e.g. Rehder & Wilson's *A Monograph of Azalea*, 1921). It was left to Herman Sleumer to bring all these various strands together in his classic paper of 1949 (Ein System der Gattung Rhododendron, *Bot. Jahrb.* 74:511–553).

In this paper Sleumer brought together the results of his own work on the subtropical species of section Vireya (mainly directed towards the preparation of an account of the genus for *Flora Malesiana*), and the work of the earlier taxonomists, and produced, for the first time since 1870, a complete, hierarchical and nomenclaturally validated supraspecific classification of the genus. The system he proposed in 1949 has been variously modified by him since (particularly in terms of the names to be applied to the various units), but it still remains the basis for all taxonomic work on the genus. Though considerably modified here, it still underlies the whole classification. An English translation of it will appear in the proceedings of the New York meeting referred to above (p. 2).

The present revision will appear in various parts, of which this is the first. The elepidote species of subgenus Hymenanthes will be dealt with by my colleague Dr Chamberlain in a paper to be published in 1980 or 1981 (cf. *Notes R.B.G. Edinb.* 36:105–126, 1978; 37:327–338, 1979, for a synopsis covering the taxa included in this and Dr Chamberlain's revisions). Professor and Dr Philipson are working on the rest of the elepidote subgenera (essentially those of the 'Azalea Series' of the Balfourian classification), and we look forward to the publication of their results in due course. Each of these revisions will have its own introduction, but one topic, that of specific and infraspecific concepts, can be dealt with in a general way here.

While the broad lines of the supraspecific classification of the genus have been laid down by Sleumer, little has been written about the species concept which could be adopted. This is rather remarkable in view of the well-known ability of rhododendrons to hybridise widely in gardens. In this revision we have tried to use concepts which are in line with modern opinion, based on the following guidelines: a) species described and known only from cultivated material have not been accepted unless they are very distinct (even then, the possibility that they are of accidental hybrid origin must be borne in mind); b) species should differ from each other in at least two independent but correlatedly varying characters, and have geographical or ecological distributions different from those of their closest allies; c) if two (or more) taxa appear to intergrade, then the resulting

treatment depends on the proportion of intermediate specimens. If these are very few in number, two (or more) species are recognised, which are considered to hybridise to a small extent. If the proportion of intermediate specimens is larger (up to c. 25% of the total), but the units are geographically discriminable with the morphological intermediates in a geographically intermediate area, then one species is recognised with two (or more) subspecies within it. Alternatively, if the various units are geographically indiscriminate, then one species is recognised, either undivided, or if the morphological variation is appropriate, divided into two (or more) varieties. These guidelines are discussed in more detail in a paper read to the R.H.S. Rhododendron Group while this revision was in preparation (Cullen, *Rhodo. & Camellia Yearbook* 1978:33–43).

Work on the cytology, anatomy and phytochemistry of the genus, using the present revision as a basis, is proceeding. Results will be published as they become available. It is hoped to prepare papers on *Rhododendron* dispersal and evolution when the whole genus has been revised.

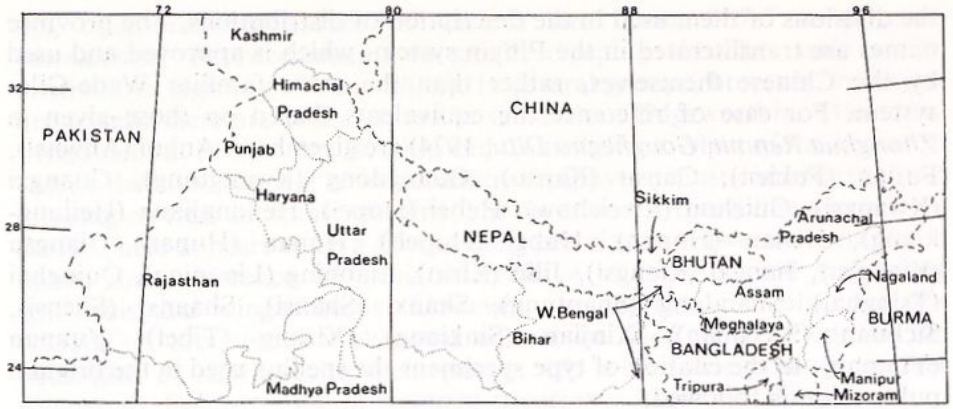
## Introduction to subgenus Rhododendron

As accepted in this revision, all the lepidote (i.e. scaly) rhododendrons belong to subgenus Rhododendron. This treatment represents a major departure from Sleumer's classification, in which the lepidote species are distributed among four subgenera: Rhododendron (called Lepidorhodium in Sleumer's 1949 paper), Pseudazalea, Rhodorastrum and Pseudorhodorastrum. The characters used by Sleumer for this division involve the relationship of inflorescence and new shoot buds, and the persistence or deciduousness of the leaves. None of these characters is 'strong' (cf. pp. 7 & 13), and the species placed in these additional subgenera are closely related to different groups within subgenus Rhododendron sensu stricto. Consequently, I have downgraded these three subgenera to the status of subsections within subgenus Rhododendron section Rhododendron. This treatment is supported by the breeding behaviour of the group: all lepidote rhododendrons appear to be capable of interbreeding with each other, whereas hybridisation between lepidote and elepidote species is extremely difficult, if not, in many cases, impossible.

The enlarged subgenus Rhododendron is divisible into three sections, Rhododendron, Pogonanthum and Vireya. The first two of these are the subject of the present revision. Section Vireya is largely subtropical, distributed mainly in Malaysia, Indonesia and Papua New Guinea. It has been very thoroughly revised in these areas by Sleumer (*Flora Malesiana* 6(4):469–674, 1966), and the species treated in that work will not be discussed further. One very small group within section Vireya, subsection Pseudovireya (C. B. Clarke) Sleumer (the Vaccinioides Series in the sense of Hutchinson), occurs in the Sino-Himalaya. This group will be dealt with in a subsequent paper.

## Presentation of the revision

The revision of section Rhododendron and section Pogonanthum presented here follows the normal pattern of taxonomic revisions in most of its details. The following points must, however, be borne in mind:

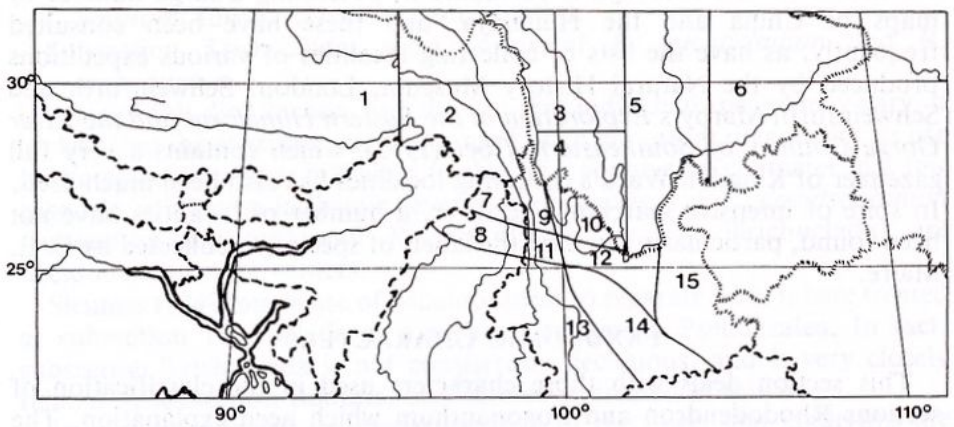



MAP 1. Country and province names used in the description of geographical distributions.

(a) *Citation of illustrations*. The illustrations cited have all been examined, and are thought to give a good representation of the species concerned. Many published illustrations (even those in some of the most prestigious books and journals) have been rejected as being either not accurate enough in their representation of diagnostic characters, or in giving a false impression of the facies of the species. Many of the species, even those widely cultivated, have never been adequately illustrated.

(b) *Descriptions*. The species descriptions are intended to be comparable within the subsections, but will be found to vary considerably from subsection to subsection.

(c) *Geographical distribution*. This is indicated by country and province only. Map 1 shows the countries most involved and the provinces of northern India. Map 2 shows the provinces of western China and




MAP 2. Areas of Burma and China used in the description of geographical distributions. 1–2, China, Xizang: 1 E Xizang, 2 SE Xizang; 3–6, China, Sichuan: 3 NW Sichuan, 4 SW Sichuan, 5 C Sichuan, 6 E Sichuan; 7–8 Burma: 7 NE Burma, 8 E Burma; 9–15, China, Yunnan: 9 NW Yunnan, 10 N Yunnan, 11 W Yunnan, 12 C Yunnan, 13 SW Yunnan, 14 S Yunnan, 15 E Yunnan.

the divisions of them used in the description of distributions. The province names are transliterated in the Pinyin system, which is approved and used by the Chinese themselves, rather than the more familiar Wade-Giles system. For ease of reference the equivalents (based on those given in *Zhonghua Renmin Gongheguo Ditu*, 1974) are given here: Anhui (Anwhei), Fujian (Fukien), Gansu (Kansu), Guangdong (Kwangtung), Guangxi (Kwangsi), Guizhou (Kweichow), Hebei (Hopei), Heilongjiang (Heilungkiang), Henan (Honan), Hubei (Hupeh), Hunan (Hunan), Jiangsu (Kiangsu), Jiangxi (Kiangsi), Jilin (Kirin), Liaoning (Liaoning), Quinghai (Tsinghai), Shandong (Shantung), Shanxi (Shansi), Shaanxi (Shensi), Sichuan (Szechuan), Xinjian (Sinkiang), Xizang (Tibet), Yunnan (Yunnan). In the citation of type specimens the spelling used in the original publication is followed.

(d) *Altitude and ecological information*. These are based entirely on the field notes on the herbarium labels. Altitudes are given in metres except in the citation of type specimens, where the unit used in the original publication is repeated.

(e) *Identification of Specimens*. Because of the large number of herbarium specimens involved in this revision, individual specimens and their details of location, etc. are not cited after the descriptions of the species. Instead, almost every species is mapped (maps 3–57), and a consolidated list of specimens (in alphabetical order of collectors and in numerical order under each collector) and their identifications are given on pp. 171–184. This list includes all the numbered specimens examined for every species except those of subsection Rhododendron and *R. lapponicum*, which are represented in herbaria by very large numbers of European specimens. All specimens cited have been examined unless otherwise indicated.

(f) *Maps*. The maps presented here are as accurate as possible. However, many place names found on herbarium labels are difficult to trace, and problems of transliteration often cause additional difficulties. The Royal Botanic Garden Edinburgh is fortunate in possessing a large number of maps of China and the Himalaya, and these have been consulted frequently, as have the lists of collecting localities of various expeditions produced by the Natural History Museum, London. Schweinfurth and Schweinfurth-Marby's *Exploration in the Eastern Himalayas and the River Gorge Country of Southeastern Tibet* (1975), which contains a very full gazetteer of Kingdon Ward's collecting localities has also been much used. In spite of intensive searching, however, a number of localities have not been found, particularly those on the labels of specimens collected by E. E. Maire.

## Taxonomic Characters

This section deals with those characters used in the classification of sections Rhododendron and Pogonanthum which need explanation. The characters found in section Vireya are mentioned only in passing. The examples cited are merely illustrative, not exhaustive.

GROWTH HABIT. Most species are free-growing shrubs, varying from almost tree-like forms attaining 12–15 m in height (e.g. *R. rubiginosum*), through

lax, open-branched shrubs of various sizes from 0·5–7 m (e.g. *R. yunnanense, R. racemosum*) to small, creeping shrublets only a few centimetres high (e.g. *R. pumilum*). In several groups, however, epiphytes are found: these are concentrated in subsections Edgeworthia, Maddenia, Moupinensia, Monantha, Boothia and Camelliiflora. Most of the species of these subsections appear to be facultative epiphytes, most commonly found growing on trees on forest margins, but occasionally free-living on rocks or cliffs. There appears to be a fairly strong correlation between the epiphytic habit, the occurrence of foliar sclereids, a multiple-layered leaf upper epidermis and winged seeds. However, the characters involved in this correlation are not clear-cut, and cannot be used as a group for the definition of supraspecific taxa (see p. 185 where this point is further discussed). Epiphytes are of frequent occurrence in section Vireya.

LEAVES. The leaves of these rhododendrons are very variable as regards shape and size; much of this variation is of taxonomic importance, but it needs no discussion here. The anatomy of the leaves has been studied in some detail by Hayes, Keenan & Cowan (*Notes R.B.G. Edinb.* 21:1–34, 1951), which should be consulted for further information. Two points, however, require some explanation here: leaf persistence and the presence or absence of a papillose lower epidermis.

The leaves of most of the species under consideration here are evergreen, and call for no particular comment. Deciduous or subdeciduous leaves occur in individual species scattered throughout the classification and the use of the phenomenon as a taxonomic character is not simple. Regularly deciduous leaves occur in the following subsections of section Rhododendron:

Subsection Triflora: *R. augustinii* subsp. *hardyi*; some variants of *R. yunnanense* and *R. pleistanthum*.

Subsection Rhodorastra: some variants of *R. dauricum*; *R. mucronulatum* (consistently).

Subsection Cinnabarina: some variants of *R. cinnabarinum* subsp. *cinnabarinum*; subsp. *tamaense* (consistently).

Subsection Trichoclada: most forms of *R. trichocladum* and *R. mekongense*.

In view of this distribution, and the fact that individual species may vary, it is clear that the character cannot be used as an important diagnostic. Its use in the present revision is limited to that of a supporting character in a few cases. In cultivation in Britain several other species, e.g. *R. davidsonianum* (subsection Triflora) and *R. caesium* (subsection Trichoclada) are deciduous in severe winters.

Sleumer (1949) made use of deciduousness to separate what is here treated as subsection Trichoclada as a separate subgenus, Pseudazalea. In fact, subsection Trichoclada is not consistently deciduous, and is very closely related to subsection Boothia, and cannot be treated in this way.

In many species of the group the cells of the lower leaf epidermis are prolonged into long or short papillae which are covered with waxy scales which impart a white coloration to the leaf undersurface (cf. Hayes, Keenan & Cowan, *op. cit.*). The white colour (often described as 'glaucous' in the older rhododendron literature) is very noticeable in the species of subsection

Glauca, and in such species as *R. racemosum* (subsection Scabrifolia) and *R. zaleucum* (subsection Triflora). The papillae can be easily seen in the photograph of the leaf surface of *R. megeratum* (Plate 2k).

Philipson & Philipson, in their discussion of subsection Lapponica (*Notes R.B.G. Edinb.* 34:1–72, 1975), discuss the occurrence of a papillose epidermis in sections Rhododendron and Pogonanthum, and its importance in supraspecific classification (they use the character as one of their reasons for excluding *R. setosum* from subsection Lapponica). The following notes extend and supplement their observations.

Subsection Edgeworthia: papillose.
Subsection Maddenia: all species papillose except *R. ciliatum* and *R. fletcheranum*.
Subsection Moupinensia: papillose.
Subsection Monantha: *R. monanthum* and *R. concinnoides* papillose; the other two species uncertain.
Subsection Triflora: most species not papillose; the exceptions are *R. zaleucum, R. searsiae, R. triflorum* and *R. ambiguum*.
Subsection Scabrifolia: papillose.
Subsection Heliolepida: all species without papillae except some forms of *R. rubiginosum*, in which small papillae are found.
Subsection Caroliniana: not papillose.
Subsection Lapponica: all species papillose with the exception of *R. setosum*.
Subsection Rhododendron: all species slightly papillose.
Subsection Micrantha: the single species very slightly papillose.
Subsection Rhodorastra: not papillose.
Subsection Saluenensia: not papillose.
Subsection Fragariflora: not papillose.
Subsection Uniflora: all species papillose except *R. ludlowii*.
Subsection Cinnabarina: all species papillose.
Subsection Tephropepla: three species papillose; *R. longistylum* and *R. hanceanum* not papillose.
Subsection Virgata: papillose.
Subsection Glauca: papillose.
Subsection Campylogyna: not papillose.
Subsection Genestieriana: papillose.
Subsection Lepidota: papillose (*R. cowanianum* uncertain).
Subsection Baileya: papillose.
Subsection Boothia: papillose.
Subsection Trichoclada: *R. lepidostylum* papillose, the other species not papillose.
Subsection Camelliiflora: papillose.
Subsection Afghanica: very slightly papillose.
Subsection Pogonanthum: papillose.

From this survey it is easily seen that a considerable number of the subsections are uniform as regards this character, while in others a few species tend to depart from the norm. The character is certainly a useful one, but the degree of stress to be placed on it in supraspecific classification is uncertain; because of this, I have returned *R. setosum* to subsection Lapponica.

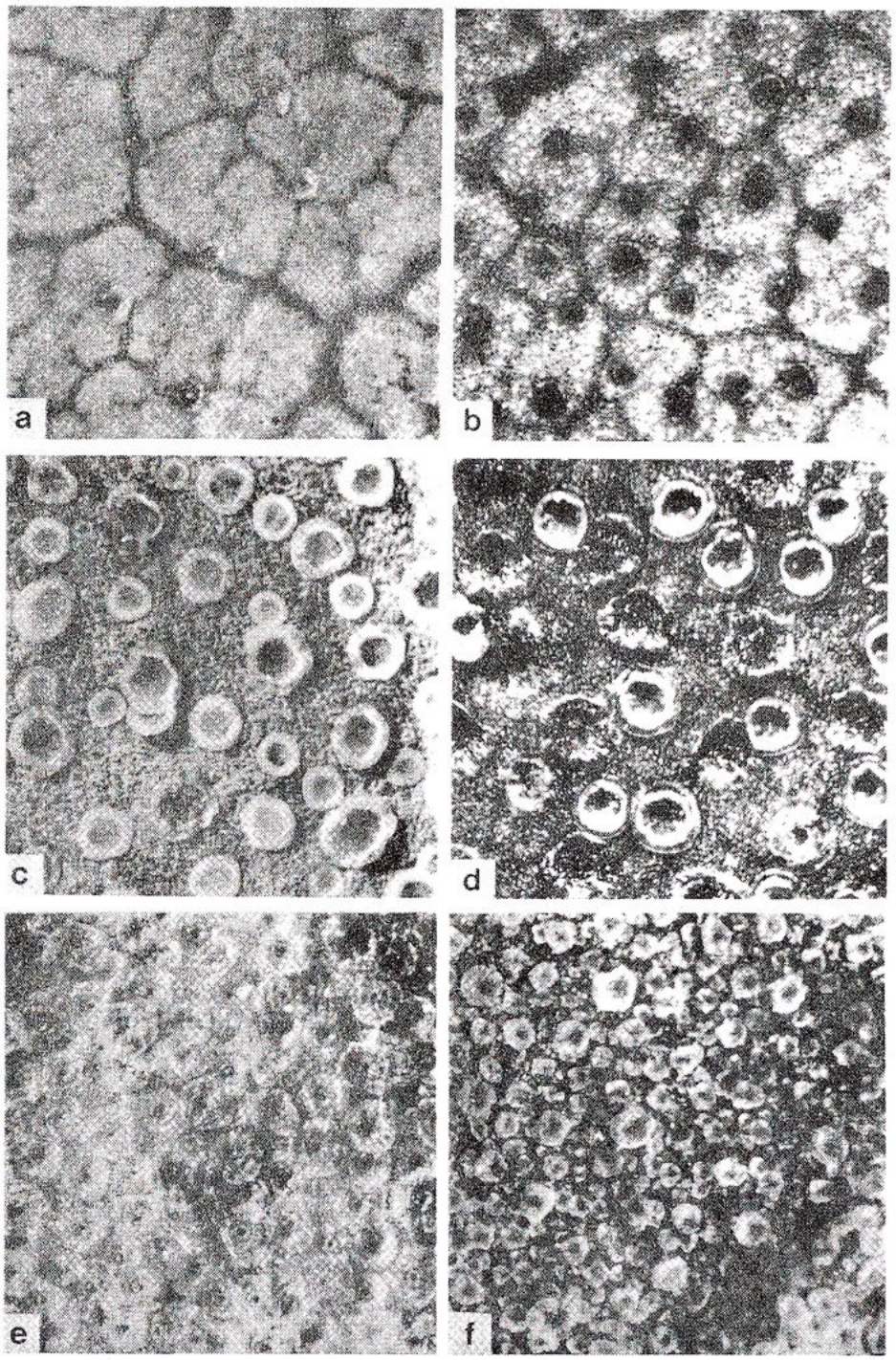



PLATE 1. Rhododendron scales: a, *R. rigidum*; b, *R. oreotrephes*; c, *R. searsiae*; d, *R. heliolepis* var. *heliolepis*; e, *R. hippophaeoides* var. *hippophaeoides*; f, *R. saluenense* subsp. *saluenense*. (× approx. 14).

SCALES. The scales of the lepidote rhododendrons provide a large number of important characters, based not only on their morphology, but also on their distribution. Scales may be found on many parts of the plant—young shoots, petioles, leaves (both surfaces), pedicels, calyces, corollas (outside only), ovary and capsules. For most purposes they are best examined on the leaf undersurface, and when scales are mentioned in the revision without reference to their place of occurrence, it is the scales on the lower leaf surface that are meant.

The origin and development of the scales has been well documented by Cowan (*The Rhododendron Leaf*, 1950) and Seithe (*Bot. Jahrb.* 79: 297–373, 1960) and will not be discussed further here.

The scale consists of three parts: a stalk, by means of which it is attached to the leaf surface; a swollen or flattened central part; and a flat, broad or narrow rim. Within the basic structure many variations occur. The stalk is not usually visible when the leaf surface is examined, and is usually quite short, so that the scale lies almost flush with the leaf surface. However, in subsection Saluenensia and in section Pogonanthum, the stalks of some of the scales are considerably elongated, so that the scales are arranged in several tiers (cf. plate 1f). Similar long-stalked scales are found on the pedicels of some other species.

The scales of the species of subsection Boothia are sunk in pits in the leaf surface (e.g. *R. megeratum*, plate 2k); the epidermal cells in these species are prolonged into papillae which give a crenulate outline to the pits in which the scales are sunk.

The central part of the scale, which is resinous when the scales are young, may be domed (e.g. *R. cinnabarinum* subsp. *xanthocodon*, plate 2g) or flat (e.g. *R. searsiae*, plate 1c; *R. heliolepis*, plate 1d). Its breadth in relation to the rim is sometimes taxonomically significant (cf. subsection Triflora, Yunnanense aggregate, pp. 65–69). In general, however, the central part is of lesser taxonomic interest than the rim.

In subsections Trichoclada, Fragariflora, Campylogyna and two species of subsection Boothia the scales are, in fact, rimless or almost so, consisting merely of a short stalk and a swollen, more or less globular central part (e.g. *R. megeratum*, plate 2k; *R. trichocladum*, plate 2l). Such scales are termed 'vesicular', and their occurrence is an important diagnostic. In other cases the rim may be narrow (e.g. *R. cinnabarinum* subsp. *xanthocodon*, plate 2g; *R. rigidum*, plate 1a) or broad (e.g. *R. lepidotum*, plate 2j; *R. searsiae*, plate 1c). In most cases the rim is radially striated, but in *R. lepidotum* the striations are very indistinct.

The margin of the rim is usually smooth and entire, giving the scale a more or less circular outline, but in section Pogonanthum (and many species of section Vireya) it is lacerate, producing a star-shaped scale. This feature does not show up well in photographs, but it is illustrated by Cowan (*Rhodo. Yearbook* 1947: f. 22 & 24) and Sleumer (*Flora Malesiana* 6(4):469–674, 1966). In subsections Saluenensia and Baileya the margin of the rim in crenulate (e.g. *R. saluenense* subsp. *saluenense*, plate 1f) and in most species of subsection Lapponica it is irregularly undulate (e.g. *R. hippophaeoides* var. *hippophaeoides*, plate 1e). In subsection Boothia, in which the scales are sunk in pits, the rim is often upturned and cup-shaped.

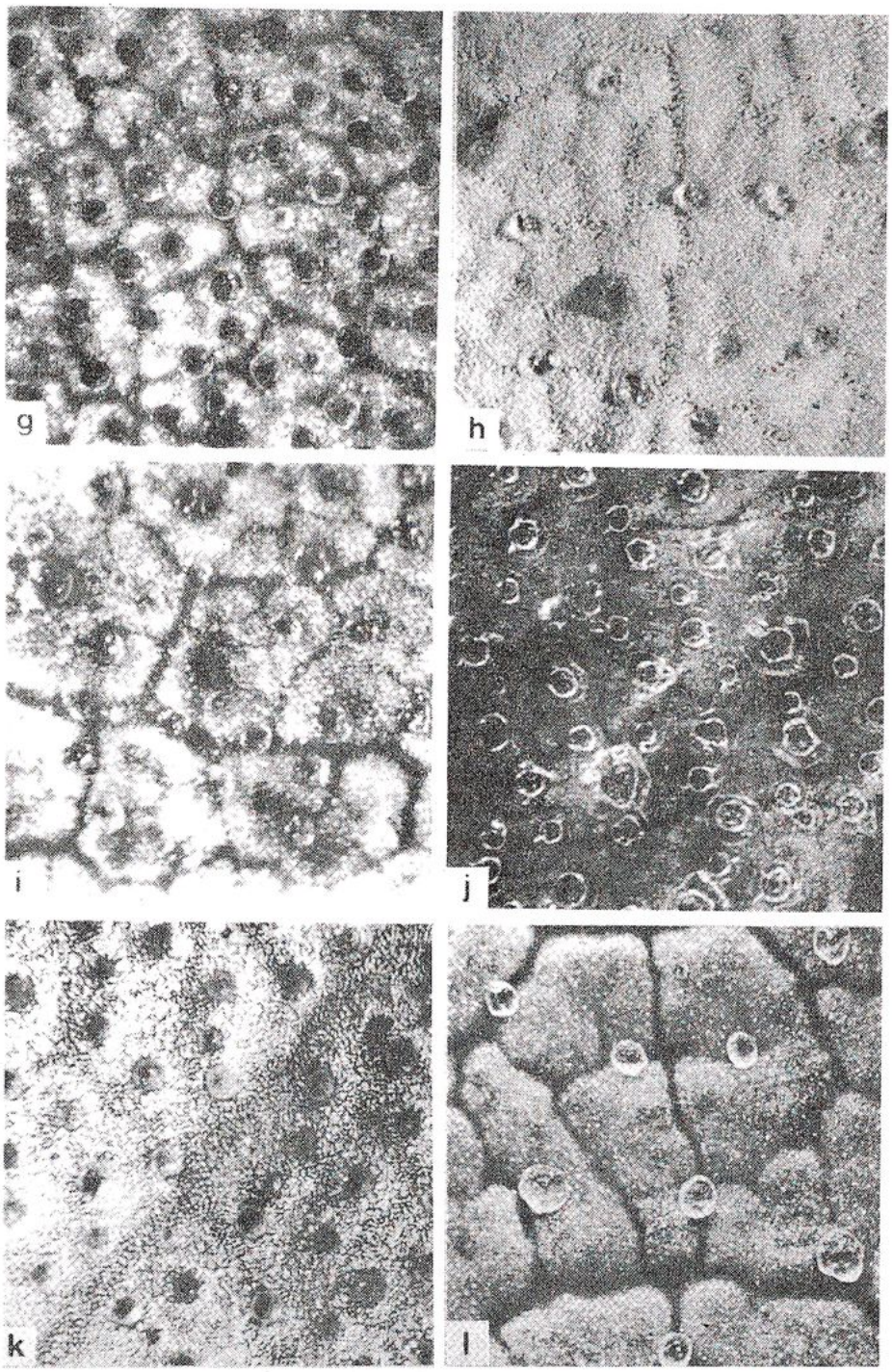



PLATE 2. Rhododendron scales: g, *R. cinnabarinum* subsp. *xanthocodon*; h, *R. glaucophyllum* var. *glaucophyllum*; i, *R. campylogynum*; j, *R. lepidotum*; k, *R. megeratum*; l, *R. trichocladum*. (× approx 14).

In any particular species the scales are usually very uniform in size, colour and morphology, varying only slightly and continuously. In *R. maddenii* and many other species of subsection Maddenia the range of variation in size is striking, the smallest scales (0·2 mm in diameter) being only half the size of the largest (0·4 mm in diameter). Similar continuous variation occurs in *R. mekongense*, but in this species the smallest scales tend to occur close to the leaf margin.

In a few groups, however, there are characteristic heteromorphisms which are taxonomically important. The most striking of these is seen in subsection Glauca, in which the scales are dimorphic, and stand out very clearly from the white papillose background. In the species belonging to this group the majority of scales are golden, translucent, domed, shortly stalked and almost rimless; a few are dark brown, flattened or cup-shaped, broadly rimmed and borne on longer stalks (cf. *R. glaucophyllum*, plate 2h). This dimorphism is very striking, and is the major diagnostic character of the subsection. A more complex example is provided by *R. searsiae* (subsection Triflora) in which three types of scale are found: large, slightly opaque or milky scales c. 0·3 mm in diameter; smaller, milky scales, 0·15–0·2 mm in diameter; and large, clear, golden scales, 0·3–0·4 mm in diameter (cf. plate 1c). This, as far as I know, is a unique case. Very large scales, 0·3–0·5 mm in diameter are characteristic of subsection Heliolepida; in *R. heliolepis* they are usually well spaced and easily visible to the naked eye.

The scales of most species are brown to golden brown; dimorphism in scale colour does, however, occur, and forms an important taxonomic character in subsection Lapponica (cf. Philipson & Philipson, 1975; and pp. 92–109). Certain individual species diverge markedly in colour however, and scale colour sometimes provides important taxonomic characters. Colourless and translucent, often almost 'glassy' scales are characteristic of subsection Lepidota (e.g. *R. lepidotum*, plate 2j) and also occur in individual species in other groups (e.g. *R. hippophaeoides* var. *hippophaeoides*, plate 1e). Milky, opaque scales, which often have a pinkish or purplish coloration occur in *R. mekongense* (subsection Trichoclada), *R. oreotrephes* (subsection Triflora), *R. fastigiatum* (subsection Lapponica), *R. pruniflorum* (subsection Glauca) and *R. cinnabarinum* (subsection Cinnabarina), as well as in *R. searsiae* mentioned above. Very dark brown scales occur in subsection Lapponica and in sections Pogonanthum and Vireya.

The spacing of the scales has been widely used as a diagnostic character in the genus (cf. *The Species of Rhododendron*, 1930), but it is very variable, and must be used with caution. Very distant scales are found in some plants of *R. campylogynum* (subsection Campylogyna); other plants have much more densely packed scales, and it seems that in this species, at least, the scales have a tendency to be deciduous. Very distant scales are a constant feature of *R. rigidum* (subsection Triflora, plate 1a) and *R. trichocladum* (subsection Trichoclada, plate 2l) and provide a reliable diagnostic character for these two species. At the other end of the range the scales may be very closely packed so as to overlap each other. This situation is found in a wide range of unrelated species, e.g. *R. hippophaeoides* var. *hippophaeoides* (subsection Lapponica, plate 1e), *R. rubiginosum* (subsection

Heliolepida), *R. polylepis* (subsection Triflora), *R. surasianum* (subsection Maddenia), etc.

It seems likely that further study of the scales, using the scanning electron microscope, will provide more taxonomically valuable characters. Philipson & Philipson (1975) and Manley & Garlick (*Rhodo. & Camellia Yearbook* 1978:44–47) have published a few examples.

HAIRS. In subgenus Rhododendron hairs are of lesser taxonomic importance than they are in the elepidote subgenera. Nonetheless, they still provide some features of taxonomic interest.

Most of the hairs found in the lepidote rhododendrons fall into one or other of two types (terminology after Cowan, *The Rhododendron Leaf*, 1950): a) filiform-acicular hairs, which are short, fine, unicellular hairs which frequently form a minute pubescence on the petioles and midribs of the leaves; and, b) loriform hairs, bristles or setae, which are more robust, multicellular hairs frequently found on the leaf margins.

The presence or absence of these two hair types on various organs is often taxonomically significant. Loriform hairs are often deciduous, but their bases are usually persistent, and can normally be seen under a magnification of × 15–20.

In addition to these widely distributed hair types, a few others occur sporadically, and are of greater taxonomic significance. Subsection Edgeworthia is characterised by the presence of long, twisted, densely matted, loriform bristles on the leaves, shoots and calyces. These hairs form a very characteristic indumentum which, on the lower leaf surface at least, completely obscures the presence of scales. This type of indumentum is restricted to subsection Edgeworthia. Branched (dendroid) hairs occur on the margins of the inflorescence bud scales of section Pogonanthum, and serve to diagnose this section from section Rhododendron, in which branched hairs do not occur, with the exception of a few random occurrences: on the calyx lobes of one specimen of *R. baileyi* (p. 151) and on the petioles of one specimen of *R. charitopes* subsp. *charitopes* (p. 141), and in one species of subsection Lapponica (cf. Philipson & Philipson, 1975, p. 17); the significance of these occurrences is obscure.

INFLORESCENCE. The inflorescence is always a raceme. Various modifications of the basic type occur, however, the most frequent being the several-flowered, umbel-like raceme with a very short rachis. Other variations, such as the reduction of the inflorescence to the 1-flowered condition (e.g. *R. monanthum, R. pseudociliipes*), or the extension of the rachis to produce a non-umbellate condition (e.g. *R. hanceanum, R. micranthum,* and particularly, *R. afghanicum*) also occur.

The bud scales (bracts) and bracteoles generally do not provide features of taxonomic importance (except for the characteristic occurrence of branched hairs on the bud scales of section Pogonanthum). This, however, may be due to lack of knowledge rather than anything else, as the bud scales and bracteoles are generally deciduous, and are not usually present on herbarium specimens. Further observations on these organs in authentic material in cultivation are necessary.

In subsections Fragariflora, Uniflora and Saluenensia the inflorescence buds are sunk in the upper leaves of the shoot; these leaves are very bract-like with laterally expanded petioles and reduced, very pubescent laminae.

In most of the species under consideration the inflorescence buds are terminal on the shoots, and new growths are produced from buds in the axils of the leaves below the inflorescence. In a few cases, however, some or all of the inflorescences are lateral, and new growths are produced either from buds below the (lateral) inflorescences or from the terminal (or apparently terminal) bud. These cases are as follows:

Subsection Triflora: inflorescences terminal and axillary in most species; new growth from buds below the inflorescences.

Subsection Scabrifolia: inflorescences all axillary, the terminal bud abortive; new growth from buds below the inflorescences.

Subsection Rhodorastra: inflorescences all axillary, the terminal bud abortive; new growth from buds below the inflorescences.

Subsection Cinnabarina: in *R. keysii* the inflorescences are mostly axillary (in *R. cinnabarinum* they are all terminal); new growth from buds below the inflorescences.

Subsection Virgata: inflorescences all axillary; new growth from the terminal (or apparently terminal) bud.

Sleumer (1949) distinguished his subgenus Rhodorastrum (i.e. subsection Rhodorastra) and subgenus Pseudorhodorastrum (i.e. subsections Scabrifolia and Virgata) on the basis of this characteristic. However, subsections Triflora and Cinnabarina appear to show the transition from the normal terminal inflorescence to the more unusual, lateral condition, and suggest that the character must not be relied on too heavily. Also, each of the groups which has only lateral inflorescences is clearly related to other groups which have terminal inflorescences, and it seems unnecessary to recognise the lateral-flowered groups at a different rank from all the rest.

The pedicels of the various species provide several obvious characters of taxonomic importance, such as length and indumentum. These require no explanation. The pedicels of subsections Uniflora and, to a lesser extent, Campylogyna, elongate considerably and harden in fruit. This phenomenon seems to be linked with their low growth habit as an adaptation for more efficient seed dispersal.

Subsection Lapponica (with the exception of *R. cuneatum*) is notable in that the pedicel is in line with the axis of the flower (Philipson & Philipson, 1975, p. 11). In all the other subsections the flower is held in such a manner that the pedicel and the axis form an obtuse angle.

CALYX. The calyx provides a number of taxonomic characters. It may be conspicuous with five herbaceous or coloured lobes, or it may be reduced to a mere rim or raised line around the apex of the pedicel. Such characteristics as size and shape of the lobes are frequently used as diagnostics.

When present and conspicuous, the calyx lobes are generally fringed with hairs or scales. The most frequent condition is that of the lobes being fringed (or even erose-ciliate) with loriform bristles. As well as the bristles, a few filiform-acicular hairs may also be present; the condition in which the lobes are fringed with filiform-acicular hairs only is rather infrequent. In only a few cases, notably *R. taggianum*, the lobes are fringed with scales.

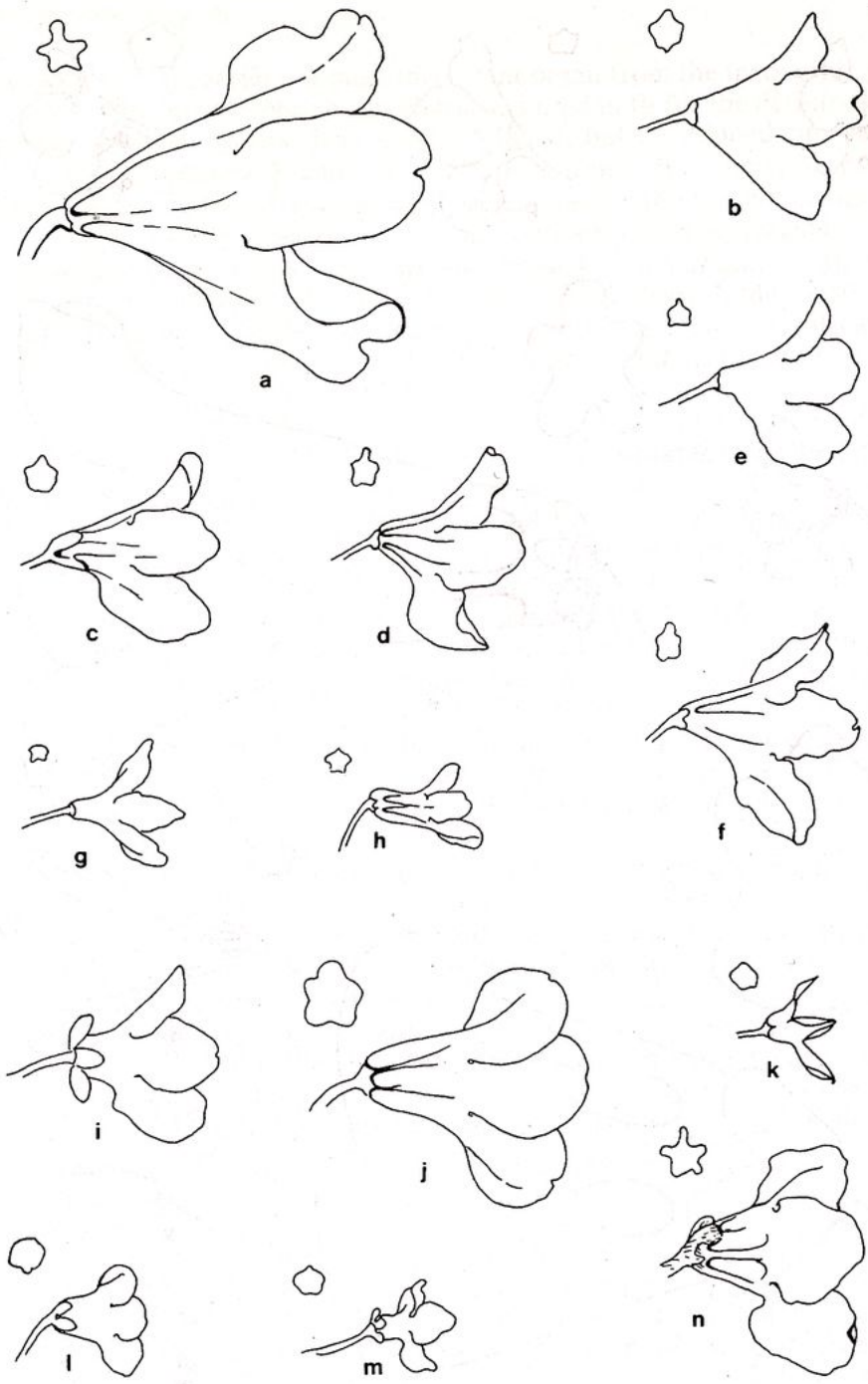



FIG. 1. Rhododendron corolla shapes (diagrammatic): a, *R. horlickianum*; b, *R. rubiginosum*; c, *R. cuneatum*; d, *R. rigidum*; e, *R. oreotrephes*; f, *R. searsiae*; g, *R. racemosum*; h, *R. ferrugineum*; i, *R. tephropeplum*; j, *R. cinnabarinum* subsp. *xanthocodon*; k, *R. micranthum*; l, *R. campylogynum*; m, *R. lepidotum*; n, *R. seinghkuense*. Insets: cross section of the corolla tube near the base. (k × 1⅓; all others × ⅔).

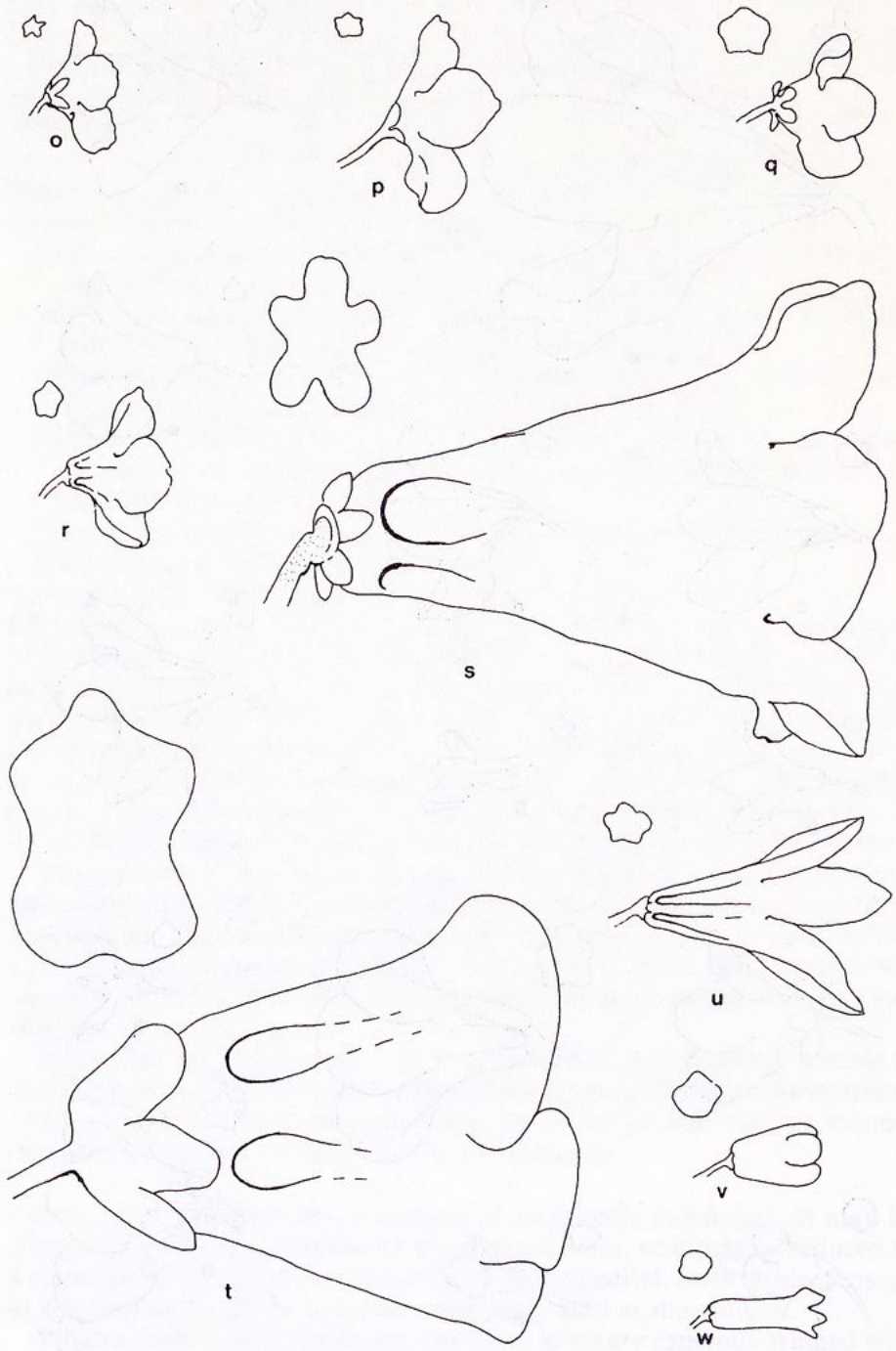



FIG. 2. Rhododendron corolla shapes (diagrammatic): o, *R. dauricum*; p, *R. saluenense* subsp. *chameunum*; q, *R. charitopes* subsp. *tsangpoense*; r, *R. trichocladum*; s, *R. dalhousiae* var. *dalhousiae*; t, *R. megacalyx*; u, *R. cinnabarinum* subsp. *cinnabarinum*; v, *R. spinuliferum*; w, *R. keysii*. Insets: cross sections of the corolla tube near the base. (All × ⅔).

The calyx is persistent in fruit, though it generally loses its indumentum as the lobes dry out.

COROLLA. The corolla is a most important organ from the taxonomic point of view, and provides numerous characters used both for the definition and grouping of the species. It is usually 5-lobed, but 6–10-lobed corollas are found in subsections Maddenia and Camelliiflora. It is always zygomorphic, but the degree of zygomorphy varies considerably; some species, e.g. *R. micranthum, R. impeditum*, etc., are only very slightly irregular.

Corollas range in size from about 1 cm (in *R. micranthum*) to 10 cm or more in several species of subsection Maddenia. In general, the corolla tube is longer than the lobes, but the reverse condition occurs in subsections Triflora, Micrantha and Lapponica, and forms an important diagnostic for them.

Corolla shape has traditionally been an important taxonomic character, and various attempts have been made to provide suitable terms and definitions to describe it. Most of these have been based on Cowan's suggestions (*Rhodo. Yearbook* 1949:29–58), reprinted in the various *Rhododendron Handbooks*. The terminology used here is based on Cowan's, but with a few modifications; a range of shapes is illustrated in figs 1 & 2 (pp. 15 & 16).

*Funnel-shaped*. This term is used to describe corollas which, when seen from the side, have a narrow base and widen more or less smoothly and rapidly from the base to the spreading lobes (e.g. *R. horlickianum*, fig. 1a; *R. rubiginosum*, fig. 1b; *R. cuneatum*, fig. 1c). Similar corollas in which the lobes are longer than the tube and very widely spreading are described as openly funnel-shaped, and are found in species of subsections Triflora and Scabrifolia (e.g. *R. rigidum*, fig. 1d; *R. oreotrephes*, fig. 1e; *R. searsiae*, fig. 1f; *R. racemosum*, fig. 1g).

*Campanulate*. Corollas of this description have a broad, rounded base and a tube with parallel or almost parallel sides, the lobes spreading more or less at right angles to it (e.g. *R. tephropeplum*, fig. 1i; *R. cinnabarinum* subsp. *xanthocodon*, fig. 1j; *R. campylogynum*, fig. 1l; *R. micranthum*, fig. 1k; *R. lepidotum*, fig. 1m).

*Funnel-campanulate*. Corollas described thus are more or less intermediate between funnel-shaped and campanulate. They have a broad, rounded base and the sides of the tube widen smoothly and rapidly. Such corollas tend to have a rather flat appearance when seen from the front (e.g. *R. seinghkuense*, fig. 1n; *R. dauricum*, fig. 2o; *R. saluenense* subsp. *chameunum*, fig. 2p; *R. charitopes* subsp. *tsangpoense*, fig. 2q; *R. trichocladum* fig. 2r).

*Tubular-campanulate*. Corollas which have a pronounced, broadly-based tube which is somewhat divergently sided are described as tubular-campanulate (e.g. *R. dalhousiae* var. *dalhousiae*, fig. 2s; *R. megacalyx*, fig. 2t), and are found mainly in the very large-flowered species of subsection Maddenia. *R. cinnabarinum* subsp. *cinnabarinum* (fig. 2u) and *R. ferrugineum* (fig. 1h) have rather similarly shaped corollas, but the lobes are almost erect; this condition is described as narrowly tubular-campanulate.

*Tubular*. Corollas which are tubular throughout, with only small, slightly divergent lobes, are described as tubular. They are uncommon, being found only in *R. keysii* (fig. 2w) and *R. spinuliferum* (fig. 2v).

*Hypocrateriform*. The corollas of section Pogonanthum mostly have a long, narrow, parallel-sided tube and a broad, flat, oblique limb. Such corollas are described as hypocrateriform. The corolla of *R. collettianum* has a somewhat broader, more divergently sided tube than most of its allies, and its corolla is described as funnel-hypocrateriform.

These corolla shape categories are not entirely clear-cut, however, and in some species, notably *R. maddenii*, the corolla changes shape to some extent during maturation, being funnel-campanulate when newly opened, but becoming more tubular-campanulate with age.

The corolla colours presented by the species of sections Rhododendron and Pogonanthum cover almost the whole spectrum. Good clear red flowers are, however, not found, and the nearest approach to blue (found in *R. augustinii* subsp. *augustinii*) always has a tinge of magenta in it. In most species the upper corolla lobes, and, frequently, the upper part of the tube are spotted in a darker colour; the large-flowered species of subsection Maddenia, which are generally white, usually have a yellow or reddish blotch near the base of the tube. In *R. campylogynum* and *R. genestierianum* the corollas are in shades of dull pink or red, covered with a conspicuous, pruinose bloom.

The lower part of the interior of the corolla tube generally bears a patchy, pilose indumentum which interlocks to some extent with that on the filaments. The outer surface of the corolla may be entirely glabrous or pilose and/or lepidote. If hairs or scales are present, their distribution is often taxonomically significant.

STAMENS. The number of stamens is generally 10, but varies from 5 to 27. Flowers with stamens fewer than 10 are of regular occurrence in section Pogonanthum, in a few species of subsection Lapponica, and in *R. kiangisense* of subsection Maddenia. More than 10 stamens are found in subsection Camelliiflora and in several species of subsection Maddenia. The greatest range is found in *R. maddenii* itself, in which every number from 12 to 25, and 27 has been found. The number of stamens has been used to some extent for the definition of species within the broad concept of *R. maddenii* presented here (cf. Hutchinson, *Notes R.B.G. Edinb.* 12:1–84, 1919), but it varies from flower to flower on the same plant.

The stamens are usually declinate, with arched filaments, but non-declinate, actinomorphically arranged stamens occur in almost all species of subsections XIX–XXVII (the term 'actinomorphically arranged' is used because the stamens, due to inequalities in the lengths of their filaments, may still be actually zygomorphic; the anthers, however, appear as a perfectly symmetrical circle); in most species of subsection Lapponica the stamens are genuinely actinomorphic.

The filaments are usually pilose towards (but not actually at) the base, the hairs interlocking with those on the inside of the corolla tube; a few species have glabrous filaments on all, or some of, the stamens.

OVARY. The ovary is 5-locular in almost all of the species included here. In some species of subsection Maddenia, and in subsection Camelliiflora, however, the ovary may be 6–10-locular. In most species the ovary is lepidote to varying degrees; completely elepidote ovaries are uncommon, but they do occur, particularly in section Pogonanthum.

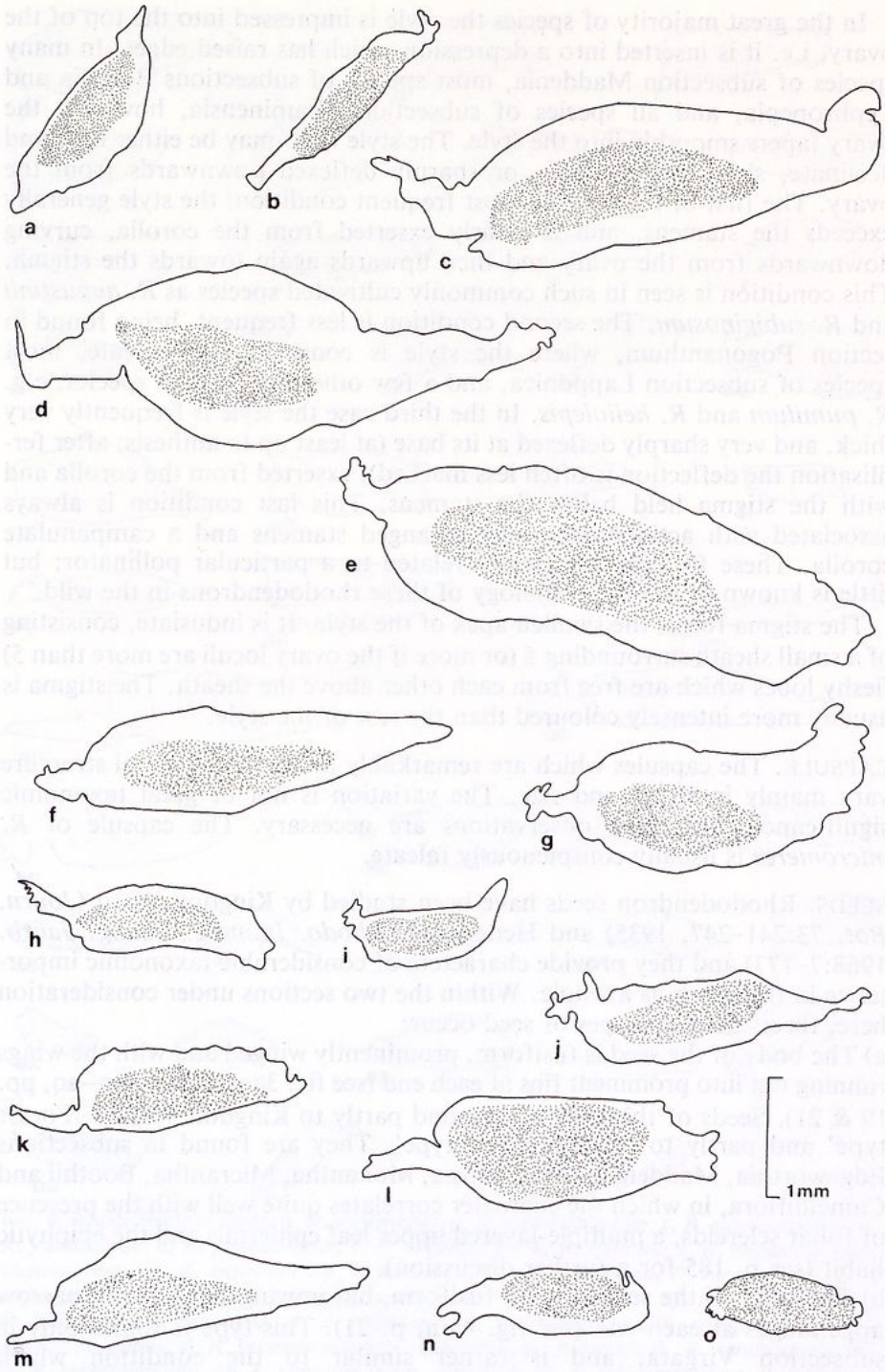



FIG. 3. Rhododendron seeds: a, *R. edgeworthii*; b, *R. pendulum*; c,d, *R. maddenii* subsp. *crassum*; e, *R. nuttallii*; f, *R. dalhousiae* var. *rhabdotum*; g, *R. liliiflorum*; h, *R. megacalyx*; i, *R. ciliatum*; j, *R. dendricola*; k, *R. pseudociliipes*; l, *R. lyi*; m, *R. moupinense*; n, *R. monanthum*; o, *R. zaleucum*.

In the great majority of species the style is impressed into the top of the ovary, i.e. it is inserted into a depression which has raised edges. In many species of subsection Maddenia, most species of subsections Boothia and Tephropepla, and all species of subsection Moupinensia, however, the ovary tapers smoothly into the style. The style itself may be either long and declinate, short and straight, or sharply deflexed downwards from the ovary. The first of these is the most frequent condition: the style generally exceeds the stamens, and is clearly exserted from the corolla, curving downwards from the ovary and then upwards again towards the stigma. This condition is seen in such commonly cultivated species as *R. augustinii* and *R. rubiginosum*. The second condition is less frequent, being found in section Pogonanthum, where the style is conspicuously clavate, most species of subsection Lapponica, and a few other non-related species, e.g. *R. pumilum* and *R. heliolepis*. In the third case the style is frequently very thick, and very sharply deflexed at its base (at least up to anthesis; after fertilisation the deflection is often less marked), exserted from the corolla and with the stigma held below the stamens. This last condition is always associated with actinomorphically arranged stamens and a campanulate corolla. These features are clearly related to a particular pollinator; but little is known of the floral biology of these rhododendrons in the wild.

The stigma forms the swollen apex of the style. It is indusiate, consisting of a small sheath surrounding 5 (or more if the ovary loculi are more than 5) fleshy lobes which are free from each other above the sheath. The stigma is usually more intensely coloured than the rest of the style.

CAPSULE. The capsules which are remarkably uniform in general structure vary mainly in shape and size. The variation is not of great taxonomic significance, but more observations are necessary. The capsule of *R. micromeres* is usually conspicuously falcate.

SEEDS. Rhododendron seeds have been studied by Kingdon Ward (*Journ. Bot.* 73:241–247, 1935) and Hedegaard (*Rhodo. Immerg. Laubg. Jahrb.* 1968:7–177) and they provide characters of considerable taxonomic importance in the genus as a whole. Within the two sections under consideration here, three different types of seed occur:

a) The body of the seed is fusiform, prominently winged and with the wings running out into prominent fins at each end (see fig. 3a–n & fig. 4an–aq, pp. 19 & 21). Seeds of this type correspond partly to Kingdon Ward's 'Forest type' and partly to his 'Epiphytic type'. They are found in subsections Edgeworthia, Maddenia, Moupinensia, Monantha, Micrantha, Boothii and Camelliiflora, in which the character correlates quite well with the presence of foliar sclereids, a multiple-layered upper leaf epidermis and the epiphytic habit (see p. 185 for a further discussion).

b) The body of the seed is again fusiform, but unwinged, and with narrow appendages at each end (see fig. 4am, p. 21). This type is found only in subsection Virgata, and is rather similar to the condition which characterises section Vireya, where the appendages are much longer and narrower.

c) The body of the seed is fusiform to irregular and unwinged and without appendages or with very small appendages at each end (see figs 3o, 4p–al & ar–be, pp. 19 & 21). This type of seed, which corresponds to Kingdon

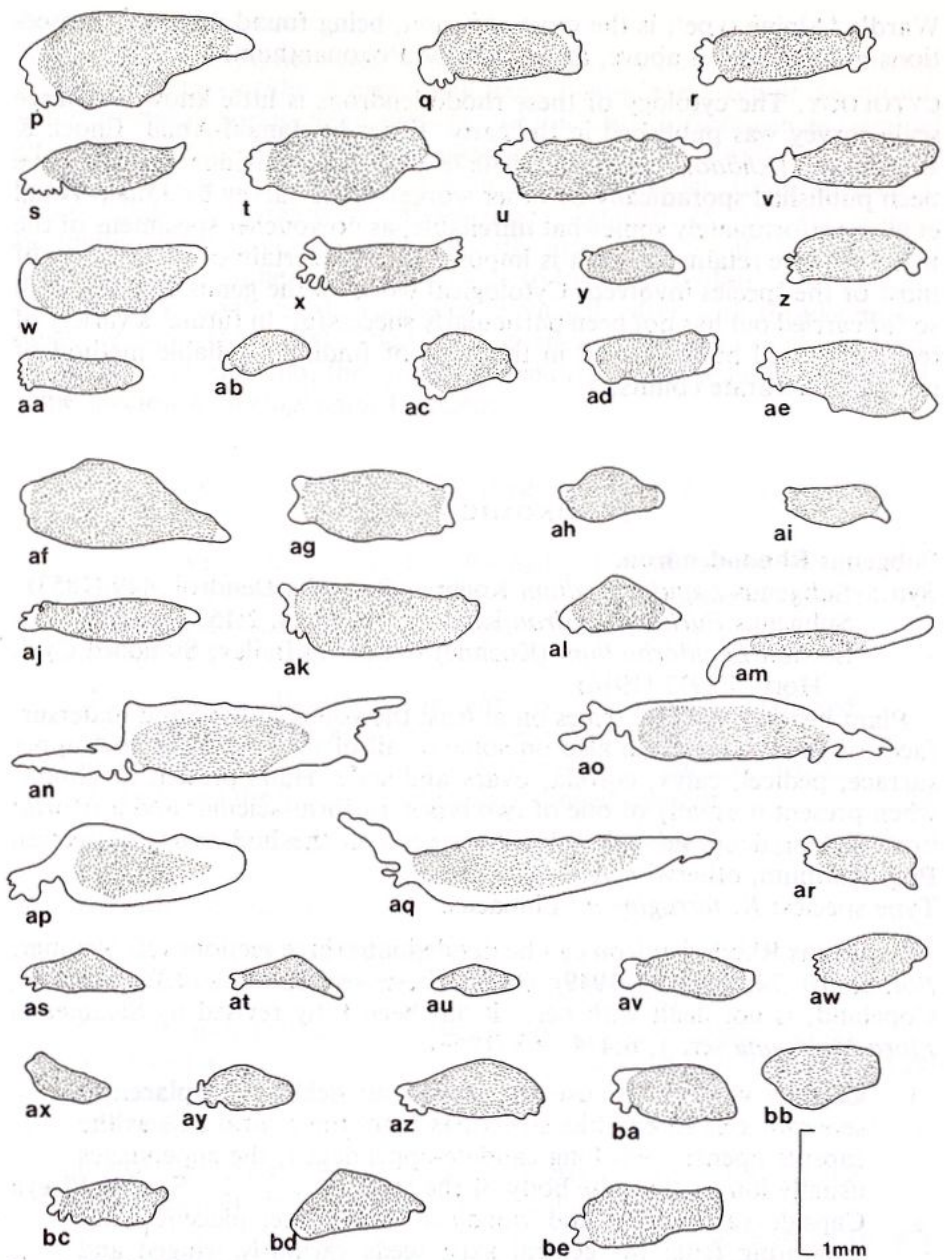



FIG. 4. Rhododendron seeds: p, *R. tatsienense*; q, *R. davidsonianum*; r, *R. siderophyllum*; s,t, *R. yunnanense*; u, *R. pleistanthum*; v, *R. oreotrephes*; w, *R. rigidum*; x, *R. augustinii* subsp. *chasmanthum*; y, *R. triflorum* var. *triflorum*; z, *R. ambiguum*; aa, *R. racemosum*; ab, *R. scabrifolium* var. *scabrifolium*; ac, *R. scabrifolium* var. *spiciferum*; ad, *R. spinuliferum*; ae, *R. heliolepis* var. *heliolepis*; af, *R. heliolepis* var. *brevistylum*; ag, *R. rubiginosum*; ah, *R. minus* var. *minus*; ai, *R. saluenense* subsp. *saluenense*; aj, *R. keysii*; ak, *R. xanthostephanum*; al, *R. tephropeplum*; am, *R. virgatum* subsp. *virgatum*; an, *R. micromeres*; ao, *R. sulfureum*; ap, *R. megeratum*; aq, *R. camelliiflorum*; ar, *R. campylogynum*; as, *R. genestierianum*; at, *R. lepidotum*; au, *R. cowanianum*; av, *R. lowndesii*; aw, *R. trichocladum*; ax, *R. mekongense* var. *mekongense*; ay, *R. mekongense* var. *melinanthum*; az, *R. cephalanthum* subsp. *cephalanthum*; ba, *R. cephalanthum* subsp. *platyphyllum*; bb, *R. anthopogon* subsp. *anthopogon*; bc, *R. anthopogon* subsp. *hypenanthum*; bd, *R. primuliflorum*; be, *R. trichostomum*.

Ward's 'Alpine type', is the most common, being found in all the subsections not mentioned above, and in section Pogonanthum.

CYTOLOGY. The cytology of these rhododendrons is little known. A large scale survey was published in the early 'fifties by Janaki-Amal, Enoch & Bridgwater (*Rhodo. Yearbook* 1950:78–91), and individual counts have been published sporadically by other workers. The survey by Janaki-Amal et al. is unfortunately somewhat unreliable, as no voucher specimens of the material were retained, and it is impossible to be certain of the identity of most of the species involved. Cytological work on the genus at Edinburgh so far carried out has not been particularly successful. In future, a variety of techniques will be attempted in the hope of finding a reliable method of obtaining accurate counts.

## TAXONOMIC ACCOUNT

Subgenus **Rhododendron**.

Syn.: Subgenus *Lepidorrhodium* Koehne, Deutsche Dendrol. 449 (1853).
Subgenus *Eurhododendron* K. Koch, Dendrol. 2:157 (1852).
Section *Lepidorhodium* (Koehne) Rehder in Bailey, Standard Cycl. Hort. 5:2937 (1916).

Plant bearing lepidote scales on at least the young growth and undersurfaces of the leaves, often also on some or all of the following: leaf upper surface, pedicel, calyx, corolla, ovary and style. Hairs present or absent, when present normally of one of two types: filiform-acicular and loriform; branched or dendroid hairs always present on the bud scales of section Pogonanthum, otherwise very rare.

Type species: *R. ferrugineum* Linnaeus.

Subgenus Rhododendron can be divided into three sections (cf. Sleumer, *Bot. Jahrb.* 74: 511–553, 1949). One of these, section Vireya (Blume) H. F. Copeland, is not dealt with here; it has been fully revised by Sleumer in *Flora Malesiana* ser. 1, 6:474–668 (1968).

1. Capsule valves soft, usually twisted on dehiscence; placentas separating as thread-like structures from the central axis as the capsule opens; seeds long caudate-appendaged, the appendages usually longer than the body of the seed . . . Section **Vireya**

\+ Capsule valves hard and woody at dehiscence; placentas not separating from the central axis; seeds variously winged and finned, rarely caudate-appendaged, when with appendages these shorter than the body of the seed . . . . . 2

2. Scales lacerate, corolla hypocrateriform or funnel-hypocrateriform; plant with pineapple-like smell; hairs fringing the inflorescence bud scales dendroid . . . . . Section **Pogonanthum** (p. 156)

\+ Scales entire, crenulate or undulate; corolla very rarely hypocrateriform; plants variously aromatic but not smelling of pineapple; hairs fringing the inflorescence bud scales simple . Section **Rhododendron**

Section **Rhododendron**.

Syn.: Section *Lepipherum* G. Don, Gen. Hist. Dichlam. Pl. 3:845 (1834).

Small to large shrubs or even small trees. Leaves evergreen or deciduous, often aromatic. Scales entire, crenulate or undulate. Inflorescences terminal or axillary, bud scales fringed with simple hairs. Calyx well-developed or almost obsolete, often reduced to a rim. Corolla tubular, funnel-shaped or campanulate, very rarely hypocrateriform. Stamens (5–)10(–27), usually declinate, more rarely actinomorphically arranged, usually well exserted from the corolla tube. Ovary usually 5–10-locular, lepidote. Capsule with hard, woody valves. Seeds winged or unwinged, often with fin-like appendages at each end (these often very small or obsolete), rarely caudate-appendaged at each end, the appendages shorter than the body of the seed. Type species: *R. ferrugineum* Linnaeus.

A large section, divisible into 27 intricately related subsections:

1. Leaves very densely pilose beneath, the hairs completely obscuring the small, golden scales . . . **I. Edgeworthia** (p. 25)
+ Leaves glabrous or variously hairy beneath, the hairs not obscuring the scales . . . . . 2

2. Style thin, declinate or straight, never markedly deflexed, usually longer than the generally declinate stamens . . . 3
+ Style thick, markedly deflexed, at least before anthesis, usually shorter than the actinomorphically arranged stamens . . 24

3. Lateral inflorescences present; terminal inflorescences present or not . . . . . 4
+ All inflorescences terminal . . . . . 9

4. Corolla lobes shorter than the tube . . . . . 5
+ Corolla lobes longer than the tube (rarely only slightly so) . . 7

5. Corolla funnel-shaped, pubescent outside; calyx clearly lobed, lobes 2–3 mm . . . . . **XVII. Virgata** (p. 129)
+ Corolla tubular, glabrous outside; calyx a mere rim or somewhat undulate . . . . . 6

6. Flowers erect; stamens and style exserted beyond the corolla lobes; leaves pubescent and loriform-ciliate above . . . **VI. Scabrifolia** (p. 80)
+ Flowers pendulous; stamens and style not exserted beyond the corolla lobes; leaves glabrous . . **XV. Cinnabarina** (p. 122)

7. Terminal inflorescences present as well as lateral; corolla very openly funnel-shaped, very zygomorphic . **V. Triflora** (p. 61)
+ All inflorescences lateral; corolla funnel-shaped, not very zygomorphic . . . . . 8

8. Corolla pilose outside, at least near the base; each inflorescence 1-flowered . . . . . **XI. Rhodorastra** (p. 111)
+ Corolla glabrous outside; each inflorescence with 2 or more flowers . . . . . **VI. Scabrifolia** (p. 80)

9. Corolla lobes longer than tube . . . . . 10
\+ Corolla lobes shorter than, or rarely as long as, the tube . . 12

10. Pedicel in line with the axis of the flower; corolla funnel-shaped or almost hypocrateriform; scales undulate . . . . . **IX. Lapponica** (p. 92)
\+ Pedicel making an obtuse angle with the axis of the flower; corolla very openly funnel-shaped to almost rotate; scales crenulate or vesicular . . . . . 11

11. Scales crenulate; leaves entire . . **XII. Saluenensia** (p. 114)
\+ Scales vesicular; leaves crenulate . . **XIII. Fragariflora** (p. 119)

12. Corolla 40 mm or more . . . . . **II. Maddenia** (p. 29)
\+ Corolla 6–35 mm . . . . . 13

13. Corolla campanulate or tubular-campanulate, the sides of the tube parallel or almost so . . . . . 14
\+ Corolla funnel-shaped, flaring from the base, the sides of the tube diverging . . . . . 21

14. Scales dimorphic, golden and brown, standing out clearly against the white undersurface of the leaf . **XXI. Glauca** (p. 139)
\+ Scales and leaf undersurface not as above . . . . . 15

15. Calyx reduced to a rim, sometimes slightly undulate, less than 2 mm . . . . . 16
\+ Calyx conspicuously 5-lobed, the lobes more than 2 mm . . 19

16. Corolla up to 10 mm, white, unspotted and unblotched, glabrous within . . . . . **XVIII. Micrantha** (p. 132)
\+ Corolla larger, variously coloured, if white then spotted and/or blotched, pubescent to pilose within . . . . . 17

17. Corolla fleshy; nectar copious, forming 5 large drops in the base of the corolla tube . . . . . **XV. Cinnabarina** (p. 122)
\+ Corolla not fleshy; nectar a mere sticky smear around the base of the ovary . . . . . 18

18. Inflorescences 1–3-flowered; stamens and style exserted beyond the corolla lobes . . . . . **IV. Monantha** (p. 59)
\+ Inflorescences many-flowered; stamens and style not exserted beyond the corolla lobes . . . . **X. Rhododendron** (p. 110)

19. Leaf margins, petioles and young shoots not loriform-setose; corolla tubular-campanulate, or if openly campanulate then the calyx lobes erect or reflexed, not adpressed to the corolla; seeds unwinged . . . . . **XVI. Tephropepla** (p. 126)
\+ Leaf margin, petioles and young shoots loriform-setose; corolla openly campanulate, calyx lobes adpressed to it; seeds winged and appendaged . . . . . 20

20. Ovary tapering into the style . . **III. Moupinensia** (p. 57)
\+ Style impressed into the ovary . . . **II. Maddenia** (p. 29)

21. Corolla pubescent outside; small shrublets . **XIV. Uniflora** (p. 120)
\+ Corolla lepidote outside; tall shrubs . . . . . 22

22. Calyx well-developed, clearly lobed, loriform-ciliate . . 23
\+ Calyx rim-like, not lobed, or if slightly lobed then not loriform-ciliate . . . . . **VII. Heliolepida** (p. 87)

23. Style pubescent; corolla with pink to dark red spots . . . **IX. Lapponica** (p. 92)
\+ Style glabrous or lepidote; corolla with greenish spots . . **VII. Caroliniana** (p. 91)

24. Stamens 12–16 . . . . . **XX. Camelliiflora** (p. 138)
\+ Stamens 5–10(–11) . . . . . 25

25. Inflorescence a raceme with long, conspicuous axis, not at all umbellate; corolla with a ± rotate limb, greenish white . . **XXVII. Afghanica** (p. 156)
\+ Inflorescence an umbellate raceme, rarely with a short axis; corolla variously shaped and coloured, not as above . . 26

26. Scales on the white-papillose leaf undersurface markedly dimorphic, larger and brown, smaller and golden . . . **XXI. Glauca** (p. 139)
\+ Scales and leaf undersurface various, not as above . . . 27

27. Scales vesicular . . . . . 28
\+ Scales not vesicular, clearly rimmed, the rims sometimes upturned . . . . . 30

28. Corolla pruinose, pink to purple . . **XXII. Campylogyna** (p. 145)
\+ Corolla not pruinose, yellow to white, sometimes flushed pink . 29

29. Ovary tapering into style; pedicels shorter than the corollas . **XIX. Boothia** (p. 133)
\+ Style impressed into ovary; pedicels longer than the corollas . **XXVI. Trichoclada** (p. 151)

30. Scales crenulate . . . . . **XXV. Baileya** (p. 150)
\+ Scales entire . . . . . 31

31. Ovary tapering into style; seeds winged and appendaged . . **XIX. Boothia** (p. 133)
\+ Style impressed into ovary; seeds unwinged and obscurely appendaged . . . . . 32

32. Tall shrubs, more than 1 m; undersurface of leaves and corolla pruinose; inflorescences with more than 4 flowers . . . **XXIII. Genestieriana** (p. 146)
\+ Small shrubs, usually much less than 1 m; undersurfaces of leaves and corolla not pruinose; inflorescences 1–3-flowered . **XXIV. Lepidota** (p. 148)

I. Subsection **Edgeworthia** (Hutchinson) Sleumer, Bot. Jahrb. 74:532 (1949).

Syn.: Series *Edgeworthii* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron, 228 (1930).

Epiphytes or shrubs scrambling among or over rocks. Indumentum dense, frequently obscuring the small, yellow scales. Leaves evergreen, often

bullate above. Inflorescence terminal, few-flowered. Calyx well-developed, conspicuous, 5-lobed. Corolla very large to rather small, funnel-campanulate or campanulate, fragrant or not, white, white flushed pink, cream or yellow. Stamens 10, filaments pubescent in the lower part, declinate or actinomorphic. Ovary 5-locular, densely tomentose. Style declinate, exceeding the stamens, or sharply deflexed downwards and shorter than the stamens (at least at anthesis) pubescent and/or lepidote at the base. Capsule tomentose. Seeds winged and finned.
Type species: *R. edgeworthii* Hooker.

The three species which form this subsection have a unique indumentum of dense, curled, brownish or whitish hairs which, on the lower leaf surfaces at least, completely obscures the small, golden scales. The possession of this indumentum defines the group, which is otherwise somewhat heterogeneous. *R. edgeworthii* itself has large, fragrant flowers with declinate stamens and styles; *R. pendulum* and *R. seinghkuense* have considerably smaller, more campanulate, scentless flowers with ± actinomorphic stamens and the style sharply deflexed. In spite of this diversity, however, the unique indumentum seems to be of sufficient weight to maintain the group as a subsection, even though it is clearly allied through *R. edgeworthii* to subsections Maddenia and Moupinensia, and through the other species to subsections Boothia and Camelliiflora. *R. pendulum* is remarkable in that its young leaves show revolute ptyxis—a feature found otherwise only in the elepidote Rhododendrons (Sinclair, *Notes R.B.G. Edinb.* 19:267–271, 1937).

1. Corolla 35–60 mm; style declinate, exceeding the declinate stamens . . . . . **1. edgeworthii**
\+ Corolla 15–22 mm; style sharply deflexed downwards, shorter than the ± actinomorphic stamens . . . . . 2

2. Leaves obtuse, though mucronate-callose, oblong-elliptic; corolla white, pinkish or cream . . . . . **2. pendulum**
\+ Leaves shortly acuminate, elliptic or narrowly ovate; corolla bright yellow . . . . . **3. seinghkuense**

**1. R. edgeworthii** Hooker, Rhodo. Sikkim Himalaya, t. 21 (1849). Type: Sikkim Himalaya, in valleys on the inner range, 7000–9000 ft, fl. May–June, fr. November, *Hooker* (K). Fig. 3a (p. 19).
Syn.: *R. bullatum* Franchet, Bull. Soc. Bot. Fr. 34:281 (1887). Type: China, Yunnan, ad pedem montis Tsang-chan, alt. 2500 m, 20 iv 1886, *Delavay* 2062 (P).
*R. sciaphilum* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 10:146 (1917). Type: E Burma, Htawjaw, valley of Naung chaung, Lashi country, 7000–8000 ft, 4 vi 1914, *Kingdon Ward* 1629 (holo. E).
Ic.: Fl. des Serres, ser. 1, 8: t. 797, 798 (1852–3); Bot. Mag. 82: t. 4936 (1856); Hara (ed.), Photo-album of Plants of East Himalaya t. 164 (1968); Cox, Dwarf Rhododendrons t. 14 (1973); Ic. Corm. Sin. 3: t. 4017 (1974).

Shrub to 2·5 m, epiphytic or scrambling on rocks. Indumentum dark orange to pale beige brown. Leaves oblong-ovate, oblong-lanceolate or rarely elliptic, 6–15 × 2·5–5 cm, usually acuminate, upper surface strongly bullate and glabrous; scales on the lower surface completely obscured by the indumentum, small, distant, golden. Inflorescence 2–3-flowered, pedicels up to 2 cm, densely tomentose. Flowers usually fragrant. Calyx clearly lobed, the lobes oblong-orbicular, densely tomentose on the margins and also usually on the outer surface, lepidote on the outer surface, the inner surface finely pubescent, 11–14 mm. Corolla funnel-campanulate, (35–)45–60(–66) mm, the tube (19–)25–30(–40) mm, white, sometimes flushed pink and/or with a yellow blotch at the base, glabrous within, lepidote outside. Stamens 10, declinate, filaments densely pilose in the lower part. Ovary densely tomentose. Style about as long as the corolla, declinate, exceeding the stamens, tomentose and/or lepidote for a variable distance above the base. Capsule densely tomentose, oblong-globose, c. 18 × 12 mm.
INDIA (Sikkim, W Bengal, Arunachal Pradesh), BHUTAN, E BURMA, CHINA (N, NW & C Yunnan, S Xizang). In dense forest, 2100–3300 m. Map 3, p. 28.

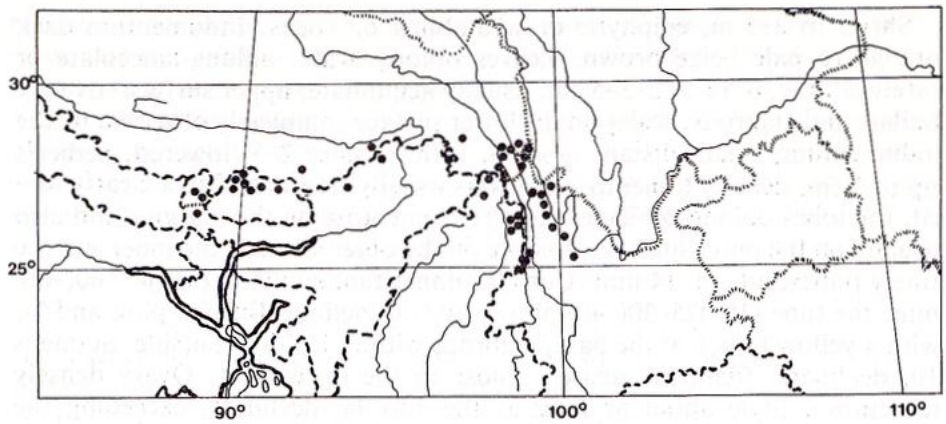
Variable in size and habit across a very wide distribution area; the variation, however, is not amenable to taxonomic recognition.

**2. R. pendulum** Hooker, Rhodo. Sikkim Himalaya t. 13 (1849). Type: Sikkim Himalaya, 9000–11000 ft, *Hooker* (holo. K). Fig. 3b, p. 19.
Ic.: Fl. des Serres, ser. 1, 7: t. 662 (1851–2); Cox, Dwarf Rhododendrons t. 15 (1973).

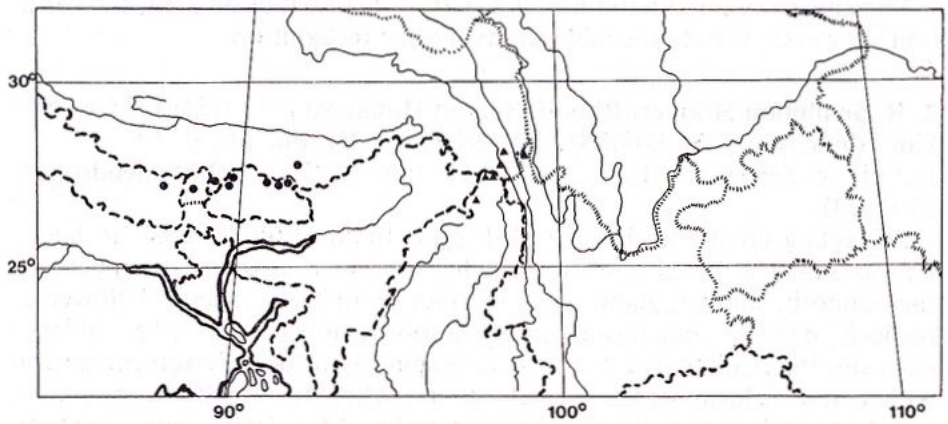
Straggling epiphytic shrub, 0·3–1·3 m. Indumentum whitish to beige. Leaves 34–50 × 14–25 mm, oblong-elliptic, obtuse at the apex, upper surface smooth, shining, glabrous and elepidote. Inflorescences 2–3-flowered, pedicels densely tomentose. Calyx 5-lobed, lobes oblong or oblong-obovate, long ciliate, the outer surface sparsely to densely tomentose and with a few reddish scales. Corolla white, white flushed pink, or cream, openly funnel-campanulate, ± actinomorphic, 15–22 mm, tube 7–10 mm, lepidote outside, ± glabrous within. Stamens 10, ± actinomophic, filaments pilose in the lower part. Ovary 5-locular, lepidote and densely tomentose, especially towards the apex. Style sharply deflexed, shorter than the stamens, usually with a few hairs and scales at the base. Capsule ± oblong, c. 12 mm.
NEPAL, INDIA (Sikkim), BHUTAN, CHINA (S Xizang). In dense forest, 2270–3630 m. Map 4, p. 28.

**3. R. seinghkuense** Kingdon Ward, Notes R.B.G. Edinb. 16:174 (1931). Type: Burma, Seinghku Wang, 6000–10000 ft, *Kingdon Ward* 6793 (iso. E). Fig. 1n, p. 15.

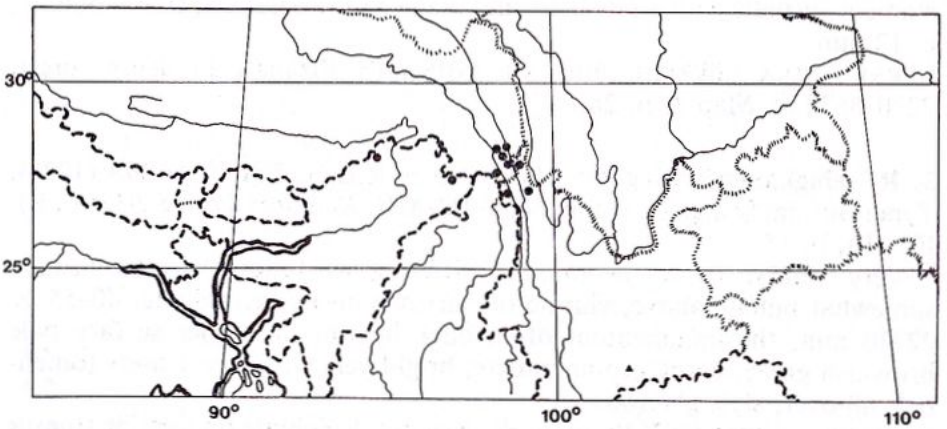
Very similar to *R. pendulum*, differing as follows: leaves usually somewhat bullate above, elliptic or narrowly ovate, acuminate, 40–55 × 22–30 mm, the indumentum often dark brown, the upper surface pale brownish green, corolla campanulate, bright yellow, ovary densely tomentose all over, style glabrous.
NE BURMA, CHINA (NW Yunnan, SE Xizang). Epiphytic on trees or stumps and on rocks in dense forest, 1800–3000 m. Map 4, p. 28.




MAP 3. ● *R. edgeworthii*.




MAP 4. ● *R. pendulum*; ▲ *R. seinghkuense*.




MAP 5. ● *R. nuttallii*; ▲ *R. excellens*.

The characters used in the literature to separate *R. seinghkuense* and *R. pendulum* are unreliable. One specimen (*Kingdon Ward* 5440), is reported as climbing by means of nodal roots and the apparent remains of these are visible on the specimen. Such a climbing mechanism is otherwise unknown in the genus.

II. Subsection **Maddenia** (Hutchinson) Sleumer, Bot. Jahrb. 74:533 (1949).
Syn.: Series *Maddenii* sensu Hutchinson, Notes R.B.G. Edinb. 12:1 (1919) and The Species of Rhododendron 447 (1930).

Shrubs or small trees up to 15 m, often epiphytic. Young growth lepidote and often loriform-setose. Leaves evergreen, lepidote above when young, rapidly becoming elepidote, lower surface whitish- or greyish-papillose with usually unequal scales of varying densities. Inflorescences terminal, 1–6(–11)-flowered, flowers usually fragrant. Calyx very variable, from rim-like and inconspicuous to large, 5-lobed and ciliate. Corolla mostly large, usually funnel-campanulate, more rarely ± campanulate or very narrowly funnel-campanulate, often compressed to some extent laterally, the tube usually fluted with 5 grooves, white, pink or yellow. Stamens 8–27, declinate, filaments usually pilose towards the base. Ovary 5–12-locular, lepidote. Style impressed or the ovary tapering into the style, usually lepidote towards the base, declinate. Capsule lepidote, often large. Seeds winged and finned.
Type species: *R. maddenii* Hooker.

A large group of often critical species with a very wide distribution from Nepal in the west, through the Himalaya to Burma and China (Yunnan), where most of the species are concentrated, then further east and south to Guizhou, Guanxi and Jiangxi provinces of China, Thailand, Laos, Vietnam and S Burma.

Three revisions of the group have been published: two by Hutchinson (*Notes R.B.G. Edinb.* 12:1–84, 1919; *The Species of Rhododendron*, 1930) and a more recent one by Sleumer (*Blumea* Suppl. 4:40–47, 1956). These revisions differ considerably in the area covered (e.g. Hutchinson does not deal at all with the species from Laos and Vietnam, and Sleumer does not deal with all the Himalayan species) and in the number of species recognised (Hutchinson recognises 46, Sleumer 21). The present revision falls somewhere between these two extremes. The 36 species recognised here are grouped into four informal units which correspond, more or less, with the three subseries recognised by Hutchinson. The largest of these informal units (Group 4) corresponds with Hutchinson's subseries Ciliicalyx, and contains 26 species, of which 10 are grouped in two aggregates of five species each. The species within each aggregate are only weakly delimited from each other, and are very difficult to identify; and the two aggregates parallel each other in morphology and distribution, the main distinguishing feature being the impressed style of the *johnstoneanum* aggregate and the non-impressed style (i.e. ovary tapering into the style) of the *ciliicalyx* aggregate. This character appears to be highly significant in the rest of the group, but its use to distinguish the two aggregates may prove, on further (preferably field) investigation, to be unwarranted.

Subsection Maddenia is related on the one hand to subsection Edgeworthia, and on the other to subsection Triflora (via *R. zaleucum* of the latter subsection, see p. 63).

1. Stamens (15–)17–25(–27); ovary 10–12-locular . . **1. maddenii**
+ Stamens 10–12, rarely 15; ovary 5–7-locular . . . . . 2

2. Pedicels and calyx whitish-pruinose, the pedicels divaricate-recurved in fruit; capsule not exceeding the persistent calyx . **10. megacalyx**
+ Pedicels and calyx not whitish-pruinose, the pedicels erect or spreading in fruit; capsule clearly exceeding the persistent calyx . 3

3. Leaf with the main vein raised on the upper surface, at least near the base; calyx conspicuous, deeply lobed, not ciliate, or ciliate with filiform-acicular hairs . . . . . 4
+ Leaf with the main vein totally impressed above; calyx inconspicuous or conspicuous and then fringed with loriform setae . 11

4. Stamens 15, much shorter than corolla tube . . **2. excellens**
+ Stamens 8–10(–12), as long as, or longer than corolla tube . 5

5. Leaves with the secondary and tertiary veins forming a prominent reticulum over the whole undersurface; scales very unequal, the smaller ± rimless, the larger with broad, usually ascending, irregular rims . . . . . **3. nuttallii**
+ Leaves with secondary and tertiary veins not forming a reticulum beneath or doing so obscurely near the margins; scales ± equal, not as above . . . . . 6

6. Pedicels pubescent as well as lepidote; calyx lobes pubescent outside . . . . . **4. dalhousiae**
+ Pedicels lepidote only; calyx lobes glabrous . . . . . 7

7. Stamens 8 . . . . . **8. kiangsiense**
+ Stamens 10(–12) . . . . . 8

8. Petioles and margins of young leaves loriform-setose, the setae variably deciduous . . . . . 9
+ Petioles and margins of young leaves not loriform-setose . . 10

9. Leaves 100–130 × 30–50 mm; corolla 60–80 mm . . **7. liliiflorum**
+ Leaves 60–65 × 28–30 mm; corolla c. 45 mm . . . **9. levinei**

10. Calyx lobes ciliate with filiform-acicular hairs . . . **5. lindleyi**
+ Calyx lobes not ciliate, margined with scales . . **6. taggianum**

11. Style impressed, i.e. inserted into a conspicuous depression in the top of the ovary . . . . . 12
+ Style not impressed, the ovary tapering smoothly into the style . 25

12. Corolla distinctly yellow all over . . . . . 13
+ Corolla white or pink, often with a yellowish blotch at the base but not yellow all over . . . . . 17

13. Calyx very small, disc-like, at most 2 mm; corolla lepidote all over the outer surface . . . . . 14
\+ Calyx conspicuous, clearly lobed, 5–9 mm; corolla not, or very sparsely, lepidote . . . . . 15

14. Leaves 60–100 × (18–)20–40 mm, densely lepidote on the upper surface . . . . . **15. burmanicum**
\+ Leaves 25–40 × (12–)15–20 mm, elepidote on the upper surface . . . . . **16. crenulatum**

15. Leaves with distant scales beneath, the surface green; margins conspicuously crenate, at least in the upper half . . . . **13. fletcheranum**
\+ Leaves with dense, contiguous to overlapping scales beneath, producing a brownish colour; margins not crenate . . . . 16

16. Leave broadly elliptic, obtuse to rounded at the apex, 26–38(–50) × 16–22 mm; corolla 20–32 mm; calyx 5–7 mm . . . . **12. valentinianum**
\+ Leaves elliptic, ± acute at the apex, c. 74 × 33 mm; corolla c. 38 mm; calyx c. 9 mm . . . . . **14. amandum**

17. Calyx more than 5 mm, lobes ± equal, herbaceous; corolla up to 50 mm; style completely elepidote . . . . . **11. ciliatum**
\+ Calyx less than 4 mm or if longer then the lobes markedly unequal, not herbaceous; corolla usually longer than 50 mm; style lepidote at least at the base . . . . . 18

18. Stem with swollen, tuber-like base; calyx lobes markedly unequal, up to 7 mm . . . . . **18. cuffeanum**
\+ Stem without swollen, tuber-like base; calyx lobes at most 4 mm 19

19. Leaves not more than 21 mm wide, the blade somewhat decurrent on the petiole; leaf margins and petioles usually persistently loriform-ciliate . . . . . **19. formosum**
\+ Leaves more than 21 mm wide, the blade not decurrent on the petiole; leaf margins and petioles not persistently loriform-ciliate, though often so when young . . . . . 20

20. Style lepidote only at the extreme base; leaves drying a distinct pale greyish green . . . . . **17. scopulorum**
\+ Style lepidote well above the base; leaves drying dark green or brownish . . . . . 21

21. Calyx without a persistent fringe of loriform setae **24. dendricola**
\+ Calyx with a persistent fringe of loriform setae . . . 22

22. Corolla densely pubescent over the whole surface outside, only the tips of the lobes glabrous . . . . . **23. walongense**
\+ Corolla pubescent outside only towards the base of the tube, the lobes glabrous or rarely with a line of hairs along the middle . 23

23. Calyx clearly lobed; scales on the leaf lower surface not contiguous . . . . . **23. ciliipes**
\+ Calyx disc-like, not or scarcely lobed; scales on the lower leaf surface contiguous . . . . . 24

24. Young growth, petioles and leaf margins loriform-ciliate; leaves c. 2 × longer than broad . . . . . **20. johnstoneanum**
\+ Young growth, petioles and leaf margins not loriform-ciliate; leaves c. 3 × longer than broad . . . **21. rufosquamosum**

25. Calyx glabrous, without a fringe of loriform setae . **31. fleuryi**
\+ Calyx with a persistent fringe of loriform setae . . . 26

26. Style totally elepidote; corolla neither pubescent nor lepidote outside; calyx with well-developed oblong-linear lobes . . **30. yungchangense**
\+ Style lepidote towards the base; corolla pubescent and/or lepidote outside, at least at the base; calyx with obscure or undulate-deltoid lobes . . . . . 27

27. Calyx fringed with loriform setae and filiform-acicular hairs; corolla pubescent outside over most of the surface of the tube and the bases of the lobes . . . . . **32. horlickianum**
\+ Calyx fringed with loriform setae only; corolla pubescent only at the base of the tube . . . . . 28

28. Corolla lepidote only along the upper part of the tube; lobes with crisped margins . . . . . **34. veitchianum**
\+ Corolla tube lepidote all over or ± completely elepidote; margins of the lobes not crisped . . . . . 29

29. Leaf scales overlapping, flaky . . . . **35. surasianum**
\+ Leaf scales distant or contiguous, not as above . . . 30

30. Style pubescent as well as lepidote in the lower third; pedicels usually pubescent . . . . . **36. ludwigianum**
\+ Style lepidote but not pubescent in the lower third; pedicels never pubescent . . . . . 31

31. Leaves persistently lepidote above; corolla distinctly pink all over . . . . . **33. carneum**
\+ Leaves elepidote above; corolla white or flushed pink . . 32

32. Inflorescence 1(–2)-flowered; leaves 40–60(–80) × 16–27 mm; calyx not persistently loriform-ciliate . . **25. pseudociliipes**
\+ Inflorescence (2–)3–5-flowered; leaves mostly 60–100 × 25–60 mm; calyx persistently loriform-setose . . . . . 33

33. Corolla pubescent but not lepidote outside at the base of the tube . . . . . **26. ciliicalyx**
\+ Corolla pubescent and lepidote outside at the base of the tube . 34

34. Shoots loriform-setose for at least one year . . . **29. lyi**
\+ Shoots loriform-setose when young, the setae soon deciduous . 35

35. Leaves ± ovate, 2 × longer than broad, scales on the lower surface ± lax . . . . . **27. roseatum**
\+ Leaves ± elliptic, 3 × longer than broad, scales on the lower surface contiguous or partly so . . . . **28. pachypodum**

**Group 1.** Stamens (15–)17–25(–27); ovary 8–12-locular.

**1. (4.) R. maddenii** Hooker, Rhodo. Sikkim Himalaya t. 18 (1849).

Shrub up to 2 m, sometimes epiphytic. Leaves 60–160(–180) × 28–60 (–80) mm, elliptic or broadly obovate, rarely somewhat ovate, acute to obtuse at the apex, cuneate at the base, elepidote above, densely lepidote beneath, the surface often brownish. Inflorescence (1–)2–5(–7)-flowered, pedicels 5–15(–20) mm, lepidote. Calyx usually deeply 5-lobed, the lobes oblong to oblong-lanceolate, margins erose, usually glabrous, (2·5–)5–12(–16) mm. Corolla white, often flushed pink or purplish, more rarely wholly pink, usually with a yellowish blotch at the base, at first narrowly funnel-campanulate, later ± funnel-campanulate, (35–)60–85(–100) mm, the tube (20–)30–50(–60) mm, densely lepidote outside, the scales conspicuous on the tube and middle of the lobes. Stamens (15–)17–25(–27), filaments glabrous or sparsely pilose towards the base. Ovary (8–)10(–12)-locular, densely lepidote, tapering into the style which is lepidote over most of its length. Capsule 10–20 mm, (8–)10(–12)-ridged, lepidote, ovoid-globose to oblong-cylindrical.

A complex and very variable species (see below), which can be divided into two highly intergrading subspecies.

1. Leaves less than 40(–55) mm broad, usually 60–110(–150) × 28–40(–55) mm, often obovate; capsule ovoid-globose, rounded to the apex; filaments often glabrous . . . **a.** subsp. **maddenii**

\+ Leaves more than 40 mm broad, usually 90–150(–180) × (40–)55–80 mm, usually ± elliptic; capsules oblong-cylindrical, abruptly rounded to almost truncate at the apex; filaments usually pubescent . . . . . **b.** subsp. **crassum**

**1a.** subsp. **maddenii.** Type: Sikkim Himalaya, in thickets by the Lachen and Lachung rivers at Choongtam, 6000 ft, fl. vi-viii, fr. ix, *Hooker* (holo. K).

Syn.: *R. jenkinsii* Nuttall, Hooker's Kew Journ. 5:361 (1853). Type: 'Bhutan' (i.e. India, Arunachal Pradesh, cf. Ludlow, Trans. Bot. Soc. Edinb. 41: 351–363, 1972), southern slopes of Oola mountain, 6–7000 ft, *Booth* (holo. K).

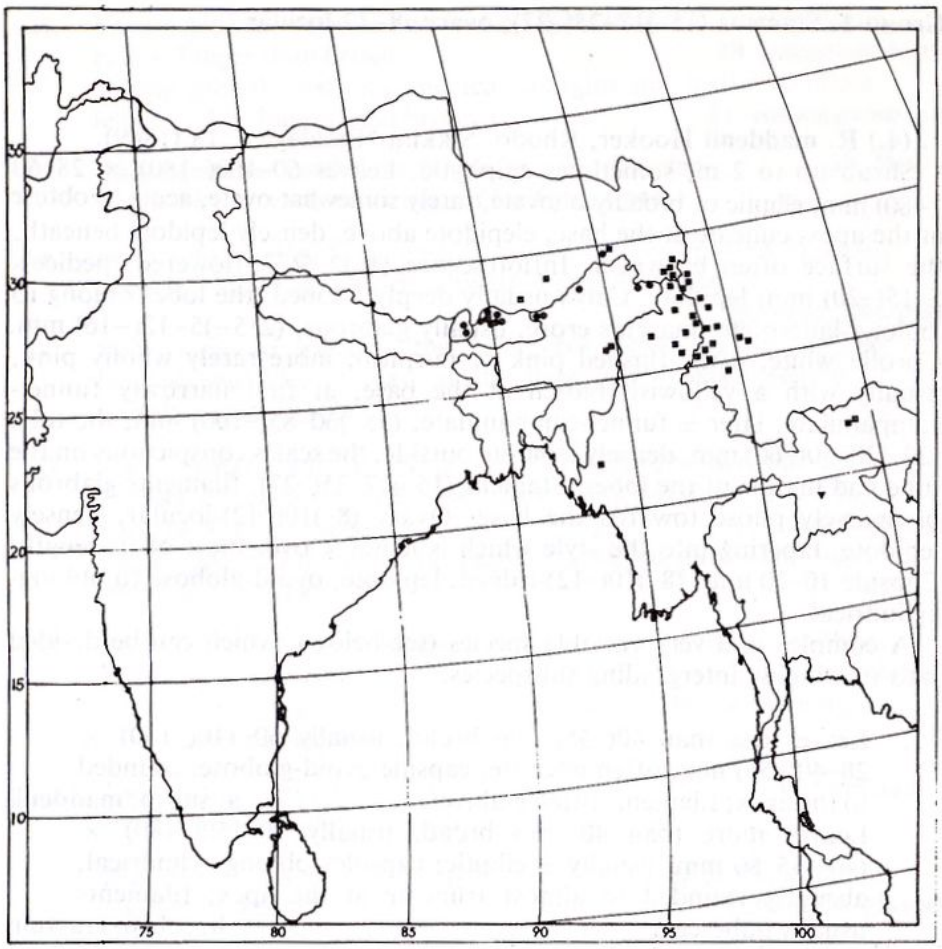
*R. calophyllum* Nuttall, op. cit.: 362. Type: 'Bhutan', *Booth* (holo. K).

*R. macranthum* Griffith, Notulae 4:303 & t. 520 (1854). Type: Bootan, Tongse, *Griffith* (n.v.).

*R. maddenii* var. *longiflora* Watson, Gard. Chron. 15:684 (1894). Type: none cited.

*R. brevitubum* Balfour f. & Cooper, Notes R.B.G. Edinb. 12:24 (1919), non J. J. Smith, Ic. Bogor. 4:253 (1914). Type: Bhutan, Punakka, 6–7000 ft, 27 vi 1915, *Cooper* 3936 (n.v.).

*R. brachysiphon* [Balfour ex] Hutchinson, Notes R.B.G. Edinb. 12:24 (1919). Type: Bhutan, Punakka, 6–7000 ft, 27 vi 1915, *Cooper* 3936 (n.v.).




MAP 6. ● *R. maddenii* subsp. *maddenii*; ■ subsp. *crassum*; ▼ *R. crenulatum*.

*R. polyandrum* Hutchinson, op. cit.: 25. Type: Bhutan, Chapcha Thimpu, 8500 ft, 8 vii 1914, *Cooper* 1454 (holo. E).

Ic.: Fl. des Serres, ser. 1, 9: t. 912 (1853–4); Rev. Hort., ser. 4, 4:301, t. 16 (1855); Bot. Mag. 80: t. 4805 (1854) & 83: t. 5002 (1857).

INDIA (Sikkim, Arunachal Pradesh), BHUTAN, CHINA (SE Xizang). Hillsides, scrub, damp forest, 1900–2600 m. Map 6.

Subsp. *maddenii* is extremely variable in corolla shape, stamen number and filament indumentum, all of which require further study in natural populations.

**1b.** subsp. **crassum** (Franchet) Cullen, Notes R.B.G. Edinb. 36: 107 (1978). Fig. 3c, d, p. 19.

Syn.: *R. crassum* Franchet, Bull. Soc. Bot. Fr. 34:282 (1887). Type: China, Yunnan, in dumetis ad Hou-tien-pa in monte Tsang-chan supra Tali, alt. 2500 m, *Delavay* 2112 (holo. P).

*R. maddenii* var. *obtusifolia* Hutchinson, Bot. Mag. 134: t. 8212 (1908). Type: Manipur, Japvo, 8000–10000 ft, 9 iii 1882, *Watt* 6461 (iso. E).

*R. manipurense* Balfour & Watt, Notes R.B.G. Edinb. 10:119 (1917). Type: as for *R. maddenii* var. *obtusifolia*.

*R. odoriferum* Hutchinson, Gard. Chron. 82:30–32 (1927). Type: a cultivated specimen (holo. K).

*R. chapaense* Dop in Lecomte, Fl. Gen. Indo-Chine 3:743 (1930). Type: Indochina, Tonkin, massif de Lo-sin-tong près de Cha-pa, *Poilane* 12672 (holo. P).

Ic.: Bot. Mag. 134: t. 8212 (1908) & 164: t. 9673 (1943–8); Notes R.B.G. Edinb. 12:26 (1919); Ic. Corm. Sin. 3: t. 4020 (1974).

INDIA (Manipur), BURMA, CHINA (N, NW, W & SW Yunnan, SE Xizang), VIETNAM. Cliffs, slopes, scrub and thickets, 2400–3650 m. Map 6, p. 34.

*R. maddenii*, as treated here, is the result of the amalgamation of all the six species of subseries Maddenii recognised by Hutchinson in his 1919 revision plus the later-described *R. odoriferum*. *R. excellens*, included by Hutchinson in subseries Maddenii in his *Species of Rhododendron* account, is excluded, as its affinities lie with *R. dalhousiae* and *R. nuttallii*. Although *R. maddenii* is variable in a large number of characters, it is impossible to distinguish species within it, as most of the variation is uncorrelated. For instance, stamen number, on which Hutchinson lays such stress, shows continuous variation from 15–25, and individual flowers occur which have 27. Different flowers on the same specimen may have different numbers of stamens. Hutchinson records 25 for the type of *R. polyandrum* (*Cooper* 1494); two further flowers dissected during this study had 17 and 19 stamens respectively. The number of stamens, on average, seems to increase from west to east, from Sikkim to western China (S Xizang), and then to decrease further south and east into China. Similarly, there seems to be a cline in filament indumentum, from glabrous in the west (Sikkim and Bhutan) to the east (China), where all specimens examined had pubescent filaments. The density of the scales on the lower leaf surface is another character showing great variability, but not linked in any perceptible way with geography. Corolla size is also variable, even on an individual plant; for instance, one flower of *Forrest* 27150 is 47 mm long, whereas another is 87 mm. Similar, though less spectacular, differences occur in other collections, and, as a whole, corolla size shows continuous variation. Corolla shape varies with the age of the flower, the younger flowers being more tubular than the older. The only characters whose variability appears to have any taxonomic usefulness are leaf breadth and fruit shape, and even these are neither clear-cut nor completely correlated; hence the recognition of subspecies here.

**Group 2.** Leaf with the main vein raised on the upper surface, at least near the base; pedicels and calyx not pruinose; calyx large, conspicuous, deeply lobed, not ciliate or ciliate with filiform-acicular hairs, stamens 10–15; ovary 5-locular; pedicels erect-spreading in fruit; capsule longer than the persistent sepals.

**2. (5.) R. excellens** Hemsley & Wilson, Kew Bull. 1910:113. Type: China, Yunnan, south of the Red river from Mengtze, *Henry* 13666 (holo. K, photo. E).

Ic.: Notes R.B.G. Edinb. 12:30 (1919); Ic. Corm. Sin. 3: t. 4021 (1974).

Shrub of 3 m or more. Leaves oblong-elliptic, tapered to a shortly rounded base and to the obtuse apex, 150–190 × 40–55 mm, the lower surface with slightly unequal scales about their own diameter apart. Inflorescence 3–4-flowered, pedicels c. 20 mm, densely lepidote. Calyx conspicuous, rather deeply 5-lobed, the lobes ± ovate, rounded at the apex, lepidote towards the base, glabrous. Corolla funnel-campanulate, white, c. 100 mm, the tube 75–80 mm, lepidote outside. Stamens (12–)15, much shorter than the corolla tube, filaments pubescent towards the base. Ovary densely lepidote, tapered into the style which is lepidote in the lower part. Capsule unknown.

CHINA (SW Yunnan). Map 5, p. 28.

An obscure species, known only from the type collection.

**3. (6.) R. nuttallii** Booth, Kew Journ. 5:355 (1853). Type: 'Bhutan' (i.e. India, Arunachal Pradesh, cf. Ludlow, Trans. Bot. Soc. Edinb. 41:351–363, 1972) Duphla hills at Mere Patar, on the banks of the Papoo, 4000–5000 ft, *Booth* (holo. K). Fig. 3e, p. 19.

Syn.: *R. sinonuttallii* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:60 (1920). Type: China, SE Tibet, Salween/Kiu-chiang Divide, ix–x 1919, *Forrest* 18939 (holo. E).

Ic.: Fl. des Serres, ser. 2, 3: t. 1326, 1327 (1858); Bot. Mag. 85: t. 5146 (1859); Ic. Corm. Sin. 3: t. 4025, 4028 (1974).

Shrub or small tree, 2–10 m, sometimes epiphytic. Leaves large, 170–260 × 75–130 mm, oblong-elliptic or oblong-obovate, tapered to the base and the bluntly acute or obtuse apex, upper surface rugose, elepidote, lower surface with a dense covering of very unequal scales, the smaller almost rimless or narrowly rimmed, the larger about 2 × the diameter of the smaller, broadly rimmed, the rim ascending to cup-shaped, irregular; secondary and tertiary veins forming a conspicuous reticulum all over the lower surface. Inflorescence 2–5-flowered, pedicels 20–33 mm, lepidote. Calyx conspicuous, deeply 5-lobed, the lobes narrowly oblong, obtuse, sparsely lepidote or elepidote, sometimes with a few filiform-acicular hairs. Corolla funnel-campanulate, white with a yellow blotch, mouth very oblique, (75–)100–125 mm from base to apex of the longest lobe, tube (45–)70–80 mm, sparsely lepidote outside. Stamens 10, filaments pubescent towards the base. Ovary densely lepidote, tapered into the style which is lepidote in the lower part. Capsule densely lepidote, cylindric or ovoid cylindric, 50–70 × 18–20 mm, weakly 5-ridged, much exceeding the persistent calyx.

INDIA (Arunachal Pradesh), CHINA (NW Yunnan, SE Xizang). Cliffs, ledges, rocky slopes in open forest, 1200–3650 m. Map 5, p. 28.

*R. nuttallii* has a broken distribution pattern, scattered over a wide area. There is a specimen from Guizhou province (Chen feng hsien, *Tsiang* 4201) which is inadequate for certain identification, but which may well be *R. nuttallii*; this would extend the distribution considerably further eastwards.

**4. (7). R. dalhousiae** Hooker, Rhodo. Sikkim Himalaya t. 1 non t. 2 (1849).

Epiphytic or more rarely free-growing shrub. Young shoots loriform-setose. Leaves mostly narrowly elliptic, more rarely tending to obovate, (75–)100–170 × 35–70 mm, tapered to the base and to the ± rounded apex, petioles variably loriform-ciliate, lower surface greyish or brownish green with small, slightly unequal, reddish scales more than their own diameter apart; margins often crenulate. Inflorescence 2–3-flowered, pedicels 15–20 mm, lepidote and pubescent, accrescent in fruit. Calyx conspicuous, deeply 5-lobed, the lobes oblong or oblong-triangular, rounded at the apex, 10–15 × 5–10 mm, lepidote at the base, the middles of the lobes with few to many filiform-acicular hairs. Corolla narrowly funnel-campanulate to funnel-campanulate, white or cream, often yellowish inside, sometimes with 5 red lines running from the base of the tube to the apices of the lobes, 85–105 mm, tube 60–75 mm, very sparsely lepidote to elepidote outside. Stamens 10, filaments pubescent in the lower part. Ovary lepidote, tapered into the style which is lepidote in the lower part. Capsule cylindric-fusiform, 40–50 × 15–20 mm, lepidote, rather strongly 5-ridged.

The species is divisible into two varieties on the basis of corolla colour:

| | | |
|---|---|---|
| 1. | Corolla with 5 longitudinal red lines . . | **b.** var. **rhabdotum** |
| + | Corolla without 5 longitudinal red lines . . | **a.** var. **dalhousiae** |

**4a.** var. **dalhousiae.** Type: Sikkim Himalaya, 7000–9000 ft, *Hooker* (holo. K). Fig. 2s, p. 16.

Ic.: The Garden 28: opp. p. 318 (1885); Flora & Sylva 3:40 (1905); Bot. Mag. 79: t. 4718 (1853); Rhodo. Immerg. Laubg. Jahrb. 1968:56.

NEPAL, INDIA (Sikkim, W Bengal), BHUTAN, CHINA (S Xizang). Epiphytic on trees, or on rocks and cliffs in forest and scrub, 1800–2450 m. Map 7, p. 39.

**4b.** var. **rhabdotum** (Balfour f. & Cooper) Cullen, Notes R.B.G. Edinb. 36:107 (1978). Fig. 3f, p. 19.

Syn.: *R. rhabdotum* Balfour f. & Cooper, Notes R.B.G. Edinb. 10:141 (1917). Type: Bhutan, Punakka, 8000 ft, 29 v 1915, *Cooper* 3987 (holo. E).

Ic.: Gard. Chron. 90:235 (1931) & 96: 34 (1934); Bot. Mag. 159: t. 9447 (1936).

INDIA (Arunachal Pradesh), CHINA (S Xizang). Epiphytic in forests or free-growing on hillsides, 1500–2600 m. Map 7, p. 39.

The red-striped flower is the only distinguishing feature of var. *rhabdotum*.

**5. (8.) R. lindleyi** T. Moore, Gard. Chron. 1864:364 (1864). Type: 'Bhutan' (i.e. India, Arunachal Pradesh, cf. Ludlow, Trans. Bot. Soc. Edinb. 41:351–363, 1972), *Booth* (holo. K).

Syn.: *R. bhotanicum* C. B. Clarke in Hooker, Fl. Brit. India 3:475 (1882). Type: as for *R. lindleyi*.

Ic.: Notes R.B.G. Edinb. 12:40 (1919); Gard. Chron., suppl. pl. opp. p. 171 (1926); Urquhart, The Rhododendron 1: t. 8 (1958); Bot. Mag., n.s. 173: t. 363 (1960); Hara (ed.), Photo-album of E Himalayan Plants t. 163 (1968); Ic. Corm. Sin. 3: t. 4030 (1974).

Epiphytic shrub, 1–4 m. Leaves 85–130 × 29–46 mm, narrowly elliptic to oblong-elliptic, rarely somewhat obovate, tapered or rounded to the base, apex obtuse or rounded, lower surface greyish green with rather distant, somewhat unequal, reddish brown scales. Inflorescence 2–3(–5)-flowered, pedicels 10–17(–25) mm, rather sparsely lepidote. Calyx large, conspicuous, deeply 5-lobed, the lobes pinkish or green, thin, becoming papery in fruit, tube densely lepidote, the lobes narrowly ovate-oblong, rounded at the apex, 11–18 × 5–8(–10) mm, rather prominently veined, conspicuously and persistently filiform-acicular-ciliate, elepidote. Corolla openly funnel-campanulate, (65–)70–95 mm, tube (45–)50–60 mm, white or cream with an orange-yellow blotch at the base, sometimes suffused pink in bud, elepidote or very sparsely lepidote, glabrous or finely pubescent at the base. Stamens 10, filaments pubescent in the lower part. Ovary densely lepidote, tapering into the style, which is lepidote in the lower part. Capsule cylindric-fusiform, weakly 5-ridged, c. 40 mm, much exceeding the persistent calyx. NEPAL, INDIA (W Bengal, Arunachal Pradesh, Manipur), BHUTAN, CHINA (S Xizang). Mostly epiphytic, rarely on rocks, in forests, 2000–2750 m. Map 8, p. 39.

**6. (9.) R. taggianum** Hutchinson, Notes R.B.G. Edinb. 16:178 (1931). Type: NE Upper Burma, western flank of the N'Maikha-Salween Divide, near Pan-ti-lo, 10000–11000 ft, *Forrest* 26440 (holo. E).

Syn.: *R. headfortianum* Hutchinson, Bot. Mag. 163: t. 9614 (1942). Type: a cultivated plant (holo. K).

Ic.: Bot. Mag. 163: t. 9612 (1942); Ic. Corm. Sin. 3: t. 4026, 4027 (1974).

Very similar to *R. lindleyi*, differing as follows: frequently a free-growing shrub, calyx lobes 17–19 × 11 mm, not filiform-acicular-ciliate but often margined with quickly deciduous scales.

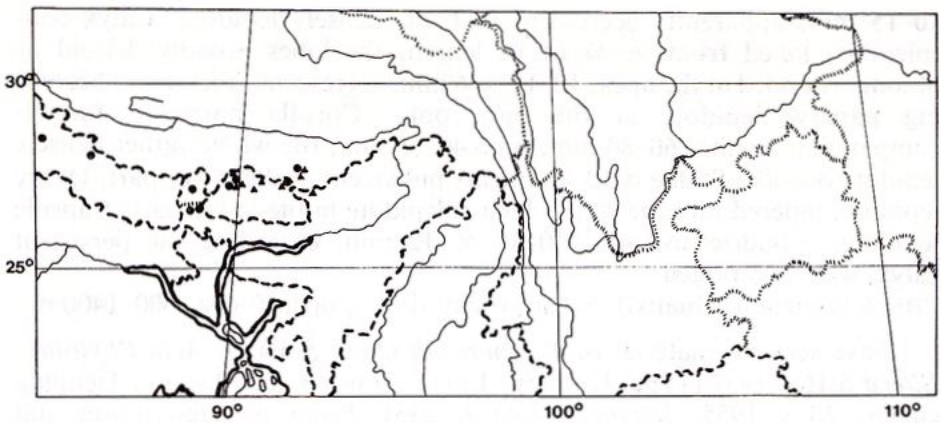
NE BURMA, CHINA (NW Yunnan). Forest margins and scrub, 1800–3700 m. Map 8, p. 39.

An extremely attractive species, closely related to, and vicariating with, *R. lindleyi*. The distinctions between it and *R. headfortianum* (which is thought to have originated from China, SE Xizang—Tsangpo gorge, below Pemakochung, *Kingdon Ward* 6310) are too slight for recognition as separate species.

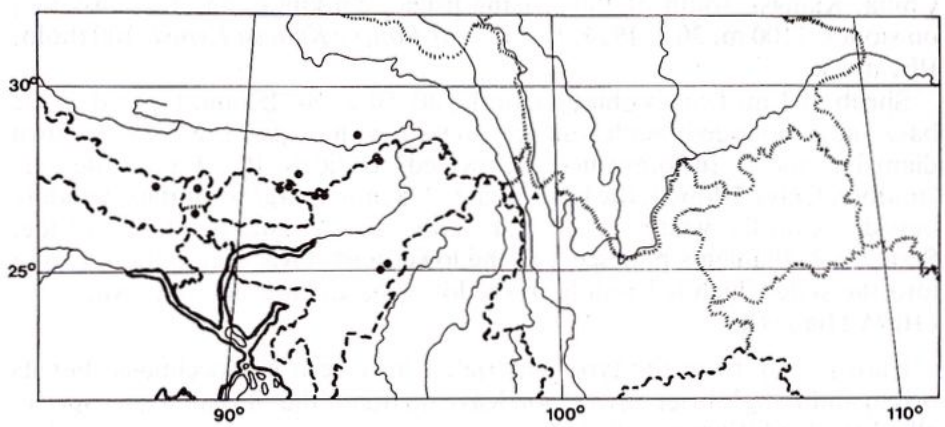
**7. (10.) R. liliiflorum** Léveillé, Feddes Rep. 12:102 (1913). Type: China, Kouy-Tcheou, Pin-fa, Juin-ou-chan, 3 vi, 15 vii 1902, *Cavalerie* 54 (holo. E). Fig. 3g, p. 19.

Ic.: Notes R.B.G. Edinb. 12:34 (1919); Ic. Corm. Sin. 3: t. 4024 (1974).

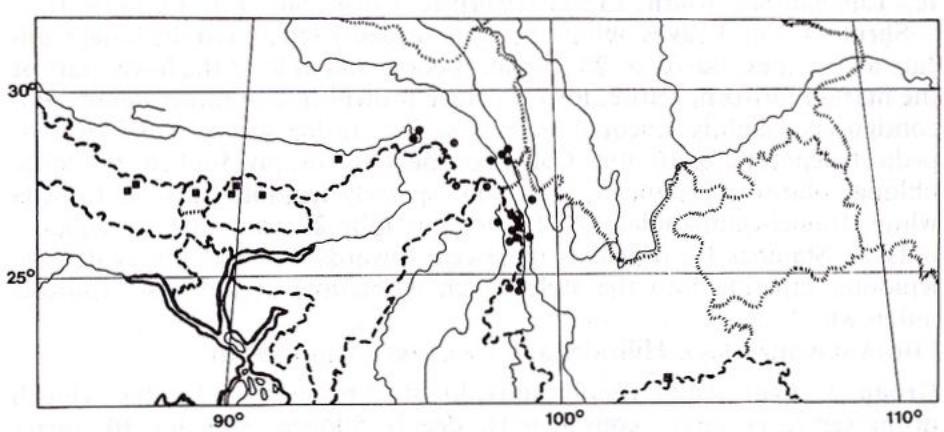
Shrub to 3 m or more. Leaves oblong-elliptic or narrowly oblong-elliptic, tapering to a rather abruptly rounded apex, narrowing to the base, 100–130 × 31–50 mm, petioles loriform-setose when young, the setae variably deciduous, undersurface brownish or greyish green with unequal brownish scales about their own diameter apart. Inflorescence 2–3-flowered, pedicels




MAP 7. ● *R. dalhousiae* var. *dalhousiae*; ▲ var. *rhabdotum*.




MAP 8. ● *R. lindleyi*; ▲ *R. taggianum*.




MAP 9. ● *R. megacalyx*; ■ *R. ciliatum*.

10–15 mm, apparently accrescent in fruit, densely lepidote. Calyx conspicuous, lobed from ½–¾ of its length, the lobes broadly deltoid or oblong, rounded at the apex, 10–12 × 6 mm, accrescent in fruit and becoming papery, lepidote at the base only. Corolla narrowly funnel-campanulate, white, 60–80 mm, tube 40–55 mm, the whole rather densely lepidote outside. Stamens 10, filaments pubescent in the lower part. Ovary lepidote, tapered into the style which is lepidote in the lower part. Capsule lepidote, cylindric-fusiform, 30–35 × 12 mm, exceeding the persistent calyx, weakly 5-ridged.
CHINA (Guizhou, Guanxi). Scrub, rocky slopes, open forest, 600–1400 m.

I have seen no material of *R. chunienii* Chun & Fang, *Acta Phytotax. Sinica* 6:169, 1957 (Type: Kwangsi, Lingshan hsien, Tati hsiang, Tienping chuen, 20 v 1955, *Kwangfu Exped.* 235). From the description and photograph of the type (op. cit. t. 40), it is very similar to *R. liliiflorum*, but is described as having only 5 stamens.

**8. (11.) R. kiangsiense** Fang, Acta Phytotax. Sinica 8:192 (1958). Type: China, Kiangsi, south of Ping-huang hsien, Wu-king-shan, Tze-chi-kung, on slopes, 1100 m, 30 iv 1954, *Institute of Botany Kiangsi Exped.* 100 (holo. PE, n.v.).

Shrub of 1 m. Leaves oblong-elliptic, 40–50 × 20–25 mm, tapered to the base, apex rounded, undersurface greyish with scales 1–2 × their own diameter apart. Inflorescence 2-flowered, pedicels 10–14 mm, densely lepidote. Calyx 5-lobed, the lobes ovate, 7–8 mm, margins sinuous, lepidote outside. Corolla white, c. 40 mm, tube 20–22 mm, lepidote outside. Stamens 8, filaments pubescent in the lower part. Ovary lepidote, tapering into the style which is lepidote in the lower part. Capsule unknown.
CHINA (Jiangxi).

Known only from the type material. I have seen no specimens, but its origin and Fang's brief description leave no doubt that it is a distinct species allied to *R. liliiflorum* and *R. levinei*.

**9. (12.) R. levinei** Merrill, Philipp. Journ. Sci. 13:153 (1916). Type: China, Kwangtung, Loh Fau Mt., c. 950 m, *Merrill* 10952; ibid., *CCC (Levine)* 1330 (isosyntype E).
Ic.: Lingnan Sci. Journ. 13:521 (1934); Ic. Corm. Sin. 3: t. 4023 (1974).

Shrub, 3–4 m. Leaves oblong-obovate, broadly tapered to the base, truncate at the apex, 60–65 × 28–30 mm, petiole and at least the lower part of the margin loriform-setose, lower surface brownish with rather dense, subcontiguous, slightly unequal golden scales. Inflorescence 1–3-flowered, pedicels lepidote, c. 10 mm. Calyx conspicuous, deeply 5-lobed, the lobes oblong, obtuse to rounded, c. 8 mm, sparsely lepidote outside. Corolla white, funnel-campanulate, c. 45 mm, the tube 20 mm, sparsely lepidote outside. Stamens 10, filaments pubescent towards the base. Ovary densely lepidote, tapering into the style which is lepidote at the base. Capsule unknown.
CHINA (Guangdong). Hillsides and rock crevices, c. 950 m.

**Group 3.** Leaf scales deeply sunk in pits; pedicels and calyx whitish pruinose; calyx large, conspicuous, deeply 5-lobed; stamens 10; ovary 5-locular; pedicels divaricate-reflexed in fruit.

**10. (13.) R. megacalyx** Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 9:246 (1916). Type: E Upper Burma, Nwai valley, 4 vi 1904, *Kingdon Ward* 1628 (holo. E). Fig. 2t, p. 16, 3h, p. 19.
Ic.: Gard. Chron. 85:381 (1929); Bot. Mag. 156: t. 9326 (1933); Ic. Corm. Sin. 3: t. 4022 (1974).

Shrub of 1·3–5 m. Leaves elliptic to obovate, tapering to the somewhat rounded base, the apex very rounded, 100–160 × 45–75 mm, lower surface brownish with heteromorphic, subcontiguous scales, the smaller rimless, deeply sunk in pits, the larger with rims and less deeply sunk, all golden or brownish. Inflorescence 2–6-flowered, pedicels 15–32 mm, accrescent and divaricate-reflexed in fruit, glabrous and elepidote or rarely slightly lepidote. Calyx very large, lobed from half to almost its total length, cup-like, reddish, lobes broadly elliptic, rounded at the apex, 22–30 × 14–20 mm, glabrous and elepidote, accrescent and becoming papery in fruit, whitish pruinose. Corolla white or cream, rarely flushed pinkish purple, funnel-campanulate, mouth very oblique, 65–95 mm from base to apex of the longest lobe, tube c. 50 mm, very sparsely lepidote outside. Stamens 10, filaments pubescent in the lower part. Ovary densely lepidote, tapering into the style, which is lepidote at the base. Capsule 20–25 × 12–15 mm, cylindric-globose, lepidote, shorter than to as long as the persistent calyx.
INDIA (Arunachal Pradesh), NE BURMA, CHINA (NW & W Yunnan, SE Xizang). Forests, scrub, thickets, often near water, 2000–3350 m. Map 9, p. 39.

A very distinctive species.

**Group 4.** Leaves with the main vein totally impressed above; pedicels and calyx not whitish pruinose, not divaricate-reflexed in fruit; calyx often small, usually ciliate with loriform setae; stamens (8–)10; ovary 5-locular.

**11. (14.) R. ciliatum** Hooker, Rhodo. Sikkim Himalaya t. 24 (1849). Type: Sikkim Himalaya, Lachen and Lachung valleys, 9000–10000 ft, *Hooker* (holo. K). Fig. 3i, p. 19.
Ic.: Bot. Mag. 78: t. 4648 (1852); Hara (ed.), Photo-album of Plants of E Himalaya t. 166 (1968); Stainton, Forests of Nepal t. 102 (1972); Ic. Corm. Sin. 3: t. 4031 (1974).

Shrub to 2 m. Young growth loriform-setose, the older branches with the bases of the setae remaining. Leaves elliptic to narrowly elliptic, dark green and somewhat rugose above, paler green or brownish beneath, acute or obtuse at the apex, (44–)55–70(–90) × (21–)24–34 mm, the upper surface loriform-setose to some extent, particularly along the lower part of the midrib, the lower surface with scattered, rather unequal scales. Inflorescence 2–5-flowered, pedicels lepidote and rather densely loriform-setose. Calyx conspicuous, somewhat unequally 5-lobed, the lobes usually herbaceous, oblong-ovate, obtuse, lepidote near the base, loriform-ciliate, the largest 6–9 mm. Corolla white or white flushed pink, campanulate to funnel-campanulate, (32–)36–45 mm, the tube (19–)21–29 mm, glabrous and elepidote outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style impressed, glabrous and elepidote. Capsule oblong-globose, c. 10–16 mm, lepidote.
NEPAL, INDIA (Sikkim), BHUTAN, CHINA (S Xizang). Hillsides, rocky places, forests, 2400–4000 m. Map 9, p. 39.

**12. (15.) R. valentinianum** [Forrest ex] Hutchinson, Notes R.B.G. Edinb. 12:45 (1919). Type: China, Yunnan, Shweli/Salween Divide, 11000 ft, v–vi 1917 (fl.), xi 1917 (fr.), *Forrest* 15899 (holo. E).
Ic.: Urquhart, The Rhododendron 1: t. 7 (1958); Bot. Mag., n.s. 179: t. 623 (1972–3).

Shrub, 0·3–1·3 m. Young growth densely loriform-setose, older branches smooth with scaling bark. Leaves elliptic, obtuse, 26–38(–50) × 16–22 (–31) mm, upper surface dark green, rugose, often with the remains of dried-out scales, loriform-setose along the midrib, margin entire, ciliate with variably persistent loriform setae, lower surface brown with dense, overlapping, unequal scales. Petioles very densely loriform-setose. Inflorescence (1–)2–5(–6)-flowered, pedicels sparsely lepidote, densely loriform-setose. Calyx conspicuous, deeply 5-lobed, the lobes oblong-ovate, obtuse, herbaceous, 5–7 mm, somewhat accrescent in fruit, lepidote on the surface, margins loriform-ciliate. Corolla 20–32 mm, tube 14–19 mm, funnel-campanulate, bright yellow, the tube pubescent outside and inside, the lobes lepidote on the outside. Stamens 10, filaments pilose in the lower part. Ovary densely lepidote, rarely with a few setae towards the apex, style impressed, variably lepidote towards the base. Capsule lepidote, ovoid-globose, 6–9 mm.
NE BURMA, CHINA (SW Yunnan). Cliffs, stony slopes, scrub, 2700–3600 m. Map 10, p. 44.

Very closely related to *R. fletcheranum* with which it vicariates, and to *R. ciliatum*. A variety *changii* (Fang, *Contr. Biol. Lab. Sci. Soc. China* 12:71, 1939) has been described on the basis of a number of specimens from Nanchuan hsien in Sichuan province. It is reputed to differ in its glabrous calyx and pedicels, but no material has been available for assessment.

**13. (16.) R. fletcheranum** Davidian, R.H.S. Rhodo. & Camellia Yearbook 16:103 (1961). Type: SE Tibet, province of Tsarung, forests and alpine regions of the Solo-la, 14000 ft, vi–vii 1922, *Rock* 22302 (holo. E).
Ic.: Bot. Mag., n.s. 176: t. 508 (1966–8).

Very similar to *R. valentinianum*, differing as follows: leaves with distant scales beneath, the surface conspicuous, green; leaf margin distinctly crenate in the upper half; midrib usually not setose above; ovary conspicuously setose towards the apex, the setae persisting on the capsule.
CHINA (SE Xizang). Forests at 4000–4300 m. Map 10, p. 44.

Known only from two collections; vicariating with the very similar *R. valentinianum*.

**14. (17.) R. amandum** Cowan, Notes R.B.G. Edinb. 19:245 (1937). Type: S Tibet, Chayul Chu, Natrampa, 11500 ft, 27 iv 1936, *Ludlow & Sherriff* 1365 (holo. BM, iso. E).

Shrub, 1·3–1·6 m. Young growth loriform-setose. Leaves elliptic, broadly acute at the apex, 70 × 33 mm, upper surface dark green or brownish, somewhat rugose, elepidote except near the base, the base of the midrib loriform-setose, margins entire, sparsely loriform-setose, lower surface brownish with rather dense scales which are contiguous or up to their own diameter apart; petioles sparsely loriform-setose. Inflorescence

2–3-flowered, pedicels densely lepidote. Calyx conspicuous, deeply 5-lobed, the lobes ovate-oblong, c. 9 mm, lepidote on the outer surface, loriform-ciliate on the margins. Corolla funnel-campanulate, pale yellow, 38 mm, tube 20 mm, glabrous and very sparsely lepidote outside, sparsely pubescent inside. Stamens 10, filaments rather sparsely pubescent towards the base. Ovary densely lepidote, style impressed, very sparsely lepidote at the extreme base. Capsule unknown.
CHINA (SE Xizang). Map 10, p. 44.

Known only from the type collection.

**15. (18.) R. burmanicum** Hutchinson, Kew Bull. 1914:185. Type: a cultivated specimen (holo. K).

Shrub to 2 m. Young growth with a dense indumentum of loriform setae which is soon deciduous. Leaves obovate, tapering to the base, obtuse at the apex, 50–55 × 20–24 mm, upper surface dark green, rather densely lepidote with flat, somewhat dried-out scales, margins loriform-ciliate when young, somewhat crenate in the upper part, lower surface densely lepidote with overlapping to contiguous scales producing a brownish colour; petioles densely lepidote and sparsely loriform-setose. Inflorescence 4–6(–10)-flowered, pedicels densely lepidote. Calyx disc-like, undulate, lepidote, loriform-ciliate. Corolla greenish yellow, funnel-campanulate, 30–35 mm, tube 18–20 mm, the base of the tube pilose outside, the whole conspicuously lepidote, tube glabrous inside. Stamens 10, filaments densely pubescent in the lower part. Ovary densely lepidote; style impressed, lepidote in the lower part. Fruit unknown.
C BURMA (Mt Victoria). Fringes of forest, 2700–2900 m. Map 11, p. 44.

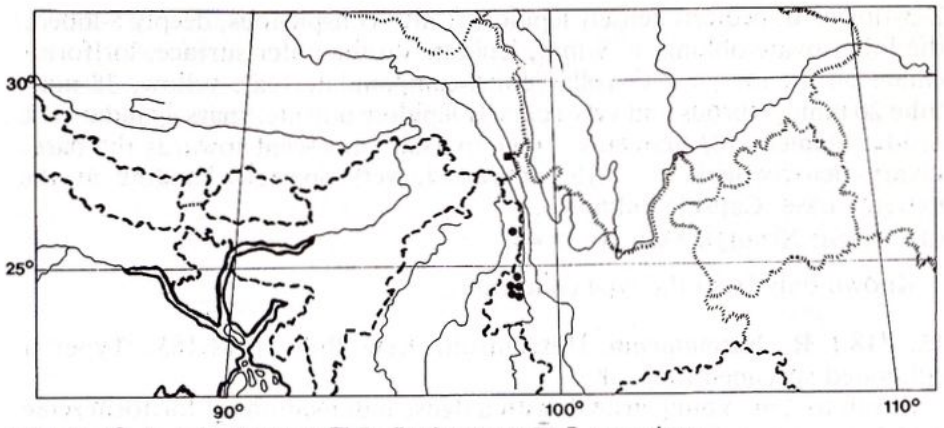
Originally described from cultivated material, later refound in the wild. A distinct and easily recognised species.

**16. (19.) R. crenulatum** [Hutchinson ex] Sleumer, Blumea Suppl. 4:44 (1958). Type: Laos, prov. Tranh-Ninh, Pu Bia (103° 7′, 19° 01′), summit c. 2800 m, 14 iv 1932, *Kerr* 21044 (holo. K; iso. BM, P–ult. n.v.).

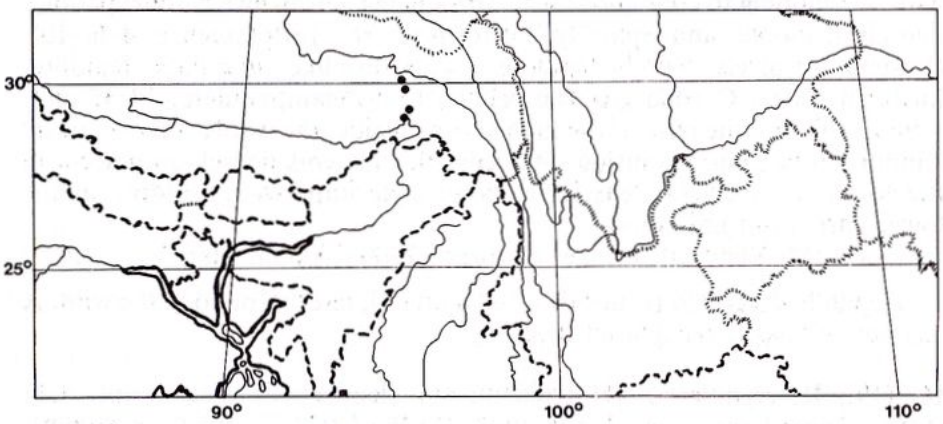
Shrub to 1 m. Young branches loriform-setose, the setae persistent. Leaves oblong-elliptic, (25–)30–40 × (12–)15–20 mm, cuneate at the base, rather abruptly narrowed to the acute apex, upper surface with the veins puberulent, margins crenulate, lower surface densely lepidote. Inflorescence 3–4-flowered, pedicels densely lepidote. Calyx 5-lobed, the lobes ± ovate, obtuse, c. 2 mm, densely lepidote, loriform-ciliate. Corolla pale yellow, c. 30 mm, tube 15 mm, lepidote and pilose near the base outside. Stamens 10, pubescent towards the base. Ovary densely lepidote, style impressed, lepidote for most of its length, densely so at the base, more laxly so above. Capsule broadly oblong, 10–13 mm, lepidote.
LAOS. Map 6, p. 34.

Known only from the type collection.

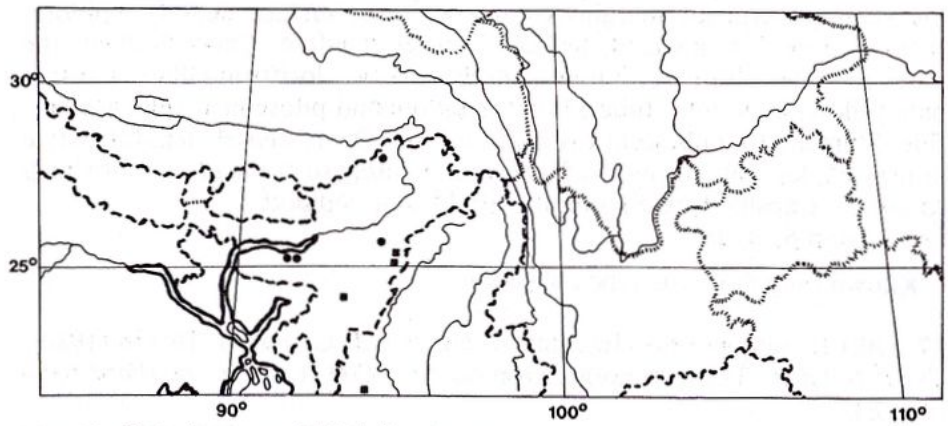
**17. (20.) R. scopulorum** Hutchinson, Notes R.B.G. Edinb. 16:178 (1930). Type: S Tibet, Tsangpo gorge, Gompo Ne, 6000 ft, *Kingdon Ward* 6354 (iso. E).
Ic.: Bot. Mag. 158: t. 9399 (1935); Ic. Corm. Sin. 3: t. 4032 (1974).




MAP 10. ● *R. valentinianum*; ■ *R. fletcheranum*; ▼ *R. amandum*.




MAP 11. ● *R. scopulorum*; ■ *R. burmanicum*.




MAP 12. ● *R. formosum*; ■ *R. johnstoneanum*.

Shrub to 2·6 m. Young growth loriform-setose, the older twigs smooth and sparsely lepidote. Leaves elliptic to obovate-elliptic, tapered to the base, the apex obtuse to rounded, 47–75 × 18–32 mm, drying a distinctive pale greyish green, upper surface elepidote or very sparsely lepidote, lower surface with distant, unequal, golden scales; petioles sparsely lepidote. Inflorescence 2–4-flowered, pedicels lepidote. Calyx 5-lobed, the lobes broadly triangular, obtuse, c. 3 mm, lepidote outside, not ciliate. Corolla funnel-campanulate, white or white flushed pink with a yellow or golden blotch inside, 50–55 mm, the tube c. 30 mm, rather sparsely pilose over most of the tube outside, the outsides of the lobes lepidote. Stamens 10, filaments densely pubescent towards the base. Ovary densely lepidote, style impressed, lepidote at the extreme base, rarely pubescent there as well. Capsule c. 16 mm, lepidote.
CHINA (SE Xizang—Tsangpo and Po-Tsangpo valleys). Cliffs, forested slopes, 1950–2450 m. Map 11, p. 44.

Easily recognised in the herbarium by the distinctive light colour of the leaves; this coloration is found to a lesser extent in cultivated living material. The style may be lepidote only or both lepidote and pubescent at the extreme base; this feature appears to be of no taxonomic significance.

**18. (21.) R. cuffeanum** [Craib ex] Hutchinson, Bot. Mag. 143: t. 8721 (1917).

Shrub of uncertain height. Stem swollen and tuber-like at the base. Young growth lepidote. Leaves rather narrowly elliptic, acuminate at apex 100–125 × 30–40 mm, upper surface brownish green, sparsely lepidote, lower surface pale green, lepidote with distant, golden scales; petiole lepidote and with a few sparse loriform setae. Inflorescence c. 5-flowered, pedicels lepidote and sparsely pubescent. Calyx unequally 5-lobed, the longest lobe c. 7 mm, all oblong-ovate, foliaceous, lepidote and sparsely pubescent outside, fringed with loriform setae. Corolla funnel-campanulate, white with a yellow blotch inside, 55–65 mm, the tube 22–35 mm, pubescent outside at the base, sparsely lepidote all over, tube glabrous inside. Stamens 10, filaments pubescent towards the base. Ovary densely lepidote, style impressed, lepidote in the lower half, pubescent near the base. Capsule unknown.
KNOWN ONLY IN CULTIVATION.

This is an obscure species in many ways. There is no herbarium material from the wild and it is known only from cultivated material. Young plants were reputedly collected by Lady Cuffe on Mt Victoria in Burma and grown on at Glasnevin, Dublin. The notes with the type description in the *Botanical Magazine* suggest that the place of origin was Sindaung on the edge of the Shan plateau, but this was later altered to Mt Victoria by Hutchinson. The swollen stem base, which is illustrated in the *Botanical Magazine* plate appears to be unique in this group of rhododendrons. Hutchinson's two descriptions (*Bot. Mag.*, cited above, and *Notes R.B.G. Edinb.* 12:52, 1919) do not agree entirely with material at Edinburgh said to come from the type plant and determined by him: for instance, in this material the corolla is sparsely lepidote all over, not 'not lepidote except towards the 5 lobes which are sparingly so towards the middle'; and the

style is pubescent and lepidote at the base, not just lepidote. I have not been able to trace a type specimen, so this matter cannot be resolved.

**19. (22.) R. formosum** Wallich, Plant. Asiat. Rar. 3(3): t. 207 (1832).

Erect shrub to 2 m. Young growth loriform-setose. Leaves narrowly elliptic to linear-elliptic or linear-obovate, long-tapering to the base, acute or acuminate at the apex, (26–)42–72 × 10–21 mm, not more than 21 mm broad, the blade narrowly decurrent on the petiole, upper surface dark green, elepidote, margin loriform-setose when young, some, at least, of the setae persisting, lower surface lepidote with unequal scales about their own diameter apart; petioles loriform-setose. Inflorescence 2–3-flowered, pedicels lepidote. Calyx disc-like, lepidote, weakly loriform-ciliate. Corolla white or white flushed pink, often with a yellow blotch and pink markings along the tube, openly funnel-campanulate, 40–55 mm, the tube 24–30 mm, pilose at the base and variably lepidote outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style impressed, lepidote to well above the base. Capsule c. 16 mm, lepidote.

A rather variable and geographically scattered species, divisible into two varieties:

| | | |
|---|---|---|
| 1. | Leaves 10–16 mm broad . . . . | **a.** var. **formosum** |
| + | Leaves 15–21 mm broad . . . . | **b.** var. **inaequale** |

**19a.** var. **formosum.** Described from 'Assam, Khasia Hills, 3–5000 ft'.

Syn.: *R. gibsoni* Paxton, Mag. of Bot. 8: t. 217 (1841). Type: a cultivated specimen (n.v.).

*R. formosum* var. *salicifolium* C. B. Clarke, Fl. Brit. India 3:473 (1882). Described from the Khasia Hills.

*R. iteaphyllum* Hutchinson, Notes R.B.G. Edinb. 12:83 (1919). Syntypes: Assam, Khasia Hills, rocks of Bor-Panee, 2000 ft, 24 vii 1850, *Hooker & Thomson* (K); along the stream at the same place, *Simons* (K); without locality, *Lobb* 3 and *G. Mann* (both K).

Ic.: Gartenflora 9: t. 277 (1860); Bot. Mag., n.s. 177: t. 563 (1969–70).

INDIA (Meghalaya). Hillsides, 1450–2300 m. Map 12, p. 44.

**19b.** var. **inaequale** (Hutchinson) Cullen, Notes R.B.G. Edinb. 36:108 (1978).

Syn.: *R. inaequale* Hutchinson, Notes R.B.G. Edinb. 12:75 (1919). Type: India, Kollong, 6000 ft, 23 viii 1885, *Clarke* 40025 (holo. K).

Ic.: Bot. Mag., n.s., 171: t. 295 (1956–7).

INDIA (Meghalaya, Manipur, Arunachal Pradesh). Hillsides, 1450–2230 m. Map 12, p. 44.

**20–24. R. johnstoneanum** aggregate.

Erect or epiphytic shrubs, often of considerable size. Young growth usually loriform-setose, the setae variably persistent. Leaves variable in shape and size, usually large, more than 21 mm broad, dark green above, laxly to densely lepidote beneath, the blade not decurrent on the petiole, which is frequently loriform-setose. Inflorescence several-flowered, pedicels lepidote. Calyx small and disc-like, rarely somewhat larger and undulately

lobed, usually loriform-setose. Corolla large, openly funnel-campanulate, white or white flushed pink, often with a yellow blotch at the base, variably pilose and lepidote outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style impressed, lepidote to well above the base. Capsule lepidote.

This is a complex of five segregate species occurring in India (Manipur), Burma and China. The distinctions between the species are slight, and not always completely clear, though the variation appears to have a geographical basis. They might well all be treated as subspecies of the one broad species, but information on their population structure is unobtainable, so they are retained as species below. Only short, diagnostic descriptions are given. Fruiting specimens can often not be identified with certainty any further than the aggregate, though geography can be helpful in deciding the most likely segregate.

**20. (23.) R. johnstoneanum** [Watt ex] Hutchinson, Notes R.B.G. Edinb. 12:72 (1919). Type: Manipur, Sirhorifurar, 6000–7500 ft, 11 iv 1882, *Watt* 6401 (holo. K, iso. E).

Syn.: *R. formosum* var. *johnstoneanum* [Watt ex] Brandis, Indian Trees 411 (1906).

Ic.: Gard. Chron. 95:327 (1934).

Variably sized shrub. Young growth loriform-setose. Leaves elliptic to broadly elliptic, tapering to the base, obtuse or subacute at the apex, 55–75 × 24–30 mm, margins variably loriform-ciliate, undersurface brownish with dense, contiguous or overlapping scales. Calyx disc-like, loriform-ciliate. Corolla white, often with a yellowish blotch and pink or purplish flush, 48–55 mm, tube 25–30 mm, pilose at the base only, laxly lepidote over most of the surface. Capsule lepidote, 16–22 mm.

INDIA (Manipur, Mizoram). Forest margins, slopes, 1850–3100 m. Map 12, p. 44.

A specimen from western central Burma (Mindat ridge, *Kingdon Ward* 22200) is very similar to *R. johnstoneanum* and may well be a minor variant of it; it lacks the ciliation of the leaves.

**21. (24.) R. rufosquamosum** Hutchinson, Notes R.B.G. Edinb. 12:63 (1919). Type: China, Yunnan, Szemao, 4800 ft, *Henry* 11983 (holo. K, iso. E).

Shrub of about 1 m. Young growth not loriform-ciliate. Leaves 80–105 × 25–30 mm, narrowly obovate, tapered to the base, acuminate at the apex, not loriform-ciliate, undersurface brownish with dense, contiguous to overlapping scales. Calyx small, disc-like, loriform-ciliate. Corolla white, pinkish in bud, 55–65 mm, tube c. 35 mm; tube pilose at the base, the rest of the outer surface laxly lepidote. Capsule unknown.

CHINA (S Yunnan—area around Szemao and the Papienho river). Hillsides c. 1500 m. Map 13, p. 49.

The most southerly representative of the aggregate, known from only two collections: the type, and *Rock* 3012.

**22. (25.) R. ciliipes** Hutchinson, Notes R.B.G. Edinb. 16:177 (1931). Type: China, Yunnan, Shweli/Salween Divide, v 1925, *Forrest* 26384 (holo. E).

Shrub of 1·3–1·6 m. Young growth loriform-setose. Leaves narrowly ovate to elliptic, rounded at the base, ± acuminate towards the apex, 50–70 × 30–35 mm, upper surface dark brownish green, lower surface brownish with rather lax scales; petiole loriform-setose. Inflorescence 3–4-flowered, pedicels lepidote. Calyx rather conspicuous, undulately 5-lobed, the lobes broadly triangular, obtuse, loriform-ciliate, lepidote, c. 4 mm. Corolla white with a greenish blotch at the base, 55–60 mm, tube c. 30 mm, pilose near the base, laxly lepidote all over the outside. Ovary lepidote. Capsule unknown.

CHINA. (N & NW Yunnan). Cliffs and boulders, c. 3000 m. Map 13, p. 49.

Another obscure species. The paratype cited by Hutchinson with the original description (*Forrest* 25484) is very different from the type, and is here placed in *R. pseudociliipes* (p. 50). *R. ciliipes* is very similar in foliage to *R. roseatum*, also from the Shweli/Salween Divide, but it has an impressed style.

**23. (26.) R. walongense** Kingdon Ward, Gard. Chron. 133:5 (1953). Type: Tibet, near Rima, 7000 ft, 28 iii 1950, *Kingdon Ward* 19259 (holo. BM, iso. E).

Shrub 2–3 m. Young growth not loriform-setose. Leaves elliptic, tapered to the base, slightly acute at the apex, sometimes with a short drip-tip, 100–110 × 38–45 mm, undersurface brownish with lax, unequal scales. Calyx small, disc-like, somewhat undulately lobed, lepidote, margins loriform-ciliate. Inflorescence 3–6-flowered. Corolla creamy white with a greenish blotch, c. 60 mm, tube c. 38 mm, the outside completely pilose except for the tips of the lobes, sparsely lepidote on the lobes. Capsule c. 15 mm.

INDIA (Arunachal Pradesh), CHINA (SE Xizang). Rocks, cliffs, ravines, rarely epiphytic, 1500–2150 m. Map 13, p. 49.

**24. (27.) R. dendricola** Hutchinson, Notes R.B.G. Edinb. 12:60 (1919). Type: N Burma, Nwai valley, 11 v 1914, *Kingdon Ward* 1538 (holo. E). Fig. 3j, p. 19.

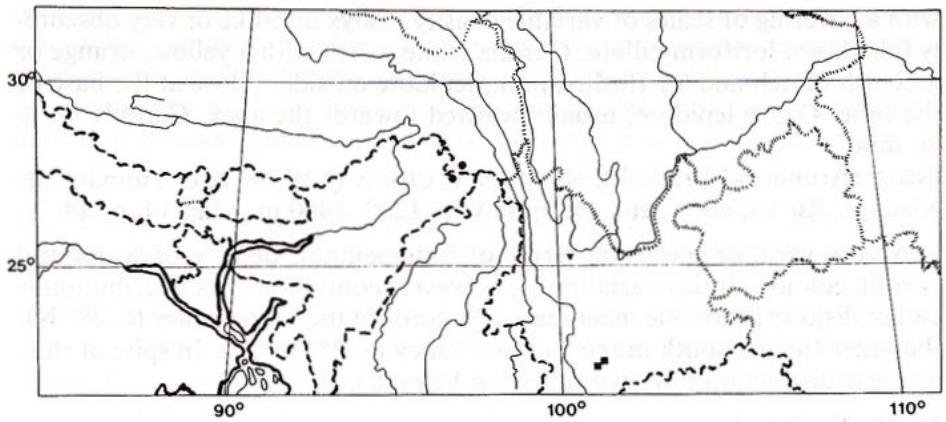
Syn.: *R. atentsiense* Handel-Mazzetti, Anz. Akad. Wiss. Wien 18:14 (1921). Type: China, Yunnan bor.-occid., in monte inter pagum Atentse et fluvium Mekong sito, versus 4000 m, 1914, *Gebauer* (holo. WU—n.v., iso. E).

*R. notatum* Hutchinson, Notes R.B.G. Edinb. 16:177 (1931). Type: Upper Burma, Seinghku Wang, 5000–5500 ft, *Kingdon Ward* 6711 (holo. E).

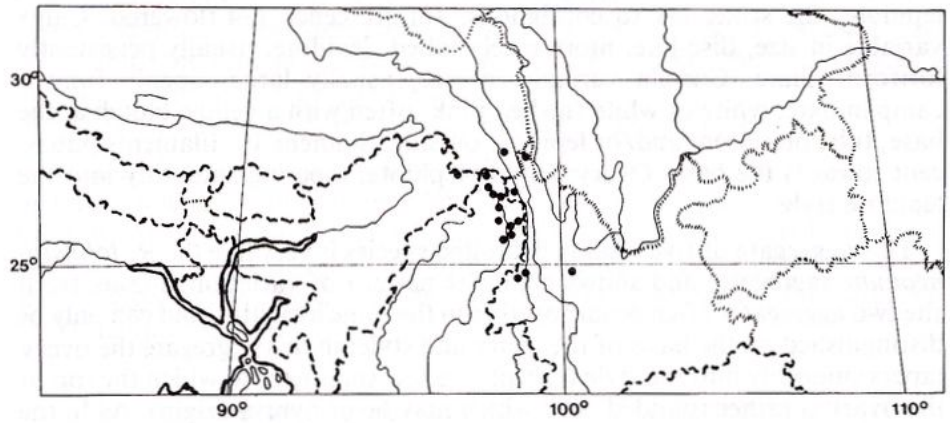
*R. taronense* Hutchinson, op. cit.: 178. Type: China, Yunnan, Taron valley, 4000–5000 ft, *Kingdon Ward* 5501 (holo. E).

Ic.: Notes R.B.G. Edinb. 12:61 (1919); Bot. Mag., n.s., 165: t. 1 (1948).

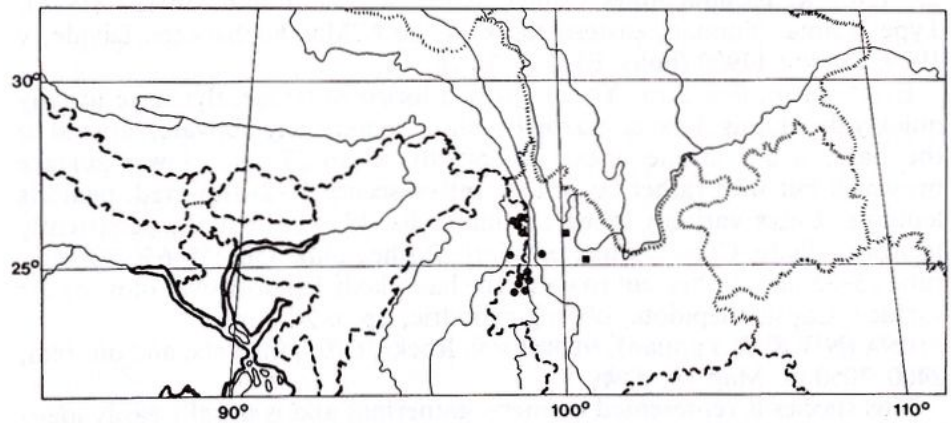
Epiphytic or free-growing shrub. Young growth rarely loriform-setose. Leaves narrowly elliptic to narrowly obovate, tapered to the base, rather abruptly acute or with a short drip-tip, 70–120 × 30–48 mm, undersurface




MAP 13. ● *R. walongense*; ■ *R. rufosquamosum*; ▼ *R. ciliipes*.




MAP 14. ● *R. dendricola*




MAP 15. ● *R. pseudociliipes*; ■ *R. ciliicalyx*.

with a covering of scales of variable density. Calyx disc-like or very obscurely lobed, not loriform-ciliate. Corolla white, often with a yellow, orange or greenish blotch and/or flushed pink, lepidote outside, pilose at the base of the tube. Ovary lepidote, usually waisted towards the apex. Capsule up to 20 mm.
INDIA (Arunachal Pradesh), NE BURMA, CHINA (NW, W & C Yunnan, SE Xizang). Rocks, cliffs, etc., or epiphytic, 1200–1400 m. Map 14, p. 49.

A very variable species in terms of indumentum, density of scales and corolla colour; all this variation is, however, continuous. Its distribution is rather disjunct, with one main mass of records in the Taron valley (c. 28° N), the other further south in the Salween valley (c. 25–26° N). In spite of this, no clear distinction into two units can be made.

**25–29. R. ciliicalyx** aggregate.

Free-growing or epiphytic shrubs, often of considerable size, Young growth usually loriform-setose, the setae variably persistent. Leaves variable in shape, usually narrowly elliptic or obovate, sometimes narrowly ovate, 40–100 × 16–60 mm, margins variably loriform-ciliate, undersurface lepidote, the scales lax to contiguous. Inflorescence 1–4-flowered. Calyx variable in size, disc-like, more rarely lobed, lepidote, usually persistently loriform-ciliate. Corolla variable in size, usually large, openly funnel-campanulate, white or white flushed pink, often with a yellow blotch at the base, tube pubescent and/or lepidote outside. Stamens 10, filaments pubescent towards the base. Ovary densely lepidote, tapering smoothly into the lepidote style.

This aggregate of five weakly delimited species is very like the *R. johnstoneanum* aggregate, and shows a similar pattern of variation. Plants from the two aggregates often occur together in the same localities, and can only be distinguished on the basis of the ovary and style: in this aggregate the ovary tapers smoothly into the style (except in a few specimens in which the top of the ovary is rather rounded, and which may be of hybrid origin). As in the case of the *johnstoneanum* aggregate, only short, diagnostic descriptions are given. Specimens in fruit cannot usually be identified further than the aggregate.

**25. (28.) R. pseudociliipes** Cullen, Notes R.B.G. Edinb. 36:122 (1978). Type: China, Yunnan, eastern flank of the N'Maikha/Salween Divide, v 1929, *Forrest* 17900 (holo. E). Fig. 3k, p. 19.

Erect shrub, 0·6–2 m. Young growth loriform-setose, the setae usually quickly deciduous. Leaves narrowly elliptic to narrowly obovate, tapered to the base, acute at the apex, 40–60(–80) × 16–27 mm, lower surface brownish but with rather lax scales. Inflorescence 1(–2)-flowered, pedicels lepidote. Calyx variably lobed or almost disc-like, not usually persistently loriform-ciliate. Corolla white or faintly flushed pink, (50–)55–65(–70) mm, tube 25–35 mm, pubescent towards the base, laxly lepidote over most of the surface. Capsule lepidote, oblong-cylindric, up to 20 mm.
CHINA (NW & W Yunnan), NE BURMA. Rocks, cliffs, thickets, and on trees, 2400–3050 m. Map 15, p. 49.

This species is represented by many gatherings and is usually easily identifiable by its 1-flowered inflorescences and small leaves. The material put

together here has been variously identified as *R. ciliicalyx, scottianum, ciliipes* (a paratype!), *dendricola, notatum* and *supranubium*. It approaches most closely to Hutchinson's concept of *R. supranubium* (as judged by determinations made by him), but the type of this is different (identified here with *R. pachypodum*, see p. 53) and so the new name is necessary.

**26. (29.) R. ciliicalyx** Franchet, Bull. Soc. Bot. Fr. 33:233 (1886). Type: China, Yunnan, prope Mo-so-yn, 2400 m, *Delavay* 736 (holo. P—n.v., iso. E).

Syn.: *R. missionarum* Léveillé, Bull. Geogr. Bot. 24:20 (1915). Type: China, Yunnan, Tong-koua-pur, 3000 m, 1911, *Maire* (holo. E).
*R. pseudociliicalyx* Hutchinson, Notes R.B.G. Edinb. 12:54 (1919). Type: a cultivated specimen (holo. E).

Ic.: Rev. Hort. 1899:36; Bot. Mag. 127: t. 7782 (1901).

Free-growing shrub. Young growth loriform-setose, the setae usually persistent. Leaves elliptic or narrowly elliptic, tapering to the base, acute at the apex, 70–110 × 26–40 mm, brownish beneath with rather dense but not contiguous scales. Inflorescence (2–)3–5-flowered. Calyx small, undulately lobed, persistently loriform-ciliate. Corolla white or pink, 50–60 mm, tube 25–34 mm, the tube pubescent but not lepidote outside, the lobes sparsely lepidote. Capsule ovoid-cylindric, c. 20 mm.

CHINA (N & C Yunnan). Hillsides c. 2400 m. Map 15, p. 49.

*R. ciliicalyx* is a reasonably uniform species. *R. missionarum* is in no way different and probably comes from the same general area (the localities given by Maire have not been precisely identified). *R. pseudociliicalyx* was described from a cultivated specimen; it is also identical to *R. ciliicalyx* and is likely to have originated in Yunnan rather than Sichuan as surmised by Hutchinson (*loc. cit.*).

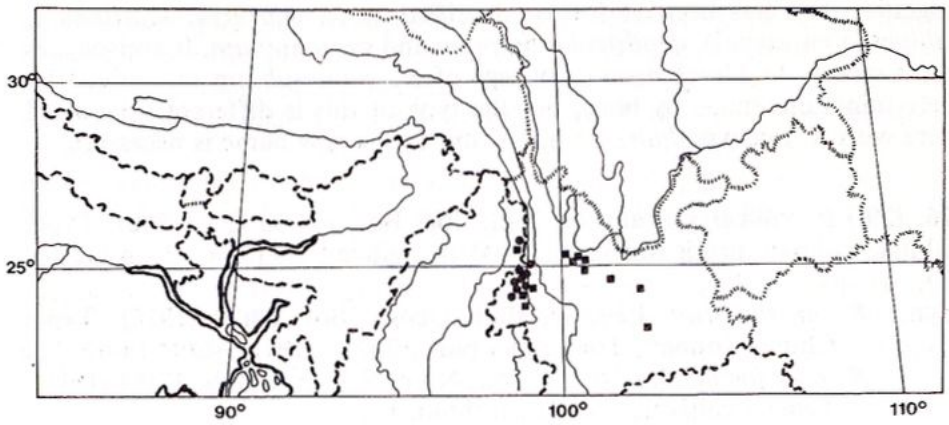
**27. (30.) R. roseatum** Hutchinson, Notes R.B.G. Edinb. 12:57 (1919). Type: China, W Yunnan, Shweli/Salween Divide, 8000–9000 ft, v 1913, *Forrest* 11866 (holo. E).

Syn.: *R. lasiopodum* Hutchinson, op. cit.: 58. Type: China, Yunnan, Shweli/Salween Divide, 8000–9000 ft, v 1913, *Forrest* 9919 (holo. E).

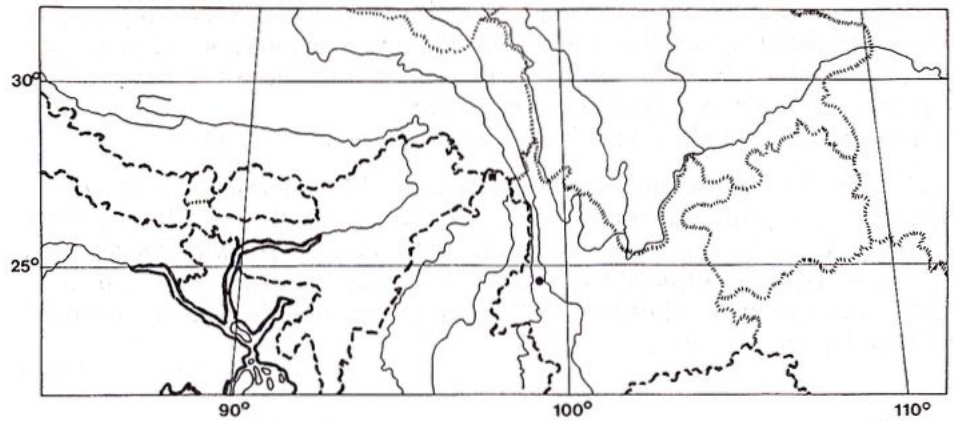
Shrub from 1–4 m. Young branches sparsely loriform-setose, the setae quickly deciduous. Leaves ± obovate, tapered to the base, abruptly acute at the apex, 70–120 × 35–60 mm, the lower surface brownish with lax to rather dense scales. Inflorescence (2–)3–5-flowered. Calyx obscurely lobed, loriform-ciliate. Corolla white or white flushed pink, with a yellow blotch at the base, (50–)55–75 mm, tube (28–)30–40 mm, pubescent at the base outside, the whole surface laxly lepidote. Capsule lepidote, c. 20 mm.

CHINA (W & SW Yunnan). Forests, hillsides, scrub, 1800–2750 m. Map 16, p. 52.

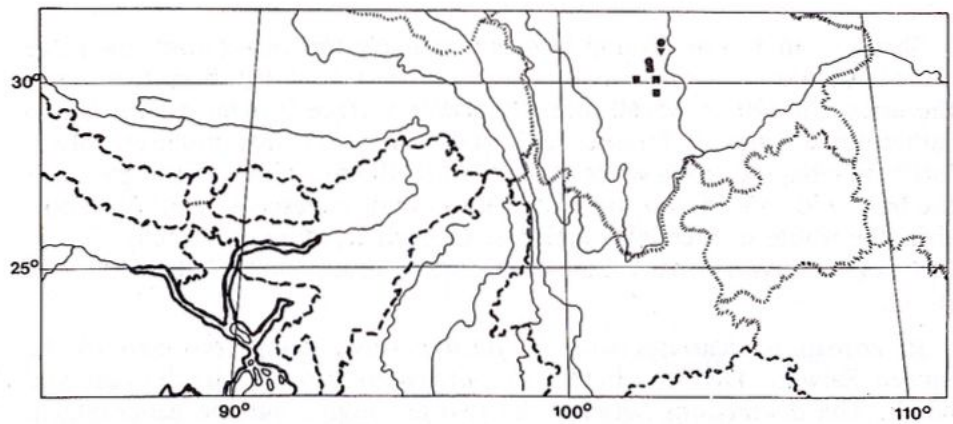
*R. roseatum* vicariates with *R. pachypodum*, being restricted to the Shweli/Salween Divide, whereas *R. pachypodum* occurs to the east and north. The distinctions between the two are slight, but the geographical separation corresponds well with the morphological one.




MAP 16. ● *R. roseatum*; ■ *R. pachypodum*.




MAP 17. ● *R. yungchangense*; ■ *R. horlickianum*.




MAP 18. ● *R. moupinense*; ■ *R. dendrocharis*; ▼ *R. petrocharis*.

**28. (31.) R. pachypodum** Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9: 254 (1916). Type: China, Yunnan, head of Hsia-kuan valley, 6000 ft, v 1913, *Forrest* 10008 (holo. E).

Syn.: *R. pilicalyx* Hutchinson, Notes R.B.G. Edinb. 12:66 (1919). Type: Yunnan, Mengtsz, northern mountains, 8000 ft, *Henry* 10524 (holo. E).

*R. scottianum* Hutchinson, op. cit.: 64. Type: China, Yunnan, head of Hsia-kuan valley, 6000 ft, v 1913, *Forrest* 10008 (holo. E).

*R. supranubium* Hutchinson, op. cit.: 68. Type: China, Yunnan, E flank of the Tali range, 11–12000 ft, vi 1910, *Forrest* 6764 (holo. E).

Very similar to *R. roseatum* differing only in the narrower leaves with laxer scales on the lower surface.

NE BURMA, CHINA (N, W, C & S Yunnan). Forest margins, scrub, slopes and cliffs, 1800–4000 m. Map 16, p. 52.

A very variable species in terms of scale density, corolla size and indumentum. None of this variation is correlated, however, even though individual specimens can appear very divergent. The original description of *R. pachypodum*, stating that the flowers are yellow, seems to be mistaken: the type specimen has no flowers, and other very similar specimens collected by Forrest in the same area are annotated 'flowers white with yellow blotch'. The only specimen actually annotated 'flowers yellow' has no flowers.

**29. (32.) R. lyi** Léveillé, Feddes Rep. 13:147 (1914). Type: China, Kweichow, Gan tchouen, iv 1912, *Cavalerie* 3883 (holo. E). Fig. 31, p. 19.

Syn.: *R. leptocladon* Dop in Lecomte, Fl. Gen. Indo-chine 3:745 (1930). Type: Tonkin, prov. Lao-kay, massif de Lo-sui-tong, 2200 m, *Poilane* 12680 (holo. P).

*R. saravanense* Dop, loc. cit. Type: Laos, prov. Saravane, sommet de Pou Set, 1400 m, *Poilane* 16165 (holo. P).

Ic.: Notes R.B.G. Edinb. 12:56 (1919); Bot. Mag. 150: t. 9051 (1924).

Shrub to 2 m. Young shoots loriform-setose, the setae persistent for at least one year. Leaves narrowly obovate, 70–80 × 25–30 mm, tapering to the base, bluntly acute at the apex, lower surface brown with dense but not contiguous scales. Inflorescence (2–)3–4-flowered. Calyx obscurely lobed or undulate, persistently loriform-setose. Corolla white, funnel-campanulate, c. 55 mm, tube c. 30 mm, pilose at the base, the whole surface sparingly lepidote. Capsule ± cylindric, tapering, lepidote, c. 25 mm.

CHINA (Guizhou), VIETNAM, LAOS. Forest, altitude unknown. Map 19, p. 56.

Possibly also occurring in Thailand and elsewhere.

**30. (33.) R. yungchangense** Cullen, Notes R.B.G. Edinb. 36:123 (1978). Type: China, Yunnan, ranges N of Yungchang fu, 7–8000 ft, *Forrest* 25446 (holo. E).

Free-growing shrub, to 1·3 m. Young growth loriform-setose, the setae variably persistent. Leaves narrowly elliptic to narrowly obovate, tapered to

the base and to the rather obtuse apex, 70–100 × 28–38 mm, upper surface dark brownish green, glabrous, elepidote, margin loriform-ciliate when young, glabrous later, lower surface light greyish green, papillose, with a lax covering of unequal, golden scales; petioles lepidote and loriform-setose. Inflorescence (1–)2–4-flowered, pedicels sparsely lepidote. Calyx conspicuous, 5-lobed, the lobes oblong, c. 7 mm, conspicuously and evenly loriform-ciliate, the surface sparsely lepidote. Corolla 60 mm, tube 32 mm, white faintly flushed pink, funnel-campanulate, glabrous and elepidote outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote, tapering into the style which is elepidote except for a few scattered scales near the base. Capsule oblong-cylindric, lepidote, 12–16 mm.
CHINA. (W Yunnan). Cliffs, 2100–2450 m. Map 17, p. 52.

Known only from the type and its re-collection in fruit (*Forrest* 25772). Very distinctly and easily recognised by the elepidote style and glabrous and elepidote corolla. Material under cultivation as *Forrest* 25446 is *R. chrysodoron* (see p. 135), and has no connection with *R. yungchangense*.

**31. (34.) R. fleuryi** Dop in Rev. Bot. Appl. Agric. Trop. 9:255 (1929). Type: Laos, prov. Darlac, massif du Langbian, au sommet du piton du Langbian, 2000–2500 m, *Chevalier* 30896 (holo. P).
Ic.: Lecomte, Fl. Gen. Indochine 3:727, 731 (1930).

Shrub, 3–5 m. Leaves oblong-lanceolate, tapering to base and apex, 50–80 × 20–40 mm, margins somewhat loriform-ciliate, dark green above, brownish beneath with dense almost contiguous scales; petioles loriform-ciliate. Inflorescence 5–6-flowered, pedicels sparingly lepidote, markedly recurved in fruit. Calyx disc-like, glabrous. Corolla white with 5 yellow lines on the tube, c. 40 mm, glabrous. Stamens 10, filaments pubescent towards the base. Ovary lepidote, tapering into the style which is sparsely lepidote near the base.
LAOS. Hillsides, 2000–2500 m.

**32. (35.) R. horlickianum** Davidian, Rhododendrons (R.H.S.), 53 (1972). Type: N Burma, Adung valley, 16 iv 1931, *Kingdon Ward* 9403 (holo. A). Fig. 1a, p. 15.

Epiphytic or free-growing shrub up to 3 m. Young growth loriform-setose. Leaves narrowly elliptic, tapered to the base and the long-acuminate apex, 85–100 × 28–31 mm, upper surface brownish green, margins variably loriform-ciliate, lower surface brownish with rather lax, dark scales. Inflorescence 2–3-flowered, pedicels lepidote. Calyx disc-like or obscurely undulately lobed, fringed with rather sparse loriform setae and also with filiform-acicular hairs, surface lepidote. Corolla white, flushed pink, with a yellow blotch inside, funnel-campanulate, 60–70 mm, tube 35–36 mm, pubescent all over the tube and bases and middles of the lobes outside, sparsely lepidote on the tube, more densely so on the lobes. Stamens 10, filaments pubescent towards the base. Ovary densely lepidote, tapering into the lepidote style. Capsule lepidote, oblong, 20–25 mm.
N BURMA (Adung valley). Rocks, or epiphytic on trees, 1200–2150 m. Map 17, p. 52.

A recently described but rather distinct species, known only from the Adung valley, easily recognised by its very acuminate leaves, pubescent corolla and the occurrence of filiform-acicular hairs on the margins of the calyx lobes.

**33. (36.) R. carneum** Hutchinson, Bot. Mag. 141: t. 8634 (1915). Type: described from a plant cultivated at Kew, said to originate in the northern Shan States of Burma (holo. K).

Free-growing shrub up to 1 m. Young growth not loriform-setose. Leaves narrowly elliptic, rarely obovate, tapered to the base and the acute apex, 50–110 × 30–40 mm, dark green and persistently lepidote above, brownish or greyish beneath with scales about their own diameter apart. Inflorescence 2–4-flowered; pedicels lepidote. Calyx unequally 5-lobed, lepidote, the margins loriform-ciliate. Corolla pink all over (sometimes very faintly so), funnel-shaped, 40–50 mm, the tube c. 30 mm, pubescent at the base and moderately lepidote all over the surface outside. Stamens 10, filaments pubescent towards the base. Ovary densely lepidote, tapering into the lepidote style. Capsule lepidote, oblong, up to 20 mm.

KNOWN ONLY IN CULTIVATION.

From the available material, which is all cultivated, *R. carneum* appears to be reasonably distinct. However, its status must remain doubtful until wild material is collected.

**34. (37.) R. veitchianum** Hooker, Bot. Mag. 83: t. 4992 (1857). Type: a cultivated plant originating from Burma (holo. K).

Syn.: *R. formosum* Wallich var. *veitchianum* (Hooker) Kurz, Journ. As. Soc. Bengal 46(2):276 (1887).

*R. cubitii* Hutchinson, Notes R.B.G. Edinb. 12:78 (1919). Type: N Burma, Bhamo Division, Maru-kahtung (Surdum), 5500 ft, iii 1910, *Cubitt* 385 (holo. E), non hort.

*R. smilesii* Hutchinson, op. cit.: 71. Type: N Siam, Pu Sai Leng, 1 iv 1893, *Smiles* (holo. K).

Ic.: Fl. des Serres, ser. 2, 4: t. 1416 (1861); The Garden 18:280 (1880).

Epiphytic or free-growing shrub up to 2 m. Young growth sparsely loriform-setose, the setae usually quickly deciduous. Leaves obovate or narrowly elliptic, gradually tapered to the base, the apex shortly acuminate, 65–100 × 28–40 mm, upper surface dark green, lower surface paler with distant, unequal, golden scales; petiole lepidote. Inflorescence (1–)2–5-flowered, pedicels short, lepidote. Calyx disc-like, scarcely lobed, lepidote, loriform-ciliate. Corolla white, often with a yellow blotch at the base, openly funnel-campanulate, 50–60(–65) mm, tube 26–34(–40) mm, sparsely pubescent at the base, lepidote along the adaxial part only; lobes with crisped margins. Stamens 10 (not 12–14 as described by Hooker), pubescent towards the base. Ovary lepidote, tapering into the style which is lepidote well above the base. Capsule up to 30 mm, lepidote.

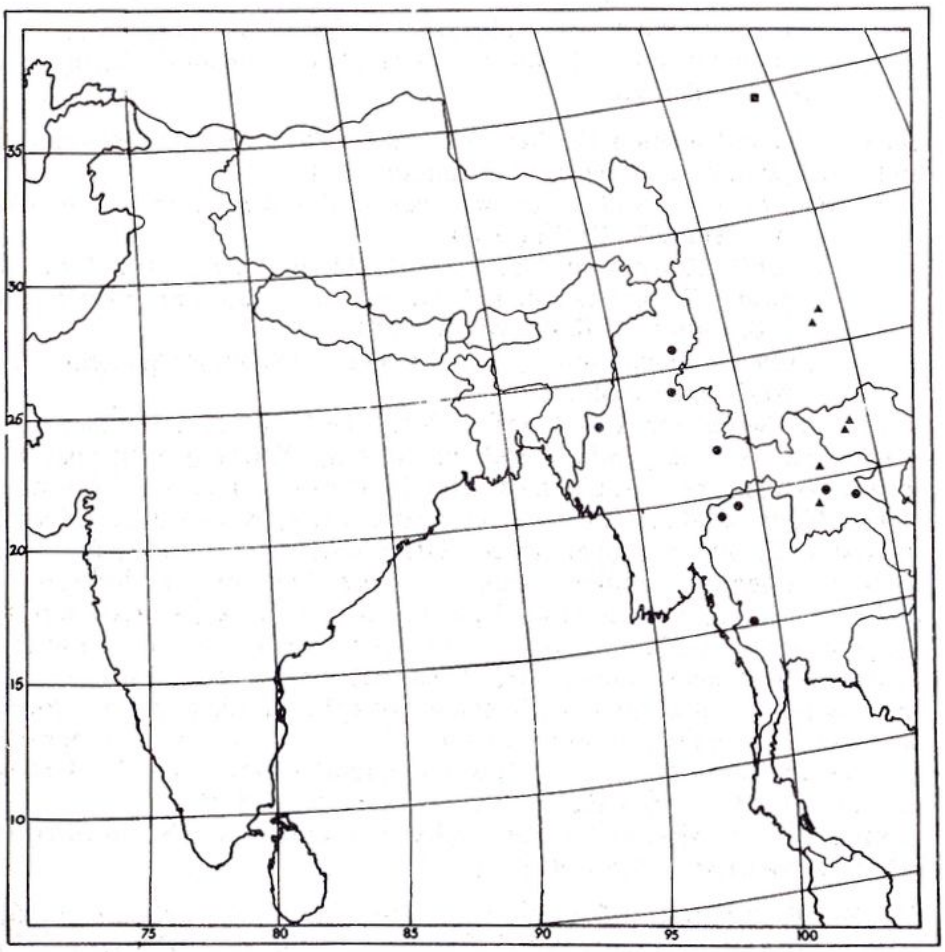
BURMA, LAOS, THAILAND. Usually epiphytic in forests, but also on cliffs or ridges, 1200–2400 m. Map 19, p. 56.

**35. (38.) R. surasianum** Balfour f. & Craib, Notes R.B.G. Edinb. 10:160 (1917). Type: Siam, Chiengmai, Doi Sutep, 1560 m, 7 vi 1914, *Kerr* 3238 (holo. E).

Usually a free-growing shrub to 4 m. Young growth not loriform-setose. Leaves narrowly elliptic, tapered to the base and the somewhat acuminate apex, 80–120 × 30–50 mm, upper surface brownish green, margins often persistently lorifom-ciliate, lower surface brown, with a dense covering of dark, unequal, overlapping flaky scales; petiole glabrous or sometimes loriform-setose. Inflorescence 3–4-flowered, pedicels densely lepidote. Calyx short, disc-like, scarcely lobed, the margins loriform-ciliate. Corolla pale pink (always?), openly funnel-campanulate, (43–)56–65 mm, tube (25–)33–42 mm, pubescent at the base, sparsely lepidote over the whole surface. Stamens 10, filaments pubescent towards the base. Ovary lepidote, tapered into the style which is lepidote to well above the base. Capsule unknown.

THAILAND (Chiengmai province). Jungle, c. 1560 m.

A specimen from the S Shan states of Burma (*McGregor* 534) appears to be the same as the Siamese material except in its very broad leaves and shorter corolla.




MAP 19. ● *R. veitchianum*; ■ *R. invictum*; ▲ *R. lyi*.

**36. (39.) R. ludwigianum** Hosseus, Beih. Bot. Centr. 28(2):122 (1911). Type: Siam, Dai Djieng Dao, Kalkgipfel III, 6600 ft, 17 ii 1905, *Hosseus* 401 (holo. B—n.v., iso. K).
Ic.: Bot. Mag., n.s. 182: t. 748 (1978).

Free-growing shrub to 1·5 m. Young branches not loriform-setose. Leaves obovate, rounded at the apex, tapered to the base, 30–70 × 15–35 mm, upper surface brownish green, lower surface lepidote with rather dense, but not overlapping, brownish scales; petiole sometimes loriform-ciliate. Inflorescence 2–3-flowered, pedicel lepidote and minutely puberulous. Calyx very small, disc-like, obscurely lobed, margins loriform-ciliate. Corolla funnel-campanulate, white and pink, c. 65 mm, tube c. 33 mm, sparsely pubescent over most of the surface, the lobes lepidote. Stamens 10, filaments pubescent towards the base. Ovary lepidote, tapered into the style which is lepidote and minutely pubescent in the lower third. Capsule unknown.
THAILAND (Dayap province). Ridges, 1600–2180 m.

*Species uncertainly known*

**R. parryae** Hutchinson, Gard. Chron. 93:386 (1933). Type: described from a plant cultivated at Kew, said to have originated from Assam, Lushai Hills, c. 1800 m, *Parry* 146. The material is in fruit, and is probably *R. johnstoneanum,* though it is impossible to be sure.

**R. coxianum** Davidian, Rhododendrons (R.H.S.), 51 (1972). Type: Assam, camp 1, boggy area over first low ridge SE of Apa Tani valley, Subansiri Div. of N.E.F.A., 5400 ft, 22 iv 1965, *Cox & Hutchison* 475B (holo. E). This plant was collected out of flower in the wild; material brought back and cultivated flowered in 1971 and the species was than described. Unfortunately, there are some discrepancies between the leaves of the wild and the cultivated plants. Those on the wild specimens are markedly loriform-ciliate, and with loriform setae on the upper surface when young; the setae and cilia persist in a patchy manner in the older leaves. In the cultivated plants the leaves are not at all loriform-ciliate or -setose, though in shape and type of scales, they match the wild plant. It seems most likely that this is a variant of *R. formosum* from N and E of the Khasia hills; further material is necessary to settle the point.

III. Subsection **Moupinensia** Sleumer, Bot. Jahrb. 74:534 (1949).
Syn.: Series *Moupinense* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron, 502 (1930).

Shrubs to 1 m, often epiphytic. Young shoots lepidote and loriform-setose. Leaves evergreen, lepidote above when young, the scales variously deciduous, ciliate with loriform setae, densely lepidote beneath. Inflorescence terminal, 1–2-flowered. Calyx conspicuous, 5-lobed. Corolla

white, pinkish or red, openly funnel-campanulate. Stamens 10, declinate, filaments pubescent towards the base. Ovary 5-locular, lepidote, tapering into the declinate style which is pubescent or glabrous at the base. Capsule broadly cylindric, tapering to the apex. Seeds winged and finned.
Type species: *R. moupinense* Franchet

A small subsection, closely related to, and scarcely distinguishable from subsection Maddenia, differing mainly in flower size and to a lesser extent, shape. All three species have the ovary tapering into the style.

1. Style exceeding stamens; corolla 30–40 mm; leaves 31–40 × 16–22 mm . . . . . **1. moupinense**
\+ Style shorter than to as long as stamens; corolla 20–25 mm; leaves 13–17 × 6–10 mm . . . . . 2
2. Corolla rosy pink . . . . . **2. dendrocharis**
\+ Corolla white . . . . . **3. petrocharis**

**1. (40.) R. moupinense** Franchet, Bull. Soc. Bot. Fr. 33:233 (1886). Type: China, Thibet or., circa Moupine, alt. 4000 m, *David* (holo. P—n.v., iso. E). Fig. 3m, p. 19.
Ic.: Schneider, Ill. Handb. Laubh. 2:482 (1909); The Garden 78:96 (1914); Rev. Hort. 1914:155; Bot. Mag. 141: t. 8598 (1915); Cox, Dwarf Rhododendrons pl. IV (1973); Ic. Corm. Sin. 3: t. 4044 (1974).

Shrub of 1–1·3 m, often epiphytic. Young growth loriform-setose, the setae variably deciduous. Leaves narrowly ovate to elliptic or obovate, 31–40 × 16–22 mm, rounded to cordate at the base, obtuse at the apex, pale green and elepidote above and with a few filiform-acicular hairs along the midrib, margins loriform-ciliate with variably persistent cilia, lower surface pale green or brownish with rather dense scales; petioles loriform-setose. Inflorescence 1–2-flowered, pedicels lepidote and filiform-acicular-pubescent. Calyx 5-lobed, the lobes rounded, c. 2 mm, lepidote and filiform-acicular-pubescent. Corolla openly funnel-campanulate, white, often flushed pink, usually with dark red spots on the inside of the upper part of the tube, glabrous and elepidote outside, rather densely pubescent within the tube, 30–34 mm, tube 16–18 mm. Stamens very unequal. Style exceeding stamens, glabrous or slightly pubescent towards the base. Capsule large, cylindric, tapering, 20–22 mm, densely lepidote.
CHINA (C Sichuan). On rocks and tree trunks, or epiphytic, 2000–4000 m. Map 18, p. 52.

**2. (41.) R. dendrocharis** Franchet, Bull. Soc. Bot. Fr. 33:233 (1886). Type: China, Mupin, ad truncos putridos, in sylvis regionis altissimae, v 1869, *David* (holo. P—n.v., iso. E).
Ic.: Schneider, Ill. Handb. Laubh. 478, 482 (1909); Fang, Ic. Pl. Omeiensium 1: t. 33 (1942); Ic. Corm. Sin. 3: t. 4043 (1974)

Very similar to *R. moupinense*, differing as follows: shrub to 0·7 m; leaves 13–17 × 6–10 mm; calyx lobes up to 3 mm, ± elepidote; corolla rose pink, 20–22 mm, tube 10–13 mm; style shorter than stamens. Capsule unknown.
CHINA (C Sichuan). On old logs, 2600–3000 m. Map 18, p. 52.

**3. (42.) R. petrocharis** Diels, Feddes Rep. 17:196 (1921). Type: China, Sze'tschwan, Wen tschuan hsien, in valle Scha pe infra Tschin wei, in rupibus, 1800 m, 26 iv 1914, *Limpricht* (fragment E).
Very similar to *R. dendrocharis* but the shoots more persistently loriform-setose, and the corolla white, less densely hairy within.
CHINA. (C Sichuan). Rocks and slopes, 1800–2300 m. Map 18, p. 52.

These three species are all very similar, and are all found in one relatively small area. It is likely that population studies would suggest a rather different treatment, probably recognising only one species. One specimen (*Wang* 22890) from Ma-pien-hsien, appears intermediate between *moupinense* and either *dendrocharis* or *petrocharis*, having vegetative features of the latter two and at least one large flower (c. 30 mm) with an elongated, exserted style and very unequal stamens; an undissected flower on the sheet is considerably smaller (22 mm), and the style is not clearly exserted. It is impossible to tell the colour of the flowers in this specimen. A further specimen from Guizhou, Fan ching shan, Lao shan near Ching huang tung, 2200 m, 1931, *Steward, Chiao & Cheo* 492, is very similar to *R. moupinense*, but has a less open flower and the style is lepidote for some distance above the base: this may be another related species, geographically separated from the rest of the subsection, but the one specimen available is poor and not fit for description.

IV. Subsection **Monantha** Cullen, Notes R.B.G. Edinb. 36:122 (1978).
Epiphytic or free-growing shrubs. Leaves evergreen. Scales large, flat, often unequal, broadly rimmed. Inflorescence terminal, 1–3-flowered. Calyx obscure or 5-lobed. Corolla lepidote, yellow often drying greenish, or purple, ± tubular-funnel-shaped to tubular-campanulate with scarcely spreading lobes. Stamens 10, filaments pubescent below. Stamens and style exserted beyond the corolla lobes. Ovary 5-locular. Style impressed. Capsule lepidote. Seeds winged and finned.
Type species: *R. monanthum* Balfour f. & W. W. Smith

This is a small group of species, of which one is quite widespread and common, while the other three are rare, narrowly localised and known from very few specimens. The group as a whole is related to subsections Maddenia and Boothia, with both of which it shares the frequently epiphytic habit. The species have formerly been placed in various groups (*monanthum* in the Boothii series, later in the Uniflorum series, *kasoense, flavantherum* and *concinnoides* in the Triflorum series), but there is no doubt that they are closely related to each other, and form a distinct subsection of their own, characterised by the curiously shaped corolla with exserted stamens and style, and the winged and finned seeds.

| | | |
|---|---|---|
| 1. | Inflorescence 1(–2)-flowered | 2 |
| + | Inflorescence 3-flowered | **3. kasoense** |
| 2. | Corolla purple | **4. concinnoides** |
| + | Corolla yellow | 3 |
| 3. | Calyx a minute, undulate rim | **1. monanthum** |
| + | Calyx 5-lobed, the lobes c. 2·5 mm | **2. flavantherum** |

**1. (43.) R. monanthum** Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:250 (1916). Type: China, Yunnan, Lupo pass, Mekong/Salween Divide, 10–11000 ft, xi 1905, *Forrest* 951 (holo. E). Fig. 3n, p. 19.

Syn.: *R. sulfureum* sensu Diels, Notes R.B.G. Edinb. 7:66 (1912) non Franchet.

Ic.: Ic. Corm. Sin. 3: t. 4015 (1974).

Small shrub, 0·3–1 m, usually epiphytic. Young growth densely lepidote. Leaves ovate-elliptic or elliptic, 30–45 × 14–22 mm, cuneate at the base, acute at the apex, slightly revolute, upper surface dark geen, usually persistently lepidote with dried-out scales, lower surface finely papillose, brownish or silvery, densely covered with close, unequal, broadly rimmed, flat scales. Inflorescence 1(–2)-flowered, pedicels 2–5 mm, densely lepidote. Calyx a minute, undulately lobed rim, very densely lepidote. Corolla tubular-funnel-shaped to tubular-campanulate, the lobes scarcely spreading, 14–20 mm, tube 10–14 mm, bright yellow, drying greenish, lepidote outside. Style impressed, glabrous, elepidote, exceeding the stamens. Capsule lepidote, ± cylindric, 14–16 mm.

NE BURMA, CHINA (NW Yunnan, SE Xizang). Epiphytic on trees at forest margins, or on open slopes at the edges of thickets, 2450–3650 m. Map 20, p. 64.

**2. (44.) R. flavantherum** Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16:181 (1931). Type: China, Tibet, Tsangpo gorge near Churung confluence, 8–9000 ft, 25 ii 1924, *Kingdon Ward* 6313 (iso. E).

Very similar to *R. monanthum*, differing as follows: leaves less clearly papillose beneath, the scales more distant, pale; calyx 5-lobed, the lobes broadly triangular, ± obtuse, c. 2·5 mm.

CHINA. (SE Xizang), North-facing cliffs, 2450–2750 m. Map 20, p. 64.

Known only from the type collection; doubtfully distinct from *R. monanthum*.

**3. (45.) R. kasoense** Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16:181 (1931). Type: Assam, Delei valley, Kaso peak, 7000–8000 ft, *Kingdon Ward* 8522 (iso. E).

Very similar to *R. monanthum*, differing as follows: leaves less clearly papillose beneath, the scales more distant, pale; inflorescences 3-flowered; capsule perhaps more slender.

INDIA (Arunachal Pradesh), CHINA (SE Xizang). Forests, 2450–2750 m. Map 20, p. 64.

Known only from a few collections, and scarcely different from *R. monanthum* except in the characters noted above, of which the inflorescence is the most important.

**4. (46.) R. concinnoides** Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16:180 (1931). Type: Assam, Delei valley, 8000–11000 ft, *Kingdon Ward* 8578 (iso. E).

Very similar to *R. monanthum*, differing essentially only in its purple corolla.

INDIA (Arunachal Pradesh). Map 20, p. 64.

Known only from the type collection, this species is a purple-flowered equivalent of *R. monanthum*. Its distinctness is dubious (purple/yellow corolla colour variation is known in other species, e.g. *R. lepidotum,* see p. 149) and further material is necessary before its status can be settled.

V. Subsection **Triflora** (Hutchinson) Sleumer, Bot. Jahrb. 74:536 (1949).

Syn.: Series *Triflorum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron, 758 (1930) pro parte; sensu Davidian, R.H.S. Rhodo. Yearbook 17:156 (1963) pro parte.

Shrubs, often large, 0·3–10 m or more. Young growth lepidote, sometimes loriform-setose. Leaves evergreen or variably deciduous, frequently long and narrow, laxly to densely lepidote beneath; scales varying in size and development of rim. Inflorescences terminal and axillary from the axils of the uppermost few leaves on the shoot, each 1–3-flowered, usually well distinguished, occasionally coalescing into a many-flowered, compound inflorescence. Calyx usually minute. Corolla very zygomorphic, the lobes as long as, or longer than the tube, widely spreading, very openly funnel-shaped, glabrous, lepidote or pilose outside, usually pubescent within the tube. Stamens 10, exserted, declinate, filaments variably pubescent in the lower part. Ovary lepidote, sometimes pubescent at the apex also, style impressed, exceeding stamens, declinate, usually glabrous. Capsule lepidote, usually narrowly cylindric. Seeds unwinged and with very small, obscure fins.

Type species: *R. triflorum* Hooker.

A large and variable subsection, taxonomically very troublesome. Davidian (*op. cit.*) divides it into four subseries: Augustinii, Yunnanense, Triflorum and Hanceanum; of these, the last is so distinct that its two species have been removed in this account, *R. hanceanum* to subsection Tephropepla (p. 126) and *R. afghanicum* to subsection Afghanica (p. 156) After removal of a few more species (*R. flavantherum, kasoense* and *concinnoides* to subsection Monantha, *R. longistylum* to subsection Tephropepla (p. 126), and *R. bivelatum* to the status of an imperfectly known taxon—see p. 170), what remains forms a very homogeneous group.

Distinctions between the species are often very tenuous, and the identification of many specimens, particularly in cultivation, is extremely difficult. Six species are particularly intricately related, and are treated below as the *R. yunnanense* aggregate. These might well be regarded as subspecies of the one species, as they show reticulate variation and, to some extent, geographical replacement. However, they are very widely spread in

cultivation, and I have refrained from making the necessary combinations. Field observations, however, may well force the issue.

Subsection Triflora is related to subsection Maddenia through *R. zaleucum*. It is also closely related to subsection Scabrifolia and subsection Heliolepida, and more distantly, perhaps, to subsection Lapponica (through the rather doubtfully placed *R. gemmiferum*).

1. Corolla basically yellow in colour, sometimes suffused with red, reddish brown or green . . . . . 2
\+ Corolla basically white, pink, lilac, purple or almost blue, without any yellow, except rarely in the form of yellow spots on a white or pink ground . . . . . 5

2. Scales small, almost rimless, less than 0·1 mm in diameter; mature bark smooth, reddish brown, peeling . . **15. triflorum**
\+ Scales larger, prominently rimmed, c. 0·2 mm in diameter; mature bark not as above, usually grey-brown and ridged, not peeling . . . . . 3

3. Corolla densely pubescent outside with retrorse hairs; inflorescences mostly lateral; leaves with conspicuous, acuminate drip-tip . . . . . **18. lutescens**
\+ Corolla glabrous or minutely puberulent with short straight hairs outside; most inflorescences terminal; leaves without drip-tip . . . . . 4

4. Leaf undersurface with close to contiguous scales; upper surface pubescent for only a short distance along the midrib . . **16. ambiguum**
\+ Leaf undersurface with distant scales, more than their own diameter apart; upper surface puberulent along the midrib and the lamina on either side of it for most of the length of the leaf . **17. keiskei**

5. Midrib pilose beneath with long, straight or somewhat twisted, loriform setae . . . . . 6
\+ Midrib glabrous beneath or minutely puberulent with filiform-acicular hairs . . . . . 7

6. Corolla, calyx, pedicels, petioles and leaf midrib beneath, and, often also the leaf upper surface with a dense indumentum of somewhat twisted loriform hairs . . . . **10. trichanthum**
\+ Loriform hairs absent from corolla, pedicels and leaf upper surface; midrib with ± straight, narrow setae beneath . . **9. augustinii**

7. Leaves very white papillose beneath with large, flat, ± rimless scales; corolla tube puberulent outside at base . **1. zaleucum**
\+ Leaves not obviously white-papillose beneath; scales various but not as above; corolla tube glabrous at base . . . . 8

8. Scales ± rimless, vesicular, small, reddish, purplish or almost grey; young leaves, pedicels and calyx pruinose . **8. oreotrephes**
\+ Scales flat, rimmed, brown, yellow or golden; pedicels and calyx rarely pruinose . . . . . 9

9. Corolla purple, tube lepidote outside . . . . . 10
\+ Corolla white, pink or lavender, the tube elepidote outside . 12

10. Scales on leaf undersurface dense, overlapping, flaky; leaves 3 or more × longer than broad . . . . . **14. polylepis**
\+ Scales on leaf undersurface dense but not overlapping, rarely even contiguous, not flaky; leaves 2–3 × longer than broad . 11

11. Petioles loriform-setose . . . . . **12. amesiae**
\+ Petioles glabrous . . . . . **11. concinnum**

12. Corolla at most 13 mm . . . . . **19. gemmiferum**
\+ Corolla more than 15 mm . . . . . 13

13. Scales contiguous, trimorphic in three size classes; leaves silvery grey beneath . . . . . **13. searsiae**
\+ Scales close to distant, never contiguous, not distinguishable into three size classes; leaves brown or green beneath . . 14

14. Scales 1–2 × their own diameter apart . . . . . 15
\+ Scales 3–8 × their own diameter apart . . . . . 17

15. Scales very broadly rimmed, the central part forming up to ½ the scale diameter; inflorescences coalescing, the outer pedicels recurving, particularly in fruit . . . . **4. siderophyllum**
\+ Scales narrowly rimmed, the central part forming more than ½ the scale diameter; inflorescences distinct, pedicels not recurving 16

16. Leaves 2 or more × longer than broad; corolla (18–)20–26 mm; young growth brownish or green . . . **3. davidsonianum**
\+ Leaves up to 2 × longer than broad; corolla 16–19(–20) mm; young growth usually reddish crimson . . . **2. tatsienense**

17. Loriform setae present on the leaves (margins and upper surface) and petioles (all variably deciduous) . . **5. yunnanense**
\+ Loriform setae absent from leaves . . . . . 18

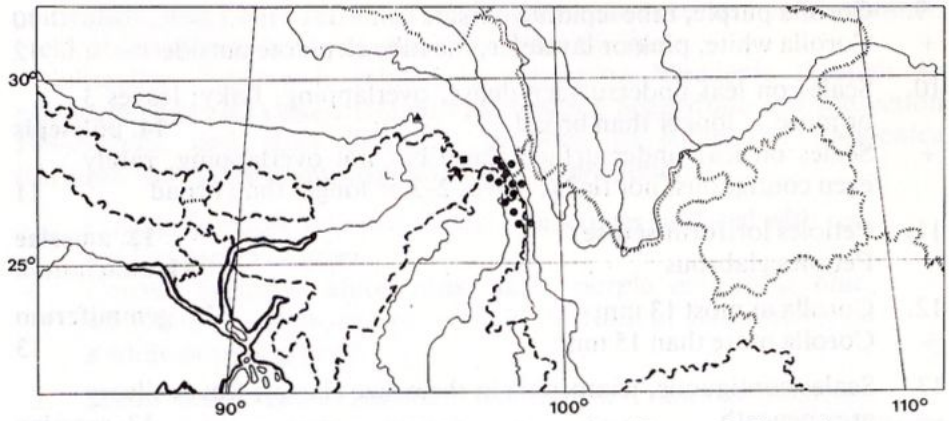
18. Petioles glabrous, usually pruinose-glaucous beneath; scales 5–8 × their own diameter apart . . . . . **7. rigidum**
\+ Petioles puberulent, not pruinose-glaucous; scales 3–5 × their own diameter apart . . . . . **6. pleistanthum**

**1. (47). R. zaleucum** Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 10:163 (1917). Type: China, W Yunnan, western flank of the Shweli/Salween Divide, 10–11000 ft, viii 1912, *Forrest* 8923 (holo. E). Fig. 3o, p. 19.

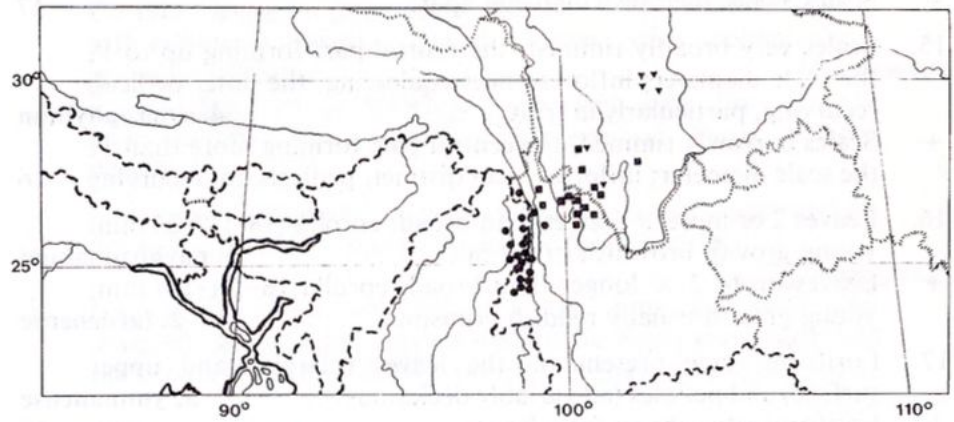
Syn.: *R. erileucum* Balfour f. & Forrest, Notes R.B.G. Edinb. 12:108 (1920). Type: China, W Yunnan, Shweli/Salween Divide, 9–10000 ft, v–vi 1918, *Forrest* 17593 (holo. E).

Ic.: Bot. Mag. 147: t. 8878 (1921); Millais, Rhododendrons, ser. 2, opp. p. 244 (1924); Ic. Corm. Sin. 3: t. 4079 (1974).

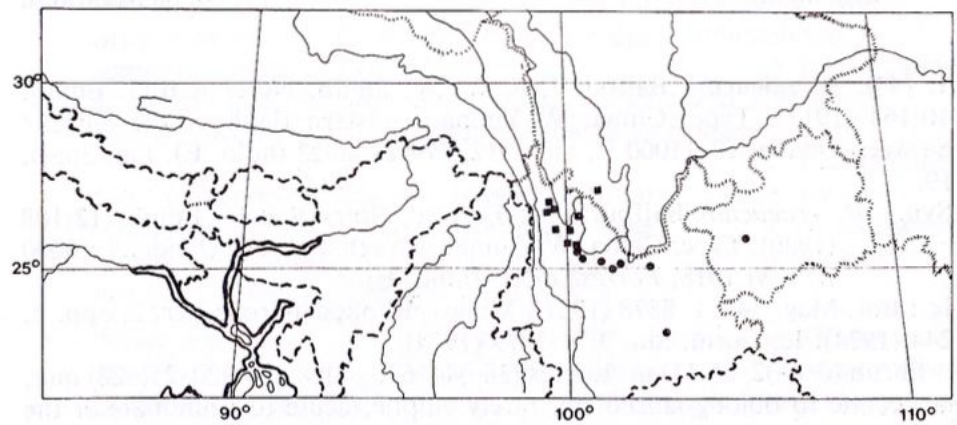
Shrub (0·6–)2–8(–11) m. Leaves (38–)44–62(–88) × (16–)20–25(–28) mm, lanceolate to oblong-lanceolate, rarely elliptic, acute to acuminate at the apex, cuneate-rounded at base, upper surface usually elepidote, midrib




MAP 20. ● *R. monanthum*; ■ *R. kasoense*; ▼ *R. concinnoides*; ▲ *R. flavantherum*.




MAP 21. ● *R. zaleucum*; ■ *R. tatsienense*; ▼ *R. davidsonianum*.




MAP 22. ● *R. siderophyllum*; ■ *R. rigidum*.

usually puberulous; margins with loriform cilia, at least when young; lower surface shining, white-papillose with distant, flat, large, rimless golden scales. Inflorescences 1–4-flowered, pedicels lepidote, (8–)12–15(–19) mm. Calyx very small, scarcely lobed to undulate, often loriform- and/or filiform-acicular-ciliate. Corolla white, white flushed pink or lavender, (27–)30–40(–44) mm, tube (14–)18–23 mm, sparsely lepidote and usually puberulous, at least at the base of the tube outside, pubescent inside. Capsule lepidote, oblong-cylindric, 10 mm or more.
N BURMA, CHINA (NW, W & SW Yunnan). Scrub, thickets and forest margins, 1800–3000(–3500) m. Map 21, p. 64.

A distinct species with a rather southerly and low altitude distribution, in many ways (size of leaves and flowers, corolla indumentum) a link with subsection Maddenia. A few specimens collected at Wei hsi (to the north and east of the main distribution area) appear to be intermediate to *R. oreotrephes* (p. 69) in the possession of opaque scales, smallish flowers and much less conspicuous white leaf undersurface; they may well be natural hybrids.

**2–7. R. yunnanense** aggregate.
Shrubs or small trees up to 10 m. Young growths lepidote, sometimes loriform-setose. Leaves mostly evergreen, more rarely subdeciduous or totally deciduous, very narrowly elliptic or oblong to broadly elliptic, usually ± elepidote above, densely to sparsely lepidote beneath with usually small, rather narrowly rimmed scales; loriform hairs sometimes present on petiole, leaf margin and leaf upper surface; tertiary and quaternary venation usually conspicuous on the lower surface. Inflorescences terminal and axillary, sometimes coalescing into a many-flowered, compound inflorescence, pedicels lepidote. Calyx minute, disc-like or obscurely lobed, often ciliate with filiform-acicular and/or loriform hairs. Corolla white, pink or lavender, ± elepidote along the tube, spotted within with reddish, yellowish or brown spots. Filaments variably pubescent below. Ovary narrowly cylindric, lepidote, sometimes with a few hairs at the apex. Style glabrous, exceeding the stamens. Capsule narrowly cylindric, lepidote.

A complex of six intergrading microspecies, which are often difficult to distinguish; the characteristics on which they are based are susceptible to great variation which is not always clearly correlated, either among the various characters themselves, or with geography. These plants are very common in western Yunnan, and require population study there. The descriptions which follow are abbreviated and diagnostic.

A small number of specimens cannot be identified further than the aggregate (usually because of a total lack of leaves). One specimen, *Cavalerie* 1254 has been cited by Léveillé as the type of three names: *leucandrum, strictum* and *seguinii*; these are treated here as synonyms of other species. The several sheets of this gathering in Edinburgh are all *R. siderophyllum*; which of them is the type of which name is not known.

**2. (48.) R. tatsienense** Franchet, Journ. de Bot. 9:394 (1895). Type: China, Su-tchuen occidental, aux environs de Tatsienlu dans la vallée de Jerikkou, *Soulié* (holo. P—n.v., iso. E). Fig. 4p, p. 21.

Syn.: *R. tapelouense* Léveillé, Bull. Geogr. Bot. 25:20 (1915). Type: China, Yunnan, mt Ta-pe-lou, 3200 m, v 1912, *Maire* (holo. E).
*R. stereophyllum* Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 10:159 (1916). Type: China, Yunnan, mountains in the NE of the Yangtze bend, 10000 ft, *Forrest* 11299 (holo. E).
*R. hypophaeum* Balfour f. & Forrest, Notes R.B.G. Edinb. 12:120 (1920). Type: China, SW Szechuan, mountains around Muli, 11000 ft, *Forrest* 16249 (holo. E).
*R. leilungense* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:273 (1922). Type: China, Yunnan, Lei-lung shan, 9000 ft, *Forrest* 15208 (holo. E).
*R. heishuense* Fang, Acta Phytotax. Sinica 2:83 (1933). Type: China, Szechuan, Hei-shou-ho, Mao-hsien, 2900 m, 22 vi–3 vii 1931, *Lee* 2253 & 2323 (holo. CHENGDU—n.v.).

Shrub, 0·3–5 m. Young growth usually deep reddish crimson. Leaves up to 2 × longer than broad, 22–42(–52) × 12–23(–27) mm, broadly to narrowly elliptic, base rounded to subcordate, rarely somewhat cuneate, usually lepidote above with dried-out scales, the undersurface with a dense covering of small, slightly unequal, brown, narrowly rimmed (dark centre making up more than ½ of the scale diameter) scales 1–2 × their own diameter apart; petiole and upper surface of midrib somewhat puberulent. Inflorescence few-flowered; pedicels straight, lepidote, 5–10(–11) mm, rarely slightly puberulent. Calyx disc-like or undulate, often ciliate with filiform-acicular or more rarely loriform hairs. Corolla (16–)17–21 mm, rose, whitish rose-pink or lavender, usually completely elepidote outside. Capsule (7–)8–12 mm.
CHINA (N & NW Yunnan, SW Sichuan). Scrub and thickets and on forest margins, rarely in moist meadows or on stream sides, 2100–4250 m. Map 21, p. 64.

A rather variable species, vicariating with (to the south of) *R. davidsonianum*. A few specimens are somewhat intermediate between the two, in particular those hitherto referred to *R. hypophaeum*, which agrees with *tatsienense* in the shortly pedicelled, small flowers and with *davidsonianum* in the narrower leaves.

**3. (49.) R. davidsonianum** Rehder & Wilson, Pl. Wils. 1:515 (1913). Type: China, W Szechuan, southeast of Tachienlu, 2000–2500 m, v & x 1908, *Wilson* 1275 (iso. E). Fig. 4q, p. 21.
Syn.: *R. charianthum* Hutchinson, Bot. Mag. 142: t. 8665 (1916). Type: a cultivated specimen (holo. K).
Ic.: Rev. Hort. 1914, opp. p. 324; Bot. Mag. 141: t. 8605 (1915) & 144: t. 8759 (1918); Ic. Corm. Sin. 3: t. 4090, 4093 (1974).

Shrub, 0·6–5 m. Young growth greenish or brownish. Leaves 3 or more × longer than broad, (27–)30–62 × 11–20 mm, acute at the apex, cuneate at the base, often ± V-shaped in section, lower surface densely lepidote with small brown scales with narrow rims, the darker centre making up more than ½ the diameter of the scale, 1–2 × their own diameter apart. Inflorescence open, few-flowered, pedicels lepidote, (8–)11–15 mm. Calyx

disc-like or undulate, sometimes ciliate. Corolla (21–)23–27 mm, pink, pinkish lavender or lavender, ± elepidote outside. Capsule 11–13 mm.
CHINA (SW & C Sichuan). In thickets and on forest margins, 2000–3300 m. Map 21, p. 64.

**4. (50.) R. siderophyllum** Franchet, Journ. de Bot. 12:262 (1898). Type: (Syntypes) China, Yunnan, Yunnansen, *Delavay* (holo. P—n.v.); Mitsao et montagnes de Yunnansen, *Ducloux* 122 & 123 (holo. P—n.v., iso. E); Tsekou, *Soulié* 1013 (holo. P—n.v.). Fig. 4r, p. 21.

Syn.: *R. rubro-punctatum* Léveillé & Vant., Feddes Rep. 9:448 (1911). Type: China, Kouy tcheou, Pin-fa, 1908, *Cavalerie* (holo. E).

*R. leucandrum* Léveillé, ibid. 12:103 (1913). Type: China, Kouy tcheou, Kiao-tche che, 1902, *Cavalerie* 1254 at least in part (E—see p. 65).

*R. jahandiezii* Léveillé, ibid. 13:340 (1914). Type: China, Yunnan, flancs du Io chan, 3200 m, v 1913, *Maire* (holo. E).

*R. ioanthum* Balfour f., Notes R.B.G. Edinb. 13:270 (1922). Type: China, Yunnan, *Maire* (holo. E).

*R. obscurum* [Franchet ex] Balfour f., op. cit.: 278. Type: China, Yunnan, prope Yunnansen, 4 iii 1891, *Delavay* (holo. P, iso. E).

Ic.: Ic. Corm. Sin. 3: t. 4091 (1974).

Shrub, 1–7 m. Young growth brownish. Leaves broadly elliptic to elliptic, rarely obovate or ovate, 48–84 × (16–)24–32 mm, apex acute, base cuneate (rarely with rounded apex and base on fast-growing extension shoots), ± elepidote above, with a dense covering beneath of large, flat, broadly rimmed scales (the darker centre making up less than ½ the diameter of the scale), 1–2 × their own diameter apart. Inflorescences very dense and crowded, coalescing into a many-flowered compound inflorescence, pedicels lepidote, 5–11 mm, the outer ones recurved, particularly in fruit. Corolla white or pinkish violet, 18–22(–25) mm, elepidote outside. Capsule 11–14 mm.
CHINA (C & S Yunnan, Guizhou). Open ridges and dry, wooded hills, 840–2100(–2600) m. Map 22, p. 64.

Very similar to *R. tatsienense* but occurring well to the south and at lower altitudes; differing mainly in the size of the leaves and the nature of the scales as well as the compound inflorescence, which is usually clearly developed. A few specimens (*Forrest* 20490, 20468 and *Ten* 444) are intermediate between the two species.

**5. (51) R. yunnanense** Franchet, Bull. Soc. Bot. Fr. 33:232 (1886). Type: China, Yunnan, les bois au dessus de Mow kou Tchang, au dessus de Ta pin tze, a 2000 m, 23 iv 1886, *Delavay* (holo. P—n.v., iso. E). Fig. 4s, t, p. 21.

Syn.: *R. chartophyllum* Franchet, Journ. de Bot. 9:398 (1895). Type: China, Yunnan, sur le mont Hee-chan-men, *Delavay* 4393 (holo. P—n.v., iso. E).

*R. chartophyllum* forma *praecox* Diels, Notes R.B.G. Edinb. 5:217 (1912). Type: China, Yunnan, ascent of Sung kwei pass from Lankong valley, 9000 ft, iv 1906, *Forrest* 2030 (holo. E).

*R. hormophorum* Balfour f. & Forrest, Notes R.B.G. Edinb. 12:117 (1920). Type: China, SW Szechuan, Muli mountains, valley of the Litang, 11000 ft, *Forrest* 16265 (holo. E).

*R. aechmophyllum* Balfour f. & Forrest, ibid. 13:226 (1926). Type: China, SW Szechuan, Muli mountains, 11–12000 ft, viii 1918, *Forrest* 16790 (holo. E).

*R. suberosum* Balfour f. & Forrest, op. cit. 301. Type: China, W Yunnan, E flank of the N'Maikha/Salween Divide, 12–13000 ft, *Forrest* 18000 (holo. E).

Ic.: Bot. Mag. 124: t. 7614 (1898); Flora & Sylva 2:360 (1904); Schneider, Ill. Handb. Laubh. 2:486 (1909); Ic. Corm. Sin. 3: t. 4088, 4097, 4098 (1974).

Shrub, (0·3–)1–6 m. Young growth lepidote and sometimes loriform-setose, the setae quickly deciduous. Leaves evergreen, subdeciduous or completely deciduous, narrowly elliptic to elliptic, (30–)35–70 × 12–20 mm, apex acute, base cuneate, usually elepidote above, beneath with flat scales 3–5 × their own diameter apart; petiole and upper surface of midrib usually puberulent; petiole, leaf margin and also the leaf upper surface densely to sparsely loriform-setose, at least when young, the setae variably deciduous. Inflorescence loose, pedicels (8–)11–18 mm. Calyx minute, disc-like, lepidote, ciliate with loriform and/or filiform-acicular hairs, rarely glabrous. Corolla (21–)25–31 mm, white, pink or lavender, usually densely spotted with red or yellow, ± elepidote outside. Capsule 12–17 mm.

NE BURMA, CHINA (N, NW & W Yunnan, SW & NW Sichuan, Guizhou). Scrub, thickets, and forests, also on forest margins and sometimes on cliffs and in meadows, 2100–3950 m. Map 23, p. 70.

A variable, widely distributed and common species; the most characteristic variant, with long, narrow, very setose leaves is found along the Burmese-Chinese border, between 25° 30′ and 27° N; similar plants, though with somewhat broader, less setose leaves are found scattered over Yunnan, from Tali as far as the Yangtze, and extend into Sichuan near Muli, and also into Guizhou. Both this species and the next are very variable as to leaf persistence; there is no justification for the separation of the deciduous variants of both as *R. hormophorum*.

**6. (52.) R. pleistanthum** [Balfour f. ex] Wilding, Rhododendrons, their Names and Addresses, 73 (1923). Type: China, Yunnan, Salween/Mekong Divide, 10500 ft, 1918, *Forrest* 16357 (holo. E). Fig. 4u, p. 20.

Syn.: *R. hormophorum* Hort., pro parte.

Shrub, 0·6–4 m. Young growth lepidote, not pruinose, puberulent. Leaves evergreen or subdeciduous, sometimes entirely deciduous, 35–60 (–73) × 13–23 mm, narrowly elliptic, acute at apex, cuneate at base, ± elepidote above, lepidote beneath with flat, yellow or brown scales 3–5 × their own diameter apart; petiole and lower surface pale green, not pruinose. Inflorescence loose, pedicels lepidote and sometimes puberulent, (8–)10–18 mm. Calyx minute, disc-like or undulate, sometimes ciliate. Corolla white, white flushed pink or lilac, often with yellow or red spots, (23–)25–32 mm, ± elepidote outside. Capsule 11–18 mm.

CHINA (N & NW Yunnan, SW & NW Sichuan). Forest and forest margins, thickets, rarely on cliffs and in meadows, 2000–4500 m. Map 23, p. 70.

Very similar to *R. yunnanense* with which it vicariates to the north, but lacking the bristles on leaf margin and petiole. Also similar to *R. rigidum* from which it differs in its denser scales, puberulent petiole and midrib, and the absence of pruinose bloom.

**7. (53.) R. rigidum** Franchet, Bull. Soc. Bot. Fr. 33:233 (1886). Type: China, Yunnan, dans le gorge du Lan kien ho près Mo so yn (Lankong), 2200 m, 26 iv 1884, *Delavay* 837 (holo. P—n.v., iso. E). Fig. 1d, p. 15 & 4w, p. 21.

Syn.: *R. racemosum* var. *rigidum* (Franchet) Rehnelt, Gartenflora 57:561, t. 1577 (1908).

*R. caeruleum* Léveillé, Feddes Rep. 12:284 (1913). Type: China, Yunnan, mont de Mo tsou, v 1912, *Maire* (holo. E).

*R. rarosquameum* Balfour f., Notes R.B.G. Edinb. 10:137 (1917). Type: China, Yunnan, Io chan, 3200 m, *Maire* (holo. E).

*R. sycnanthum* Balfour f. & W. W. Smith, op. cit.: 162. Type: China, Yunnan, E flank of Tali range, 10–11000 ft, v 1910, *Forrest* 6771 (holo. E).

*R. hesperium* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:263 (1922). Type: China, Yunnan, Tali range, W flank, 10000 ft, vi 1917, *Forrest* 15576 (holo. E).

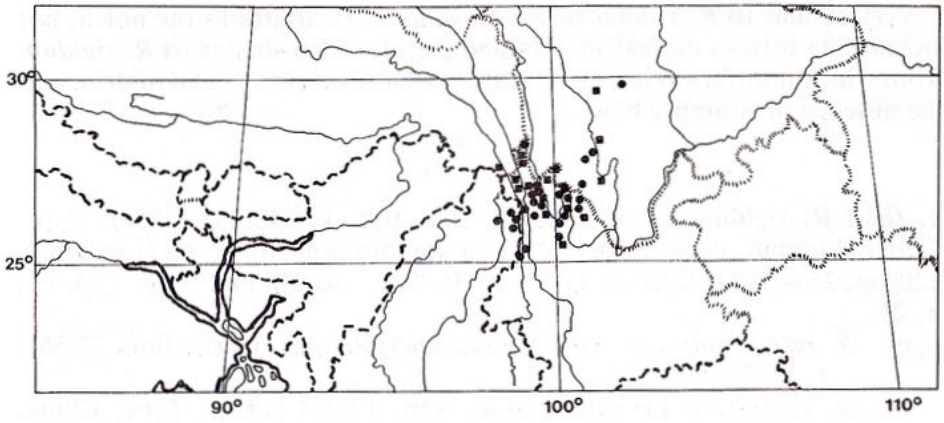
*R. eriandrum* [Léveillé ex] Hutchinson, The Species of Rhododendron, 798 (1930). Type: none designated.

Shrub, 1–10 m. Young growth sparsely lepidote, usually with pruinose-glaucous bloom. Leaves 29–65 × 13–25 mm, hard, elliptic to narrowly elliptic, acute at apex, cuneate at base, elepidote above, beneath sparsely lepidote with very distant (c. 5–8 × their own diameter apart), narrowly rimmed, golden or brown scales; petiole and upper part of midrib usually pruinose-glaucous, rarely sparsely puberulent. Inflorescence loose, pedicels lepidote, (8–)10–17 mm. Calyx minute, disc-like or undulate, sparsely lepidote, usually glabrous. Corolla white to rose pink or lilac, unspotted or spotted with red, (21–)24–27(–30) mm, ± elepidote outside. Capsule 10–16 mm.

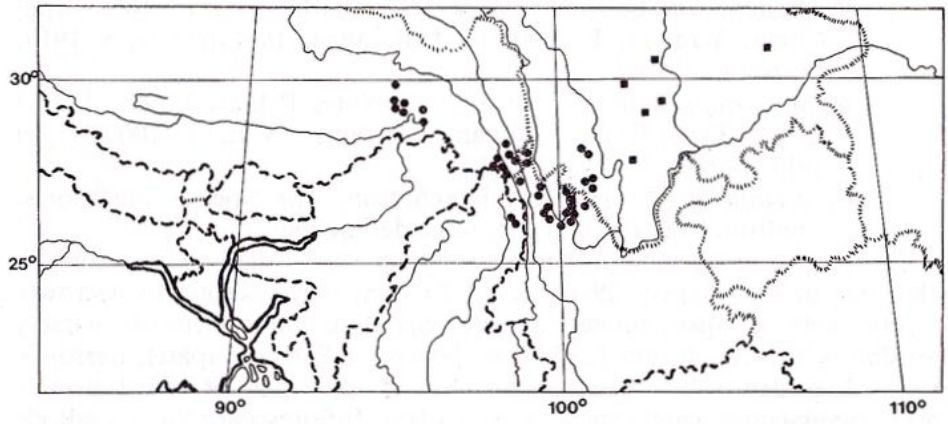
CHINA (N & NW Yunnan, SW Sichuan). Scrub, thickets and forest, sometimes on rocky slopes, 2000–3350 m. Map 22, p. 64.

Very similar to *R. pleistanthum*. Some specimens are more or less intermediate between the two; the type of *R. caeruleum* is, to some extent at least, one of these. *R. bodinieri* Franchet, *Journ. de Bot.* 12:257, 1898 (type: China, Yunnan, mont de Ma Kay avant le ville Se tschong hsien, *Bodinier* 1519, holo. P—n.v., iso. E) is a curious plant with the individual scales and inflorescence like *siderophyllum* but the scales themselves are very distant, as in *R. rigidum*. It may be a natural hybrid of these two.

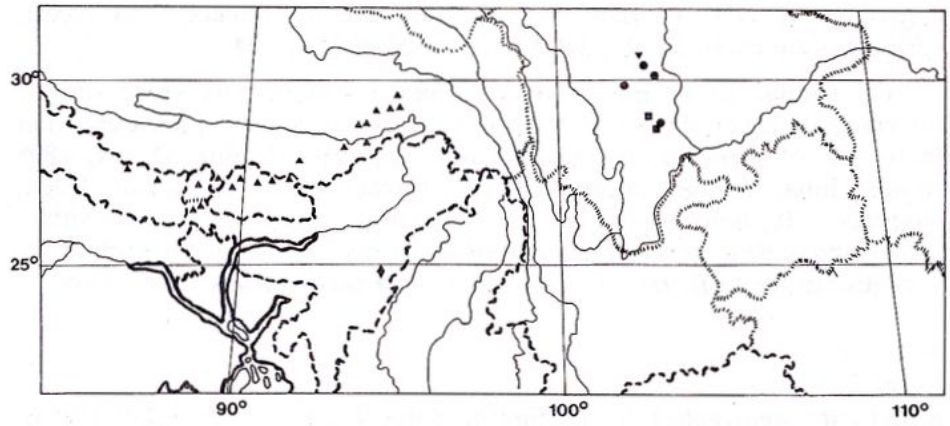
**8. (54.) R. oreotrephes** W. W. Smith, Notes R.B.G. Edinb. 8:201 (1914). Type: China, Yunnan, W flank of Lichiang range, 11–12000 ft, vi 1910, *Forrest* 5873 (holo. E). Pl. 1b; fig. 1e, p. 15 & 4v, p. 21.




MAP 23. ● *R. yunnanense*; ■ *R. pleistanthum*.




MAP 24. ● *R. oreotrephes*; ■ *R. concinnum*.




MAP 25. ● *R. trichanthum*; ■ *R. searsiae*; ▼ *R. amesiae*; ▲ *R. triflorum* var. *triflorum*; ◆ var. *bauhiniiflorum*.

Syn.: *R. timeteum* Balfour f. & Forrest, Notes R.B.G. Edinb. 12:166 (1920). Type: China, SW Szechuan, Muli mountains, valley of the Litang, 11000 ft, *Forrest* 16285 (holo. E).

*R. artosquameum* Balfour f. & Forrest, ibid. 13:234 (1922). Type: SE Tibet, Tsarung, Ka gwr pu, 12000 ft, vii 1917, *Forrest* 14535 (holo. E).

*R. cardoeoides* Balfour f. & Forrest, op. cit: 239 (1922). Type: China, NW Yunnan, Kari pass, 11000 ft, vi 1917, *Forrest* 13931 (holo. E).

*R. depile* Balfour f. & Forrest, op. cit.: 268. Type: China, Yunnan, Bei-ma-shan, 12000 ft, vi 1917, *Forrest* 13992 (holo. E).

*R. hypotrichum* Balfour f. & Forrest, op. cit.: 268. Type: SE Tibet, Tsarung, Mekong/Salween Divide, 10–11000 ft, vi 1918, *Forrest* 16543 (holo. E).

*R. phaeochlorum* Balfour f. & Forrest, op. cit.: 284. Type: SE Tibet, Tsarong, Salween/Kiu-chiang Divide, viii 1919, *Forrest* 19200 (holo. E).

*R. pubigerum* Balfour f. & Forrest, op. cit.: 289. Type: SE Tibet, Tsarong, Salween/Kiu-chiang Divide, vii 1919, *Forrest* 19206 (holo. E).

*R. trichopodum* Balfour f. & Forrest, op. cit.: 304. Type: SE Tibet, Tsarong, Doker la, 11000 ft, xii 1917, *Forrest* 14347 (holo. E).

*R. exquisetum* Hutchinson, Gard. Chron. 98:98 (1932). Type: a cultivated specimen (holo. K, iso. E).

Ic.: Bot. Mag. 144: t. 8784 (1918) & 162: t. 9597 (1939–40); Gard. Chron. 84: suppl. pl. opp. p. 440 & p. 493 (1928); Ic. Corm. Sin. 3: t. 4085, 4086, 4095 (1974).

Shrub or small tree, 1–8 m. Young growth lepidote, usually whitish or greyish pruinose. Leaves mostly evergreen, sometimes semi-deciduous, orbicular, elliptic to oblong or obovate, apex rounded to acute, base cuneate to cordate, 21–63(–87) × 18–31(–40) mm, upper surface usually elepidote, often slightly puberulent along the midrib, undersurface with dense but not contiguous purplish, reddish brown or greyish, opaque, narrowly rimmed scales; petiole glabrous or puberulent, the puberulence, when present, often extending to the underside of the midrib. Inflorescence 1–3(–4)-flowered, pedicels (8–)15–20(–26) mm, sparsely lepidote, often greyish or whitish pruinose. Calyx reduced to a rim, rarely slightly lobed, sparsely lepidote, sometimes ciliate with filiform-acicular hairs. Corolla rose or rose-lavender, often with darker spots, more rarely white, (21–)25–30(–34) mm, tube (9–)16–21(–23) mm, elepidote and glabrous outside, pubescent within the tube. Capsule lepidote, oblong-cylindric, 11–16 mm.

CHINA (N & NW Yunnan, S & SE Xizang, SW Sichuan). Scrub, open thickets, forests, forest margins and on rocky slopes, 2750–4250 m. Map 24, p. 70.

A very common species, variable in leaf shape and flower size, but immediately identifiable by means of the leaf scales, which are unlike those of any other species. It appears to form hybrids with *R. racemosum* (p. 82) and *R. zaleucum* (p. 63) in Yunnan, with *R. concinnum* (p. 75) in Sichuan, and perhaps with *R. cinnabarinum* subsp. *xanthocodon* (p. 124) in Xizang.

**9. (55.) R. augustinii** Hemsley, Journ. Linn. Soc. 26:19 (1889).

Shrub up to 10 m, though often less. Young growth pilose or more rarely glabrous. Leaves narrowly elliptic to elliptic, more rarely very narrowly elliptic, acute to acuminate at the apex, cuneate at the base, usually evergreen, more rarely subdeciduous to deciduous, (40–)50–100(–110) × 18–30(–40) mm, upper surface ± elepidote, glabrous or with fine filiform-acicular hairs along the midrib and/or the main veins, lower surface lepidote with distant golden or brown scales, the midrib with an indumentum of long, ± straight hairs, at least towards the base, this indumentum extending on to the petiole or not, petiole sometimes just puberulent. Inflorescences (2–)3(–5)-flowered, pedicels 8–22 mm, sparsely lepidote, sometimes puberulent. Calyx disc-like or obscurely lobed with lobes up to 3 mm, lepidote, often puberulent and variably ciliate. Corolla openly funnel-shaped, 28–40 mm, tube 11–16 mm, purple, lavender or almost blue, rarely white, with greenish or brownish spots inside, tube lepidote or sparsely pilose outside, pubescent within. Stamens 10, filaments pubescent towards the base. Ovary lepidote, variably pilose towards the apex.

A complex species, widely distributed and divisible into four subspecies:

1. Leaves ± deciduous; corolla white with brownish spots . . **d.** subsp. **hardyi**
\+ Leaves ± evergreen; corolla blue to purple with greenish or brownish spots . . . . . 2
2. Petiole with loriform as well as filiform-acicular hairs; corolla purple . . . . . **c.** subsp. **rubrum**
\+ Petiole with filiform-acicular hairs only, or glabrous; corolla blue to lavender . . . . . 3
3. Indumentum of leaf midrib beneath extending along the underside of the petiole; leaf upper surface with filiform-acicular hairs along most of the veins; corolla tube lepidote . **a.** subsp. **augustinii**
\+ Indumentum only on leaf midrib beneath, not or scarcely extending on to petiole; leaf upper surface glabrous or with filiform-acicular hairs along the midrib only; corolla tube elepidote, usually pilose outside . . **b.** subsp. **chasmanthum**

**9a.** subsp. **augustinii.** Type: Hupeh, Patung distr., *Henry* 1420–1, 3736 (holo. K).

Syn.: *R. vilmorinianum* Balfour f., Notes R.B.G. Edinb. 12:181 (1920) quoad typ. non descr. vel spec. cult. Type: material raised by Vilmorin, possibly from seed collected in E Szechuan by Farges (holo. E).

*R. augustinii* var. *yui* Fang, Contr. Biol. Lab. Sci. Soc. China 12:78 (1939). Type: China, Szechuan, Pao hsung hsien (Mupin), 2300–2500 m, *Yu* 1976 (n.v.).

Ic.: Gard. Chron. 52:4 (1912); Millais, Rhododendrons, opp. p. 24 (1917); Urquhart, The Rhododendron 1: t. 6 (1958).

CHINA (E Sichuan, Hubei, scattered). Rocky exposed sites and forest margins, 1300–3000 m. Map 26, p. 74.

A distinct subspecies which vicariates with the more westerly subsp. *chasmanthum*; intermediates between the two occur in central and western Sichuan. *R. vilmorinianum*, on the basis of the type specimens, is clearly synonymous with subsp. *augustinii*; the description of *vilmorinianum* given by Balfour, and material identified as such by him and subsequent authors (Hutchinson, Davidian) is, however, a different plant which is known only in cultivation and is almost certainly a garden hybrid between *R. augustinii* and *R. yunnanense*. It has petioles and leaves fringed with loriform setae, the upper surface pubescent along the main veins and midrib, and a lepidote corolla tube; the leaf scales are like *augustinii*, but the characteristic patch of hairs on the midrib is lacking and the corolla is white or pink.

**9b.** subsp. **chasmanthum** (Diels) Cullen, Notes R.B.G. Edinb. 36:109 (1978). Fig. 4x, p. 21.

Syn.: *R. chasmanthum* Diels, Notes R.B.G. Edinb. 5:212 (1912). Type: China, Yunnan, Mekong/Salween Divide, NW of Tseku, 10–12000 ft, x 1904, *Forrest* 513 (holo. E).

*R. augustinii* var. *chasmanthum* (Diels) Davidian, R.H.S. Rhodo. Yearbook 17:164 (1963).

*R. augustinii* forma *grandifolia* Franchet, Journ. de Bot. 12:261 (1898). Type: China, Setchuen occidental (i.e. Yunnan), Tehrana près de Tsekou, *Soulié* 1012 (holo. P—n.v., iso. E).

*R. augustinii* forma *subglabra* Franchet, loc. cit. Type: China, Setchuen occidental (i.e. Yunnan), Tehrana près de Tsekou, *Soulié* 1009, 1010 (iso. E).

*R. hirsuticostatum* Handel-Mazzetti, Wien Akad. Anzeig. 27:27 (1920). Type: China, Szechuan, Schao-shan ad austro-or. urbis Ningyuen, 2200–2500 m, 15 iv 1914, *Handel-Mazzetti* 1353 (holo. WU—n.v., iso. E).

*R. chasmanthoides* Balfour f. & Forrest, Notes R.B.G. Edinb. 13: 246 (1922). Type: China, Yunnan, Tseku, *Soulié* 1012 (holo. E).

Ic.: Bot. Mag. n.s., 166: t. 79 (1949).

CHINA (N & NW Yunnan, SW & NW Sichuan, SE Xizang). Forests, forest margins and scrub, 2200–3650 m. Map 26, p. 74.

As mentioned above, subsp. *chasmanthum* vicariates with subsp. *augustinii*. The type of *R. hirsuticostatum* is somewhat intermediate between the two, but closer to subsp. *chasmanthum* than to subsp. *augustinii*.

**9c.** subsp. **rubrum** (Davidian) Cullen, Notes R.B.G. Edinb. 36:109 (1978).

Syn.: *R. augustinii* var. *rubrum* Davidian, R.H.S. Rhodo. Yearbook 17: 165 (1963). Type: China, Yunnan, Shiu-lu shan, 13000 ft, *Forrest* 25914 (holo. E).

*R. bergii* Davidian, Quart. Journ. Amer. Rhodo. Soc. 30:210 (1976). Type: as for var. *rubrum*.

CHINA (NW Yunnan). Scrub and thickets, c. 4000 m. Map 26, p. 74.

A curious plant, known only from two gatherings and material in cultivation, in some respects (presence of loriform hairs, purple corolla) similar to *R. trichanthum* (p. 74). It is perhaps a naturally occurring hybrid, but field observations on this point are necessary.

**9d.** subsp. **hardyi** (Davidian) Cullen, Notes R.B.G. Edinb. 36:109 (1978).
Syn.: *R. hardyi* Davidian, Rhododendrons with Magnolias and Camellias 1974:47. Type: China, Yunnan/SE Tibet border, western range of Mekong on Kaakerpo, Doker la and Tsarung, 11500 ft, v–vi 1932, *Rock* 23010 (holo. E).
CHINA (NW Yunnan). Thickets and forests, 3350–3650 m. Map 26.

A very handsome shrub, separated from subsp. *chasmanthum* by characters that are not entirely clear cut (deciduousness of leaves, corolla colour).

**10. (56.) R. trichanthum** Rehder, Journ. Arn. Arb. 26:480 (1945). Type: (syntypes) China, W Szechuan, in thickets and thin woods, 2300–3659 m, *Wilson* 3944, 3945, 3946 (holo. A).
Syn.: *R. villosum* Hemsley & Wilson, Kew Bull. 1910:119 non Roth (1807). Type as for *R. trichanthum*.
Ic.: Bot. Mag. 147: t. 8880 (1921); Ic. Corm. Sin. 3: t. 4076 (1974).


MAP 26. ▼ *R. augustinii* subsp. *augustinii*; ● subsp. *chasmanthum*; ▲ subsp. *rubrum*; ■ subsp. *hardyi*.

Shrub, 1–3(–6) m. Young shoots densely loriform-setose, the setae often persisting for more than one year. Leaves evergreen, ovate-elliptic to narrowly elliptic, acute to acuminate at the apex, cuneate to rounded at the base, (55–)60–80 × (23–)28–35 mm, upper surface glabrous to loriform-setose, elepidote or sparsely lepidote, lower surface pilose (at least on the midrib, lamina sometimes ± glabrous) with filiform-acicular and sometimes a few loriform hairs, scales brown, distant; petiole densely pilose with filiform-acicular and loriform hairs. Inflorescences 2–3-flowered, pedicels 12–17 mm, lepidote and with a dense indumentum of twisted loriform-setae. Calyx weakly 5-lobed, the lobes 1–2 mm, lepidote and loriform-setose. Corolla 30–36 mm, tube 14–16 mm, light to dark purple, lepidote and with a variably dense indumentum of flattened loriform setae outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote and with a variable indumentum of filiform-acicular hairs and loriform setae. Capsule oblong-cylindric, up to 19 mm, lepidote, variably bristly.
CHINA (NW Sichuan). Woods and thickets, 2300–3300 m. Map 25, p. 70.

Although hairy like *R. augustinii*, this species seems more closely related to *R. concinnum*. *R.* x *trichophorum* Balfour f., *Notes R.B.G. Edinb.* 12:173 (1920) was based on material cultivated under *Wilson* 4242, which is *R. trichanthum*; it is intermediate in every way between *trichanthum* and *augustinii* and is almost certainly a hybrid between them.

**11. (57.) R. concinnum** Hemsley, Journ. Linn. Soc. 26:21 (1889). Type: China, Szechuan, summit of Mt Omei, *Faber* (holo. K).

Syn.: *R. yanthinum* Bureau & Franchet, Journ. de Bot. 5:94 (1891). Type: China, Szechuan, sur les montagnes au sud du Tatsienlu, *Henri d'Orleans* (holo. P—n.v., iso. E).

*R. benthamianum* Hemsley, Gard. Chron. 47:4 (1910). Type: China, Szechuan, *Wilson* 1878 (holo. K).

*R. coombense* Hemsley, Bot. Mag. 135: t. 8280 (1909). Type: a cultivated specimen (holo. K).

*R. apiculatum* Rehder & Wilson, Pl. Wils. 1:519 (1913). Type: China, Szechuan, west and near Wen chuan hsien, *Wilson* 3422 (iso. K).

*R. yanthinum* var. *lepidanthum* Rehder & Wilson, loc. cit. Type: China, Szechuan, west and near Wen chuan hsien, 2500 m, vii 1908, *Wilson* 3419 (n.v.).

*R. laetevirens* [Balfour f. ex] Hutchinson, The Species of Rhododendron, 781 (1930) in syn.

*R. pseudoyanthinum* [Balfour f. ex] Hutchinson, op. cit.: 783. Type: as for *R. yanthinum* var. *lepidanthum*.

*R. concinnum* var. *benthamianum* (Hemsley) Davidian, R.H.S. Rhodo. Yearbook 17:194 (1963).

*R. concinnum* var. *pseudoyanthinum* (Balfour ex Hutchinson) Davidian, loc. cit.

Ic.: Schneider, Ill. Handb. Laubh. 2:1042 (1909); Bot. Mag. 141: t. 8620 (1915) & 147: t. 8912 (1921); Urquhart, The Rhododendron 2: t. 27 (1962); Ic. Corm. Sin. 3: t. 4082, 4083, 4084 (1974).

Shrub, 0·5–2 m. Leaves ovate or elliptic, 35–60 × 18–32 mm, rounded to cordate at the base, acute to slightly acuminate at the apex, upper surface lepidote (scales sometimes deciduous), puberulent along the midrib, lower surface grey or brownish with numerous contiguous or almost contiguous large, flat, broadly rimmed scales with a tendency to dimorphism in colour—golden and brown. Inflorescence 2–4-flowered; pedicels (5–)7–13 mm, lepidote. Calyx minute, variably lobed, ciliate with loriform and filiform-acicular hairs, rarely glabrous. Corolla purple or reddish purple, rarely pale, 20–30 mm, tube 8–15 mm, lepidote on the tube outside, pubescent within the tube. Stamens 10, filaments pubescent towards the base. Ovary lepidote, sometimes minutely pubescent at apex. Style glabrous or puberulent. Capsule lepidote, 8–14 mm.
CHINA (NW, SW, C & E Sichuan, W Hubei). Forests and thickets, 2300–4500 m. Map 24, p. 70.

A rather variable species known from material that is, for the most part, poor. Leaf shape and size vary, as does the colour of the leaf undersurface. It is, however, reasonably distinct on the basis of its broad leaves and lepidote, purple corolla. *R. apiculatum* was based on a poor specimen collected by Wilson, and is identical with *R. concinnum* except that the extant fragment of the corolla is not lepidote. The varieties recognised by Davidian have no significance other than in horticulture. I have seen no material of *R. hutchinsonianum* Fang, *Acta Phytotax. Sinica* 2:83, 1953 (type: Szechuan, Erh-lang-shan, Tien chuan hsien, *Hu & Ho* 10148, holo. CHENGDU). From the description, it is merely a variant of *R. concinnum*.

**12. (58). R. amesiae** Rehder & Wilson, Pl. Wils. 1:523 (1913). Type: China, Szechuan, Mupin, 2300–3000 m, vi 1908, *Wilson* 3444 (iso. E).
Ic.: Bot. Mag. 154: t. 9221 (1930–31); Ic. Corm. Sin. 3: t. 4081 (1974).

Very similar to *R. concinnum*, differing as follows: petioles with a dense indumentum of loriform hairs, young growth loriform setose; corolla c. 34 mm, tube c. 18 mm.
CHINA (NW Sichuan). Thickets, 2300–3000 m. Map 25, p. 70.

Known only from the type collection and material in cultivation.

**13. (59.) R. searsiae** Rehder & Wilson, Pl. Wils. 1:523 (1913). Type: China, Szechuan, Wa-shan, 2300–2800 m, vi & xi 1908, *Wilson* 1343 (iso. E). Pl. 1c; fig. 1f, p. 15.
Ic.: Bot. Mag. 149: t. 8993 (1923); Ic. Corm. Sin. 3: t. 4089 (1974).

Very similar to *R. concinnum*, differing as follows: leaves much longer than broad, c. 70 × 20 mm, narrowly elliptic or very narrowly elliptic, cuneate at the base, usually greyish or silvery beneath with scales which are trimorphic as to size and colour—(a) small, milky and golden, (b) larger milky, and golden, and (c) larger still and golden; corolla white or pale purple, elepidote, c. 22 mm, tube c. 12 mm.
CHINA (SW Sichuan). Thickets, 2300–2800 m. Map 25, p. 70.

Known only from two collections made by Wilson on Wa-shan, and material widely distributed in cultivation.

**14. (60.) R. polylepis** Franchet, Bull. Soc. Bot. Fr. 33:232 (1886). Type: Thibet or., circa Mupin, alt. 2000 m, *David* (holo. P—n.v., iso. E).

Syn.: *R. harrovianum* Hemsley, Gard. Chron. 47:4 (1910). Type: a cultivated specimen (holo. K).

Ic.: Bot. Mag. 136: t. 8309 (1910); Ic. Corm. Sin. 3: t. 4080 (1974).

Shrub or small tree, 1–6 m. Young growth densely lepidote. Leaves narrowly elliptic to very narrowly elliptic, 50–100 × 15–30 mm, cuneate at base, acute to somewhat rounded at apex, upper surface dark green, lepidote or elepidote, glabrous, lower surface very densely covered with large, flat, overlapping, flaky scales, dark brown or yellowish brown. Inflorescences 3–4-flowered, pedicels lepidote, 9–15 mm. Calyx minute, undulate, lepidote, rarely filiform-acicular-ciliate. Corolla purple, 25–31 mm, tube 10–15 mm, lepidote outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote, somewhat pubescent at apex. Style glabrous. Capsule narrowly cylindric, c. 15 mm.

CHINA (NW & SW Sichuan). Woods and thickets, 2000–3000 m. Map 28, p. 81.

A very distinct species. In specimens collected in the wild the scales on the leaf undersurfaces appear to fray out at the edges into cobwebby material; this is consistent on all the specimens, and does not appear to be due to fungal infection. It is not found on cultivated material, and its significance is obscure.

**15. (61.) R. triflorum** Hooker, Rhodo. Sikkim Himalaya t. 19 (1849).

Straggling shrub, (0·5–)1–5(–7) m, bark of mature shoots smooth, reddish brown, peeling. Leaves usually evergreen, sometimes semi-deciduous, ovate or lanceolate, rarely narrowly elliptic, acute at apex, truncate or cordate at the base, (38–)45–60(–65) × (20–)24–32 mm, upper surface dark green, ± elepidote, lower surface greyish brown with close, very small (less than 0·1 mm in diameter), almost rimless scales. Inflorescences 2–3(–4)-flowered, pedicels lepidote, 8–13 mm. Calyx small, inconspicuous, usually ± undulate, rarely more conspicuously 5-lobed, lepidote. Corolla variable in shape, pale yellow, yellow suffused with red, or with dark red spots, 21–30 mm, tube 7–12 mm, densely lepidote and pubescent at the sinuses outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style glabrous or rarely puberulent at base. Capsule lepidote, cylindric, 10–13 mm.

A variable and widespread species, divisible into two varieties on the basis of corolla shape:

1. Corolla widely funnel-shaped . . . . **a.** var. **triflorum**
\+ Corolla very openly funnel-shaped to almost flat . . . **b.** var. **bauhiniiflorum**

**15a.** var. **triflorum.** Type: Sikkim Himalaya, inner ranges on brushy slopes, 7–9000 ft, *Hooker* (holo. K, iso. E). Fig. 4y, p. 21.

Syn.: *R. deflexum* Griffith, Notulae 4:303 & t. 519 (1854). Type: Bootan, *Griffith* (n.v.).

*R. triflorum* var. *mahogani* Hutchinson, Gard. Chron. 101:135 (1937). Type: none cited.

Ic.: Fl. des Serres, ser. 1, 7: t. 673 (1851–2); Gard. Chron. 18:45 (1882); Hara (ed.), Photo-album of Plants of E Himalya t. 162 (1968); Stainton, Forests of Nepal t. 101 (1972); Ic. Corm. Sin. 3: t. 4010 (1974).

NEPAL, INDIA (Sikkim, W Bengal, Arunachal Pradesh), BHUTAN, NE BURMA, CHINA (S Xizang). Forests, forest margins and hillsides, (2300–)2750–3650 m. Map 25, p. 70.

This variety is variable as to corolla colour; the variant with the corolla suffused or spotted dark red has been described as var. *mahogani* but is of sporadic occurrence, and linked to the typical yellow variant by numerous intermediates.

**15b.** var. **bauhiniiflorum** (Watt ex Hutchinson) Cullen, Notes R.B.G. Edinb. 36:109 (1978).

Syn.: *R. triflorum* var. *bauhiniiflorum* Watt in sched., nom. nud.
*R. bauhiniiflorum* [Watt ex] Hutchinson, The Species of Rhododendron 785 (1930). Type: Manipur, Japvo, Ching Sow & Keyang on the northern Burmese frontier, 8–9000 ft, v 1882, *Watt* 6582 (holo. E).

INDIA (Manipur). Hillsides, 2450–2750 m. Map 25, p. 70.

**16. (62.) R. ambiguum** Hemsley, Bot. Mag. 137: t. 8400 (1911). Type: none cited, typifiable from the illustration which is based on material cultivated from seed collected by Wilson. Fig. 4z, p. 21.

Syn.: *R. chiengshienianum* Fang, Ic. Pl. Omeiensium 1:1, t. 36 (1942). Type: China, Szechuan, Omei hsien, Mt Omei, 3000 m, 27 v 1940, *Sun* 2229 (iso. E).

Ic.: Bot. Mag. 137: t. 8400 (1911); Schneider, Ill. Handb. Laubh. 2:1044 (1909); Millais, Rhododendrons, 21, 234 (1917); Bärtels, Gartengehölze 194 (1973); Ic. Corm. Sin. 3: t. 4071, 4072 (1974).

Shrub, 1·5–5 m. Leaves narrowly ovate or obovate or narrowly elliptic, ± acute at the apex, cuneate-rounded at the base, 30–60(–80) × 15–32 mm, dark green and persistently lepidote above, densely lepidote beneath with contiguous or overlapping, dark brown, somewhat unequal, large, broadly rimmed scales; petiole, and midrib for a short distance from the base, pubescent. Inflorescences 3(–5)-flowered, pedicels lepidote and sometimes puberulent near the base, 10–15 mm. Calyx undulate or very weakly lobed, lepidote, sometimes filiform-acicular-ciliate. Corolla yellow, often with greenish or darker yellow spots on the upper lobes, 20–26 mm, tube 8–11 mm, variably lepidote outside, rarely elepidote. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style usually glabrous, rarely puberulent at the base. Capsule lepidote, cylindric, (9–)11–13 mm.

CHINA (C Sichuan). Thickets on hillsides, 2600–4500 m. Map 27, p. 81.

Superficially similar to *R. triflorum* but distinguished by its greyish brown, shredding bark, large, denser leaf scales and the lack of indumentum on the corolla.

**17. (63.) R. keiskei** Miquel, Ann. Mus. Bot. Lugd. Bat. 163 (1866).

Syn.: *R. laticostum* Ingram, R.H.S. Rhodo. Yearbook 25:31 (1971). Type: a cultivated plant (holo. K).
*R. trichocalyx* Ingram, op. cit.: 33. Type: a cultivated plant (holo K).

Ic.: Miyoshi & Makino, Pocket Atlas Alp. Pl. Jap. 2: t. 65 f. 375 (1907); Schneider, Ill. Handb. Laubh. 2: 472, 474 (1909); Bot. Mag. 136: t. 8300 (1910).

Small shrub, 0·3–3 m. Leaves lanceolate or oblong-lanceolate or narrowly elliptic, acute or acuminate at the apex, cuneate and abruptly rounded at the base, (25–)35–75 × (8–)11–28 mm, upper surface dark green, variably lepidote, puberulent along most of the length of the midrib and on the surface towards the base, lower surface greenish, lepidote with distant, large scales, rarely loriform-ciliate on margins and petiole. Inflorescence 2–3 (–4)-flowered, pedicels lepidote, 5–10(–14) mm. Calyx variably developed, undulate, less than 1 mm, to clearly 5-lobed with lobes up to 2·5 mm, lepidote, frequently loriform-ciliate. Corolla pale yellow, unspotted, 18–24 mm, tube 8–11 mm, variably lepidote outside and sometimes sparsely puberulent with short, straight hairs. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style glabrous. Capsule very narrowly cylindric, 6–13 mm.

JAPAN. Hills and rocky places, rarely epiphytic, 600–1850 m.

A variable species, which, in recent years, has been split up into a number of taxa at different levels, often on the basis of material in cultivation.

**18. (64.) R. lutescens** Franchet, Bull. Soc. Bot. Fr. 33:235 (1886). Type: China, Szechuan, Moupine in sylvis regionis mediae, *David* (holo. P—n.v.).

Syn.: *R. costulatum* Franchet, Journ. de Bot. 9:399 (1895). Type: China, Szechuan, Kiala, *Soulié* 492 (holo. P—n.v., iso. E).

*R. lemeei* Léveillé, Feddes Rep. 13:339 (1914). Type: China, Yunnan, monts de Ta tchai, 3000 m, iv 1913, *Maire* (holo. E).

*R. blinii* Léveillé, Bull. Acad. Geogr. Bot. 24:21 (1915). Type: China, Yunnan, braisse de coteaux à Tscheu-fong-tchan, 550 m, v 1912, *Maire* (holo. E).

Ic.: Schneider, Ill. Handb. Laubh. 2:474 (1909); Rev. Hort. 1914:324; Bot. Mag. 146: t. 8851 (1920); Millais, Rhododendrons, ser. 2, opp. p. 244 (1924); Fang, Ic. Pl. Omeiensium t. 35 (1942); Ic. Corm. Sin. 3: t. 4073 (1974).

Straggling shrub up to 6 m, with grey bark. Leaves sometimes subdeciduous, lanceolate or ± oblong, apex acuminate into a long and conspicuous drip-tip, base rounded, margins somewhat distantly crenulate, 50–90 × 13–26(–37) mm, upper surface variably lepidote, midrib usually glabrous, lower surface with large, distant, broadly rimmed, golden scales. Inflorescences mostly axillary, terminal inflorescence often lacking, pedicels 6–15 mm, lepidote and sometimes puberulent at the base. Calyx undulate or obscurely 5-lobed, lepidote, sometimes loriform-ciliate. Corolla pale yellow with greenish spots on the inside of the upper lobes, 18–25 mm, tube up to 11 mm, pubescent outside with retrorse hairs, their density variable. Stamens 10, filaments densely pubescent towards the base. Ovary lepidote, often pubescent at apex. Style glabrous or pubescent at base. Capsule lepidote, narrowly cylindric, 9–11 mm.

CHINA (C Sichuan, widely distributed but scattered). Hillsides, slopes and forest margins, (550–)1750–3000 m. Map 27, p. 81.

*R. lutescens* is a very scattered species, and has an immense altitudinal range, if the altitudes on some of Maire's specimens (e.g. the type of *R. blinii*) are credible.

**19. (65.) R. gemmiferum** Philipson & Philipson, Notes R.B.G. Edinb. 33:493 (1975). Type: China, Yunnan, on the Li-ti-ping, 11–12000 ft, vi 1917, *Forrest* 13902 (holo. E).

Small shrub to 0·6 m. Young growth densely lepidote. Leaves 16–22 × 8–11 mm, ± elliptic, obtuse at the apex, rounded-cuneate at the base, glabrous but lepidote above with ± dried-out scales, densely lepidote beneath with flat, broadly rimmed, pale to dark brown scales about their own diameter apart. Inflorescences 2–3-flowered, pedicels lepidote, 6–10 mm. Calyx rim-like, lepidote, occasionally somewhat ciliate with loriform setae. Corolla pale lavender, not very strongly zygomorphic, c. 12 mm, tube c. 5 mm, glabrous and elepidote outside, pubescent within the tube. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style glabrous, elepidote. Capsule unknown.

CHINA (N & NW Yunnan). Open pasture and margins of thickets, 3350–4250 m. Map 28, p. 81.

A rather obscure species, which, as pointed out by the Philipsons, is in many ways intermediate between subsections Triflora and Lapponica. For this reason it is included here at the end of subsection Triflora, which it resembles particularly in the characters of its inflorescence. It is possible that it may be of hybrid origin between *R. siderophyllum* or *R. tatsienense* (both small-flowered species of subsection Triflora) and some unknown species of subsection Lapponica.

*Species uncertainly known*

**R. wongii** Hemsley & Wilson, Kew Bull. 1910:118. Type: China, Szechuan, neighbourhood of Tatsienlu, 3650 m, *Wilson* 3948 (holo. K). This plant is very similar to *R. ambiguum* and probably synonymous with it; the type, however, is too scrappy to be certain of this. If the two should prove to be synonymous, the name *wongii* has priority over *ambiguum*.

*Hybrids*

*R.* x *lochmium* Balfour f. in Notes R.B.G. Edinb. 11:90 (1919). Described on the basis of material cultivated as *Wilson* 1220 (which is *R. trichanthum*), this plant seems most likely to be a hybrid between *R. trichanthum* and perhaps *R. davidsonianum*. It is frequently cultivated.

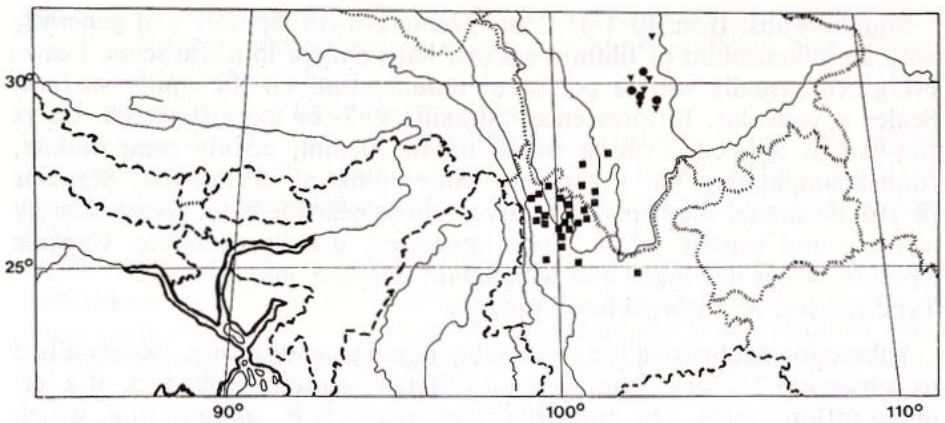
*R.* x *pallescens* Hutchinson, Gard. Chron. 93:418 (1933). Described from a plant cultivated supposedly from Rock's seed 59574 (the equivalent herbarium sheet of which, 11257, is *R. eritimum*, an elepidote species of subsection Irrorata). It has been suggested that it is a hybrid between *R. racemosum* (see p. 82) and *R. davidsonianum*.

*R.* x *trichophorum* Balfour f.—see under *R. trichanthum*, p. 74.

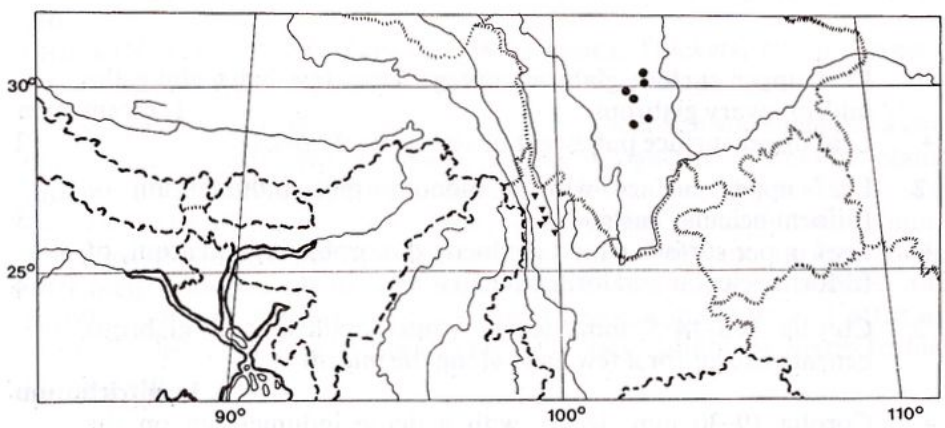
VI. Subsection **Scabrifolia** (Hutchinson) Cullen, Notes R.B.G. Edinb. 36:110 (1978).

Syn.: Series *Scabrifolium* Hutchinson in Stevenson (ed.), The Species of Rhododendron 600 (1930).

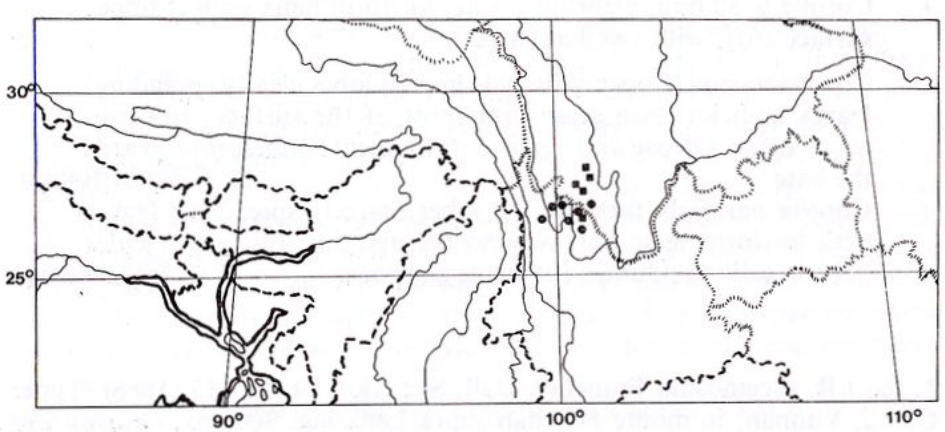
Subgenus *Pseudorhodorastrum* sections *Trachyrhodion* & *Rhodobotrys* Sleumer, Bot. Jahrb. 74:553 (1949).




MAP 27. ● *R. ambiguum*; ■ *R. racemosum*; ▼ *R. lutescens*.




MAP 28. ● *R. polylepis*; ▼ *R. gemmiferum*.




MAP 29. ● *R. mollicomum*; ■ *R. hemitrichotum*.

Small shrubs, from (0·1–)1–3 m. Young growth lepidote and generally with an indumentum of filiform-acicular hairs and/or loriform setae. Leaves evergreen, usually with a persistent indumentum on the upper surface. Scales ± vesicular. Inflorescences all axillary, 2- or more-flowered. Calyx rim-like to 5-lobed. Corolla small, up to 30 mm, openly campanulate, funnel-campanulate or ± tubular, white, pink or orange-red. Stamens (8–)10, declinate, filaments glabrous or pilose near the base. Ovary densely lepidote and usually pilose. Style impressed, usually declinate. Capsule lepidote. Seeds unwinged and with small, obscure fins.
Type species: *R. scabrifolium* Franchet.

Subsection Scabrifolia is a reasonably homogeneous group, closely allied to subsection Triflora, from which it differs essentially in the lack of a terminal inflorescence. The most divergent species is *R. spinuliferum*, which has erect, tubular, nectar-filled corollas, reminiscent of *R. keysii* (p. 126). However, it is vegetatively and chemically similar to the rest of subsection Scabrifolia, particularly to *R. scabrifolium* itself, with which it appears to hybridise in the wild, and seems to fit best into this subsection.

1. Leaf upper surface glabrous except for a few hairs along the midrib; ovary glabrous . . . . . **1. racemosum**
\+ Leaf upper surface pubescent or setose; ovary pilose . . 2

2. Leaf upper surface with a monomorphic indumentum of filiform-acicular hairs . . . . . 3
\+ Leaf upper surface with a distinctly dimorphic indumentum, of filiform-acicular and loriform hairs . . . . . 4

3. Corolla 9·5–14·5 mm; leaves white-papillose and glabrous beneath except for a few hairs along the midrib . . . . **2. hemitrichotum**
\+ Corolla 19–30 mm; leaves with a dense indumentum on the lower surface, not white-papillose . . . . **3. mollicomum**

4. Corolla 6–8 mm, puberulous inside; loriform hairs on the upper leaf surface flexuous, without swollen bases . . **4. pubescens**
\+ Corolla 9–30 mm, glabrous inside; loriform hairs on leaf upper surface stiff, with swollen bases . . . . . 5

5. Corolla narrowly openly funnel-shaped, lobes clearly spreading; leaves with loriform setae over most of the surface, filiform-acicular hairs dense and persistent; filaments pubescent towards the base . . . . . **5. scabrifolium**
\+ Corolla narrowly tubular, the lobes scarcely spreading; leaves with loriform setae only around the margins, filiform-acicular hairs usually deciduous; filaments glabrous . **6. spinuliferum**

**1. (66.) R. racemosum** Franchet, Bull. Soc. Bot. Fr. 33:235 (1886). Type: China, Yunnan, in monte He-chan supra Lankong, 3000 m, *Delavay* 299 (holo. P—n.v., iso. E). Fig. 1g, p. 15 & 4aa, p. 21.

Syn.: *R. motsouense* Léveillé, Feddes Rep. 13:148 (1913). Type: China, Yunnan, montagnes aux environs de Mo-tsou (fleuve bleu), 800 m, *Maire* (holo. E).

*R. iochanense* Léveillé, nom. nud.

Ic.: The Garden 42: opp. p. 320 (1892); Gartenflora 57: t. 1577 (1908); Schneider, Ill. Handb. Laubh. 2:472, 474 (1909); Rev. Hort. 1912:134; Urquhart, The Rhododendron 1: t. 2 (1958); Ic. Corm. Sin. 3: t. 4280 (1974).

Variably sized shrub, 0·2–3 m. Young shoots lepidote and glabrous or puberulous with fine filiform-acicular hairs. Leaves broadly obovate to oblong-elliptic, 15–50 × 7–30 mm, upper surface glabrous except for a few filiform-acicular hairs along the midrib, glabrous beneath, shining white-papillose, densely lepidote with almost rimless scales. Inflorescences 2–3-flowered, pedicels lepidote and glabrous or puberulent, up to 15 mm. Calyx rim-like, densely lepidote, glabrous. Corolla openly funnel-shaped, 7–17 mm; tube 3·5–8·5 mm, white to pale or deep pink, somewhat puberulous within. Filaments sparsely puberulous towards the base. Ovary densely lepidote, glabrous, style glabrous and elepidote. Capsule lepidote, 7–10 mm.

CHINA (N, NW, W & C Yunnan, SW Sichuan). Thickets, forest margins, scrub and rocky slopes, (800–)2750–4300 m. Map 27, p. 81.

An extremely variable species in terms of size, leaf size and shape, and corolla size and colour. Three variants may be recognised: a) smallish plants (up to 0·6 m), with large, broad, rounded leaves, short pedicels and corollas 14–17 mm; b) taller plants, up to 3 m, with smaller, relatively longer, more acute leaves, longer pedicels and corollas 9–14 mm; and c) very small, intricately branched plants with small, rounded leaves, short pedicels and corollas 7–9 mm. These three types intergrade considerably, and often all occur in the same general area. Therefore they cannot be given formal recognition.

**2. (67.) R. hemitrichotum** Balfour f. & Forrest, Notes R.B.G. Edinb. 12:115 (1920). Type: China, SW Szechuan, Mu-li, valley of the Litang, 12000 ft, vi 1918, *Forrest* 16250 (holo. E).

Shrub 0·6–2 m. Young shoots lepidote and with an indumentum of filiform-acicular hairs. Leaves narrowly elliptic, 25–40 × 7–13 mm, the indumentum on the upper surface of filiform-acicular hairs only, the lower surface shining white-papillose, glabrous except for a few hairs along the midrib, lepidote with ± rimless scales. Inflorescences 2–3-flowered, pedicels lepidote and puberulent with filiform-acicular hairs. Calyx rim-like, lepidote, ciliate with filiform-acicular and loriform hairs. Corolla openly funnel-shaped, 9·5–14·5 mm, the tube 4–8 mm, pink, or white edged with pink, glabrous and elepidote outside, puberulent inside the tube. Filaments pubescent towards the base. Ovary densely lepidote and sparsely pilose, style often slightly pilose at the base. Capsule lepidote and sparsely pilose, 5–7 mm.

CHINA (N Yunnan, SW Sichuan). Forests, open slopes, 2900–4300 m. Map 29, p. 81.

**3. (68.) R. mollicomum** Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:249 (1916). Type: China, Yunnan, mountains in the NE of the Yangtze bend, 10–11000 ft, vi 1913, *Forrest* 11490 (holo. E).

Syn.: *R. mollicomum* var. *rockii* Tagg, Notes R.B.G. Edinb. 15:114 (1926). Type: China, Yunnan, Yangtze watershed, W slope of Lichiang snow range, iv 1923, *Rock* 8551 (holo. E).

Very similar to *R. hemitrichotum*, differing as follows: leaves densely pubescent on the undersurface which is not shining and white, corolla pale to deep pink, rather narrowly funnel-shaped, 19–30 mm, tube 12–18 mm, capsule 6–10 mm.

CHINA (N Yunnan, SW Sichuan). Scrub, thickets, forest margins, 2800–3800 m. Map 29, p. 81.

**4. (69.) R. pubescens** Balfour f. & Forrest, Notes R.B.G. Edinb. 12:153 (1920). Type: China, SW Szechuan, Muli mountains, 10000 ft, viii 1918, *Forrest* 16812 (holo. E).

Ic.: Bot. Mag. 156: t. 9319 (1933); Ic. Corm. Sin. 3: t. 4277 (1974).

Small shrub, to 1·3 m. Young shoots lepidote and with an indumentum of filiform-acicular hairs. Leaves very narrowly elliptic to very narrowly lanceolate, strongly revolute, 18–24 × 3–6 mm, with a dimorphic indumentum above of persistent, short, filiform-acicular hairs and longer, flexuous loriform setae which are ultimately deciduous; lower surface lepidote and with an indumentum of filiform-acicular hairs. Inflorescences 2–3-flowered. Calyx rim-like, fringed with long, loriform setae. Corolla funnel-shaped, 6–11 mm, the tube 3–5 mm, rose pink, glabrous and elepidote outside, puberulent inside the tube. Stamens 8–10, filaments pubescent towards the base. Ovary lepidote and pilose. Capsule lepidote and pilose, 5–6 mm.

CHINA (N Yunnan, SW Sichuan). Open rocky places, scrub, 2800–3000 m. Map 30, p. 86.

**5. (70.) R. scabrifolium** Franchet, Bull. Soc. Bot. Fr. 33:236 (1886).

Shrub to 3 m. Young shoots with a dimorphic indumentum of filiform-acicular hairs and longer, loriform setae which have swollen bases. Leaves narrowly elliptic to oblanceolate, 15–90 × 4–15 mm, indumentum of the upper surface like that of the young shoots, lower surface lepidote and with a dense indumentum of loriform hairs. Inflorescences 2–3(–5)-flowered. Calyx rim-like or clearly 5-lobed, with lobes 2–3 mm, fringed with loriform setae. Corolla variable in shape and size (see below), white to deep pink, the tube glabrous inside. Stamens 10, filaments pubescent towards the base, usually densely so. Ovary lepidote and densely pilose, the scales obscured by the hairs. Style sparsely pubescent at the base. Capsule lepidote and pilose, 6–9 mm.

A complex and variable species divided here into three varieties. Var. *scabrifolium* represents the 'pure' species; the other two varieties show more or less intergradation towards *R. spinuliferum*, particularly in corolla shape.

1. Corolla openly funnel-shaped, 9–15 mm, tube 3–7 mm . . . . . **a.** var. **scabrifolium**
\+ Corolla narrowly funnel-shaped, 12·5–23 mm, tube 6–17 mm . . 2

2. Corolla 12·5–15 mm; leaves mostly narrow, c. 15–30 × 4–10 mm . . . . . **b.** var. **spiciferum**
\+ Corolla 16–23 mm; leaves usually larger, c. 25–90 × 8–25 mm . . . . . **c.** var. **pauciflorum**

**5a.** var. **scabrifolium.** Type: China, Yunnan, in monte Hee-chan-men supra Lan-kong, *Delavay* 297 (holo. P—n.v., iso. E). Fig. 4ab, p. 21.
CHINA (N Yunnan). Rocky slopes in scrub, 1800–3000 m. Map 30, p. 86.

This is the most northerly taxon of the complex, and is distinct in many localities; to the south of its range it merges into the other two varieties.

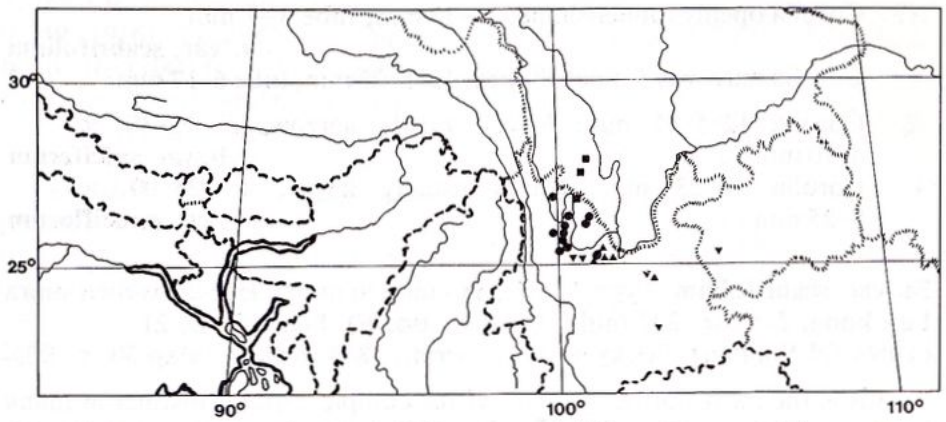
**5b.** var. **spiciferum** (Franchet) Cullen, Notes R.B.G. Edinb. 36:110 (1978). Type: China, Yunnan, sur les coteaux à Kin-lin et près Yunnansen, *Delavay* (holo. P—n.v., iso. E). Fig. 4ac, p. 21.
Syn.: *R. spiciferum* Franchet, Journ. de Bot. 9:400 (1895).
CHINA (C & S Yunnan). Rocky slopes, c. 2400 m. Map 30, p. 86.

Occurring to the south of var. *scabrifolium*, often in the same general area as var. *pauciflorum* and *R. spinuliferum*. There is a fruiting specimen from Guizhou (*Tsiang* 8627) which is very similar to var. *spiciferum*, but, in the absence of flowers, it cannot be accurately identified.

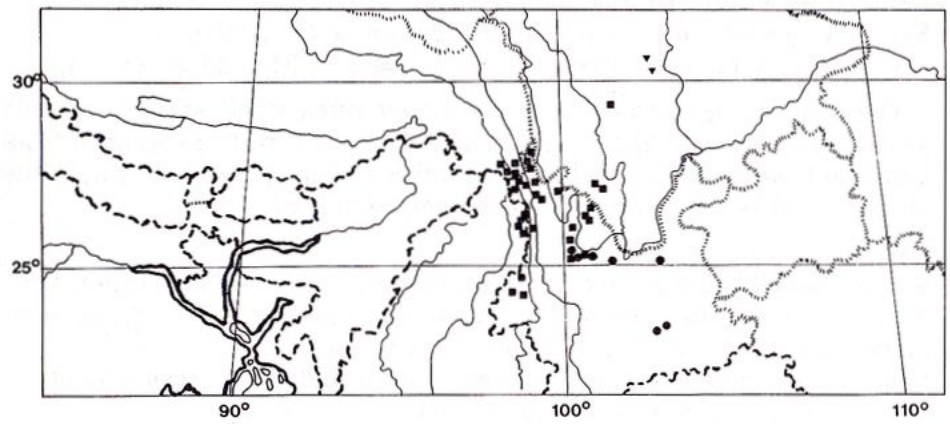
**5c.** var. **pauciflorum** Franchet, Journ. de Bot. 12:262 (1898). Type: China, Yunnan central, aux environs de Yunnansen dans les ravines de la montagne, 16 ii 1897, *Ducloux* 75 (holo. P—n.v.; iso. E, K).
Syn.: *R. dielsianum* Handel-Mazzetti nomen nudum (*R. scabrifolium* × *R. spinuliferum*) non Schlechter.
CHINA (C & S Yunnan). Rocky slopes, 2000–2600 m. Map 30, p. 86.

This variety is closer to *R. spinuliferum,* particularly in corolla shape than the other two varieties of *R. scabrifolium*. The prominent and elongate pedicels noted by Franchet do occur in some specimens, but do not appear to be diagnostic; they are perhaps a modification due to shade.

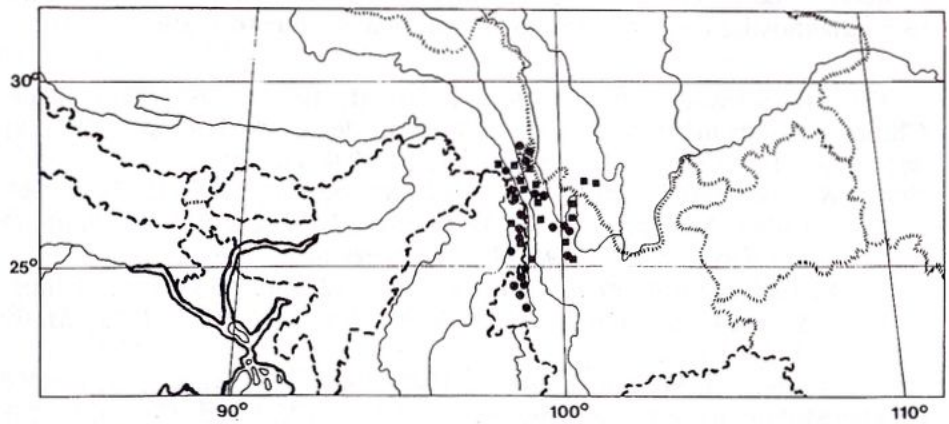
**6. (71.) R. spinuliferum** Franchet, Journ. de Bot. 9:399 (1895). Type: China, Yunnan méridional, dans le bois au dessus de Tonghay, *Delavay* 4883 (holo. P—n.v.; iso. E, K). Fig. 2v, p. 16 & 4ad, p. 21.
Syn.: *R. duclouxii* Léveillé, Bull. Soc. Agr. Sarthe 39:46 (1903). Types: China, Yunnan, env. de Yunnansen, 24 ii & 2 iii 1897, *Bodinier* 115 (iso. E); ibid., 29 i 1897, *Ducloux* 61 (iso. E).
*R. fuchsiiflorum* Léveillé, Feddes Rep. 12:284 (1913). Type: China, Yunnan, montagnes arides de Mo-tsou, 800 m, v 1912, *Maire* (holo. E).
Ic.: Schneider, Ill. Handb. Laubh. 2:1042 (1909); Bot. Mag. 137: t. 8408 (1911); Millais, Rhododendrons, opp. p. 246 (1917); Gard. Chron. 63:248 (1918); Ic. Corm. Sin. 3: t. 4279 (1974).




MAP 30. ■ *R. pubescens*; ● *R. scabrifolium* var. *scabrifolium*; ▲ var. *pauciflorum*; ▼ var. *spiciferum*.




MAP 31. ● *R. spinuliferum*; ■ *R. rubiginosum*; ▼ *R. bracteatum*.




MAP 32. ● *R. heliolepis* var. *heliolepis*; ■ var. *brevistylum*.

Very like *R. scabrifolium* in general appearance, differing as follows: leaves large, ultimately glabrous above (though with filiform-acicular hairs persisting along the midrib and the bases of the setae persistent around the margins), calyx usually disc-like, unlobed, densely pubescent, the corolla ± erect, tubular to very narrowly funnel-shaped, filled with watery nectar, 17–23 mm, tube 11–17 mm, stamens and style exserted, filaments glabrous, capsule 11–17 mm.
CHINA (C & S Yunnan). Thickets, (800–)1800–2500 m. Map 31, p. 86.

Very distinct in its pure form, but merging into *R. scabrifolium* in the northern part of its range. A most remarkable species, not likely to be confused with any other, presumably with a distinctive pollination syndrome.

VII. Subsection **Heliolepida** (Hutchinson) Sleumer, Bot. Jahrb. 74:536 (1949).
Syn.: Series *Heliolepis* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 320 (1930).

Shrub or small trees, 1–10 m. Young growth often purple or reddish, lepidote, usually glabrous. Leaves evergreen, often very aromatic when crushed, densely lepidote beneath with large, conspicuous scales. Inflorescences all terminal, (4–)5–10-flowered, pedicels lepidote and often puberulent. Calyx usually disc-like, rarely somewhat lobed. Corolla white, pink or rarely purplish, often spotted, funnel-shaped, conspicuously lepidote outside. Stamens 10, declinate, filaments pubescent towards the base. Ovary densely lepidote, 5-locular. Style glabrous or pubescent at the base, impressed, longer or shorter than the longest stamens, declinate or straight. Seeds unwinged and obscurely finned.
Type species: *R. heliolepis* Franchet.

A small, homogeneous group of species related to subsection Triflora but distinguished by the many-flowered, purely terminal inflorescences, less zygomorphic corolla, and density of the scales. The floral biology of the group (as far as this can be judged from herbarium material) is interesting, and has a profound effect on the classification. *R. rubiginosum* flowers earlier than the other species (May–June), and has a long, declinate style, considerably longer than the longest stamens at anthesis; the other species (excluding *R. invictum* which is known only from poor material) flower mainly in July and August, and have straight styles, much shorter than the longest stamens. The length of the style may well reflect the length of time available for pollen tubes to reach the ovules, as all the species produce fruit at about the same time (October–December). Thus, *R. rubiginosum* and *R. heliolepis*, though occupying the same general area, are prevented from interbreeding to any great extent by a temporal isolating mechanism. It seems likely that occasional overlaps in flowering times do occur, giving rise to hybrids: the plants known hitherto as *R. fumidum* and *R. pholidotum* are possibly the results of such hybridisations as they combine the floral characteristics of *R. heliolepis* with the leaf characters (*pholidotum*) or indumentum characters (*fumidum*) of *R. rubiginosum*. Field study of this point is desirable; for the moment these two names are sunk under *R. heliolepis*.

1. Leaves sparsely puberulent along the minor veins on the upper surface; corolla lepidote along the upper suture . . **1. invictum**
+ Leaves glabrous above, except rarely along the main vein; corolla lepidote all over the surface . . . . . 2

2. Style shorter than the longest stamens at anthesis, straight, usually pilose at the base (at least where impressed); calyx fringed with minute hairs; corolla sparsely puberulent outside, at least near the base or at the sinuses; scales on the leaf undersurface equal, not contiguous . . . . . 3
+ Style longer than the longest stamens, declinate, glabrous; calyx and corolla glabrous; scales on leaf undersurface contiguous or overlapping . . . . . **4. rubiginosum**

3. Pedicels puberulent at the base; corolla 15–25 mm; old leaf bud scales ± persistent . . . . . **2. bracteatum**
+ Pedicels glabrous; corolla (22–)24–34 mm; old leaf bud scales not persistent . . . . . **3. heliolepis**

**1. (72.) R. invictum** Balfour f. & Farrer, Notes R.B.G. Edinb. 10:116 (1917). Type: China, Kansu, Siku-Satanee ranges 8–9000 ft, iv-v, *Farrer* 79 (holo. E).

Shrub to 2 m with thin, lepidote branches. Leaves 40–50 × 22–25 mm, ovate or elliptic, ± acute, somewhat cuneate at the base, elepidote but puberulous along the main veins above, glabrous beneath but with dense golden scales. Inflorescence unknown. Calyx very small, rim-like, sparsely lepidote, the margin ciliate with small, fine hairs. Corolla funnel-shaped, c. 28 mm, tube c. 12 mm, purple (?), very sparsely puberulous and lepidote along the adaxial suture outside, sparsely pilose within. Stamens 10, filaments pilose towards the base. Ovary densely lepidote with a few hairs in the impressed part near the style base. Style shorter than the longest stamens at anthesis. Capsule sparsely lepidote, c. 9 mm.
CHINA (Gansu). Map 19, p. 56.

An obscure species, known only from the type collection which appears to have suffered some damage since Balfour and Farrer wrote their type description. The plant is similar in most respects to *R. heliolepis*, but is widely separated from it geographically.

**2. (73.) R. bracteatum** Rehder & Wilson, Pl. Wils. 1:819 (1913). Type: China, W Szechuan, near Wen chuan hsien, 3300 m, vii 1908, *Wilson* 3421 (iso. K).
Ic.: Bot. Mag. 150: t. 9031 (1924); Ic. Corm. Sin. 3: t. 4078 (1974).

Shrub to 2 m with thin lepidote branches. Young shoots purplish, puberulous. Leaves ovate to elliptic, up to 35 × 15 mm, ± acute at the apex, rounded to subcuneate at the base, ± glabrous and elepidote above, sparsely lepidote with large, golden scales beneath. Bud scales of the leaf buds persistent. Inflorescence 4–6-flowered, pedicels sparsely lepidote, puberulous at the base. Calyx weakly 5-lobed, the lobes 1–2 mm, sparsely lepidote, the margins filiform-acicular-ciliate. Corolla openly funnel-shaped, 15–25 mm, white with many reddish spots, sparsely lepidote and puberulent towards the sinuses outside, puberulent inside the tube. Stamens 10, filaments

pubescent towards the base. Ovary lepidote and sparsely puberulent towards the apex. Style shorter than the longest stamens at anthesis, glabrous or sparsely pilose at the base. Capsule lepidote, 10–15 mm.
CHINA (C Sichuan). In woodland and on cliffs, c. 3300 m. Map 31, p. 86.

**3. (74.) R. heliolepis** Franchet, Bull. Soc. Bot. Fr. 34:283 (1887).

Shrub to 3 m. Young growth lepidote, purplish. Leaves oblong-ovate to oblong-elliptic, (50–)57–105 × (18–)20–40 mm, acute at the apex, rounded, truncate or cuneate at the base, lepidote above with whitish, scurfy deciduous scales, the undersurface with close but not contiguous golden or brownish scales. Inflorescence (4–)6–10-flowered, pedicels lepidote. Calyx rim-like or variably lobed, sometimes with one lobe rather longer than the rest, at most 3 mm, sparsely lepidote, filiform-acicular-ciliate. Corolla funnel-shaped, white to pink, more rarely purplish, usually with reddish, greenish or brownish spots on the upper lobes, puberulous outside towards the base and at the sinuses and densely lepidote, pilose inside the tube, (22–)24–34 mm, tube (13–)16–21 mm. Stamens 10, filaments densely pilose towards the base. Ovary densely lepidote, usually puberulous in the impressed part at the base of the style. Style shorter than the longest stamens, straight, variably pubescent towards the base, rarely entirely glabrous. Capsule lepidote, cylindric, 10–14 mm.

A complex and variable species; variation in many characters (leaf shape and size, scale density, pedicel length, corolla size and style indumentum) is continuous and it is difficult to find correlated characters that will serve to divide the species. Two varieties are recognised here, but they intergrade considerably and show no geographical separation. Characters previously used for the distinction of species within *R. heliolepis* are entirely unsatisfactory.

1. Leaves truncate or rounded at the base, length/breadth ratio 2·2–2·8(–3·3); inflorescence (4–)5–8-flowered . **a.** var. **heliolepis**
\+ Leaves cuneate at the base, length/breadth ratio (2·2–)2·7–3·3 (–3·6); inflorescence (5–)6–10-flowered . **b.** var. **brevistylum**

**3a.** var. **heliolepis.** Type: China, Yunnan, circa Hokin, in sylvis alt. 2500 m, usque ad cacumina supra collum Koua-la-po, 3500 m, *Delavay* 2089 (holo. P—n.v., iso. E). Pl. 1d; fig. 4ae, p. 21.

Syn.: *R. fumidum* Balfour f. & W. W. Smith, Notes R.B.G. Edinb.10:112 (1917). Type: China, W Yunnan, plateau of Te-ma-tchouen, vii 1912, *Maire* 224 (holo. E).

*R. oporinum* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 10:129 (1917). Type: E Upper Burma, Wulaw pass, valley of Naung chaung, 11–12000 ft, 27 viii 1914, *Kingdon Ward* 1906 (holo. E).

*R. plebeium* Balfour f. & W. W. Smith, op. cit.: 136. Type: China, W Yunnan, Shweli/Salween Divide, western flank, 10000 ft, *Forrest* 8938 (holo. E).

Ic.: Ic. Corm. Sin. 3: t. 4068 (1974).

CHINA (N, NW, W & SW Yunnan, SW Xizang), NE BURMA. Thickets and woodland, 2500–3700 m. Map 32, p. 86.

**3b.** var. **brevistylum** (Franchet) Cullen, Notes R.B.G. Edinb. 36:110 (1978). Fig. 4af, p. 21.

Syn.: *R. brevistylum* Franchet, Journ. de Bot. 8:261 (1898). Type: China, Setchuen oriental, vallée de haut Mekong à Sela, 15 vii 1875, *Soulié* (holo. P—n.v., iso. E).

*R. pholidotum* Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 10:132 (1917). Type: China, Yunnan, Tali range, eastern flank, 10000 ft, viii 1906, *Forrest* 4162 (holo. E).

*R. porrosquameum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:57 (1920). Type: China, Yunnan, Likiang range, western flank, vi 1917, *Forrest* 15071 (holo. E).

Ic.: Bot. Mag. 147: t. 8898 (1921); Ic. Corm. Sin. 3: t. 4067 (1974).

CHINA (N, NW & W Yunnan, SE Xizang, SW Sichuan). Thickets, 3000–3700 m. Map 32, p. 86.

**4. (75.) R. rubiginosum** Franchet, Bull. Soc. Bot. Fr. 34:282 (1887). Type: China, Yunnan, in dumetis ad pedem montis Tsang chan supra Tali, 2500 m, *Delavay* 2060 (holo. P—n.v., iso. E). Fig. 1b, p. 15 & 4ag, p. 21.

Syn.: *R. leclerei* Léveillé, Feddes Rep. 12:284 (1913). Type: China, Yunnan, haut plateau de Ta-hai-tse, 3200 m, v 1912, *Maire* (holo. E).

*R. catapastum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:36 (1920). Type: China, W Yunnan, Yung peh mountains, vii 1918, *Forrest* 16597 (holo. E).

*R. desquamatum* Balfour f. & Forrest, op. cit.: 40. Type: China, W Yunnan, Shweli/Salween Divide, Jang-tzow-shan, v 1919, *Forrest* 15761 (holo. E).

*R. stenoplastum* Balfour f. & Forrest, op. cit.: 60. Type: China, W Yunnan, Shweli/Salween Divide, v 1919, *Forrest* 17920 (holo. E).

*R. leprosum* Balfour f., nom. nud.

*R. squarrosum* Balfour f., nom. nud.

Ic.: Bot. Mag. 124: t. 7621 (1898) & 160: t. 9497 (1937); Millais, Rhododendrons opp. p. 236 (1917); The Garden 83:277 (1919); Ic. Corm. Sin. 3: t. 4065, 4066 (1974).

Shrubs or small trees up to 10 m, or more in cultivation. Young growth lepidote, purplish. Leaves narrowly elliptic to elliptic or almost lanceolate, (40–)60–115 × (12–)20–45 mm, cuneate at base, acute to acuminate at apex, glabrous and ± elepidote above, very densely lepidote with overlapping or contiguous unequal scales beneath (the larger scales usually darker than the smaller, distributed all over the surface or restricted to the area adjacent to the midrib only), the surface pale or dark brown due to the density of the scales. Inflorescence up to 10-flowered, pedicels lepidote. Calyx very small, usually rim-like, sometimes undulate, sparsely lepidote, glabrous. Corolla openly funnel-shaped, (15–)20–30(–38) mm, tube (11–)15–20(–23) mm, pink, mauve-pink, or rarely white flushed pink, glabrous but lepidote outside, pilose within the tube. Stamens 10, filaments sparsely pubescent towards the base. Ovary densely lepidote. Style glabrous, longer than the longest stamens at anthesis, declinate. Capsule lepidote, cylindric, 11–16 mm.

CHINA (N, NW, W & C Yunnan, SW Sichuan, SE Xizang), NE BURMA. Thickets and open forest, 2500–3500 m. Map 31, p. 86.

A widely distributed and variable species; the variation is largely uncorrelated, however, and the distinction of separate species or infra-specific taxa is not possible.

VIII. Subsection **Caroliniana** (Hutchinson) Sleumer, Bot. Jahrb. 74:535 (1949).

Syn.: Series *Carolinianum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 192 (1930).

Shrubs to 2(–5) m. Young growth lepidote. Leaves evergreen, rather densely lepidote beneath, slightly revolute. Inflorescence terminal, several-flowered, rachis often somewhat elongate, pedicels lepidote. Calyx short, unequally 5-lobed, the margins ciliate with loriform hairs. Corolla narrowly to openly funnel-shaped, usually densely lepidote outside, pubescent inside, white to pink, usually green spotted. Stamens 10, declinate, filaments pubescent towards the base. Ovary lepidote. Style impressed, declinate, glabrous, longer than the stamens at anthesis. Capsule cylindric, tapering, 5-ridged. Seeds unwinged and very obscurely finned.

Type Species: *R. carolinianum* Rehder (= *R. minus* Michaux var. *minus*).

Apart from *R. lapponicum* (p. 107), the species of this subsection is the only lepidote Rhododendron to occur in the New World. The subsection is closely related to subsection Heliolepida; indeed, the characters separating the two are rather tenuous, consisting mainly of the somewhat more deeply lobed, ciliate calyx of subsection Caroliniana. However, the geographical separation is significant and gives greater weight to the recognition of a separate subsection.

The subsection has traditionally consisted of three species: *R. carolinianum* Rehder, *R. minus* Michaux and *R. chapmanii* Gray. However, detailed work by Duncan & Pullen (*Brittonia* 14:290–298, 1962) has shown that only one species, divided into two varieties, can be recognised.

**1. (76.) R. minus** Michaux, Journ. Hist. Nat. 1:412 (1972).

Shrub, 2(–5) m. Young shoots green or purplish, sparsely lepidote. Leaves elliptic to broadly elliptic, (10–)55–80(–110) × (18–)25–35(–50) mm, dark green with dried-out scales and puberulent along the midrib above, densely lepidote beneath with small-rimmed, brownish scales. Inflorescence dense, 5–8-flowered, pedicels lepidote. Calyx lobes 1–2 mm, lepidote and sparsely loriform-ciliate. Corolla (21–)25–30(–35) mm, tube (9–)10–14(–18) mm, rather sparsely lepidote on the outer surfaces of the lobes, sometimes also very sparsely pubescent, sparsely pubescent within the tube. Style glabrous or occasionally slightly lepidote at the base, smoothly curved downwards at anthesis. Capsule cylindric.

Two varieties may be distinguished:

1. Leaf apex acute or acuminate; branches usually not erect and rigid . . . . . **a.** var. **minus**

\+ Leaf apex obtuse or retuse; branches erect and rigid . . . . **b.** var. **champanii**

**1a.** var. **minus**. Type: described from USA, banks of the Savannah river, Georgia. Fig. 4ah, p. 21.

Syn.: *R. punctatum* Andrews, Bot. Rep. 1: t. 36 (1798). Type: described from a cultivated plant.

*R. punctatum* var. *3*, Ker in Andr. Bot. Reg. 1: t. 37 (1815). Type: described from a cultivated plant.

*R. cuthbertii* Small, Torreya 2:9 (1902). Type: USA, Georgia, along the Savannah river, 1901, *Cuthbert* (n.v.).

*R. carolinianum* Rehder, Rhodora 14:99 (1912). Type: numerous syntypes from USA, N Carolina, including *Biltmore Herb.* 4463 (E), *Small & Heller* 281 (E), *Harbison* 168 (E), 119 (n.v.).

Ic.: Schneider, Ill. Handb. Laubh. 2:472, 474 (1909); Addisonia 1: t. 1 (1916); Millais, Rhododendrons 232 (1917).

USA (Tennessee, N Carolina, S Carolina, Georgia, Alabama). Woods, mountain slopes, etc.

The characters formerly used to separate *R. minus* and *R. carolinianum* have been thoroughly investigated by Duncan & Pullen (*op. cit.*), and have been shown to be extremely variable and not diagnostic.

**1b.** var. **champanii** (A. Gray) Duncan & Pullen, Brittonia 14:297 (1962). Type: described from USA, Florida, sandy pine barrens.

Syn.: *R. champanii* A. Gray, Proc. Amer. Acad. Phila. 12:61 (1876).

Ic.: Rhodo. Yearbook 1957: t. 40.

USA (Florida). Scattered localities in open pinelands and dry creek banks.

IX. Subsection **Lapponica** (Balfour f.) Sleumer, Bot. Jahrb. 74: 535 (1949).

Syn.: Series *Lapponicum* Balfour f., Notes R.B.G. Edinb. 9:298 (1916).

Series *Parvifolia* Busch in Komarov, Fl. URSS 18:44 (1952) pro parte.

Series *Burjatica* Malyschev, Not. Syst. Herb. Inst. Bot. Akad. Sci. URSS 21:455 (1961).

Section *Lapponica* (Balfour f.) Philipson & Philipson, Notes R.B.G. Edinb. 34:25 (1975).

Section *Setosa* Philipson & Philipson, op. cit.: 3.

Small shrubs. Leaves evergreen, usually papillose beneath. Scales variously coloured, lax to dense, with broad, undulate rims. Inflorescence terminal, a 1–several-flowered umbellate raceme, pedicels usually short and in line with the axis of the flower. Calyx usually conspicuously 5-lobed. Corolla usually openly funnel-shaped, more rarely almost hypocrateriform. Stamens 5–10(–11), usually actinomorphically arranged. Ovary 5-locular, lepidote. Style straight or declinate. Seeds unwinged and obscurely finned. Type species: *R. lapponicum* (Linnaeus) Wahlenberg.

This subsection has been very thoroughly revised by Philipson & Philipson (*Notes R.B.G. Edinb.* 34:1–71, 1975, which should be consulted for a more detailed discussion); the present account is based entirely on theirs with a few modifications. The main difference between the present and the Philipsons' account concerns *R. setosum*, which they removed from the subsection (*op. cit.*: 3), but which I have replaced. It is certainly true that *R.*

*setosum* differs from the rest of the group in a number of important characters, but it is similar in general overall facies, and seems to be better treated as an aberrant member of subsection Lapponica than as the only member of a new monotypic subsection. *R. cuneatum* (p. 95) is also aberrant in a number of ways.

Subsection Lapponica is related to subsection Triflora through *R. gemmiferum* (p. 80) and to subsection Heliolepida through *R. cuneatum*. It is also related to subsection Rhododendron and perhaps also to section Pogonanthum (p. 156).

1. Shoots persistently loriform-setose . . . **27. setosum**
+ Shoots glabrous or filiform-acicular puberulent, never loriform-setose . . . . . 2

2. Scales on the lower leaf surface opaque, white or pinkish . . **13. fastigiatum**
+ Scales not as above . . . . . 3

3. Corolla 20 mm or longer . . . . . **1. cuneatum**
+ Corolla less than 20 mm . . . . . 4

4. Scales on the lower leaf surface uniformly coloured . . . 5
+ Scales on the lower leaf surface of two colours or tints . . 23

5. Corolla yellow or white . . . . . 6
+ Corolla not yellow or white . . . . . 8

6. Scales on the lower leaf surface widely spaced . . **14. flavidum**
+ Scales on the lower leaf surface contiguous to almost so . . 7

7. Calyx up to 1·5 mm . . . . . **17. orthocladum**
+ Calyx 2·8 mm or more . . . . . **6. websteranum**

8. Scales on the lower surface of the leaf pale (straw-coloured to fawn) . . . . . 9
+ Scales on the lower leaf surface rufous or brown . . . 14

9. Stamens 4–7, filaments glabrous . . . . . **2. tsaii**
+ Stamens more than 7, filaments pilose near the base . . . 10

10. Stamens and style not exserted from corolla tube . . **3. intricatum**
+ Stamens and style exserted from corolla tube . . . . 11

11. Inflorescences more than 2-flowered . . **4. hippophaeoides**
+ Inflorescences 1–2-flowered . . . . . 12

12. Calyx up to 1 mm . . . . . **5. thymifolium**
+ Calyx 2 mm or longer . . . . . 13

13. Central area of scales on lower leaf surface pale; leaves usually narrowly elliptic, base widening gradually from petiole . . **6. websteranum**
+ Central area of scales on lower leaf surface golden; leaves usually elliptic, widening abruptly from petiole . . . **7. nitidulum**

14. Style shorter than or equal to stamens . . . . . 15
\+ Style longer than stamens . . . . . 17

15. Stamens 5–6 . . . . . **8. complexum**
\+ Stamens usually 10 . . . . . 16

16. Leaves lanceolate or narrowly elliptic . . . **17. orthocladum**
\+ Leaves elliptic to broadly elliptic . . . . **9. yungningense**

17. Mature leaf with brown scales dispersed over the pale lower surface . . . . . 18
\+ Mature leaf with scales closely arranged . . . . . 19

18. Calyx lobes 2·5 mm or more . . . . **15. impeditum**
\+ Calyx lobes up to 2·5 mm . . . . . **16. polycladum**

19. Calyx lobes up to 2 mm . . . . . 20
\+ Calyx lobes 2 mm or more . . . . . 21

20. Leaves broadly elliptic or rotund, lower surface rufous . . **10. tapetiforme**
\+ Leaves lanceolate or narrowly elliptic, lower surface brown . **17. orthocladum**

21. Outside of corolla pilose . . . . . **11. dasypetalum**
\+ Outside of corolla glabrous or occasionally minutely puberulous 22

22. Lower surface of leaf dark brown . . . **12. amundsenianum**
\+ Lower surface of leaf paler, ferrugineous or tan . **9. yungningense**

23. Lower leaf surface with the darker scales few and scattered . 24
\+ Lower leaf surface with the darker scales more evenly dispersed . 29

24. Calyx lobes 4 mm or more . . . . . **18. minyaense**
\+ Calyx lobes up to 4 mm . . . . . 25

25. Background scales of the lower leaf surface buff . . . 26
\+ Background scales of the lower leaf surface brown . **17. orthocladum**

26. Leaf usually longer than 12 mm . . . . . **19. bulu**
\+ Leaf shorter than 12 mm . . . . . 27

27. Corolla lepidote outside; leaf strongly mucronate. **20. telmateium**
\+ Corolla elepidote outside; leaf slightly mucronate . . . 28

28. Corolla rosy or purple . . . . . **7. nitidulum**
\+ Corolla yellow . . . . . **14. flavidum**

29. Leaf emucronate with decided contrast between dark and pale scales, usually less than 9 mm . . . . . **21. nivale**
\+ Leaf not with the above combination of characters . . . 30

30. Calyx up to 2·5 mm . . . . . 31
\+ Calyx 2·5 mm or more . . . . . 33

31. Leaf lanceolate or narrowly elliptic . . . **17. orthocladum**
\+ Leaf elliptic . . . . . 32

| | | |
|---|---|---|
| 32. | Style shorter than stamens . . . . . | **22. burjaticum** |
| + | Style longer than stamens . . . . . | **23. lapponicum** |
| 33. | Leaf emucronate . . . . . | **24. capitatum** |
| + | Leaf mucronate . . . . . | 34 |
| 34. | Calyx lobes with a central band of scales . . | **26. rupicola** |
| + | Calyx lobes without a central band of scales . . | **25. russatum** |

**1. (77.) R. cuneatum** W. W. Smith, Notes R.B.G. Edinb. 8:200 (1914). Type: China, Yunnan, eastern flank of Lichiang range, 3650 m, x 1910, *Forrest* 6738 (holo. E). Fig. 1c, p. 15.

Syn.: *R. ravum* Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:270 (1916). Type: China, Yunnan, mts. in NE of the Yangtze bend, 11000 ft, vii 1913, *Forrest* 10423 (holo. E).

*R. cinereum* Balfour f. in Millais, Rhododendrons 145 (1917) nom. nud.

*R. cheilanthum* Balfour f. & Forrest, Notes R.B.G. Edinb. 11:32 (1919). Type: China, Yunnan, mts in NE of Yangtze bend, 10–11000 ft, vii 1913, *Forrest* 11736 (holo. E).

*R. sclerocladum* Balfour f. & Forrest, op. cit. 11:133 (1919). Type: China, Yunnan, mts of Chungtien plateau, 11000 ft, vii 1914, *Forrest* 12665 (holo. E).

Shrub, 1–2(–4) m. Leaves densely lepidote, 11–70 × 5–26 mm, narrowly to broadly elliptic, apex acute, obtuse or rounded, strongly mucronate, base cuneate, undersurface uniformly fawn to deep rust or occasionally with darker spots, the scales contiguous or overlapping. Inflorescence up to 6-flowered, pedicels 2–13 mm, lepidote. Calyx (2–)5–8(–12) mm, lobes usually oblong, apex rounded to acute, with pale scales forming a central band, margin long-ciliate, sometimes with a few scales. Corolla deep purple to rose-lavender, often with darker markings, rarely almost white, funnel-shaped, (12–)22–31 mm, tube (5–)10–16 mm, pubescent within and often ouside also, lepidote or elepidote outside. Stamens 10, pubescent in the lower part, varying in length. Ovary lepidote, style declinate, longer than or rarely equal to stamens, pubescent towards the base. Capsule lepidote, ovoid, up to 14 mm.

CHINA (N & W Yunnan, SW Sichuan).

A distinctive species, in many ways similar to the species of subsection Heliolepida (p. 87), from which it differs mainly in the possession of a large, deeply lobed calyx. It is in many ways (large, zygomorphic flower, type of scaling, etc.) aberrant in subsection Lapponica, and stands in an intermediate position between Lapponica and Heliolepida. The Philipsons (1975, p. 16) note the occurrence of natural hybrids with *R. hippophaeoides* and other, undetermined, species.

**2. (78.) R. tsaii** Fang, Contr. Biol. Lab. Sci. Soc. China 22:66 (1939). Type: China, Yunnan, Chao-tung hsien, 2900 m, 19 v 1932, *Tsai* 50928 (holo. A, iso. E).

Shrub to 0·3 m. Leaves 6–12 × 2·5–5 mm, narrowly elliptic or oblong-lanceolate, apex subacute or obtuse, slightly mucronate, base cuneate, undersurface uniform buff, densely covered with overlapping pale scales. Inflorescence 3–7-flowered, pedicels lepidote, 1–2·5 mm. Calyx 0·8–1 mm, the lobes rounded, densely lepidote, margin lepidote and with a few cilia. Corolla pale purplish, broadly funnel-shaped, 4·5–6·8 mm, tube 2–2·8 mm, elepidote outside, slightly pubescent within. Stamens 4–7, shorter than corolla, filaments glabrous. Ovary densely pale lepidote, style c. 2 mm, slightly shorter than the stamens, glabrous. Capsule unknown.
CHINA (E Yunnan). Open moss land, 2900 m.

Known only from the type collection. The Philipsons (1975, p. 17) suggest the occurrence of natural hybrids between *R. tsaii* and *R. hippophaeoides*.

**3. (79.) R. intricatum** Franchet, Journ. de Bot. 9:395 (1895). Type: China, Szechuan occidental, aux environs de Tongolo, *Soulié* 765 (holo. P; iso. K, US).

Syn.: *R. blepharocalyx* Franchet, op. cit.: 396. Type: China, Sutchuen occidental, au voisinage de Tongolo, dans la vallée de Mouma et dans les montagnes de Tche-to, *Soulié* 398 (holo. P).

*R. peramabile* Hutchinson, Gard. Chron. 91:366 (1932). Type: a cultivated specimen (holo. K).

Shrub to 1·5 m, compact and intricately branched. Leaves (4·8–)6–12(–14) × (2·7–)3·5–7(–8) mm, oblong to elliptic or rotund, apex rounded, usually shortly mucronate, base cuneate to rounded, the margin often bearing branched hairs, undersurface uniformly buff to straw-coloured, scales ± contiguous to overlapping. Inflorescence (1–)2–6(–8)-flowered, pedicels lepidote, to 5 mm. Calyx 0·5–2 mm, lobes deltoid to oblong, margin lepidote with pale golden scales and/or marginal cilia. Corolla almost hypocrateriform, pale lavender to dark blue, rarely yellowish, elepidote outside, 8–12(–14) mm, tube 4–6(–7) mm. Stamens 10, not exserted from corolla tube, filaments pubescent towards the base. Ovary lepidote, style shorter than the stamens. Capsule ovoid, lepidote, c. 5 mm.
CHINA (N Yunnan, SW & C Sichuan). Open moist meadows, hillsides, forest margins, 2800–4900 m.

**4. (80.) R. hippophaeoides** Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:236 (1916).

Erect shrub to 1·25 m. Leaves (8–)12–25(–30) × (4–)5–10(–11) mm, elliptic to oblong, apex rounded to obtuse, base cuneate, undersurface yellowish buff, scales overlapping. Inflorescence 4–7-flowered, pedicels lepidote, 2·5–7 mm. Calyx up to 1·8 mm, the lobes often unequal, rounded to broadly deltoid, variably lepidote and ciliate. Corolla bright rose or lavender blue to bluish purple, rarely white, broadly funnel-shaped, 10·5–15 mm, tube 4–6·5 mm, elepidote, pubescent inside. Stamens 10, shorter than corolla, filaments pubescent towards the base. Ovary lepidote, style slightly shorter than to slightly longer than the stamens, glabrous or occasionally pubescent at the base. Capsule narrowly ovoid, 5–6 mm, lepidote.

Two varieties may be distinguished:

1. Style 4–10·5 mm . . . . . **a.** var. **hippophaeoides**
+ Style 13–16 mm . . . . . **b.** var. **occidentale**

**4a.** var. **hippophaeoides.** Type: Yunnan, mountains west of Tengku valley, 3650 m, *Forrest* 12562 (holo. E, iso. K). Pl. 1e.
Syn.: *R. fimbriatum* Hutchinson, Gard. Chron. 91:438 (1932). Type: a cultivated specimen (holo. K).
CHINA (NW, W, SW, N & C Yunnan, SW Sichuan). Open slopes, often marshy, 2400–4800 m.

**4b.** var. **occidentale** Philipson & Philipson, Notes R.B.G. Edinb. 34:20 (1975). Type: China, mid-west Yunnan, Chienchuan/Mekong Divide, vi 1923, *Forrest* 23341 (holo. E, iso. BM).
CHINA (N & C Yunnan). Open stony slopes, 3500–4250 m.

The Philipsons (1975, p. 20) record various natural hybrids of *R. hippophaeoides*.

**5. (81.) R. thymifolium** Maximowicz in Bull. Acad. Imp. Sc. St. Petersb. 23:531 (1877). Type: China, Kansu, 1873, *Przewalski* (holo. LE; iso. E, K).
Syn.: *R. polifolium* Franchet, Journ. de Bot. 9:397 (1895). Type: China, Sutchuen occidental, aux environs de Ta-tsien-lou, *Soulié* (holo. P).
*R. spilanthum* Hutchinson, Rhodo. Soc. Notes 3, No. 5:287 (1932). Type: China, Szechuan, Muli or Mili kingdom, vi 1922, *Rock* 6460 (iso. E).

Erect, openly branched or fastigiate shrub up to 1·25 m. Leaves (3–)5–12(–13·5) × (1·8–)2–5(–6) mm, elliptic, oblong or narrowly obovate to lanceolate or oblanceolate, apex obtuse, usually shortly mucronate, base narrowly cuneate, undersurface uniformly straw-coloured with contiguous to overlapping scales. Inflorescence 1(–2)-flowered, pedicels lepidote, 0·5–2 mm. Calyx 0·5–1·2 mm or rim-like, lobes rounded to deltoid, variously lepidote and/or ciliate. Corolla pale lavender-blue to deep purplish, broadly funnel-shaped, 7–11 mm, tube (2–)3–4 mm, sparingly lepidote outside, pubescent inside. Stamens 10 (rarely more), exceeding the corolla, filaments pubescent towards the base. Ovary lepidote, style short (3–5·8 mm) or long (10–16 mm), glabrous or rarely with a few scales or hairs near the base. Capsule 3–3·5 mm, lepidote.
CHINA (N Sichuan, Quinghai, Gansu). Forest and open alpine slopes, 2600–4600 m.

The Philipsons (1975, p. 22) record a natural hybrid with *R. telmateium*.

**6. (82.) R. websteranum** Rehder & Wilson, Pl. Wils. 1:511 (1913).

Erect, much branched shrub to 1·5 m. Leaves 6–15 × 3–9 mm, ovate or oblong-elliptic to ovate-lanceolate, apex obtuse, base cuneate, undersurface straw-coloured or golden brown, densely covered with contiguous scales. Inflorescence 1(–2)-flowered, pedicel 1–2 mm, lepidote. Calyx 2·8–5 mm, lobes broadly rounded or strap-shaped, margin usually densely ciliate,

sometimes with a few marginal scales. Corolla pale purple or yellow, funnel-shaped, 13·5–19 mm, tube 4·5–7 mm, pubescent in the throat and sometimes on the outside. Stamens 10, ± equalling the corolla, filaments pubescent towards the base. Ovary lepidote, style exceeding the stamens, slightly pubescent and with some scales near the base. Capsule ovoid, densely lepidote, 4–5 mm.

Two varieties may be distinguished:

| | | |
|---|---|---|
| 1. | Corolla pale purple . . . . . | **a.** var. **websteranum** |
| + | Corolla yellow . . . . . | **b.** var. **yulongense** |

**6a.** var. **websteranum.** Type: China, Szechuan W, north of Tachien-lu, Ta-pao-shan, 4100–4900 m, *Wilson* 1225 (holo. A; iso. BM, E, K).
CHINA (NW Sichuan). Heath and moorland, 3300–4900 m.

**6b.** var. **yulongense** Philipson & Philipson, Notes R.B.G. Edinb. 34:23 (1975). Type: China, Szechuan, Yulong-ksi, Minya country, S of Tatsienlu, vii 1929, *Rock* 17429 (holo. E).
CHINA (NW Sichuan). Grassland, 4300–4770 m.

Known from only two collections.

**7. (83.) R. nitidulum** Rehder & Wilson, Pl. Wils. 1:509 (1913).

Erect or ascending, much branched shrub to 1·3 m. Leaves 5–11 × (2·5–)3–7 mm, ovate or elliptic, apex obtuse or rounded, mucro absent or obscure, base truncate to broadly cuneate, undersurface uniformly fawn or with scattered darker scales as well, with the scales contiguous or almost so. Inflorescence 1–2-flowered, pedicel lepidote, 0·5–1·5 mm. Calyx (1·5–)2·5–3 mm, the lobes strap-shaped, rounded, equal or unequal, indumentum and scales variable. Corolla rosy lilac or violet-purple, funnel-shaped, 12–15 mm, tube 4–5 mm, pubescent inside. Stamens (8–)10, equalling or slightly longer than corolla, filaments pubescent towards the base or glabrous. Ovary lepidote, style exceeding the stamens, pubescent or glabrous at the base. Capsule ovoid, c. 5 mm, lepidote.

Two varieties may be distinguished:

| | | |
|---|---|---|
| 1. | Leaf uniformly pale lepidote beneath . . . | **a.** var. **nitidulum** |
| + | Leaf pale lepidote and with a few darker scales beneath . . | **b.** var. **omeiense** |

**7a.** var. **nitidulum.** Type: China, Szechuan W, Mupin, 3300–4000 m, vi 1908, *Wilson* 3458 (holo. A; iso. BM, E, K).
Syn.: *R. nitidulum* var. *nubigenum* Rehder & Wilson, op. cit.: 510. Type: China, W Szechuan, vicinity of Tachienlu, 4300–4500 m, vii 1908, *Wilson* 3461 (holo. A; iso. BM, E, K).
CHINA (NW Sichuan). Moorlands, 3300–5000 m.

**7b.** var. **omeiense** Philipson & Philipson, Notes R.B.G. Edinb. 34:24 (1975). Type: China, Szechuan, Mt Omei, 3300 m, vii-viii 1931, *Wang* 23448 (holo. A; iso. E).
CHINA (C Sichuan, Mt Omei only). Rocky slopes, 3200–3500 m.

**8. (84.) R. complexum** Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:222 (1916). Type: China, Yunnan, Chungtien plateau, 3350–3650 m, *Forrest* 12520 (holo. E, iso. K).

Fastigiate or rounded, much branched shrub, 8–60 cm. Leaves 3·5–11 × 1·8–6 mm, broadly or narrowly elliptic to ovate, apex obtuse or rounded, mucro small or absent, base cuneate or truncate, undersurface uniformly ferrugineous with contiguous scales. Inflorescence 3–4(–5)-flowered, pedicels lepidote, 0·5–7·5 mm. Calyx obsolete to less than 1 mm, rarely to 2 mm, lobes deltoid, rounded or strap-shaped, margin lepidote and/or ciliate. Corolla pale lilac to rosy purple, usually narrowly funnel-shaped, 9–13 mm, tube 4–6 mm, pubescent inside and occasionally outside. Stamens 5–6(–8), filaments pubescent towards the base. Ovary lepidote, style usually short (up to 3 mm), rarely longer (6–8 mm), glabrous or slightly pubescent towards the base. Capsule c. 5 mm, ovoid to subrotund, lepidote.
CHINA (N Yunnan). Alpine screes, rocks and stony slopes, 3400–4600 m.

**9. (85.) R. yungningense** Balfour f. in Stevenson (ed.), The Species of Rhododendron 436 (1930). Type: China, SW Szechuan, mountains east of Yungning, 4260 m, *Forrest* 20463 (holo. E).
Syn.: *R. glomerulatum* Hutchinson, Gard. Chron. 91:428 (1932). Type: a cultivated specimen (holo. K).

Erect shrub, 1(–1·3) m. Leaves (6–)8–20 × (2–)4–8 mm, elliptic to broadly elliptic or oblong, apex acute or obtuse, clearly or obscurely mucronate, base cuneate, undersurface fawn to ferrugineous, sometimes with slight darker spotting, with ± contiguous scales. Inflorescence 3–4(–6)-flowered, pedicels lepidote, 2–3 mm. Calyx lobes irregular, usually 2–3 mm, deltoid to strap-shaped or irregularly lobed, variably lepidote and ciliate. Corolla deep purplish blue, rose-lavender or rarely white, broadly funnel-shaped, 11–14(–16·5) mm, tube 5–6 mm, pubescent in the throat and rarely so on the outside. Stamens (8–)10, filaments pubescent towards the base. Ovary lepidote, style short (3·5–6 mm) or long (10–15 mm), glabrous. Capsule ovoid, c. 5 mm, lepidote.
CHINA (N & NW Yunnan, SW Sichuan). Open alpine slopes, 3200–4300 m.

The Philipsons (1975, p. 27) record the occurrence of a natural hybrid with *R. rupicola* var. *rupicola*.

**10. (86.) R. tapetiforme** Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 9:279 (1916). Type: China, Tibet/Yunnan frontier, Ka-gwr-pu, 4550 m, vii 1913, *Kingdon Ward* 795 (holo. E).

A low matted or rounded, densely branched shrub, prostrate or up to 90 cm. Leaves 4–12(–17) × (2–)3–8(–9·5) mm, broadly elliptic to rotund, apex obtuse or rounded, emucronate or with slight mucro, base broadly cuneate, undersurface uniformly rufous, densely covered with contiguous scales. Inflorescence 1–3(–4)-flowered, pedicels lepidote, sometimes puberulous, 1·5–3 mm. Calyx obsolete or up to 2 mm with rounded or deltoid lobes, variably lepidote or ciliate. Corolla usually purplish or purplish blue, sometimes violet or rose, exceptionally yellow, broadly funnel-shaped, pubescent inside and sometimes on the outside as well, 9–16 mm, tube 3–5 mm. Stamens 10 or rarely 5–6, filaments pubescent towards the base. Ovary

lepidote, style exceeding the stamens (very rarely shorter), glabrous or pubescent towards the base. Capsule ovoid, lepidote, 5–7 mm.
NE BURMA, CHINA (NW Yunnan, SE Xizang). Open alpine slopes and bare screes, 3500–4600 m.

The Philipsons (1975, p. 28) record natural hybrids between *R. tapetiforme* and various other species. *R. chamaezelum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:241, 1922 (Type: China, Yunnan, Mekong/Salween Divide, 12000 ft, vi 1917, *Forrest* 14074, holo. E) is considered to be of hybrid origin, between *R. tapetiforme* and *R. rupicola* var. *chryseum*.

**11. (87.) R. dasypetalum** Balfour f. & Forrest, Notes R.B.G. Edinb. 11:45 (1919). Type: China, Yunnan, Li-ti-ping, 3500 m, vi 1917, *Forrest* 13905 (holo. E, iso. K).

Much branched shrub to 75 cm. Leaves 8–15 × 3–7·5 mm, elliptic or oblong-elliptic, apex obtuse or rounded, mucronate, base broadly cuneate, sometimes with a few simple cilia near the base and on the petiole, undersurface uniformly tawny brown, densely covered with contiguous scales. Inflorescence 2-flowered, pedicels lepidote and puberulous, 3–4 mm. Calyx 3 mm, lobes broadly strap-shaped, rounded, pubescent and lepidote, margin ciliate. Corolla bright purplish rose, broadly funnel-shaped, 12–15(–18) mm, tube 4–5(–8) mm, pubescent inside, pilose outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style exceeding stamens, pubescent at base. Capsule ovoid, c. 5 mm, lepidote.
CHINA (NW Yunnan). Open stony pasture, 3500 m.

Known only from one collection.

**12. (88.) R. amundsenianum** Handel-Mazzetti, Anz. Akad. Wiss. Wien. Math.-Nat. Kl. 58:25 (1921). Type: China, Szechuan, m. Lose-schan, nr. Ningyuen, c. 3900–4250 m, 16 iv 1914, *Handel-Mazzetti* 1414 (holo. W, iso. A).

Shrub to 50 cm. Leaves 9–18 × 5–9 mm, broadly elliptic or rotund, apex rounded with a short reflexed mucro, base truncate or broadly cuneate, undersurface a uniform rusty brown, the scales irregularly contiguous. Inflorescence c. 3-flowered, pedicels densely lepidote, 2–3 mm. Calyx 4–5 mm, lobes ovate with a central band of scales, margins densely ciliate. Corolla and stamens unknown. Style up to 15 mm, pubescent towards the base. Capsule lepidote, 5 mm.
CHINA (SW Sichuan).

Known only from very limited material (2 collections) and in need of further study when more material is available.

**13. (89.) R. fastigiatum** Franchet, Bull. Soc. Bot. Fr. 33:234 (1886).
Type: China, Yunnan, in monte Tsang-chan supra Tali, vi 1883, *Delavay* 360 (holo. P; iso. A, E p.p., K).
Syn.: *R. nanum* Léveillé, Feddes Rep. 12:285 (1913). Type: China, Yunnan, 1911, *Maire* (holo. E).
*R. capitatum* sensu Franchet, Bull. Soc. Bot. Fr. 32:7 (1885) non Maximowicz (see p. 107).

Prostrate, tufted shrub, or forming a compact cushion, to 1·5 m. Leaves (4·5–)7–14(–16) × (2·8–)3–6(–9) mm, oblong, broadly elliptic or ovate, apex rounded to subacute, mucronate, base cuneate or subtruncate, undersurface fawn to greyish with the scales contiguous in groups or more scattered. Inflorescence 1–3(–4)-flowered, pedicels lepidote, 0·5–3 mm. Calyx 2·5–5·5 mm, lobes oblong or bluntly triangular, apex rounded or acute, scaling variable, margin usually ciliate. Corolla bright lavender-blue to pinkish or rich purple, funnel-shaped (9·5–)10–15·5(–18) mm, tube 3–6·5(–8) mm, pubescent inside and rarely also outside, usually elepidote outside. Stamens (6–)10, filaments pubescent towards the base. Ovary lepidote, occasionally with an apical tuft of hairs, style exceeding the stamens, glabrous or rarely pubescent and/or lepidote at the base. Capsule ovoid, 5–6 mm, lepidote.

CHINA (N & C Yunnan). Open stony pastures, screes, cliffs and in forest, 3400–4400 m.

The Philipsons (1975, p. 38) record a natural hybrid with *R. rupicola* var. *rupicola*.

**14. (90.) R. flavidum** Franchet in Journ. de Bot. 9:395 (1895).

Erect shrub to 2·5 m. Leaves 7–15 × 3–7 mm, broadly elliptic to oblong, apex rounded, shortly mucronate, base broadly to narrowly cuneate, undersurface pale grey-green with well-spaced scales. Inflorescence 1–3-flowered, pedicels pubescent, sometimes with a few scales as well, 1–4 mm. Calyx 2–4(–7) mm, minutely pubescent at the base, lobes strap-shaped or deltoid, acute, sometimes unequal, sparsely lepidote or elepidote, ciliate. Corolla yellow, broadly funnel-shaped, pubescent outside and inside, 12–18 mm, tube 4–7 mm, elepidote or sparsely lepidote. Stamens (8–)9–10, ± equal to the corolla, filaments pubescent towards the base. Ovary densely lepidote, style exceeding stamens, pubescent at base. Capsule ovoid, lepidote, c. 6 mm.

Two varieties can be distinguished:

1. Scales on leaf undersurface uniform in colour; calyx lobes 2–4(–7) mm . . . . . **a.** var. **flavidum**
\+ Scales on leaf undersurface dimorphic, some dark, the rest golden; calyx lobes c. 2 mm . . . . **b.** var. **psilostylum**

**14a.** var. **flavidum.** Type: China, 'E Tibet' (*sic*!), Tatsienlou, 1893, *Soulié* 625 (iso. E).

Syn.: *R. primulinum* Hemsley, Gard. Chron. 47:4 (1910). Type: a cultivated specimen (holo. K).

CHINA (NW Sichuan). Alpine regions, 3000–4000 m.

**14b.** var. **psilostylum** Rehder & Wilson, Pl. Wils. 1:513 (1913). Type: China, Szechuan, west of Kuan hsien, summit of Niu-tou-shan, 3300 m, 20 vi 1908, *Wilson* 3452 (holo. A; iso. BM, E, K).

Syn.: *R. psilostylum* (Rehder & Wilson) Balfour f., Notes R.B.G. Edinb. 11:104 (1919).

CHINA (NW Sichuan).

Known only from one collection.

**15. (91.) R. impeditum** Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:239 (1916). Type: China, Yunnan, western flank of the Lichiang range, 3650–3960 m, vi 1910, *Forrest* 5876 (holo. E).

Syn.: *R. litangense* [Balfour f. ex] Hutchinson in Stevenson (ed.), The Species of Rhododendron 411 (1930). Type: none cited.

*R. semanteum* Balfour f., loc. cit., nom. nud.

Compact, much branched shrub to 0·9(–1·2) m. Leaves (4–)5–14(–15) × (2·5–)3–6(–7) mm, elliptic or ovate to broadly elliptic or oblong, apex obtuse or acute, mucronulate, base broadly cuneate, undersurface pale grey-green speckled brown or more uniformly rusty, the scales markedly to slightly discontiguous. Inflorescence up to 4-flowered, pedicels lepidote and rarely pubescent, 0·8–3 mm. Calyx usually 2·5–4 mm, occasionally shorter, lobes strap-shaped with a rounded or deltoid apex, usually with a few scales forming a central band, margin ciliate. Corolla violet or purple to rose-lavender, rarely white, broadly funnel-shaped, (7–)8–15 mm, tube (2–)3–6 mm, pubescent inside, rarely also outside, elepidote or with a few scales on the outside of the lobes. Stamens usually 10, often rather variable in number, filaments pubescent towards the base. Ovary lepidote, style very variable in length, from shorter than to longer than the stamens, glabrous or pubescent towards the base. Capsule ovoid, 4–6 mm, lepidote.

CHINA (N Yunnan, SW Sichuan). Forests, open slopes, alpine meadows, cliffs, etc., 3300–4600 m.

The Philipsons (1975, p. 42) record hybrids between *R. impeditum* and various other species.

**16. (92.) R. polycladum** Franchet, Bull. Soc. Bot. Fr. 33:234 (1886). Type: China, Yunnan, pâturages et rochers au Koua-lou-po (Hoking), 3000 m, *Delavay* 267 bis (holo. P; iso. A, E).

Syn.: *R. scintillans* Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:217 (1916). Type: China, Yunnan, summit of Lankong/Hochin pass, 11000 ft, v 1913, *Forrest* 10014 (holo. E).

*R. compactum* Hutchinson, Gard. Chron. 91:326 (1932). Type: a cultivated specimen (holo. K).

Erect shrub to 1·2 m. Leaves (4–)8–18(–20) × (2–)3–6(–8) mm, narrowly elliptic to elliptic, acute or obtuse, very shortly or obscurely mucronate, base cuneate, undersurface greyish with brown stippling, or more uniformly reddish brown, the scales discontiguous or contiguous in groups. Inflorescence up to 5-flowered, pedicels lepidote, 0·5–3 mm. Calyx obsolete to 2·5 mm, lobes sometimes unequal, deltoid to rounded, lepidote, margins ciliate and/or lepidote. Corolla lavender to rich purple-blue, rarely white, broadly funnel-shaped, pubescent inside and occasionally outside as well, elepidote, 7·5–13 mm, tube 2·5–5 mm. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style exceeding stamens, glabrous or rarely with a few hairs at the base. Capsule oblong, up to 6 mm, lepidote.

CHINA (N, NW, W & C Yunnan). Forest margins, open slopes, cliffs, 3000–4300 m.

The Philipsons (1975, p. 43) report natural hybrids with *R. nivale* subsp. *australe* and other species.

**17. (93.) R. orthocladum** Balfour f. & Forrest, Notes R.B.G. Edinb. 11:104 (1919).

Much branched erect shrub to 1·3 m. Leaves 8–16 × 2·5–5(–6) mm, narrowly elliptic to lanceolate, apex obtuse, shortly or obscurely mucronate, base cuneate, undersurface yellowish brown to fawn, usually with deeper brown speckling, scales contiguous or almost so, golden to yellow-brown with few to many darker scales intermixed. Inflorescence (1–) 2–4(–5)-flowered, pedicels lepidote, 1·5–2(–3) mm. Calyx 0·5–1·5 mm, lepidote at base, lobes rounded to deltoid, often unequal, sometimes with a few scales on the back, margin occasionally with a few scales and cilia. Corolla pale to deep lavender blue to purple or whitish pink, funnel-shaped, 7–13·5 mm, tube 2–4·5 mm, pubescent in the throat, lobes elepidote or sparsely lepidote outside. Stamens 8–10, shorter than to equalling the corolla. Ovary lepidote, style 3·5–5 or 15–16 mm long, glabrous or sparsely lepidote. Capsule ovoid, 5 mm, lepidote.

Three varieties may be distinguished:

| | | |
|---|---|---|
| 1. | Corolla white . . . . . | **c.** var. **microleucum** |
| + | Corolla blue to purple . . . . . | 2 |
| 2. | Style 3·5–5 mm . . . . . | **a.** var. **orthocladum** |
| + | Style 15–16 mm . . . . . | **b.** var. **longistylum** |

**17a.** var. **orthocladum.** Type: China, Yunnan, mountains in the NE of the Yangtze bend, 3350–3650 m, vii 1913, *Forrest* 10481 (holo. E; iso. A, K).
CHINA (N Yunnan, SW Sichuan). Forest margins, cliffs, thickets, 2500–4500 m.

**17b.** var. **longistylum** Philipson & Philipson, Notes R.B.G. Edinb. 34:44 (1975). Type: China, Yunnan, mt. Ta-pao-shan, between Wei hsi and the Mekong, vii 1928, *Rock* 17135 (holo. NY; iso. A, E).
CHINA (N & NW Yunnan). Thickets on alpine slopes, 3500 m.

**17c.** var. **microleucum** (Hutchinson) Philipson & Philipson, Notes R.B.G. Edinb. 34:45 (1975).
Syn.: *R. microleucum* Hutchinson, Gard. Chron. 93:334 (1933). Type: a cultivated specimen (holo. K, iso. E).

Known only in cultivation, and distinguished from var. *orthocladum* solely by its white flowers.

**18. (94.) R. minyaense** Philipson & Philipson, Notes R.B.G. Edinb. 34:45 (1975). Type: China, Szechuan SW, Djesi-la and Djesi-Longba, south of Tatsienlu, 4600 m, vi 1929, *Rock* 17726 (holo. E; iso. A, US).

Erect, rounded, much branched shrub to 60 cm. Leaves (7–)9–17 × (4–)5–10 mm, broadly ovate or oblong-elliptic, apex obtuse or rounded, mucro obscure, base broadly cuneate, truncate or subcordate, undersurface tawny with some darker speckling, densely covered with contiguous golden scales, some with darker centres. Inflorescence 2–3-flowered, pedicels lepidote, 1–2 mm. Calyx lobes 4–7·5 × 3–4·5 mm, broadly rounded or ovate, margins

ciliate and sometimes with a few scales, and with a band of scales up the centre. Corolla pale to deep purplish blue, funnel-shaped, 14–18 mm, tube 4–6 mm, pubescent inside and often also outside, rarely sparsely lepidote outside. Stamens 10, rarely fewer, slightly shorter than the corolla. Ovary lepidote, style 14–16 mm, exceeding the stamens, pubescent or glabrous towards the base. Capsule ovoid, c. 5 mm, lepidote.
CHINA (NW Sichuan).

**19. (95.) R. bulu** Hutchinson in Rhodo. Soc. Notes 31 No. 5:280 (1932). Type: SE Tibet, Lusha, 3050 m, 19 v 1924, *Kingdon Ward* 5686 (holo. E).

Erect, straggling shrub up to 1·6 m. Leaves (8–)12–21 × 4–7(–8) mm, elliptic or oblong-elliptic, apex rounded, obscurely mucronate, usually emarginate, base broadly cuneate, undersurface pale with tan speckling, with irregularly contiguous or slightly discontiguous colourless, straw or buff scales with some larger, darker scales dispersed among them. Inflorescence 1–3(–5)-flowered, pedicel pubescent and lepidote, 1–2 mm. Calyx lobes 1–2(–4) mm, triangular to irregularly rounded, outer surface lepidote, margin lepidote and with a few cilia. Corolla pinkish purple, magenta, deep violet or occasionally white, pubescent in the throat and rarely so on the outer surface, (9·5–)10·5–13(–17) mm, tube 2·5–3(–5) mm, lobes with pale scales on the outer surface. Stamens (8–)10. Ovary lepidote, style 12–17 mm, usually exceeding the stamens, usually pubescent and with a few scales towards the base. Capsule ovoid, lepidote, c. 5 mm.
CHINA (S & SW Xizang—Tsangpo valley). Open woodland, scrubby and wooded hillsides, 3000–3800 m.

The Philipsons (1975, p. 47) record a natural hybrid with *R. nivale* subsp. *nivale*.

**20. (96.) R. telmateium** Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:279 (1916). Type: China, Yunnan, mountains of the Chungtien plateau, 3650 m, vi 1914, *Forrest* 12568 (holo. E).

Syn.: *R. diacritum* Balfour f. & W. W. Smith, op. cit., 225. Type: China, Yunnan, mountains of the Chungtien plateau, 13–14000 ft, v 1913, *Forrest* 12614 (holo. E).

*R. drumonium* Balfour f. & W. W. Smith, op. cit.: 226. Type: China, Yunnan, valley of the Chung river, 10500 ft, v 1913, *Kingdon Ward* 269A (holo. E).

*R. idoneum* Balfour f. & W. W. Smith, op. cit.: 237. Type: China, Yunnan, mountains of Chungtien plateau, 13–14000 ft, vii 1914, *Forrest* 12623 (holo. E).

*R. pycnocladum* Balfour f. & W. W. Smith, op. cit.: 267. Type: China, Yunnan, Lichiang range, 10–11000 ft, v 1906, *Forrest* 2181 (holo. E).

Much branched prostrate shrub forming dense cushions or mats, or erect and up to 1 m. Leaves 3–12(–14) × 1·5–5(–6·5) mm, narrowly elliptic or lanceolate to broadly elliptic or rotund, apex acute to rounded, strongly mucronate, base cuneate, undersurface golden-fawn to pale orange or reddish brown with densely overlapping scales, the majority pale gold to reddish brown mixed with few to many darker scales (these rarely absent).

Inflorescence 1-2(-3)-flowered, pedicels lepidote, sometimes puberulous also, 0·5-1·5(-2) mm. Calyx 0·5-2·5(-3) mm, lobes deltoid to rounded, often unequal, lepidote, margin with scales and/or long cilia. Corolla lavender or rose-pink to purple, broadly funnel-shaped, (6-)7-12(-14) mm, tube 2-4 mm, pubescent in the throat and often also outside, sparingly to densely lepidote outside. Stamens 10, varying in length, ± as long as the corolla. Ovary lepidote, style 3-17 mm, shorter than, equalling or longer than stamens, glabrous or pubescent towards the base, sometimes with a few scales. Capsule ovoid, c. 3 mm, lepidote.
CHINA (N, NW & C Yunnan, SW Sichuan). Forests, open rocky slopes, cliffs, 2900-5000 m.

A variable species. The Philipsons (1975, p. 50) record natural hybrids with *R. intricatum* and *R. thymifolium*.

**21. (97.) R. nivale** Hooker, Rhodo. Sikkim Himalaya 29 (1849).

Low, compact, much branched shrub, prostrate or attaining 60-90(-120) cm. Leaves 3·5-9(-12) × (1·5-)2-5(-6) mm, elliptic to broadly elliptic, ovate or rotund, apex obtuse, rounded or acutish, emucronulate or very shortly mucronulate, base broadly cuneate, undersurface yellowish to fawn, often with dark brown speckling, the scales contiguous to slightly discontiguous, the majority pale gold with darker scales widely but regularly spaced, rarely the dark scales as many as the paler. Inflorescence 1-2(-3)-flowered, pedicels 0·5-1·5 mm, lepidote and sometimes also pubescent. Calyx obsolete or with lobes 2-4(-4·5) mm, oblong or elongate-deltoid, lepidote and sometimes pubescent at the base, bearing pale and some dark scales on their outer surface, margin lepidote and often with some cilia. Corolla varying from rich purple through magenta and lilac to pink, broadly funnel-shaped, pubescent in the throat and often also on the outside, elepidote or occasionally lepidote, (7-)9-13(-16) mm, tube (2·5-)3-4(-6) mm. Stamens usually 10, filaments pubescent towards the base, longer or shorter than corolla. Ovary lepidote, style variable, 3·5-18 mm, usually longer than stamens, rarely shorter, glabrous or slightly pubescent at the base. Capsule rotund to ovoid, 3-5 mm, lepidote.

Three subspecies may be recognised:

| | | |
|---|---|---|
| 1. | Calyx ±obsolete . . . . . | **b.** subsp. **boreale** |
| + | Calyx lobes 2-4(-4·5) mm . . . . . | 2 |
| 2. | Calyx lobes lepidote-margined; leaf apex rounded. | **a.** subsp. **nivale** |
| + | Calyx lobes ciliate; leaf apex ± acute . . | **c.** subsp. **australe** |

**21a.** subsp. **nivale**. Type: Sikkim/Tibetan frontier, 4800-5490 m, *Hooker* (holo. K; iso. E, UPS, US).

Syn.: *R. paludosum* Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16:175 (1931). Type: S Tibet, Rong-chu (Tumbatse), 12000 ft, *Kingdon Ward* 5792 (holo. K, iso. E).

NEPAL, INDIA (Sikkim), BHUTAN, CHINA (S & SE Xizang). Open mountainsides, screes, up to 5800 m.

**21b.** subsp. **boreale** Philipson & Philipson, Notes R.B.G. Edinb. 34:52 (1975). Type: China, Yunnan, mountains of Moting, NE of the Yangtze/Mekong watershed, vi 1923, *Rock* 9312 (holo. E, iso. K).

Syn.: *R. nigropunctatum* Franchet, Journ. de Bot. 5:95 (1891). Type: Thibet, entre Lhassa et Batang, 8 v 1890, *Henri d'Orleans* (holo. P, iso. K).

*R. ramosissimum* Franchet, ibid. 12:64 (1898). Type: Setchuen occidental au sud de Tatsienlu, *Mussot* (iso. BM).

*R. alpicola* Rehder & Wilson, Pl. Wils. 1:506 (1913). Type: China, W Szechuan, N of Tachienlu, Ta-pao-shan, 4000–5000 m, vii 1908, *Wilson* 3465 (iso. BM, E, K).

*R. alpicola* var. *strictum* Rehder & Wilson, op. cit.: 513. Type: China, W Szechuan, N of Tachienlu, Ta-pao-shan, 4300 m, 7 vii 1908, *Wilson* 3467a (iso. BM, E, K, US).

*R. violaceum* Rehder & Wilson, op. cit.: 513. Type: China, W Szechuan, *Wilson* 3463 (holo. A; iso. E, US).

*R. oresbium* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 9:253 (1916). Type: China, Tibet/Yunnan frontier, Doker la, 13–15000 ft, *Kingdon Ward* 541 (holo. E).

*R. stictophyllum* Balfour f., Notes R.B.G. Edinb. 11:139 (1919). Type: China, Szechuan, Principality of Batang, Yaragong, vi 1903, *Soulié* 3303 (holo. P, iso. E).

*R. vicarium* Balfour f., ibid. 12:176 (1920). Type: China, W Szechuan, Tatsienlu, 27 vi 1894, *Soulié* 2772 (holo. P, iso. E).

*R. batangense* Balfour f., ibid. 13:31 (1920). Type: China, W Szechuan, Principality of Batang, Yaragong, vi 1903, *Soulié* 3304 (holo. P, iso. E).

*R. oreinum* Balfour f., op. cit. 13:54 (1920). Type: China, W Szechuan, Yaragong, v 1904, *Soulié* 3710 (holo. P).

*R. yaragongense* Balfour f., op. cit. 13:64 (1920). Type: China, W Szechuan, Principality of Batang, Yaragong, *Soulié* 3709 (holo. P, iso. E).

CHINA (NW Yunnan, SE Xizang, SW & NW Sichuan). Open moorland, dry rocky slopes, swampy grassland, 3200–5000 m.

**21c.** subsp. **australe** Philipson & Philipson, Notes R.B.G. Edinb. 34:54 (1975). Type: China, Yunnan, Chao-lioshau, Mekong/Yangtze Divide, 4260 m, vii 1924, *Forrest* 25707 (holo. E).

CHINA (NW & C Yunnan). Alpine moorland, cliffs, 3100–4300 m.

The Philipsons record natural hybrids between the subspecies of *R. nivale* and various other species (1975, pp. 52, 53, 55).

**22. (98.) R. burjaticum** Malyschev, Not. Syst. Herb. Inst. Acad. Sci. URSS 21:455–458 (1961). Type: USSR, Montes Sajanenses orientales, alpes Kitojenses, fl. Saghan-Sajir, 20 vi 1958, *Malyschev* (holo. LE—n.v.).

Much branched spreading shrub to 15 cm. Leaves 8–12 × 3–6 mm, elliptic to ovate, apex obtuse, mucronate, base broadly cuneate, undersurface bicolorous, densely covered with pale golden scales mixed with darker, amber scales. Inflorescence 3–8-flowered, pedicel lepidote and minutely pubescent, (1–)2–3·5 mm. Calyx lobes rounded to triangular, c. 0·5 mm,

lepidote, margin ciliate. Corolla rosy violet, narrowly funnel-shaped, 12–15 mm, tube 5–7 mm, pubescent in the throat. Stamens (5–)7(–10), shorter than corolla, filaments pubescent towards the base. Ovary lepidote, style 3–4 mm, shorter than the stamens. Capsule ovoid, lepidote, c. 6 mm.
USSR (eastern Sajan mountains to the west of the southern end of Lake Baikal). Moist places in Larch forests.

**23. (99.) R. lapponicum** (Linnaeus) Wahlenberg, Fl. Lapp. 104 (1812).
Syn.: *Azalea lapponica* Linnaeus, Sp. Pl. 151 (1753). Described from Lapland.
*A. ferruginosa* Pallas, Fl. Ross. 2: pl. 70 fig. 1A, B (1788).
*R. parvifolium* Adams, Nouv. Mém. Soc. Nat. Mosc. 9:237 (1834).
*R. palustre* Turczaninow in Bull. Sci. Nat. Mosc. 11:96 (1838).
*R. parviflorum* F. Schmidt, Fl. Sachal. 158 (1868)..
*Azalea parvifolia* (Adams) Kuntze, Rev. Gen. 2:387 (1891).
*R. confertissimum* Nakai, Bot. Mag. Tokyo 31:239 (1917).

Much branched prostrate or erect shrub to 1 m. Leaves 4–20(–25) × 2–7(–9) mm, oblong-elliptic to elliptic-ovate, apex obtuse or rounded, mucronate (sometimes obscurely so), base cuneate, undersurface fawn to ferrugineous, the contiguous scales bicolorous, either straw-coloured to fawn, or ferrugineous, the two colours occurring in various proportions. Inflorescence 3–6-flowered, pedicels lepidote, 3–12 mm. Calyx 1–2 mm, lobes deltoid, variably lepidote, margin ciliate. Corolla violet-rose to purple or sometimes white, broadly funnel-shaped, pubescent in the throat, (6·5–)7·5–14(–15) mm, tube (1·5–)2–5(–6) mm. Stamens 5–10, filaments pubescent towards the base. Ovary lepidote, style 10·5–15 mm, exceeding the stamens, glabrous. Capsule ovoid, 4–6 mm, lepidote.
SCANDINAVIA, USSR (Siberia), USA (Alaska), CANADA, GREENLAND, with outliers in C USA and CANADA (British Columbia).

**24. (100.) R. capitatum** Maximowicz, Bull. Acad. Imp. Sci. St. Petersb. 23:351 (1877). Type: China, Kansu, *Przewalski* 22 (holo. LE).

Compact and rounded shrub to 1·5 m. Leaves (7–)10–18(–22) × (3–)5–9 mm, elliptic or oblong-elliptic, apex rounded, emucronate, base broadly cuneate, undersurface pale brown with darker speckling, the bicolorous scales contiguous or discontiguous, colourless to straw-coloured with pale golden centres and tan to dark amber with darker centres, usually either equal in number or the pale scales predominating. Inflorescence 3–5-flowered, pedicel 1–3 mm, pilose or lepidote. Calyx variable, often with unequal membranous lobes up to 6 mm, pilose or lepidote at base, margins ciliate. Corolla pale lavender to bluish purple or deep purple, broadly funnel-shaped, pubescent in the throat and sometimes minutely so on the tube outside, 10–15 mm, tube 3–5 mm. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style 6–13 mm, usually slightly exceeding the stamens, glabrous or pubescent towards the base. Capsule ovoid, 5–6 mm, lepidote.
CHINA (N Sichuan, Quinghai, Gansu, Shaanxi). Forests, mountainsides, moist meadows, 3000–4300 m.

Similar to *R. nitidulum* (p. 98), with which it possibly intergrades (cf. Philipson & Philipson, 1975, p. 58).

**25. (101.) R. russatum** Balfour f. & Forrest, Notes R.B.G. Edinb. 9:126 (1919). Type: China, Yunnan, on the Kari pass, 3650 m, vi 1917, *Forrest* 13915 (holo. E).

Syn.: *R. cantabile* [Balfour f. ex] Hutchinson, Bot. Mag. t. 8963 (1922). Type: a cultivated specimen (holo. K).

*R. osmerum* Balfour f. & Forrest in Stevenson (ed.), The Species of Rhododendron 425 (1930) in synon., nom. nud.

Shrub, 0·3–1·5 m. Leaves 16–40 × 6·5–17 mm, narrowly to broadly elliptic or oblong, apex obtuse or rounded, mucronate, base cuneate, the undersurface heavily speckled brown or rust or almost uniformly red-brown, the scales contiguous or almost so, the colour varying from pale to dark brown on the one leaf. Inflorescence up to 6-flowered, pedicels lepidote, 1–2(–5) mm. Calyx lobes up to 6 mm, broadly oblong, with a few scales at the base and in a central band or ± elepidote, margin ciliate and sometimes with a few scales. Corolla deep indigo blue, purple, pink or rose, broadly funnel-shaped, 10–20 mm, tube 4–9 mm, pubescent in the throat and often also on the outside, elepidote. Stamens 10, filaments pubescent towards the base. Ovary lepidote and sometimes with a tuft of hairs at the apex, style 14–20 mm, pubescent for up to ½ its length, sometimes sparingly. Capsule ovoid, c. 6 mm, lepidote, usually with persistent apical hairs. CHINA (N & NW Yunnan, SW Sichuan). Alpine pasture, forest margins, 3400–4300 m.

The Philipsons (1975, pp. 59–60) record the occurrence of natural hybrids with various other species.

**26. (102.) R. rupicola** W. W. Smith, Notes R.B.G. Edinb. 8:203 (1914).

Much branched shrub to 0·6(–1·2) m. Leaves 6·5–21 × 3–12·5 mm, broadly elliptic to elliptic, oblong or ovate, apex rounded, mucronate, base broadly cuneate to truncate, undersurface heavily stippled reddish brown on a fawn background, the scales overlapping to slightly separated, bicolorous, dark brown or amber and pale golden, the darker scales usually predominating. Inflorescence up to 6-flowered, pedicels lepidote, rarely pubescent as well, 2–4 mm. Calyx lobes (2·5–)4–5(–6) mm, oblong or broadly ovate, apex obtuse or rounded, rarely deltoid, with a broad central band of scales, occasionally shortly pubescent, margin ciliate. Corolla usually intense purple or yellow, occasionally deep crimson or magenta, very rarely white, broadly funnel-shaped, (8–)10–16(–18) mm, tube 3–6(–8) mm, pubescent in the throat and sometimes on the outside, lepidote outside. Stamens 5–10, number variable even in the one inflorescence, filaments pubescent towards the base. Ovary either entirely pubescent or bearing scales on the upper ½, occasionally with an apical tuft of hairs, style 10–19 mm (rarely shorter), usually pubescent to some extent. Capsule broadly ovoid, 4–6 mm, pubescent, lepidote above.

Three varieties may be recognised:

| | | |
|---|---|---|
| 1. | Corolla purple to crimson, rarely white . . . | **a.** var. **rupicola** |
| + | Corolla yellow . . . . . | 2 |
| 2. | Calyx lobes margined with scales and hairs . . | **c.** var. **muliense** |
| + | Calyx lobes margined with hairs only . . . | **b.** var. **chryseum** |

**26a.** var. **rupicola.** Type: China, Yunnan, western flank of the Lichiang range, 4260 m, vi 1910, *Forrest* 5865 (holo. E; iso. A, BM).

Syn.: *R. achroanthum* Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:208 (1916). Type: China, Yunnan, mountains of the Chungtien plateau, 12–13000 ft, vii 1914, *Forrest* 12581 (holo. E).

*R. propinquum* Tagg in Rhodo. Soc. Notes 3:30 (1925) nomen nudum.

N BURMA, CHINA (N, NW, W & C Yunnan, SW Sichuan, SE Xizang). Mountainsides, rocky slopes, peaty meadows.

**26b.** var. **chryseum** (Balfour f. & Kingdon Ward) Philipson & Philipson, Notes R.B.G. Edinb. 34:62 (1975).

Syn.: *R. chryseum* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 9:219 (1916). Type: China, Tibet/Yunnan frontier, Ka-gwr-pu glacier valley, 3960–4570 m, vi 1912, *Kingdon Ward* 540 (holo. E).

NE BURMA, CHINA (NW Yunnan, SE Xizang). Forest, open moorland, 3300–4750 m.

**26c.** var. **muliense** (Balfour f. & Forrest) Philipson & Philipson, Notes R.B.G. Edinb. 34:63 (1975).

Syn.: *R. muliense* Balfour f. & Forrest, Notes R.B.G. Edinb. 11: 101 (1919). Type: China: SW Szechuan, Mu-li mts, valley of Li-tang river, 3650–3960 m, vi 1918, *Forrest* 16252 (holo. E; iso. BM, K).

CHINA (SW Sichuan). Woodland, open grasslands, alpine meadows, 3050–4875 m.

The Philipsons record natural hybrids between *R. rupicola* and several other species (1975, pp. 62–64).

**27. (103). R. setosum** D. Don, Mem. Wern. Soc. 3:409 (1821). Type: 'Habitat in Alpe immense nivosa Gossain than Nepalensium dicta, *Wallich*'.

Small, intricate shrublet to 0·3 m; young shoots densely lepidote and conspicuously loriform-setose. Leaves elliptic, oblong or obovate, 10–15 × 6–8 mm, rounded to the very obtuse though mucronate apex, ± rounded to the base; upper surface dark green, persistently lepidote with golden, ± vesicular scales, occasionally loriform-setose, margins loriform-ciliate, lower surface pale green, slightly papillose, densely lepidote with dimorphic scales, vesicular and golden, and flat, broadly rimmed, pale to dark brown. Inflorescence 1–3-flowered, pedicels lepidote and filiform-acicular pubescent, 4–10 mm. Calyx lobes 5–8 mm, oblong-orbicular, obtuse, lepidote, sometimes loriform-ciliate. Corolla purple or pinkish, openly funnel-shaped, 15–18 mm, tube 7–8 mm, pilose inside the tube, glabrous outside. Stamens 10, exserted, filaments pubescent towards the base. Ovary lepidote and filiform-acicular pubescent towards the apex, style exceeding the stamens, glabrous and elepidote. Capsule lepidote, oblong-cylindric, up to 5 mm.

NEPAL, INDIA (Sikkim, W Bengal), BHUTAN, CHINA (S Xizang—Chumbi valley only). Open hillsides and slopes, 3650–4550 m.

See notes at the beginning of this subsection (p. 92).

X. Subsection **Rhododendron**.

Syn.: [Genus] *Plinthochroma* Dulac, Fl. Haut. Pyren. 419 (1867).
Series *Ferrugineum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 252 (1930).
Subsection *Ferruginea* Sleumer, Bot. Jahrb. 74:535 (1949).

Small shrubs to 1·5 m. Leaves small, evergreen, densely lepidote beneath. Inflorescence terminal, many-flowered, with a conspicuous elongate rachis. Calyx small but clearly lobed. Corolla tubular-campanulate, small, lepidote and usually pubescent with filiform-acicular hairs outside, usually rather densely pilose within. Stamens 10, declinate, filaments pubescent towards the base. Ovary 5-locular, lepidote, glabrous. Style short or long, straight or declinate, glabrous or pubescent at the base. Seeds unwinged and obscurely finned.

Type species: *R. ferrugineum* Linnaeus.

A group of three species, distributed in C and E Europe, and vicariating with each other. The group itself is well distinguished, but related to subsections Lapponica and Rhodorastra. Its isolation from the rest of the subgenus is remarkable, and raises interesting problems of dispersal and evolution.

1. Leaves loriform-ciliate, scales on the lower surface more than their own diameter apart; style pubescent at the base. . **3. hirsutum**
\+ Leaves not ciliate, scales on the lower leaf surface overlapping or almost so; style glabrous . . . . . 2

2. Style longer than ovary; leaves acute or mucronate . **1. ferrugineum**
\+ Style about as long as the ovary; leaves obtuse . . **2. myrtifolium**

**1. (104.) R. ferrugineum** Linnaeus, Sp. Pl. 392 (1753). Type: 'Habitat in Alpibus Helveticis, Allobrogicis, Pyrenaeis'. Fig. 1h, p. 15.
Ic.: Reichenbach, Ic. Fl. Germ. 17: t. 1158 (1855); Hegi, Ill, Fl. von Mitteleur. 5(3): t. 206 f. 2 & f. 2656, 2657 (1926); Hess, Landolt & Hirzel, Flora der Schweiz 2:912 (1970).

Small shrub with erect or ascending branches, to 1·5 m. Young growth densely lepidote, sometimes with a few loriform hairs. Leaves narrowly elliptic to elliptic, acute or mucronate at the apex, 28–40 × 8–16 mm, slightly revolute, dark shining green above, ferrugineous beneath with dense overlapping scales. Inflorescence many-flowered, the rachis 10–20 mm, filiform-acicular pubescent, pedicels rather strict, densely lepidote. Calyx small, 5-lobed, lobes up to 1·5 mm, lepidote and loriform-ciliate. Corolla 12–15(–17) mm, tube 6–9(–10) mm, deep pink, rarely pale pink or white, lepidote and usually filiform-acicular pubescent outside. Stamens 10, filaments pubescent towards the base. Ovary 5-locular, lepidote, style glabrous, up to 2 × longer than the ovary. Capsule sparsely lepidote, ± oblong, 5–7 mm.

AUSTRIA, FRANCE, GERMANY, ITALY, SPAIN, SWITZERLAND (Alps and Pyrenees). Mountain slopes, open woodland and scrub.

The type species of the genus.

**2. (105.) R. myrtifolium** Schott & Kotschy, Bot. Zeit. 9:17 (1851). Type: 'Habitat in alpibus Transsilvaniae australis'.

Syn.: *R. kotschyi* Simonkai, Enum. Pl. Transs. 389 (1886).
*R. ferrugineum* subsp. *kotschyi* (Simonkai) Hayek, Prodr. Fl. Balc. 2:17 (1928).

Ic.: Reichenbach, Ic. Fl. Germ. 17: t. 1157 (1855); Schneider, Ill. Handb. Laubh. 2:478, 479 (1909); Bot. Mag. 152: t. 9132 (1927–28); Fl. Rep. Pop. Rom. 7: pl. 17, f. 1 (1960).

Very similar to *R. ferrugineum*, differing as follows: smaller shrub, rarely exceeding 0·5 m, leaves narrowly obovate, obtuse, 14–23 × 5–8 mm, less densely lepidote beneath, obscurely crenulate, pedicels filiform-acicular pubescent as well as lepidote, calyx lobes narrowly triangular, up to 2 mm, usually fringed with scales and a few loriform hairs. Corolla pink, 15–17 mm, tube 9–10 mm, more densely pubescent and less densely lepidote outside, style shorter than to ± as long as ovary.

BULGARIA, JUGOSLAVIA, ROMANIA, USSR (western European part).

Vicariates with *R. ferrugineum*.

**3. (106). R. hirsutum** Linnaeus, Sp. Pl. 392 (1753). Type: 'Habitat in Alpibus Helveticis Austriacis, Styriacis'.

Ic.: Reichenbach, Ic. Fl. Germ. 17: t. 1158 (1855); Hegi, Ill. Fl. von Mitteleur. 5(3): t. 206 f. 1 & 2652, 2654 (1926); Hess, Landholt & Hirzel, Flora der Schweiz 2:912 (1970); Urquhart, The Rhododendron 2: t. 24 (1972).

Small shrub to 1 m. Young growth sparsely lepidote, filiform-acicular pubescent and sparsely loriform-setose. Leaves narrowly obovate to obovate-orbicular, 13–30 × 7–14 mm, ± flat, glabrous above, sparsely lepidote beneath with well-separated, golden scales, the margins ciliate with long straight loriform hairs. Inflorescence many-flowered, the rachis short or reaching 10 mm. Pedicels sparsely lepidote and filiform-acicular puberulent. Calyx with narrowly triangular lobes, 2–4 mm, lepidote and fringed with loriform setae. Corolla pink, sparsely lepidote and pubescent outside, 12–18 mm, tube 6–10 mm. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style as long as the ovary or a little longer, sparsely pubescent at the base. Capsule sparsely lepidote, oblong-globose, 5–6 mm.

AUSTRIA, FRANCE, GERMANY, ITALY, JUGOSLAVIA, SWITZERLAND (Alps). Open woodland, screes, slopes and scrub.

A calcicole species, ecologically vicariant with *R. ferrugineum* in the Alps. Hybrids between the two species (*R.* × *intermedium* Tausch) are found in suitable habitats.

XI. Subsection **Rhodorastra** (Maximowicz) Cullen, Notes R.B.G. Edinb. 36:112 (1978).

Syn.: Section *Rhodorastrum* Maximowicz, Rhodo. Asiae Or. 15 (1870).
Subgenus *Rhodorastrum* (Maximowicz) C. B. Clarke in Hooker, Fl. Brit. Ind. 3:474 (1882).
Series *Dauricum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 224 (1930). (1930).

Small to moderately sized shrubs. Leaves partially or entirely deciduous, rarely all evergreen. New vegetative growth from buds below those which produce the inflorescences. Inflorescences axillary, clustered pseudoterminally at the ends of the branches, each 1-flowered. Calyx small, rim-like. Corolla openly funnel-shaped, pink to magenta (rarely white), pilose outside near the base, not or scarcely lepidote. Stamens 10, declinate, filaments pubescent towards the base. Ovary 5-locular, lepidote, glabrous. Style impressed, declinate. Capsule small, lepidote. Seeds unwinged and obscurely finned.
Type species: *R. dauricum* Linnaeus.

A group of two (or possibly more, see below) species of subdeciduous or deciduous rhododendrons, treated as a distinct subgenus by Sleumer (1949) on account of the disposition of its inflorescence and new shoot buds. However, it seems to be quite closely related to subsections Rhododendron and Lapponica within section Rhododendron.

*R. dauricum* Linnaeus, sensu lato, is widely distributed in the Soviet Union, and has been divided into three species by Pojarkova (see below). I have seen insufficient material to judge the value of these species.

1. Leaves thick, leathery, at least some usually overwintering, obtuse or retuse at the apex, 10–36 mm; corolla up to 35 mm in diameter . . . . . **1. dauricum**
\+ Leaves thin, entirely deciduous, acute to acuminate at the apex, 40–60 mm; corolla 33–40 mm in diameter . **2. mucronulatum**

**1. (107.) R. dauricum** Linnaeus, Sp. Pl. 392 (1753). Type: 'Habitat in Dauria'. Fig. 2o, p. 16.
Ic.: Loddiges Bot. Cab. 15: t. 1446 (1828); Gard. Chron. 53:51 (1913); Bot. Mag. 147: t. 8930 (1921); Ic. Corm. Sin. 3: t. 4283 (1974).

Straggling shrubs, 0·5–1·5 m. Young growth lepidote and puberulous. At least some of the leaves overwintering, coriaceous, glabrous except for the shortly puberulent upper surface of the midrib, obtuse to retuse at the apex, densely lepidote beneath, 10–36 × 5–20 mm. Pedicels very short, obscure. Calyx very small, rim-like, densely lepidote. Corolla 14–21 mm, tube 5–11 mm, 20–35 mm in diameter, pink or violet-pink, pilose outside near the base, ± elepidote. Stamens 10, exserted, filaments pubescent towards the base, anthers grey. Ovary lepidote, style glabrous. Capsule ovoid, lepidote.
USSR (eastern Siberia, Altai mountains, Angara-Sayan region, Ussuri region, Dahuria, region around the river Lena), MONGOLIA, CHINA (northern part, adjacent to Mongolia), JAPAN (Hokkaido).

*R. dauricum* is a widely distributed and variable species. Two variants have been described as separate species in the Russian literature, but I have not seen enough material to judge their distinctness. They are: *R. ledebourii* Pojarkova in Komarov (ed.) *Fl. S.S.S.R.* 18:722, t. 2 f. 3 (1952), Type: USSR, Altai, nr mouth of river Kainzci, on stony slopes, 11 vii 1915, *Krylov* (LE); and *R. sichotense* Pojarkova, *loc. cit.*, t. 2 f. 1, Type: USSR, Reg. Ussuri, around the Olga bay, 28 iv 1913, *Bjeloussov* (LE). In the

English translation of vol. 18 of Komarov's *Flora URSS* (Jerusalem, 1962) these species, and *R. mucronulatum*, are distinguished as follows:

13. Leaves dark olivaceous green above, rusty brown beneath, overwintering; flowering in spring while densely clothed in last year's leaves . . . . . 15
\+ Leaves bright green above, light coloured beneath, turning brown in fall and nearly all falling except for a few overwintering ones; flowering in spring in leafless condition . . . . . 14
14. Corolla 1·4–2·2 cm long . . . etc. . . . . **dauricum**
\+ Corolla 2·2–3·3 cm long . . . etc. . . . . **mucronulatum**
15. Corolla 1·5–2·6 cm long, incised to ⅓–¼, the wide open limb 2·8–4·5 cm in diameter, the lobes elliptic, not or slightly overlapping; capsule 0·7–1 cm long on a stipe 0·5–0·7 mm long; leaves ovate-elliptic or obovate-elliptic, on flowering shoots 0·6–2·7 cm long and 0·4–1·3 cm broad, sparsely glandular above . . . . . **ledebourii**
\+ Corolla large, 2·1–2·7 cm long, incised to the middle, the limb less open, 3–4·5 cm in diameter, the broad orbicular lobes with overlapping margins; capsule 0·9–1·3 cm long on a stipe 0·9–1·4 cm long; leaves larger, 1·7–3·5 × 0·9–2 cm, densely glandular on both sides . **sichotense**

**2. (108.) R. mucronulatum** Turczaninow, Bull. Soc. Nat. Mosc. 7:155 (1837). Type: ?

Syn.: *R. dauricum* var. *mucronulatum* (Turczaninow) Maximowicz, Rhodo. Asiae Or. 44 (1870).
*R. mucronulatum* var. *albiflorum* Nakai, Flora Koreana 2:76 (1911). Type: Corea, Seoul, *K. Jo* (n.v.).
*R. taquetii* Léveillé, Feddes Rep. 12:101 (1913). Type: Korea, Quelpaert, Hallaisan, 1700 m, vi 1911, *Taquet* 5788 (holo. E).
*R. mucronulatum* var. *ciliatum* Nakai, Fl. Sylv. Koreana 8:35 (1919). Type: 'Hab. in Corea media et austr. nec non insula Quelpaert'.
*R. mucronulatum* var. *acuminatum* Hort.

Ic.: Schneider, Ill. Handb. Laubh. 2:471, 474 (1909); Bot. Mag. 136: t. 8304 (1910); Nakai, Fl. Sylv. Koreana 8: t. 10 (1919); Komarov (ed.) Fl. S.S.S.R. 18: t. 2 f. 2 (1952); Ic. Corm. Sin. 3: t. 4284 (1974).

Straggling open shrub to 2 m. Young growth lepidote and puberulous. Leaves completely deciduous, thin, strigose with loriform hairs on the upper surface towards the margin at least when young, the upper surface of the midrib puberulent, sparsely lepidote beneath, 40–60 × 15–30 mm. Inflorescences precocious. Pedicels very short, obscure. Calyx rim-like, lepidote. Corolla very openly funnel-shaped, 21–26 mm, tube 8–12 mm, 33–42 mm in diameter, bright mauve-pink, rarely white, pilose outside near the base, glabrous or sparsely pilose inside. Stamens 10, exserted, filaments pubescent towards the base, anthers blue. Ovary lepidote, style glabrous. Capsule lepidote.

USSR (E Siberia, Ussuri region), CHINA (Hubei, Shandong), MONGOLIA, KOREA, JAPAN (Honshu, Kyushu).

*Excluded Species*

**R. fittianum** Balfour f. (*Notes R.B.G. Edinb.* 10:108, 1917) is given as a synonym of *R. dauricum* in *The Species of Rhododendron*. It is a very

obscure taxon which appears to be a chance hybrid of *R. racemosum* (p. 82) and some other, unknown species.

XII. Subsection **Saluenensia** (Hutchinson) Sleumer, Bot. Jahrb. 74:534 (1949).

Syn.: Series *Saluenense* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 587 (1930) & sensu Davidian in R.H.S. Rhodo. Yearbook 8:84–98 (1954).

Small shrubs to 1·5 m. Young growth lepidote and loriform setose, the setae variably persistent. Leaves evergreen, densely lepidote beneath with overlapping, crenulate scales. Inflorescences terminal, 1–3(–5)-flowered, the leaves beneath the inflorescence usually bract-like with expanded petioles, densely puberulent on the upper surface. Calyx deeply 5-lobed, the lobes usually loriform-ciliate. Corolla very openly funnel-campanulate to almost rotate, pink, magenta or purplish, pubescent and lepidote outside, pilose within the tube. Stamens 10, declinate, filaments densely villous-pilose towards the base. Ovary lepidote, 5-locular, style impressed, declinate, glabrous and elepidote. Capsule lepidote, small, wrinkled. Seeds unwinged and obscurely finned.

Type species: *R. saluenense* Franchet.

A small group of taxa showing intricate relationships, as noted by Stapf in his discussion of *R. saluenense* as t. 9095 of the *Botanical Magazine* (1926). In 1930 Hutchinson recognised eleven species; Davidian, in 1954, recognised eight species, one divided into two varieties (both these figures include *R. fragariflorum*, which is excluded from the subsection here). I have recognised only two species, one divided into four, the other into two, subspecies. The reasons for this treatment are complex, but may be summarised as follows. The large number of available specimens fall into two groups which are reasonably distinct morphologically and geographically (one group occurs to the west of 99° E, the other to the east of it). In the areas where these two groups overlap (mainly 98–99° E 28–29° N) many intermediates occur; some of these appear to be stabilised, and to occupy distinct ecological and altitudinal niches; others are more variable, and appear, from the evidence available, to occur only in mixed populations. The two basic groups mentioned above are the taxa *calostrotum* and *chameunum*, the former divisible into two groups, one northerly (*riparium*), the other southerly (*calostrotum* sensu stricto). These form intermediates with *chameunum* as follows:

(a) intermediate between *riparium* and *chameunum*: *saluenense*.
(b) intermediate between *calostrotum* and *chameunum*: *riparioides*.
(c) intermediate between *calostrotum* and the small, high alpine forms of *chameunum* (i.e. those formerly known as *R. prostratum*): *keleticum*.
(d) intermediate between *riparium* and the high alpine *chameunum*: *nitens* and *calciphilum* (neither of these recognised here formally).

In order to give a reasonable reflection of this situation two species are recognised here, *R. calostrotum*, divided into four subspecies, and *R. saluenense* (the name which must be applied at specific level) divided into two subspecies (one of which is subsp. *chameunum*).

The subsection itself is very distinct, though clearly related to subsection Fragariflora, and, more distantly, to subsection Uniflora.

1. Shoots, petioles, leaf midrib undersides, leaf margins and usually pedicels loriform-setose; ovary pubescent at least at the apex (where the style is impressed) . . . . **2. saluenense**
+ Shoots, petioles and leaf-midrib undersides not loriform-setose; pedicels and leaf margins setose or not; ovary entirely glabrous . **1. calostrotum**

**1. (109). R. calostrotum** Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 13:85 (1920).

Prostrate, matted or erect intricate shrub, 0·05–1·5 m. Young growth densely lepidote, not loriform-setose, or if so the setae quickly deciduous. Leaves suborbicular to oblong-ovate, rarely oblong-obovate, 11–33 × (2–)4–20 mm, upper surface matt with persistent, dried-out scales, rarely elepidote and somewhat shining, margins sparsely loriform-ciliate, lower surface with dense, overlapping scales arranged in 3–4 tiers, those of the outermost tier with long stalks and cup-shaped discs. Inflorescence 1–5-flowered, pedicels lepidote with usually many long-stalked scales with cup-shaped discs. Calyx with frequently unequal, oblong to ovate lobes, rounded at the apex, variably lepidote and filiform-acicular pubescent on the surface, margins loriform-setose, inner surface puberulent. Corolla magenta, more rarely pink or purple, often with darker spots on the upper lobes, 18–28 mm, tube 7–12(–14) mm, pilose outside, occasionally somewhat lepidote also. Stamens 10. Ovary lepidote, glabrous. Capsule 6–9 mm, lepidote.

1. Leaves ± acute, elepidote above, 2–7(–9) mm broad; prostrate shrublet . . . . . **d.** subsp. **keleticum**
+ Leaves ± obtuse, lepidote above, (7–)9–20 mm broad; decumbent or erect shrubs . . . . . 2

2. Scales on leaf undersurface ± flat, the tiers indistinct; leaves 22–33 mm long . . . . . **c.** subsp. **riparioides**
+ Scales on the undersurface clearly borne in 3–4 tiers; leaves 12–22 mm long . . . . . 3

3. Flowers 2–5 in each inflorescence; pedicels 10(–15) mm . . **b.** subsp. **riparium**
+ Flowers 1–2 in each inflorescence; pedicels 16–27 mm . . **a.** subsp. **calostrotum**

**1a.** subsp. **calostrotum**. Type: NE Burma, ridge of the Naung chaung/Nwai Divide, 16 vii 1914, *Kingdon Ward* 1790 (holo. E).
Ic.: Bot. Mag. 149: t. 9001 (1923); The Garden, 88:268 (1924); Gard. Chron. 87:511 (1930); Urquhart, The Rhododendron 1: t. 9 (1958).
N BURMA, CHINA (W Yunnan). Stony alpine meadows and cliffs, 3300–4250 m. Map 33, p. 118.

**1b.** subsp. **riparium** (Kingdon Ward) Cullen, Notes R.B.G. Edinb. 36:112 (1978).

Syn.: *R. rivulare* Kingdon Ward, Gard. Chron. 86:503 (1929) non Handel-Mazzetti (1921). Type: as for *R. riparium*.

*R. riparium* Kingdon Ward, Notes R.B.G. Edinb. 16:180 (1931). Type: China, S Tibet, Doshong La, 10–11000 ft, *Kingdon Ward* 5828 (holo. BM, iso. E).

*R. calciphilum* Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16:179 (1931). Type: Upper Burma, Seinghku Wang, 11–14000 ft, on limestone, *Kingdon Ward* 6984 (iso. E).

*R. nitens* Hutchinson, Gard. Chron. 99:135 (1936). Type: a cultivated plant (holo. K).

*R. kingdonii* Merrill, Sunyatsenia 3:256 (1937). Type: as for *R. riparium*.

*R. calostrotum* var. *calciphilum* (Hutchinson & Kingdon Ward) Davidian, R.H.S. Rhodo. Yearbook 8:87 (1954).

INDIA (Arunachal Pradesh), NE BURMA, CHINA (NW Yunnan, S & SE Xizang). Open rocky slopes and hillsides, often beside streams or in swamps, 3050–4550 m. Map 33, p. 118.

A northerly vicariant of subsp. *calostrotum*, occupying quite a wide distribution area. The small-leaved variants, described as *R. nitens* and *R. calciphilum* are in many ways intermediate to subsp. *keleticum*.

**1c.** subsp. **riparioides** Cullen, Notes R.B.G. Edinb. 36:112 (1978). Type: China, Yunnan, on the Shui-lu-shan W of Wei hsi, 13000 ft, *Forrest* 25503 (holo. E).

CHINA (NW Yunnan). Alpine meadows, cliffs, slopes, 3650–4450 m. Map 33, p. 118.

Very similar to subsp. *riparium* but differing in its larger leaves and flowers, and the scales on the leaf undersurface not being so clearly tiered, presenting a smooth, almost felted appearance. Restricted to the mountains around Weixi (Wei hsi), where *R. saluenense* subsp. *chameunum* also occurs. It may be a stabilised hybrid between *R. calostrotum* and subsp. *chameunum*.

**1d.** subsp. **keleticum** (Balfour & Forrest) Cullen, Notes R.B.G. Edinb. 36:112 (1978).

Syn.: *R. keleticum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:50 (1920). Type: China, SE Tibet, Tsarong, Salween/Kiu chiang Divide, viii 1919, *Forrest* 18918 (holo. E).

*R. radicans* Balfour f. & Forrest, op. cit.: 290 (1922). Type: China, SE Tibet, Tsarong, Salween/Kiu chiang Divide, *Forrest* 19919 (holo. E).

Ic.: Gard. Chron. 83:333 (1928).

NE BURMA, CHINA (NW Yunnan, SE Xizang). Stony alpine slopes, 4250–4550 m. Map 33, p. 118.

Subsp. *keleticum* is found only in the area of overlap between *R. calostrotum* and *R. saluenense* subsp. *chameunum*, at the highest altitudes; it grades into subsp. *riparium* below c. 4200 m.

**2. (110.) R. saluenense** Franchet, Journ. de Bot. 12:263 (1898).

Prostrate to upright shrublets or shrubs, 0·05–1·5 m. Young growth loriform-setose, the setae persistent. Leaves oblong-orbicular to oblong-elliptic, rarely oblong-obovate, 8–30 × 5–15 mm, upper surface usually rather glossy and elepidote, more rarely matt with persistent dried-out scales, often with a few loriform setae along the midrib near the base, margins loriform-setose, undersurface with dense, overlapping scales which are borne in several tiers but somewhat flattened, the midrib usually with some loriform setae. Inflorescence 1–3-flowered, pedicels lepidote and loriform-setose, 8–18 mm. Calyx lobes oblong-orbicular, rounded to subacute, 4·5–8 × 2·5–6 mm, variably lepidote, loriform-setose and filiform-acicular puberulent, usually loriform-ciliate, puberulent within. Corolla 17–28 mm, the tube 8–15 mm, magenta to purple, rarely bluish purple, pilose and with a few scales outside, pubescent within the tube. Stamens 10. Ovary lepidote, usually puberulent, at least in the impression at the base of the style. Capsule 6–8 mm, lepidote.

1. Erect shrub to 1·5 m; upper surface of leaves ± persistently lepidote and usually loriform-setose . . **a.** subsp. **saluenense**
\+ Prostrate or decumbent shrub, rarely to 1 m; leaves usually glossy and elepidote above, without loriform setae . . . **b.** subsp. **chameunum**

**2a.** subsp. **saluenense**. Type: China 'Setchuen' (i.e. Yunnan), vallée du haut Mekong à Dong ching thang, *Soulié* 1007; Se la, entre le Mekong et Salween, *Soulié* 1006 (iso. E), 1028. Pl. 1f; fig. 4ai, p. 21.

Syn.: *R. amaurophyllum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:230 (1922). Type: China, SE Tibet, Tsarong, Salween/Kiu chiang Divide, vii 1919, *Forrest* 18905 (holo. E).

Ic.: Bot. Mag. 151: t. 9095 (1925–26).

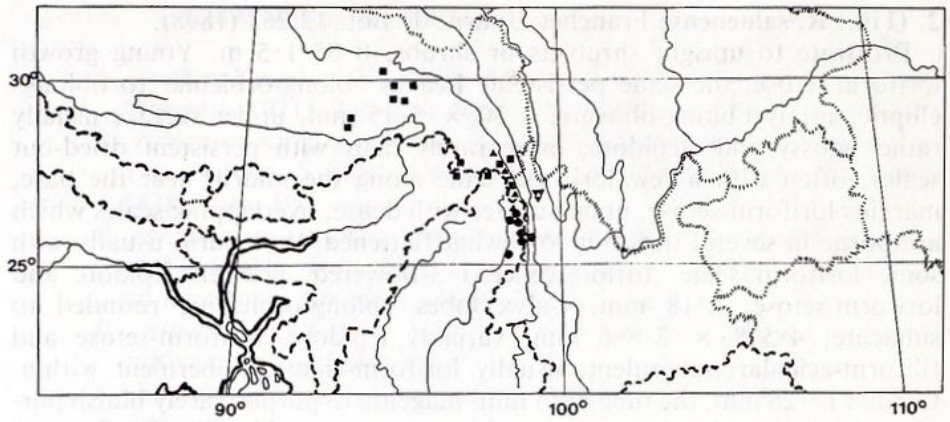
NE BURMA, CHINA (NW Yunnan, SE Xizang). Forest margins and thickets, stony hillsides, cliffs and ledges, 3300–4400 m. Map 34, p. 118.

Subsp. *saluenense*, unfortunately the first described species within this group, is found in only a small area where the much more widely distributed subsp. *chameunum* and *R. calostrotum* subsp. *riparium* and *keleticum* also occur. Subsp. *saluenense* appears to be a stable intermediate between *chameunum*, which occurs further eastwards, and *calostrotum* subsp. *riparium*, whose main area of distribution is further west. It is variable in size, bristliness and scaling of the upper leaf surface, and apparently occupies less exposed habitats than subsp. *chameunum*.

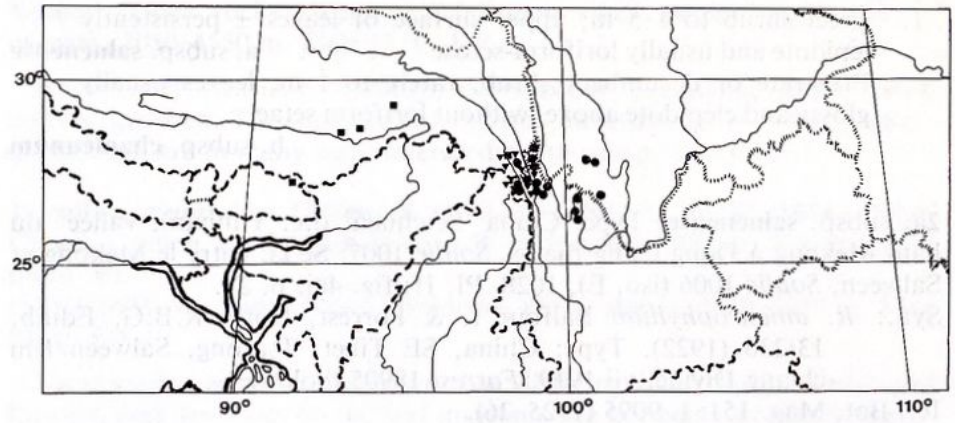
**2b.** subsp. **chameunum** (Balfour f. & Forrest) Cullen, Notes R.B.G. Edinb. 36:112 (1978). Fig. 2p, p. 16.

Syn.: *R. chameunum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:37 (1920). Type: China, Yunnan, on the Li-ti-ping, vi 1917, *Forrest* 13904 (holo. E).

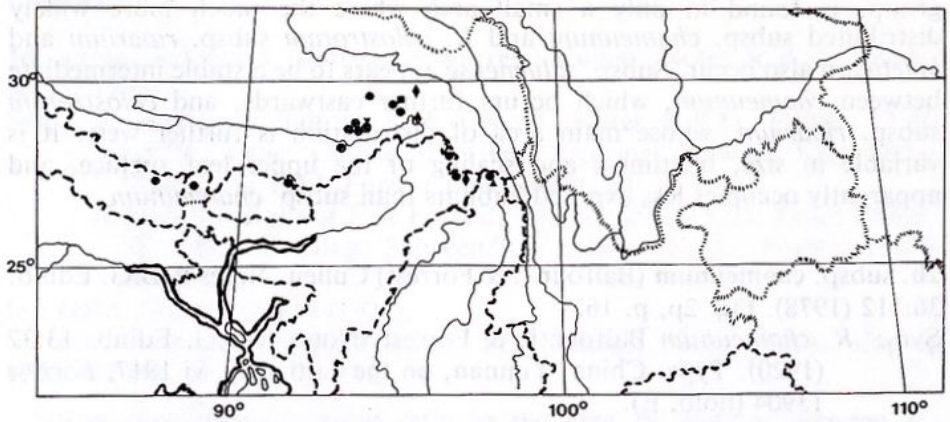
*R. prostratum* W. W. Smith, Notes R.B.G. Edinb. 8:202 (1914). Type: China, Yunnan, E flank of the Lichiang range, 15–16000 ft, vi 1910, *Forrest* 5862 (holo. E).




MAP 33. ● *R. calostrotum* subsp. *calostrotum*; ■ subsp. *riparium*; ▼ subsp. *riparioides*; ▲ subsp. *keleticum*.




MAP 34. ▼ *R. saluenense* subsp. *saluenense*; ● subsp. *chameunum*; ■ *R. fragariflorum*.




MAP 35. ● *R. pumilum*; ■ *R. uniflorum* var. *uniflorum*; ▲ var. *imperator*; ▼ *R. ludlowii*; ◆ *R. pemakoense*.

*R. cosmetum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:38 (1920). Type: China, NW Yunnan, Bei-ma-shan, vi 1917, *Forrest* 13985 (holo. E).

*R. charidotes* Balfour f. & Farrer, Notes R.B.G. Edinb. 13:242 (1922). Type: NE Burma, Chawchi pass, 10000 ft, 3 vii 1920, *Farrer* 1690 (holo. E).

CHINA (N & NW Yunnan, SE Xizang, SW Sichuan), NE BURMA. Open stony and peaty meadows, 3500–4500 m. Map 34, p. 118.

A widely distributed taxon with a somewhat dissected distribution pattern. It shows some variability in height and leaf size, but this is related largely to altitude, the smallest variants (those formerly named as *R. prostratum*), occurring above 4250 m; complete transitions from these small variants to more normal plants occur.

XIII. Subsection **Fragariflora** Cullen, Notes R.B.G. Edinb. 36:122 (1978).

Small shrublets. Leaves very small, margins crenulate, prominently veined beneath and with vesicular scales. Inflorescence terminal, 2–3-flowered. Calyx conspicuous, 5-lobed. Corolla openly campanulate to almost rotate with short tube and spreading limb, ± glabrous and elepidote outside. Stamens 10, declinate, filaments pubescent towards the base. Ovary 5-locular, lepidote, style impressed, declinate, exceeding stamens. Seeds unwinged and without fins.

Type species: *R. fragariflorum* Kingdon Ward.

The one species of this subsection is in many ways intermediate between subsection Saluenensia and subsection Campylogyna (p. 145). It combines the low growth, distant, vesicular scales and glabrous corolla of the latter with the corolla shape and style type of the former. In spite of this it is a distinct unit in its own right, very characteristic and easily recognisable, probably most closely related to subsection Saluenensia.

**1. (111.) R. fragariflorum** Kingdon Ward, Gard. Chron. 86:504 (1929) and Notes R.B.G. Edinb. 16:179 (1931). Type: China, S Tibet, Temo La, 15000 ft, 5 vi 1924, *Kingdon Ward* 5734 (holo. K).

Tussock-forming shrublet up to 40 cm. Young growth lepidote and puberulent. Leaves oblong-elliptic, 10–17 × 5–9 mm, ± rounded at the base, obtuse or rounded at the apex, upper surface dark green, rugose, glossy with persistent scales, puberulent along the midrib, lower surface pale green with reticulate venation and distant, golden or brown, vesicular scales, margin crenulate, and, at least when young, loriform-ciliate. Inflorescence 2–3-flowered, pedicels lepidote with stalked scales and densely pubescent, 7–10 mm. Calyx lobes reddish, oblong, rounded at the apex, 5–7 mm, sparsely lepidote and sometimes puberulent, fringed with scales and filiform-acicular hairs. Corolla strawberry-red to purple, 13–18 mm, tube 5–7 mm, usually elepidote and glabrous outside, rarely with a few hairs or scales on the lobes near the margins, pubescent within the tube. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style glabrous, elepidote. Capsule lepidote, c. 7 mm.

BHUTAN, CHINA (SE Xizang). Open hillsides and in swampy pasture, 3650–4500 m. Map 34, p. 118.

XIV. Subsection **Uniflora** (Cowan & Davidian) Sleumer, Bot. Jahrb. 74:532 (1949).

Syn.: Series *Lepidotum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 437 (1930) pro parte.
Series *Uniflorum* sensu Cowan & Davidian, R.H.S. Rhodo. Yearbook 3:101 (1948).

Small shrubs, often prostrate and mat-forming. Leaves evergreen, small with revolute or crenate margins. Inflorescence terminal, 1–3-flowered, the leaves beneath the inflorescence bract-like with expanded bases and petioles, pubescent above. Pedicels rigid, erect and accrescent in fruit. Corolla funnel-campanulate, 5-lobed, densely pilose outside, pink, purple or yellow. Stamens 10, declinate, filaments pubescent towards the base. Ovary lepidote. Style impressed, declinate or straight. Seeds unwinged and obscurely finned.

Type species: *R. uniflorum* Kingdon Ward.

A small and rather remarkable group which consists of one widespread species (*R. pumilum*) and five other taxa (treated as four species, one subdivided into two varieties here) known from only seven wild collections. Of these five, one, *R. ludlowii*, is very distinct, with yellow flowers and crenate leaves, and is placed here in default of any more obvious position. The other four are all very similar (at least as far as the wild specimens are concerned—material in cultivation is more variable, and may include hybrids) and present difficult taxonomic problems which cannot be properly answered until more material is collected. The treatment presented here should be regarded as purely provisional.

The subsection itself appears to be related to subsections Saluenensia and Fragariflora, but there are also similarities with subsections Tephropepla, Campylogyna, and Cinnabarina.

1. Corolla yellow; leaves crenate . . . . . **4. ludlowii**
\+ Corolla pink to purple; leaves not crenate . . . . . 2

2. Corolla campanulate, 11–21 mm, tube 7–14 mm; style shorter than the stamens . . . . . **1. pumilum**
\+ Corolla funnel-shaped, 21–30 mm, tube 12–18 mm; style exceeding the stamens . . . . . 3

3. Leaves obovate, scales beneath close, markedly unequal (the larger c. 2 × the smaller); corolla 24–30 mm . . **2. pemakoense**
\+ Leaves oblong-elliptic or narrowly elliptic, scales beneath very distant, ± equal; corolla 21–25 mm . . . **3. uniflorum**

**1. (112.) R. pumilum** Hooker, Rhodo. Sikkim Himalaya t. 14 (1849). Type: Sikkim Himalaya, about the Semu and T'hlonok rivers, *Hooker* (holo. K). Ic.: Fl. des Serres, ser. 1, 7: t. 667 (1851–2); Schneider, Ill. Handb. Laubh. 2:479 (1909); Ic. Corm. Sin. 3: t. 4014 (1974).

Creeping shrublet to 10 cm. Young growth lepidote and puberulent. Leaves elliptic to broadly elliptic, acute to rounded at the apex, cuneate at the base, 9–19 × 4·5–12 mm, upper surface dark green, ± elepidote,

margins revolute, lower surface pale greyish green with distant, small, ± equal, golden scales. Inflorescence 1–3-flowered, pedicels 10–20 mm in flower, ultimately 38–60 mm and rigid and erect in fruit. Calyx reddish, deeply lobed, the lobes ovate-oblong or oblong, 2–3·5 mm, lepidote. Corolla 11–21 mm, tube 7–14 mm, mouth slightly oblique, pink or purple, densely pilose all over the surface, scales few, mostly on the lobes. Stamens 10, filaments pubescent towards the base. Ovary densely lepidote, style impressed, straight, somewhat clavate, shorter than the stamens. Capsule 7–10 mm, lepidote.

NEPAL, INDIA (Sikkim, Arunachal Pradesh), BHUTAN, NE BURMA, CHINA (S & SE Xizang). Open places on slopes, rocks and banks, 3500–4250 m. Map 35, p. 118.

**2. (113.) R. pemakoense** Kingdon Ward, Gard. Chron. 88:298 (1930). Type: China, S Tibet, Pemakochung, Tsangpo gorge, 21 xi 1924, 10000 ft, *Kingdon Ward* 6301 (holo. K, iso. E).

Syn.: *R. patulum* Kingdon Ward, loc. cit. Type: Tibet/Assam frontier, Mishmi Hills, Delei valley, 30 v 1928, *Kingdon Ward* 8260 (holo. K, iso. E).

Ic.: Gard. Chron. 92:480 (1932); Urquhart, The Rhododendron 2: t. 21 (1967); Cox, Dwarf Rhododendrons 181 (1973); Ic. Corm. Sin. 3: t. 4016 (1974).

Prostrate to erect dwarf shrubs. Young growth lepidote and pubescent. Leaves obovate or obovate-elliptic, rounded to the apex, cuneate at the base, 17–26 × (6–)8–13 mm, upper surface ± persistently lepidote, margin revolute, lower surface with rather dense, unequal scales, the larger with somewhat undulate rims, c. 2 × the smaller, all golden when young, often becoming dark brown. Inflorescence 1–2-flowered, pedicels 9–18 mm in flower, up to 25 mm in fruit, lepidote. Calyx lobes oblong, rounded, 2·5–4 mm, lepidote, reddish. Corolla pink to pale purplish mauve, 24–30 mm, tube 13–18 mm, densely pilose and sparsely lepidote outside. Stamens 10, filaments pubescent towards the base. Ovary lepidote, sometimes pubescent towards the apex, style impressed, exceeding the stamens, pubescent, lepidote or glabrous at the base. Capsule lepidote, c. 9 mm.

INDIA (Arunachal Pradesh), CHINA (SE Xizang). Cliffs and ledges, 2900–3050 m. Map 35, p. 118.

I can find no distinction, other than flower colour, between *R. pemakoense* from the Tsangpo gorge (corolla pink) and *R. patulum* from the Delei valley, some 190 km to the south east (corolla pale purplish mauve).

**3. (114.) R. uniflorum** Kingdon Ward, Gard. Chron. 88:299 (1930).

Dwarf, ± prostrate shrub, the ends of the branches ascending, to 0·5 m. Young growth lepidote. Leaves oblong-elliptic, acute or rounded at the apex, ± cuneate towards the base, 13–25 × 5–10 mm, upper surface ± elepidote, margins revolute, lower surface with very distant, small, ± equal scales with very narrow rims, at first golden, rapidly becoming dark brown to almost black. Inflorescence 1–2-flowered, pedicels lepidote, 10–12 mm, extending to 25 mm in fruit. Calyx lobes 1·5–2·5 mm, oblong, obtuse,

lepidote. Corolla purple, densely pilose and sparsely lepidote outside, 21–25 mm, tube 12–14 mm. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style impressed, longer than the stamens, glabrous, elepidote. Capsule lepidote, c. 9 mm.

The species may be divided into two disjunct varieties:

| | | |
|---|---|---|
| 1. | Leaves rounded at the apex . . . . | **a.** var. **uniflorum** |
| + | Leaves acute at the apex . . . . | **b.** var. **imperator** |

**3a.** var. **uniflorum**. Type: China, S. Tibet, Doshong La, 11–12000 ft, 29 vi 1924, *Kingdon Ward* 5876 (holo. K, iso. E).
Ic.: Urquhart, The Rhododendron 2: t. 21 (1962).
CHINA (SE Xizang). Steep, grassy slopes, 3350–3650 m. Map 35, p. 118.

Known only from the type collection and material in cultivation.

**3b.** var. **imperator** (Kingdon Ward) Cullen, Notes R.B.G. Edinb. 36:113 (1978).
Syn.: *R. imperator* Kingdon Ward, Gard. Chron. 86:299 (1930); Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16:176 (1931). Type: NE Upper Burma, Seinghku Wang (advance base), 10–11000 ft, 9 vi 1926, *Kingdon Ward* 6884 (holo. K, iso. E).
Ic.: Bot. Mag. n.s. 176: t. 514 (1966–8).
NE BURMA. Bare cliff ledges, 3050–3350 m. Map 35, p. 118.

Known only from the type collection and material in cultivation.

**4. (115.) R. ludlowii** Cowan, Notes R.B.G. Edinb. 19:243 (1937). Type: China, SE Tibet, Pachakshiri District, Lo La, 13500 ft, 2 vii 1936, *Ludlow & Sherriff* 1895 (holo. BM, iso. E).
Ic.: Bot. Mag. n.s. 174: t. 412 (1962–3); Cox, Dwarf Rhododendrons t. 35 (1973); Ic. Corm. Sin. 3: t. 4013 (1974).

Small, spreading shrub to 0·3 m. Young growth lepidote with somewhat stalked scales, glabrous. Leaves 15–16 × 9–10 mm, broadly obovate or oblong-obovate, very obtuse at the apex, rounded to the base, margins crenate, lower surface pale green or brownish with prominent venation and distant, brown, flat, rather narrowly rimmed scales. Inflorescence 1-flowered, pedicels 15–20 mm in flower, lepidote. Calyx with conspicuous, oblong, rounded, lepidote and sparsely filiform-acicular-ciliate lobes, c. 7 mm. Corolla yellow, drying greenish yellow, sometimes with red spots inside the tube, 20–23 mm, tube c. 14 mm, broadly funnel-campanulate to almost bowl-shaped, densely pubescent and lepidote all over the outer surface. Stamens 10, filaments pubescent towards the base. Ovary lepidote, style impressed, glabrous, exceeding the stamens. Capsule unknown.
CHINA (S Xizang). Open rocky hillsides, c. 4000 m. Map 35, p. 118.

Known only from the type collection and material in cultivation.

XV. Subsection **Cinnabarina** (Hutchinson) Sleumer, Bot. Jahrb. 74:534 (1949).

Syn.: Subgenus *Keysia* [Nuttall ex] Hooker, Bot. Mag. 81: t. 4875 (1855).
Section *Keysia* (Nuttall) Maximowicz, Mém. Acad. Sci. St. Petersb. sér. 7, 16(9):15 (1870).
Series *Cinnabarinum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 221 (1930).

Shrubs to 7 m, occasionally epiphytic. Young growth lepidote, often glaucous. Leaves evergreen or partly deciduous, variable in shape, lepidote beneath with ± unequal, close but not contiguous, small, broadly or narrowly rimmed scales. Inflorescences terminal or axillary, flowers usually pendulous. Calyx small, disc-like or undulate, lepidote, sometimes ciliate. Corolla fleshy, waxy, tubular to campanulate, the lobes not greatly spreading, often pruinose outside. Stamens 10, declinate, filaments pubescent in the lower part, rarely entirely glabrous. Ovary lepidote, 5-locular, style impressed, declinate, glabrous or slightly pubescent at the base. Nectar copious, held in 5 drops in the corolla base. Capsule lepidote, cylindric. Seeds unwinged and with obscure fins.
Type species: *R. cinnabarinum* Hooker.

A group of two species which are very similar, but differ in flower size and inflorescence. It is easily recognised by the fleshy, waxy corollas which contains copious nectar, usually in the form of five large droplets, and is related to subsection Tephropepla. Many of the species formerly recognised are merely selections from the available variation, brought into cultivation and described; they are worth no more than cultivar status.

1. Inflorescences all terminal; corolla 25–36 mm; scales very narrowly rimmed . . . . . **1. cinnabarinum**
\+ Inflorescences mostly lateral; corolla up to 20 mm; scales broadly rimmed . . . . . **2. keysii**

**1. (116). R. cinnabarinum** Hooker, Rhodo. Sikkim Himalaya t. 8 (1849).

Straggling shrub up to 7 m in favourable locations. Young growth lepidote and often glaucous or with a pruinose bloom. Leaves mostly evergreen, sometimes deciduous, broadly to narrowly elliptic, rounded to the ± obtuse apex, tapered to cordate at the base, 30–90 × 27–50 mm, lepidote or elepidote above, lepidote beneath with rather fleshy, narrowly rimmed equal or unequal scales. Inflorescences all terminal, 2–7-flowered, pedicels lepidote. Calyx disc-like or undulate, lepidote. Corolla tubular to campanulate, variable in colour: yellow, orange (sometimes with a purple flush), red, red and yellow, or purple; usually with a waxy, pruinose bloom, 25–36 mm, the tube 15–22 mm. Stamens 10, filaments pubescent towards the base, rarely entirely glabrous. Ovary lepidote and sometimes puberulous at the apex. Style glabrous or sparsely pubescent or rarely lepidote at the base. Capsule lepidote, cylindric, c. 10 mm.

A very variable species, divisible into three vicariating subspecies:

1. Corolla lobes lepidote outside; most leaves deciduous; corolla purple . . . . . **c.** subsp. **tamaense**
\+ Corolla lobes elepidote outside; most leaves evergreen; corolla variable in colour, rarely purple . . . . . 2

2. Leaves relatively narrow, length/breadth ratio 2·2 or more, usually elepidote above; corolla usually ± tubular-campanulate . **a.** subsp. **cinnabarinum**

\+ Leaves relatively broader, length/breadth ratio less than 2·2, usually persistently lepidote above; corolla usually campanulate **b.** subsp. **xanthocodon**

**1a.** subsp. **cinnabarinum**. Type: Sikkim Himalaya, *Hooker* (holo. K). Fig. 2u, p. 16.

Syn.: *R. roylei* Hooker, Rhodo. Sikkim Himalaya t. 7 (1849). Type: Sikkim Himalaya, *Hooker* (holo. K).
*R. blandfordiiflorum* W. J. Hooker, Bot. Mag. 82: t. 4930 (1856). Type: Sikkim Himalaya, *(J. D.) Hooker* (holo. K).
*R. cinnabarinum* var. *roylei* (Hooker) Hort.
*R. cinnabarinum* var. *blandfordiiflorum* (Hooker) Hort.

Ic.: The Garden 15: pl. 169 (1879) & 44: t. 940 (1893); Millais, Rhododendrons, opp. p. 24 (1917); Urquhart, The Rhododendron 2: t. 25 (1962); Stainton, Forests of Nepal t. 109 (1972).

NEPAL, INDIA (W Bengal, Sikkim), BHUTAN, CHINA (S Xizang). Hillsides, forest and forest margins, 2750–3950 m. Map 36, p. 125.

The corolla of subsp. *cinnabarinum* is usually somewhat tubular, and varies in colour from dull red, through coppery red to red and yellow or orange.

**1b.** subsp. **xanthocodon** (Hutchinson) Cullen, Notes R.B.G. Edinb. 36:113 (1978).

Syn.: *R. xanthocodon* Hutchinson, Gard. Chron. 95:409 (1934). Type: a cultivated specimen derived from *Kingdon Ward* 6026 (holo. K).
*R. concatenans* Hutchinson, ibid. 97:374 (1935). Type: a cultivated specimen derived from *Kingdon Ward* 5874 (holo. K, iso. E).
*R. cinnabarinum* var. *pallidum* W. J. Hooker, Bot. Mag. 80: t. 4788 (1854). Type: a cultivated specimen (holo. K).
*R. cinnabarinum* var. *purpurellum* Cowan, Notes R.B.G. Edinb. 21:147 (1951). Type: Tibet, Natrampa, Chayul Chu, 10000 ft, 27 iv 1936, *Ludlow & Sherriff* 1354 (holo. E, iso. BM).

Ic.: Urquhart, The Rhododendron 1: t. 13 (1958); Hara (ed.), Photo-album of Plants of E Himalaya t. 165 (1968); Bot. Mag., n.s. 179: t. 634 (1972–3).

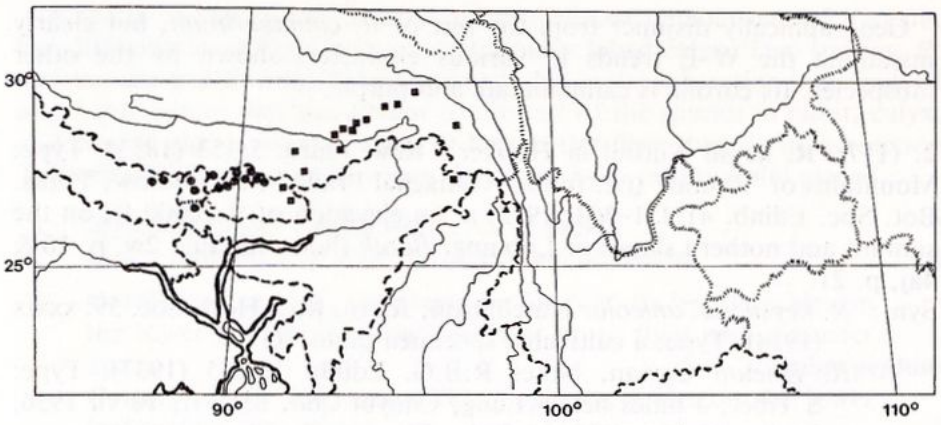
INDIA (Arunachal Pradesh), BHUTAN, CHINA (S Xizang). Hillsides, forests, forest margins, 3050–3950 m. Map 36, p. 125.

The corollas of subsp. *xanthocodon* are campanulate and vary in colour from clear yellow to apricot, yellow flushed with purple (either when young, when old, or permanently), or purple. The subspecies intergrades with subsp. *cinnabarinum* in Bhutan, where many intermediates occur.

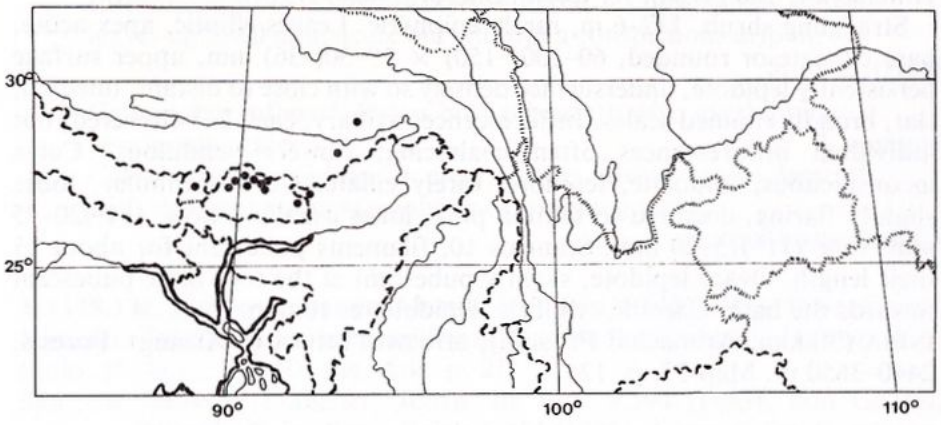
**1c.** subsp. **tamaense** (Davidian) Cullen, Notes R.B.G. Edinb. 36:113 (1978).

Syn.: *R. tamaense* Davidian, Rhododendrons (RHS) 1972:54–55. Type: N Burma, N Triangle, Tama Bum, 10000–10500 ft, 20 vi 1953, *Kingdon Ward* 21021 (holo. BM).

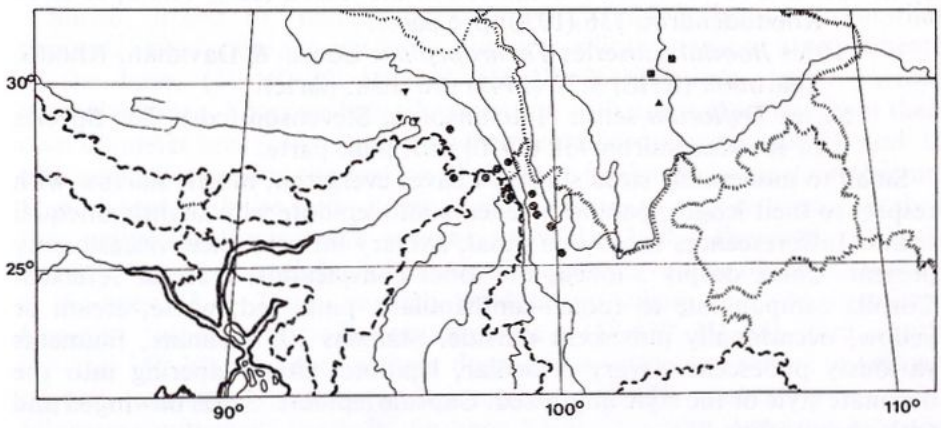
N BURMA. Thickets and forest margins, 2750–3200 m. Map 36, p. 125.




MAP 36. ● *R. cinnabarinum* subsp. *cinnabarinum*; ■ subsp. *xanthocodon*; ▲ subsp. *tamaense*; ▼ intermediate between subspp. *cinnabarinum* & *xanthocodon*.




MAP 37. ● *R. keysii*.




MAP 38. ● *R. xanthostephanum*; ■ *R. longistylum*; ▲ *R. hanceanum*; ▼ *R. auritum*.

Geographically disjunct from the rest of *R. cinnabarinum*, but clearly sustaining the W–E trends in various characters shown by the other subspecies. Its corolla is campanulate and purple.

**2. (117). R. keysii** Nuttall in Hooker's Kew Journ. 5:353 (1853). Type: Mountains of 'Bhutan' (i.e. India, Arunachal Pradesh, cf. Ludlow, Trans. Bot. Soc. Edinb. 41:351–363, 1972) at an elevation of 9–10000 ft, on the summit and nothern slopes of Loblung, *Booth* (holo. K). Fig. 2w, p. 16 & 4aj, p. 21.

Syn.: *R. keysii* var. *unicolor* Hutchinson, Journ. Roy. Hort. Soc. 59: xxxix (1934). Type: a cultivated specimen (holo. K).

*R. igneum* Cowan, Notes R.B.G. Edinb. 19:235 (1937). Type: S Tibet, 4 miles below Lung, Chayul Chu, 8500 ft, 10 vii 1936, *Ludlow & Sherriff* 2334 (holo. E).

Ic.: Bot. Mag. 81: t. 4875 (1855); Fl. des Serres, ser. 2, t. 1110 (1856); Gartenflora 12: t. 415 (1863); The Garden 48:106 (1895); Schneider, Ill. Handb. Laubh. 2:1042 (1909); Hara (ed.), Photo-album of Plants of E Himalaya t. 168 (1968); Ic. Corm. Sin. 3: t. 4046 (1974).

Straggling shrub, 1·2–6 m, rarely epiphytic. Leaves elliptic, apex acute, base cuneate or rounded, 60–100(–150) × 19–30(–36) mm, upper surface persistently lepidote, undersurface densely so with close to distant, unequal, flat, broadly rimmed scales. Inflorescences axillary, each 2–5-flowered, but individual inflorescences often coalescing; flowers pendulous. Calyx inconspicuous, undulate, lepidote, rarely ciliate. Corolla tubular, lobes slightly flaring, deep red to salmon pink, lobes usually yellow, (14–)20–25 mm, tube (11–)15–20 mm. Stamens 10, filaments pubescent for about ½ their length. Ovary lepidote, slightly pubescent at the top. Style pubescent towards the base. Capsule cylindric, lepidote, c. 10 mm.

INDIA (Sikkim, Arunachal Pradesh), BHUTAN, CHINA (S Xizang). Forests, 2440–3650 m. Map 37, p. 125.

XVI. Subsection **Tephropepla** (Cowan & Davidian) Sleumer, Bot. Jahrb. 74:532 (1949).

Syn.: Series *Boothii* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 156 (1930) pro parte.

Series *Boothii* subseries *Tephropeplum* Cowan & Davidian, Rhodo. Yearbook (RHS) 3:72 (1948) pro max. parte.

Series *Triflorum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 758 (1930) pro. min. parte.

Small to moderately sized shrubs. Leaves evergreen, mostly narrow with respect to their length, papillose beneath and lepidote with slightly unequal scales. Inflorescences mostly terminal, axillary inflorescences occasionally present. Calyx deeply 5-lobed, the lobes conspicuous, erect or reflexed. Corolla campanulate to funnel-campanulate, pink, red, white, cream or yellow, occasionally pubescent outside. Stamens 10, declinate, filaments variously pubescent. Ovary 5-locular, lepidote, either tapering into the declinate style or the style impressed. Capsule lepidote. Seeds unwinged and with obscure fins.

Type species: *R. tephropeplum* Balfour f. & Farrer.

A group of five species, related to subsections Cinnabarina and Virgata, but differing from both in the conspicuously lobed calyx. Two species, *R. hanceanum* and *R. longistylum*, are included in the subsection in default of any better place: they are similar to the rest of the species in habit, calyx, and corolla shape, and certainly fit here better than they do in subsection Triflora (*Triflorum* series), where they have been traditionally placed.

1. Style impressed; corolla white, red or pink . . . . . 2
\+ Ovary tapering into style; corolla cream or yellow . . . . 4

2. Corolla red or pink; style lepidote for c. ½ its length; scales on the lower leaf surface contiguous or up to their own diameter apart . . . . . **3. tephropeplum**
\+ Corolla white; style completely elepidote; scales on the lower leaf surface very distant . . . . . 3

3. Inflorescence 5–15-flowered with conspicuous rachis; leaves 70–100 mm or more with conspicuous acuminate drip tip . . **4. hanceanum**
\+ Inflorescence up to 3-flowered, without a conspicuous rachis; leaves up to 60 mm, acute but without a conspicuous drip tip . **5. longistylum**

4. Calyx lobes reflexed; leaves brown beneath with overlapping or contiguous scales . . . . . **2. auritum**
\+ Calyx lobes spreading or erect; leaves silvery-brown beneath with close but not contiguous or overlapping scales . . . **1. xanthostephanum**

**1. (118.) R. xanthostephanum** Merrill, Brittonia 4:148 (1941). Type: China, Yunnan, Tali, dans les broussailles au pied du Tong chuan, *Delavay* 4728 (holo. P—n.v., iso. E). Fig. 4ak, p. 21.

Syn.: *R. aureum* Franchet, Journ. de Bot. 9:394 (1895), non Georgi, Bemerk. Reise Russ. Reich 1:214 (1775). Type: as for *R. xanthostephanum*.

Ic.: Bot. Mag. 147: t. 8882 (1921); Millais, Rhododendrons, ser. 2, opp. p. 244 (1924); Ic. Corm. Sin. 3: t. 4018 (1974).

Shrub, 0·6–2 m, mature bark smooth, reddish brown, somewhat pruinose. Leaves oblong-narrowly elliptic to elliptic, acute at apex, cuneate at the base, (50–)60–80(–105) × (15–)20–25(–30) mm, upper surface brownish green, lower surface silvery brown with unequal scales about their own diameter apart, the smaller and more numerous scales deeply sunk in pits, scarcely reaching the surface of the leaf, the larger borne ± on the surface, though with the stalks in pits. Inflorescences usually terminal, rarely a few axillary inflorescences present as well, (3–)4–5-flowered, pedicels lepidote, 10–12 mm. Calyx lobes suborbicular to ovate or oblong, rounded at the apex, (2–)5–7 mm, variably lepidote, not ciliate, erect or spreading. Corolla rather narrowly campanulate, (18–)20–25(–28) mm, tube (11–)14–16(–20) mm, deep yellow, deep lemon-yellow or tending to yellow-orange, variably lepidote and sometimes slightly pubescent outside. Filaments pubescent towards the base. Ovary lepidote, tapering into the style which is lepidote at the base. Capsule lepidote, cylindric, 8–11 mm.

INDIA (Arunachal Pradesh), NE BURMA, CHINA (NW & C Yunnan, SE Xizang). In forests, on forest margins and in scrub, 1600–3000(–3900) m. Map 38, p. 125.

**2. (119.) R. auritum** Tagg, Rhodo. Soc. Notes 3:278 (1931) & Notes R.B.G. Edinb. 18:218 (1934). Type: China, S Tibet, Tsangpo gorge near Pemakochung, 8000 ft, 18 vi 1924, *Kingdon Ward* 6278 (holo. E).

Very similar to *R. xanthostephanum*, differing as follows: often taller, bark not as conspicuous, leaves narrowly elliptic to elliptic, undersurface brown with unequal, ± contiguous or overlapping scales, the smaller sunk in pits but reaching the leaf surface; calyx lobes reflexed; corolla pale yellow or cream, sometimes with a faint pink flush.

CHINA (SE Xizang—Tsangpo gorge). Sheltered cliffs, 2150–2600 m. Map 38, p. 125.

Very similar to *R. xanthostephanum* but consistently distinguishable by the reflexed calyx lobes and the less deeply sunk scales.

**3. (120.) R. tephropeplum** Balfour f. & Farrer, Notes R.B.G. Edinb. 13:302 (1922). Type: Burma, Chawchi Pass, Mokuji pass, etc., 10500 ft, 20 v 1920, *Farrer* 1567 (holo. E). Fig. 1i, p. 15 & 4al, p. 21.

Syn.: *R. spodopeplum* Balfour f. & Farrer, op. cit.: 299. Type: Burma, crags of the Shing Hong, 10000 ft, 21 vi 1920, *Farrer* 1645 (holo. E).

*R. deleiense* Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16: 172 (1931). Type: Assam, Delei valley, 8–10000 ft, *Kingdon Ward* 8165 (iso. E).

Ic.: Bot. Mag. 157: t. 9343 (1934); Gard. Chron. 96: suppl. t. 69 (1934); Cox, Dwarf Rhododendrons 87 (1973); Ic. Corm. Sin. 3: t. 4019 (1974).

Shrub, 0·5–1·3 m; bark scaling, brownish. Leaves narrowly oblanceolate to narrowly elliptic, rarely oblanceolate, rounded at the apex, cuneate at the base, (42–)50–75(–100) × (11–)16–30(–40) mm, dark green above, brownish grey beneath, papillose and with unequal scales slightly sunk in pits in the surface, contiguous to their own diameter apart, rapidly becoming blackish or dark brown. Inflorescence 3–9-flowered, rachis usually obvious, pedicels densely lepidote, (11–)16–18(–30) mm. Calyx lobes spreading, orbicular to oblong, rounded at the apex, 5–7(–8) mm, sparsely loriform-ciliate, lepidote at the base and frequently on the margins also. Corolla campanulate, pink to red, (17–)20–24 mm, tube 11–18 mm, variably lepidote outside, glabrous inside. Filaments pubescent towards the base. Ovary lepidote; style impressed, lepidote for approximately ½ its length from the base. Capsule ovoid-cylindric, 7–10 mm.

INDIA (Arunachal Pradesh), NE BURMA, CHINA (NW Yunnan, SE Xizang). Cliffs, rocky slopes, screes and alpine meadows, 2450–4300 m. Map 39, p. 131.

**4. (121.) R. hanceanum** Hemsley, Journ. Linn. Soc. Bot. 26:24 (1889). Type: China, Szechuan, Mt Omei, 4000 ft, *Faber* (holo. K).

Ic.: Kew Bull. 1914:202; Millais, Rhododendrons, opp. p. 10 (1917); Fang, Ic. Pl. Omeiensium 1: t. 34 (1942).

Shrub to 2 m. Young growth lepidote. Leaves narrowly ovate or ± oblong-elliptic, acuminate at the apex with a conspicuous drip tip, tapered to the abruptly or more smoothly rounded base, 70–115 × 34–57 mm, lower surface pale green with rather distant, flat or slightly sunken golden-brown scales, upper surface elepidote, slightly puberulent along the main vein near the base. Inflorescence 5–15-flowered with a conspicuous rachis up to 12 mm, pedicels sparsely lepidote, c. 10 mm. Calyx lobes c. 5 mm, narrowly triangular, sparsely fringed with scales. Corolla white, narrowly funnel-campanulate, c. 20 mm, tube c. 12 mm, glabrous and elepidote outside, sparsely pilose inside at the base of the tube. Stamens 10, filaments pilose towards the base, long-exserted from the corolla. Ovary lepidote, style impressed, glabrous, exceeding stamens. Capsule ovoid-cylindric, lepidote, c. 8 mm.
CHINA (C Sichuan). Cliffs, 1200–1500 m. Map 38, p. 125.

A very distinctive species, most closely allied to *R. longistylum*. Its resemblance to *R. afghanicum* (p. 156), with which it was formerly associated in the *Triflorum* series is limited to the inflorescence, and is superficial.

**5. (122.) R. longistylum** Rehder & Wilson, Pl. Wils. 1:514 (1913). Type: China, western Szechuan, west and near Wen chuan hsien, 2300 m, vii & x 1908, *Wilson* 1204 (iso. E).
Ic.: Rev. Hort. 1914:232, 233.

Shrub, 0·5–2 m. Young growth sparsely lepidote and usually puberulent. Leaves obovate or oblong-obovate, 35–52 × 9–15 mm, acute at the apex, tapered to the base, lower surface pale green with distant, unequal, golden and brown scales with broad rims, upper surface sparsely but persistently lepidote, puberulent along the main vein. Inflorescences (1–)3-flowered, pedicels lepidote and puberulent, 10–15 mm. Calyx lobes narrowly triangular, obtuse, up to 3·5 mm, fringed with scales, tube lepidote and slightly puberulent. Corolla white, narrowly funnel-shaped or funnel-campanulate, c. 20 mm, tube 12 mm, glabrous and elepidote outside, pilose within at the base of the tube. Stamens 10, filaments pilose towards the base, much exserted from the corolla. Ovary lepidote and puberulent at the apex, style impressed, glabrous, much exserted from the corolla. Capsule lepidote, broadly cylindric, c. 6 mm.
CHINA (C Sichuan). Cliffs, 1300–2300 m. Map 38, p. 125.

Known only from a few collections from near Wen chuan hsien, and material in cultivation.

**XVII.** Subsection **Virgata** (Hutchinson) Cullen, Notes R.B.G. Edinb. 36:113 (1978).
Syn.: Series *Virgatum* Hutchinson in Stevenson (ed.), The Species of Rhododendron 827 (1930) pro max. parte.
Subgenus *Pseudorhodorastrum* Sleumer section *Rhabdorhodion* Sleumer, Bot. Jahrb. 74:529 (1949).

Small shrubs. Young growth lepidote. Leaves evergreen, lepidote on both surfaces. Inflorescences borne in the axils of the upper leaves, the terminal bud vegetative, each 1(–2)-flowered. Calyx 5-lobed. Corolla funnel-shaped,

white, pink or mauve. Stamens 10, declinate, filaments pubescent towards the base. Ovary 5-locular. Style impressed, declinate. Capsule lepidote, glabrous. Seeds unwinged but caudate-appendaged at each end.
Type species: *R. virgatum* Hooker.

A monotypic subsection, easily distinguished from other lepidote rhododendrons by the lateral, 1-flowered inflorescences and tailed seeds. In Sleumer's (1949) classification this group, like subsection Rhodorastra, formed part of a subgenus separated from the main bulk of subgenus Rhododendron. However, there is no doubt that, in spite of its purely axillary inflorescences, it is very similar to subsections Cinnabarina and Tephropepla, and must be treated as a subsection, as they are.

**1. (123.) R. virgatum** Hooker, Rhodo. Sikkim Himalaya t. 26 (1849).

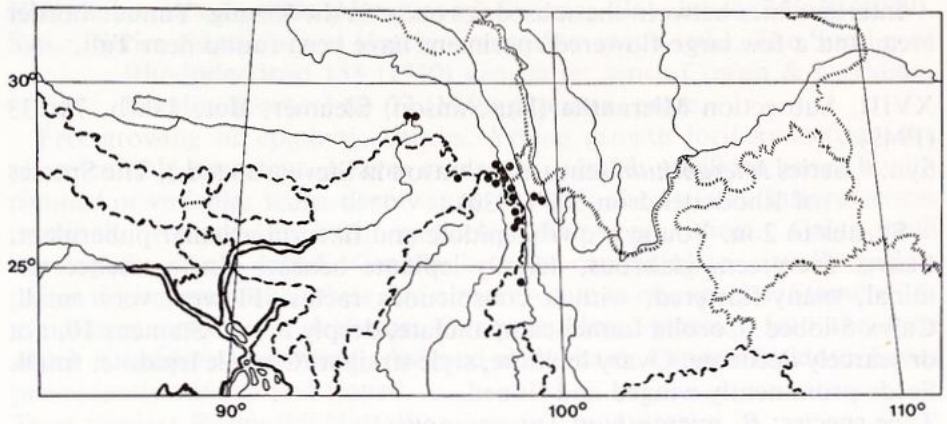
Shrub 0·3–1·5 m. Young growth lepidote. Leaves up to 50 mm, narrowly oblong or oblong-elliptic, laxly lepidote above particularly along the midrib and near the base, densely lepidote beneath with unequal scales, the surface of the leaf papillose. Inflorescences 1(–2)-flowered. Calyx 2–3 mm, the tube lepidote, the lobes occasionally fringed with filiform-acicular hairs. Corolla 15–37 mm, tube 8–20 mm, the tube pubescent and sparsely lepidote outside, the lobes lepidote outside. Stamens 10, filaments pubescent near the base. Ovary densely lepidote, style lepidote and/or pilose towards the base. Capsule lepidote, 9–12·5 mm.

A very variable species, showing variability in corolla length and colour, density of scales on the leaves and density of indumentum on the style. The variation in corolla length is clinal, with larger corollas in the western part of the range; this allows for the recognition of two subspecies:

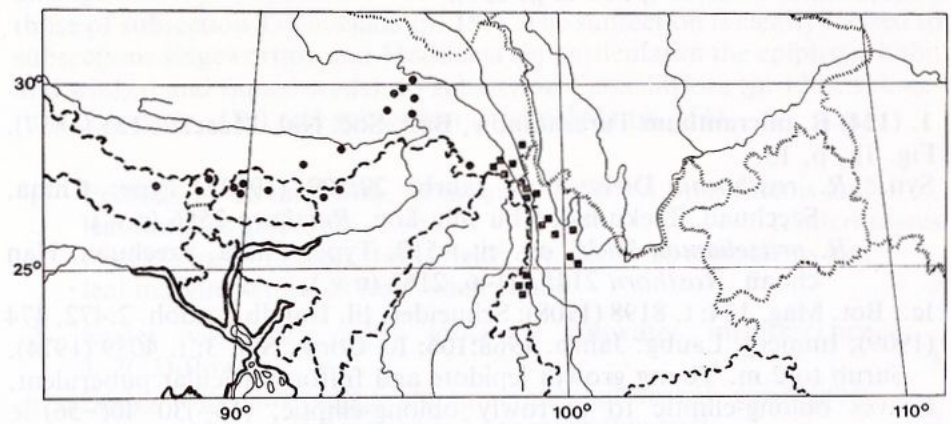
1. Corolla 25–37 mm, the tube 11–20 mm, pale to deep pink or mauve . . . . . **a.** subsp. **virgatum**
\+ Corolla 15–25 mm, the tube 8–15 mm, white or pink . . **b.** subsp. **oleifolium**

**1a.** subsp. **virgatum.** Type: Sikkim Himalaya, Lachen valley, 8–9000 ft, v & x, *Hooker* (holo. K). Fig. 4am, p. 21.
Ic.: Bot. Mag. 84: t. 5060 (1858); Fl. des Serres, ser. 2, 4: t. 1408 (1861); Schneider, Ill. Handb. Laubh. 2:471, 474 (1909); Hara (ed.), Photo-album of Plants of E Himalaya t. 167 (1968); Ic. Corm. Sin. 3: t. 4281 (1974).
NEPAL, INDIA (Sikkim, Arunachal Pradesh), BHUTAN, CHINA (S & SE Xizang). Forest margins, scrub, stony slopes, 2500–3800 m. Map 40, p. 131.

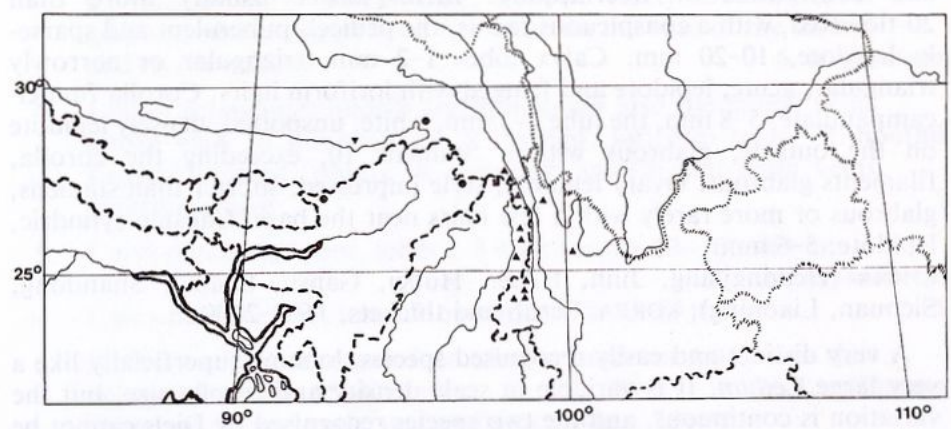
**1b.** subsp. **oleifolium** (Franchet) Cullen, Notes R.B.G. Edinb. 36:113 (1978).
Syn.: *R. oleifolium* Franchet, Bull. Soc. Bot. Fr. 33:235 (1886). Type: China, Yunnan, in montibus circa Talifou, *Delavay* (holo. P—n.v., iso. E).
*R. sinovirgatum* Hort., ined.
Ic.: Gard. Chron. 65:317 (1919); Bot. Mag. 145: t. 8802 (1919); Ic. Corm. Sin. 3: t. 4282 (1974).
CHINA (SE Xizang, N, NW, W & SW Yunnan). Forest margins, scrub, 2000–4000 m. Map 40, p. 131.




MAP 39. ● *R. tephropeplum*.




MAP 40. ● *R. virgatum subsp. virgatum*; ■ subsp. *oleifolium*.




MAP 41. ● *R. boothii*; ■ *R. chrysodoron*; ▼ *R. dekatanum*; ▲ *R. sulfureum*.

Intermediates between the subspecies occur in the Xizang/Yunnan border area, and a few large-flowered specimens have been found near Tali.

XVIII. Subsection **Micrantha** (Hutchinson) Sleumer, Bot. Jahrb. 74:533 (1949).

Syn.: Series *Micranthum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 500 (1930).

Shrubs to 2 m. Young growth lepidote and filiform-acicular puberulent. Leaves evergreen, glabrous, densely lepidote beneath. Inflorescence terminal, many-flowered, with a conspicuous rachis. Flowers very small. Calyx 5-lobed. Corolla funnel-campanulate, deeply lobed. Stamens 10, not or scarcely declinate. Ovary lepidote, style straight. Capsule lepidote, small. Seeds prominently winged and finned.

Type species: *R. micranthum* Turczaninow.

A monotypic and very distinct subsection, whose closest ally is probably subsection Lapponica (p. 92). It differs strikingly, however, in its conspicuously winged seeds, which suggest a relationship with subsections Maddenia or Boothia (p. 29 & p. 133).

**1. (124) R. micranthum** Turczaninow, Bull. Soc. Nat. Mosc. 7: 155 (1837). Fig. 1k, p. 15.

Syn.: *R. rosthornii* Diels, Bot. Jahrb. 29:509 (1900). Type: China, Szechuan, Tseku lao, Chu shin-kon, *Rosthorn* 2556 (n.v.).

*R. pritzelianum* Diels, op. cit.: 510. Type: China, Szechuan, Nan chuan, *Rosthorn* 2145, 2146, 2162 (n.v.).

Ic.: Bot. Mag. 134: t. 8198 (1908); Schneider, Ill. Handb. Laubh. 2:472, 474 (1909); Immerg. Laubg. Jahrb. 1968:106; Ic. Corm. Sin. 3: t. 4039 (1974).

Shrub to 2 m. Young growth lepidote and filiform-acicular puberulent. Leaves oblong-elliptic to narrowly oblong-elliptic, (16–)30–40(–56) × (5–)9–25 mm, acute at apex, cuneate at the base, sparsely lepidote and puberulent along the midrib and some of the veins above, densely to moderately lepidote beneath, the scales usually brownish, broad-rimmed, and contiguous or overlapping. Inflorescence usually more than 20-flowered, with a conspicuous rachis, the pedicels puberulent and sparsely lepidote, 10–20 mm. Calyx lobes 1–2 mm, triangular or narrowly triangular, acute, lepidote and fringed with loriform hairs. Corolla funnel-campanulate, 5–8 mm, the tube 1–3 mm, white, unspotted, densely lepidote on the outside, glabrous within. Stamens 10, exceeding the corolla, filaments glabrous. Ovary lepidote, style impressed, shorter than stamens, glabrous or more rarely with a few hairs near the base. Capsule cylindric, lepidote, 5–6 mm.

CHINA (Heilongjiang, Jilin, Hebei, Hubei, Gansu, Shanxi, Shandong, Sichuan, Liaoning), KOREA. Scrub and thickets, 1600–2600 m.

A very distinct and easily recognised species, looking superficially like a very large *Ledum*. It is variable in scale density and corolla size, but the variation is continuous, and the two species recognised by Diels cannot be maintained.

XIX. Subsection **Boothia** (Hutchinson) Sleumer, Bot. Jahrb. 74:530 (1949).
Syn.: Series *Boothii* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 155 (1930) pro parte; sensu Cowan & Davidian, Rhodo. Yearb. 3:60–72 (1948) pro max. parte.

Free-growing or epiphytic shrubs. Young growth loriform-setose, the setae variably persistent. Leaves evergreen, whitish-papillose beneath with rimmed or vesicular scales deeply sunk in pits in the surface. Inflorescences terminal, 1-many-flowered, pedicels often very short. Calyx well developed, clearly lobed. Corolla broadly campanulate, usually yellow (often drying greenish), white and almost rotate in one species. Stamens 10, ± actinomorphic, not declinate. Ovary lepidote, tapering into the style which is lepidote and sharply deflexed at the base. Capsule lepidote. Seeds prominently winged and finned.
Type species: *R. boothii* Nuttall.

A group of seven species, of which *R. leucaspis*, with white, almost rotate corollas, stands somewhat apart from the rest. It is, however, similar to *R. megeratum*, which links it to the rest of the group. These two species are distinguished by the possession of vesicular scales, which are very similar to those of subsection Trichoclada (p. 151). The subsection is clearly related to subsections Edgeworthia and Maddenia (in particular in the epiphytic habit and winged and finned seeds), to subsection Camelliiflora (p. 138), subsection Glauca (p. 139) and subsection Trichoclada (p. 151).

1. Pedicels 25–50 mm, thin, flexuous; corolla 9–13 mm; stems and leaf margins glabrous . . . . . **1. micromeres**
\+ Pedicels up to 15 mm, stout, rigid; corolla 15–30 mm; stems and leaf margins setose, at least when young . . . . . 2

2. Scales vesicular; calyx lobes ± obovate; inflorescence 1–2(–3)-flowered . . . . . 3
\+ Scales with rims (which are sometimes upturned); calyx lobes ovate or oblong; inflorescence 3- or more-flowered . . . 4

3. Corolla almost rotate, white sometimes tinged pink; leaves loriform-setose above . . . . . **7. leucaspis**
\+ Corolla broadly campanulate, yellow, rarely cream; leaves glabrous above except for a few setae on the base of the midrib and on the margins . . . . . **6. megeratum**

4. Leaves acuminate; midrib and sometimes also the lateral veins above with an indumentum of twisted, loriform setae **2. boothii**
\+ Leaves rounded, obtuse or subacute; midrib and main veins glabrous above . . . . . 5

5. Calyx obscurely lobed, lobes 2–3 mm; corolla 29–30(–40) mm . **3. chrysodoron**
\+ Calyx clearly lobed, lobes 5–6 mm; corolla 15–25 mm . . . 6

6. Scales on leaf undersurface clearly sunk in pits, the rims upturned; corolla 15–20 mm . . . . . **4. sulfureum**
\+ Scales on the leaf undersurface flat; corolla c. 25 mm . . **5. dekatanum**

**1. (125.) R. micromeres** Tagg, Notes R.B.G. Edinb. 16:211 (1931). Type: China, SE Tibet, Tsarong, Salween/Kiu chiang Divide, W of Si K'ia, 9–10000 ft, vi 1922, *Forrest* 21811 (holo. E). Fig. 4an, p. 21.

Epiphytic or (extremely rarely) free-growing shrub to 2 m. Young growth lepidote, glabrous. Leaves mostly narrowly elliptic, rarely elliptic or tending to obovate, glabrous, undersurface papillose but not whitish, scales close, yellow, unequal, at least the smaller sunk in crenately-margined pits, and with their rims upturned. Inflorescence (4–)5–10-flowered, rachis well developed and conspicuous, pedicels thin, flexuous, lepidote, 25–35 mm, extending to 50 mm in fruit. Calyx with well developed lobes (2–)3–5 mm, lepidote, glabrous, held ± at right angles to the floral axis or even reflexed, reflexed in fruit. Corolla broadly campanulate, yellow, 9–13 mm, tube 4–6 mm, lepidote outside, pilose within. Stamens 10, filaments pilose towards the base. Ovary lepidote. Capsule narrowly cylindric, often sickle-shaped, lepidote, 12–16 mm.

INDIA (Arunachal Pradesh), BHUTAN, CHINA (NW Yunnan, S & SE Xizang), NE BURMA. Epiphytic, 2450–3350(–4300) m. Map 43, p. 137.

A distinct species, whose affinity lies with subsection Boothia rather than with *R. genestierianum* (p. 148), with which Cowan & Davidian (Rhodo. Yearb. 3:92, 1948) relate it, as subseries Genestierianum of series Boothii. This affinity is shown in all characters but particularly in the epiphytic habit, scale type, corolla shape and seed type. The resemblances with *R. genestierianum* are superficial. This species also resembles *R. brachyanthum* (subsect. Glauca, p. 144) in its inflorescence and *R. auritum* (subsect. Tephropepla, p. 128) in its reflexed calyx lobes.

**2. (126). R. boothii** Nuttall, Hooker's Kew Journ. 5:346 (1853). Type: 'Bhutan' (i.e. India, Arunachal Pradesh, cf. Ludlow, Trans. Bot. Soc. Edinb. 41:359, 1972), Gescherong Hills, *Booth* (holo. K).

Syn.: *R. mishmiense* Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16:173 (1931). Type: Assam, Mishmi hills, Delei valley, 7–8000 ft, *Kingdon Ward* 8046 (holo. E).

Ic.: Ill. Hort. 5: t. 174 (1858); Millais, Rhododendrons, opp. p. 24 (1917); Bot. Mag. 116: t. 7149 (1890).

Usually an epiphytic shrub, rarely on rocks, up to 2 m. Young growth with a dense indumentum of twisted and matted loriform setae. Leaves narrowly ovate to ovate-oblong, acuminate at the apex, rounded at the base, very hard and leathery, 78–112 × 38–52 mm, upper surface with dense, matted loriform setae on the midrib (and rarely secondary veins), margin loriform-ciliate, lower surface with dark brown, close, ± equal scales. Inflorescence (3–)4–6(–10)-flowered, pedicels stout, up to 15 mm, covered with matted loriform setae. Calyx lobes green, ovate to oblong, (7–)10–15 mm, lepidote and loriform-ciliate. Corolla campanulate, dull to bright yellow, sometimes spotted, 25–27 mm, tube 15–16 mm, lepidote on the lobes and tube outside, pilose within the tube. Ovary lepidote. Capsule ± ovoid, up to 15 mm.

INDIA (Arunachal Pradesh), CHINA (S Xizang). Forests and scrub, 1800–2450 m. Map 41, p. 131.

I have seen no material with more than six flowers in the inflorescence, though the illustration in the *Botanical Magazine*, t. 7149, shows such a plant.

**3. (127). R. chrysodoron** [Tagg ex] Hutchinson, Gard. Chron. 95:276 (1934). Type: a cultivated specimen, said to derive from *Forrest* 25446—see below (holo. K, iso. E).

Syn.: *R. butyricum* Kingdon Ward, nomen nudum.

Ic.: Bot. Mag. 159: t. 9442 (1936); Ic. Corm. Sin. 3: t. 4007 (1974).

Shrub, perhaps epiphytic, attaining 1 m or more in cultivation. Young shoots bristly with deciduous loriform setae. Leaves oblong-elliptic, up to 88 × 45 mm, obtuse at the apex, rounded at the base, loriform-ciliate when young, the lower surface papillose with close, golden yellow scales slightly sunk in pits. Inflorescence 3–4-flowered, pedicels very short, densely lepidote. Calyx obscurely lobed, lobes 2–3 mm, lepidote, loriform-ciliate. Corolla campanulate, yellow, 29–30 mm, tube c. 15 mm, lepidote and pubescent at the base of the tube outside, pilose within the tube. Ovary lepidote. Capsule unknown.

NE BURMA (Adung valley). Scrub, 2450 m. Map 41, p. 131.

This species, which is known from only two wild-collected specimens and material in cultivation, is peculiar in several respects. It was described from cultivation and said to be raised from seed of *Forrest* 25446—a flowering specimen from Yungchang in Yunnan belonging to subsection Maddenia, and here identified as *R. yungchangense* (p. 53). The cultivated material is certainly not *yungchangense*, but appears to combine most of the characteristics of subsection Boothia with a few of subsection Maddenia, particularly scale type, calyx form, the large size of the flower and the presence of indumentum at the base of the corolla tube outside. On the basis of this evidence the plant might well have been regarded as a natural hybrid between *yungchangense* and *sulfureum*. However, in the same year that the plant first flowered in cultivation (1931), Kingdon Ward collected a specimen in the Adung valley on the Burmese/Chinese frontier, which matches it in every respect. The Adung valley is about 240 km north of Yungchang and was not visited by Forrest, so this does not explain the origin of the material in cultivation. It is possible that *chrysodoron* is distributed between the Adung valley and Yungchang, or that it is the result of occasional hybridisation between members of subsections Maddenia and Boothia, thus explaining the scattered distribution as we know it today. The description above has been drawn up from wild material; in cultivation the flowers may be larger (up to 40 mm) and, apparently, of a deeper yellow.

**4. (128.) R. sulfureum** Franchet, Bull. Soc. Bot. Fr. 34:283 (1887). Type: China, Yunnan, in dumetis ad pedem montis Tsang chan supra Tali, 2500 m, 20 iv 1886, *Delavay* 2212 (holo. P—n.v., iso. E). Fig. 4ao, p. 21.

Syn.: *R. theiochroum* Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:282 (1916). Type: China, Yunnan, Shweli/Salween Divide, 10–11000 ft, iv 1913, *Forrest* 11910 (holo. E).

*R. cerinum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:240 (1922). Type: China, Yunnan, Shweli/Salween Divide, vi 1918, *Forrest* 17592 (holo. E).

*R. commodum* Balfour f. & Forrest, op. cit.: 252. Type: China, Yunnan, N'Maikha/Salween Divide, eastern flank, 11–12000 ft, v 1919, *Forrest* 17866 (holo. E).

Ic.: Bot. Mag. 148: t. 8946 (1922); Millais, Rhododendrons ser. 2, opp. p. 244 (1924); Ic. Corm. Sin. 3: t. 4008 (1974).

Epiphytic or free-growing shrub, 0·6–1·6 m. Young growth often loriform-setose, the setae usually quickly decidouous. Leaves mostly obovate, sometimes broadly so, more rarely narrowly elliptic, (35–)45–65 (–85) × 20–35(–45) mm, very rounded to subacute at the apex, tapering to the base, margins often loriform-ciliate when young, upper surface glabrous, lower surface with close, unequal scales sunk in pits with crenulate edges, the rims of the scales upturned. Inflorescence 3–6-flowered, pedicels longer than the flowers, stout, up to 15 mm, lepidote, sometimes loriform-setose and/or filiform-acicular pubescent. Calyx lobes ovate to oblong, 5–6 mm, lepidote, sometimes loriform-ciliate or minutely pubescent along the margin. Corolla campanulate, greenish or bright yellow, unspotted, 15–20 mm, tube 8–11 mm, sparsely to densely lepidote outside, sometimes sparsely pubescent on the tube, pilose inside. Ovary lepidote. Capsule cylindric-ovoid, lepidote, 10–13 mm.

NE BURMA, CHINA (NW & SW Yunnan, SE Xizang). Rocks and slopes, or epiphytic, 2500–3650(–4000) m. Map 41, p. 131.

**5. (129). R. dekatanum** Cowan, Notes R.B.G. Edinb. 19:226 (1937). Type: China, SE Tibet, Chayul Chu, Natrampa, *Ludlow & Sherriff* 1360 (holo. BM, iso. E).

Very similar to *R. sulfureum*, differing as follows: leaves broadly ovate-oblong, 45–50 × 27–30 mm, the scales beneath contiguous, markedly unequal, flat, borne above the surface, not obviously sunk in pits; corolla c. 25 mm, tube 16 mm.

CHINA (S Xizang). Rhododendron and bamboo forest. Map 41, p. 131.

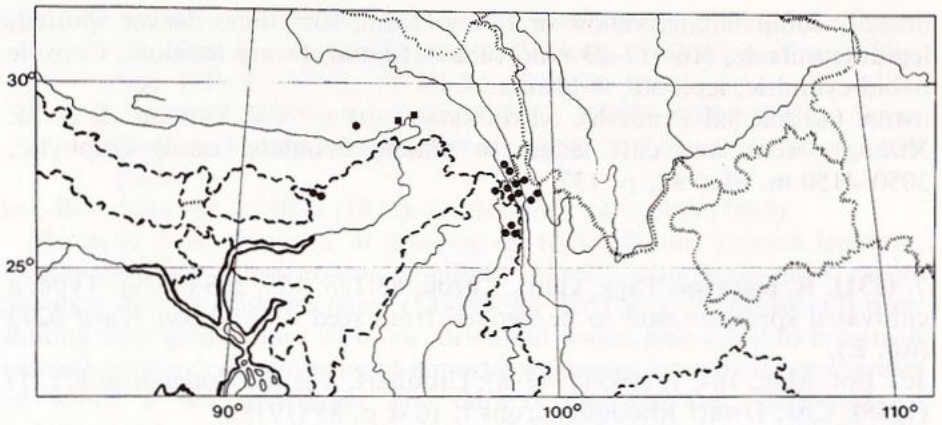
Known only from the type collection. A specimen hitherto identified as *R. sulfureum* (Burma, Kaw-ji pass, 10500 ft, *Farrer* 1550) has scales which match those of *dekatanum*; in other respects it is typical of *sulfureum*, and its status is uncertain.

**6. (130). R. megeratum** Balfour f. & Forrest, Notes R.B.G. Edinb. 12:140 (1920). Type: China, NW Yunnan, Kari pass, Mekong/Yangtze Divide, 12–13000 ft, viii 1914, *Forrest* 18942 (holo. E). Pl. 2k & fig. 4ap, p. 21.

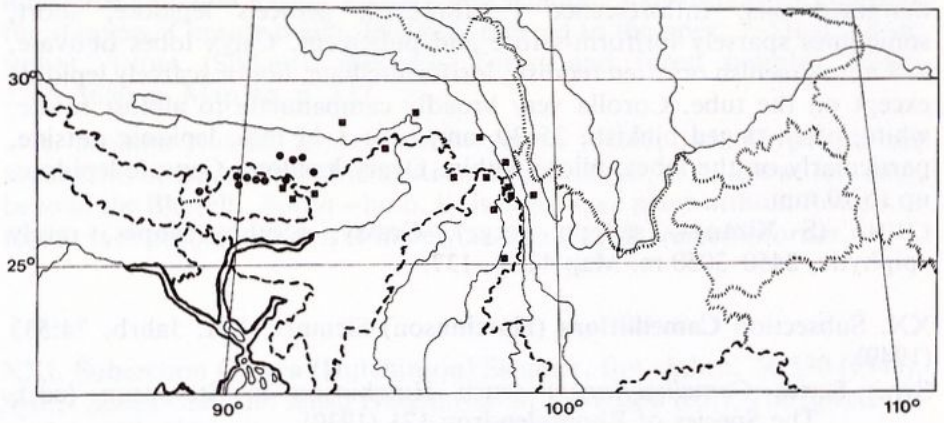
Syn.: *R. tapeinum* Balfour f. & Farrer, Notes R.B.G. Edinb. 12:164 (1920). Type: NE Burma, Chimili cliffs, 12–13000 ft, 18 v 1919, *Farrer* 938 (holo. E).

Ic.: Bot. Mag. 152: t. 9120 (1927–8); Gard. Chron. 89:431 (1931); Cox, Dwarf Rhododendrons t. 11 (1973); Ic. Corm. Sin. 3: t. 4006 (1974).

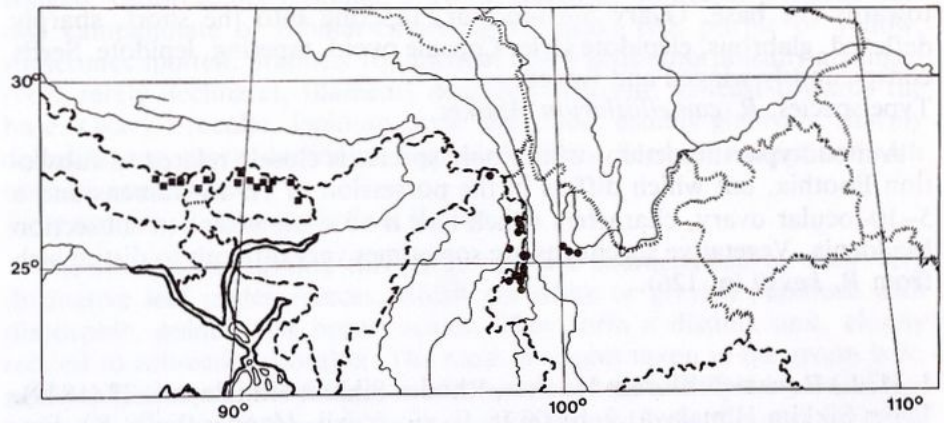
Free-growing or rarely epiphytic shrub, 0·3–1 m. Young shoots loriform-setose, the setae persistent for at least one year. Leaves elliptic or elliptic-obovate or ± orbicular, 19–36 × 12–20 mm, obtuse at the apex, rounded to the base, upper surface glabrous except for a few setae at the base of the midrib, margins loriform-ciliate, lower surface whitish-papillose with vesicular scales sunk in pits with crenulate margins; petiole loriform-setose. Inflorescence 1–2(–3)-flowered, pedicels loriform setose, shorter than the flowers, not or scarcely lepidote. Calyx lobes green, obovate, (6–)7–10 mm, sparsely lepidote outside, sparsely to densely loriform-ciliate. Corolla




MAP 42. ● *R. megeratum*; ■ *R. leucaspis*.




MAP 43. ■ *R. micromeres*; ● *R. baileyi*.




MAP 44. ■ *R. camelliiflorum*; ● *R. trichocladum*.

broadly campanulate, yellow or rarely cream, sometimes darker spotted, lepidote outside, (16–)17–23 mm, tube 8–10 mm. Ovary lepidote. Capsule ovoid-cylindric, lepidote, 8–11 mm.
INDIA (Arunachal Pradesh), NE BURMA, CHINA (NW Yunnan, S & SE Xizang). Rock and cliff ledges or among boulders, rarely epiphytic, 3050–4150 m. Map 42, p. 137.

**7. (131). R. leucaspis** Tagg, Gard. Chron. 85:128, 135, 308 (1929). Type: a cultivated specimen said to be derived from seed of *Kingdon Ward* 6273 (iso. E).
Ic.: Bot. Mag. 164: t. 9665 (1943–8); Urquhart, The Rhododendron 1: t. 11 (1958); Cox, Dwarf Rhododendrons t. 10 & p. 85 (1973).

Shrub to 1 m. Young shoots densely loriform-setose, the setae straight, not twisted and matted. Leaves broadly elliptic, 30–45 × 18–22 mm, apex obtuse, base cuneate, ± persistently loriform-ciliate, upper surface densely loriform-setose, lower surface with vesicular scales sunk in crenulately margined pits. Inflorescence 1–2-flowered, pedicels lepidote, short, sometimes sparsely loriform-setose and pubescent. Calyx lobes obovate, 7–8 mm, greenish or often reddish, loriform-ciliate, not or scarcely lepidote except on the tube. Corolla very broadly campanulate to almost rotate, white, often tinged pinkish, 25–30 mm, tube 8–11 mm, lepidote outside, particularly on the lobes, pilose within. Ovary lepidote. Capsule lepidote, up to 10 mm.
CHINA (S Xizang—Tsangpo gorge). Grassy, scrubby slopes, rarely epiphytic, 2450–3050 m. Map 42, p. 137.

XX. Subsection **Camelliiflora** (Hutchinson) Sleumer, Bot. Jahrb. 74:533 (1949).
Syn.: Series *Camelliaeflorum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 171 (1930).

Shrubs, often epiphytic, up to 2 m. Leaves evergreen, densely lepidote beneath. Inflorescence terminal, 1–2-flowered. Calyx conspicuous, 5-lobed, lepidote, glabrous. Corolla openly campanulate, the tube short and broad, lepidote outside. Stamens (11–)12–16, ± actinomorphic, filaments pilose towards the base. Ovary 5–10-locular, tapering into the short, sharply deflexed, glabrous, elepidote style. Capsule ovoid, tapering, lepidote. Seeds conspicuously winged and finned.
Type species: *R. camelliiflorum* Hooker.

A monotypic subsection, whose only species is closely related to subsection Boothia, but which differs in the possession of 12–16 stamens and a 5–10-locular ovary, characters which link it so some extent to subsection Maddenia. Vegetative specimens are sometimes very difficult to distinguish from *R. keysii* (p. 126).

**1. (132.) R. camelliiflorum** Hooker, Rhodo. Sikkim Himalaya t. 28 (1849). Type: Sikkim Himalaya, 9–10000 ft, fl. vii, fr. xii, *Hooker* (holo. K). Fig. 4aq, p. 21.

Syn.: *R. sparsiflorum* Nuttall in Hooker's Kew Journ. 5:363 (1853). Type: 'Bootan' (i.e. India, Arunachal Pradesh, cf. Ludlow, Trans. Bot. Soc. Edinb. 41:362, 1972), *Booth* (holo. K).

*R. cooperi* Balfour f., Notes R.B.G. Edinb. 10:91 (1917). Type: Bhutan, Ridang, Angduphorang, 9000 ft, 8 vi 1915, *Cooper* 3959 (holo. E).

Ic.: Bot. Mag. 82: t. 4932 (1856); Gartenflora 14: t. 460 (1865).

Shrub to 2 m, epiphytic or growing on rocks. Young growth lepidote. Leaves narrowly elliptic to oblong-elliptic, bluntly acute at the apex, tapering to a shortly rounded base, (53–)60–90(–105) × (16–)20–30(–37) mm, shining dark green above with few, dried-out scales, pale green to brownish beneath with a dense covering of almost contiguous, broadly rimmed scales of which a few are larger and darker than the rest. Inflorescence 1–2-flowered, pedicels densely lepidote. Calyx lobes oblong, rounded at the apex, 5–8 mm, lepidote or not on the surface, fringed with scales. Corolla waxy, with a short, broad tube, white to deep rose, rarely with a whitish or yellowish zone within at the base, lepidote outside, villous within, 14–18(–20) mm, tube 8–10 mm. Ovary 5–10-locular, lepidote, style usually shorter than the stamens. Capsule ovoid, lepidote, tapered to the apex, 7–11(–13) mm. NEPAL, INDIA (Sikkim), BHUTAN. Forest and forest margins, cliffs, 2750–3650 m. Map 44, p. 137.

*R. lucidum* Nuttall, *Hooker's Kew Journ.* 5: 363, 1853 (Type: On the mountains of Bootan (i.e. India, Arunachal Pradesh, cf, Ludlow, *loc. cit.*), beyond the Bhorelli, *Booth*—holo. K) is based on a plant without flowers or fruits. It is probable that it is merely a variant of *R. camelliiflorum*.

XXI. Subsection **Glauca** (Hutchinson) Sleumer, Bot. Jahrb. 74:530 (1949).

Syn.: Series *Glaucum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 294 (1930), pro parte.

Shrubs to 2 m; bark frequently coppery, scaling. Leaves evergreen, small, white or greyish papillose beneath with dimorphic scales, the smaller golden, more numerous than the larger, which are brown and longer-stalked. Inflorescence terminal, 3–10-flowered. Calyx deeply 5-lobed. Corolla campanulate or tubular-campanulate, pink, red, purple or yellow, sometimes spotted. Stamens 10, unequal but ± actinomorphically arranged (very rarely declinate), filaments densely pubescent, at least towards the base. Ovary 5-locular, lepidote, style impressed, usually glabrous, sharply deflexed (very rarely declinate). Capsule lepidote. Seeds unwinged and with obscure appendages.

Type species: *R. glaucophyllum* Rehder.

The six species forming this subsection are characterised by their very distinctive leaf undersurfaces, which are white or greyish papillose with dimorphic, golden and brown scales. They form a distinct unit, closely related to subsection Boothia. The most divergent taxon in the group is *R. glaucophyllum* var. *tubiforme*, in which the stamens and style are declinate. It is possible that this taxon has arisen by natural hybridisation, perhaps between *R. glaucophyllum* and *R. ciliatum* (p. 41) of subsection Maddenia.

1. Calyx lobes acuminate with a tuft of hairs inside at the apex, usually sparsely loriform-ciliate; leaves usually acute; corolla lepidote outside . . . . . **1. glaucophyllum**
+ Calyx lobes obtuse to rounded, without a tuft of hairs at the apex inside; leaves obtuse to rounded at apex; corolla not, or extremely sparsely, lepidote . . . . . 2

2. Corolla 10–15(–20) mm; inflorescence rachis obvious, 4 mm or more, glabrous or sparsely puberulent . . . . . 3
+ Corolla (18–)20–25 mm; inflorescence rachis very short with an indumentum of long hairs . . . . . 5

3. Style puberulent over its whole length . . . **4. shweliense**
+ Style glabrous . . . . . 4

4. Corolla purple or dull red; scales on leaf undersurface contiguous or very close, all milky . . . . **5. pruniflorum**
+ Corolla yellow; scales on leaf undersurface at least their own diameter apart, at least some of them clear . . **6. brachyanthum**

5. Corolla yellow; pedicels 13–20 mm . . . **2. luteiflorum**
+ Corolla pink to purplish; pedicels 20–27 mm . . **3. charitopes**

**1. (133.) R. glaucophyllum** Rehder, Journ. Arn. Arb. 26:73 (1945).

Shrub to 1·5 m. Leaves narrowly elliptic to elliptic, rarely somewhat obovate, usually acute at the apex (very rarely obtuse), cuneate at the base, (35–)40–60 × (13–)15–25 mm, upper surface dark brownish green. Inflorescence (2–)4–6-flowered, pedicels lepidote, 13–20 mm, rachis very short, lepidote. Calyx lobes ovate, acuminate, 6–9(–11) mm, often somewhat glaucous, lepidote at the base and around the margins, usually slightly loriform-ciliate, and with a tuft of hairs inside the apex. Corolla campanulate to tubular campanulate, (18–)20–27(–32) mm, tube (10–)13–17(–19) mm, pink or white flushed pink, rarely entirely white, sometimes spotted inside, rather densely lepidote outside, occasionally with a few hairs as well. Style impressed, sharply deflexed and shorter than the corolla, or declinate and exceeding the corolla. Capsule lepidote, ovoid, c. 10 mm.

Two varieties may be recognised:

1. Corolla campanulate; style sharply deflexed . **a.** var. **glaucophyllum**
+ Corolla tubular-campanulate; style declinate . **b.** var. **tubiforme**

**1a.** var. **glaucophyllum.** Type: Sikkim Himalaya, ridges of Cholen, Lachen and Lachoong, 10–12000 ft, *Hooker* (holo. K, iso. E). Pl. 2h.

Syn.: *R. glaucum* Hooker, Rhodo. Sikkim Himalaya t. 17 (1849) non Sweet, Hort. Brit. ed. 2, 344 (1830). Type: as for var. *glaucophyllum*.

Ic.: Fl. des Serres, ser. 1, 7: t. 672 (1851–2); Bot. Mag. 79: t. 4721 (1853); Rev. Hort. ser. 4, 4:201 (1855); Schneider, Ill. Handb. Laubh. 2:472, 474 (1909); Gard. Chron. 67:275 (1920).

NEPAL, INDIA (Sikkim), BHUTAN. Rocky slopes, 3050–3350 m. Map 45, p. 142.

**1b.** var. **tubiforme** Cowan & Davidian, Rhodo. Yearbook 3:86 (1948). Type: India, Assam, Manda La, Balipara frontier tract, 10–11000 ft, 19 v 1935, *Kingdon Ward* 11463 (holo. E).
INDIA (Arunachal Pradesh), BHUTAN, CHINA (S Xizang). Forests and rocks, 2750–3650 m. Map 45, p. 142.

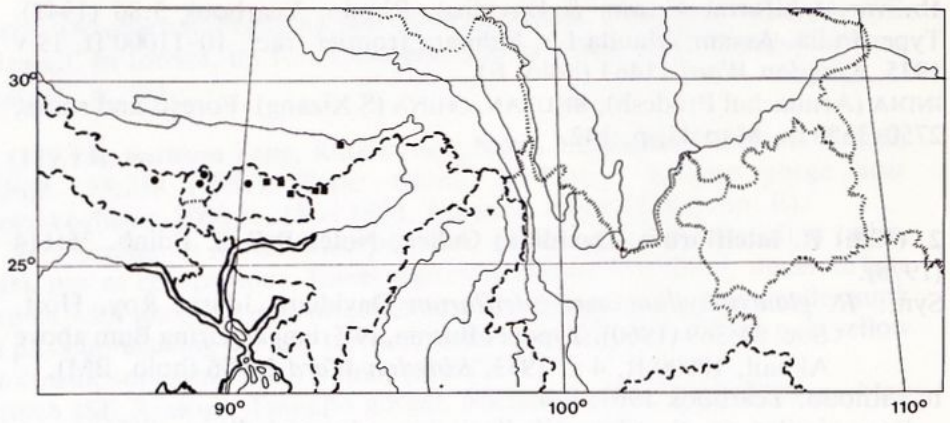
**2. (134.) R. luteiflorum** (Davidian) Cullen, Notes R.B.G. Edinb. 36:114 (1978).
Syn.: *R. glaucophyllum* var. *luteiflorum* Davidian, Journ. Roy. Hort. Soc. 85:369 (1960). Type: N Burma, N Triangle, Uring Bum above Akhail, 10000 ft, 4 xi 1953, *Kingdon Ward* 21556 (holo. BM).
Ic.: Rhodo. Yearbook 1967: t. 4.
Very similar to *R. glaucophyllum* var. *glaucophyllum*, differing as follows: leaves elliptic, obtuse at the apex, not or scarcely lepidote above, sparsely so beneath, calyx lobes rounded at the apex, not loriform-ciliate and without a tuft or hairs inside at the apex; corolla campanulate, bright, clear yellow, 20–22 mm, tube c. 12 mm.
NE BURMA. In thickets and on exposed ridges, 3050–3350 m. Map 45, p. 142.

**3. (135.) R. charitopes** Balfour f. & Farrer, Notes R.B.G. Edinb. 13:243 (1922).
Shrub to 1·5 m. Leaves elliptic to obovate, cuneate at the base, apex very bluntly rounded to almost retuse, 30–55 × (14–)18–30 mm, upper surface dark green, elepidote or very sparsely lepidote, lower surface with very marked veins, and scales of varying density. Inflorescence (3–)4–5-flowered, pedicels lepidote, (18–)20–27 mm, rachis very short, pubescent with at least some loriform hairs which, in some specimens, tend to be dendritic. Calyx lobes ovate, rounded at the apex, (3–)5–7(–9) mm, somewhat glaucous, lepidote at the base and around the margins. Corolla campanulate, (15–)20–25 mm, tube (8–)9–12 mm, pink to purplish, sometimes spotted, elepidote or very sparsely lepidote outside. Capsule ovoid, c. 10 mm.
A variable species, which can be divided into two intergrading subspecies:

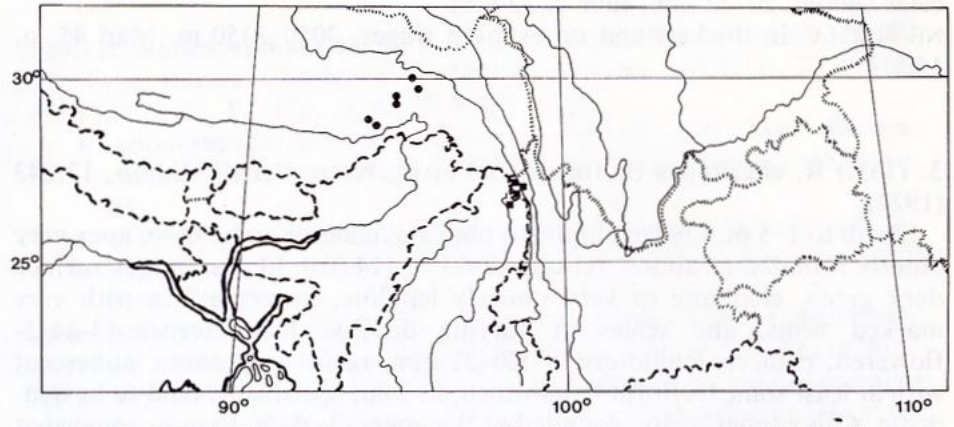
| | | |
|---|---|---|
| 1. | Calyx 6–9 mm; corolla pink . . . . | **a.** subsp. **charitopes** |
| + | Calyx (3–)5–6 mm; corolla pink or purple . | **b.** subsp. **tsangpoense** |

**3a.** subsp. **charitopes**. Type: NE Burma, Shing Hong pass, 10500–12000 ft, 18 vi 1920, *Farrer* 1627 (holo. E).
Ic.: Bot. Mag. 157: t. 9358 (1934); Ic. Corm. Sin. 3: t. 4005 (1974).
NE BURMA, CHINA (NW Yunnan). On cliffs, among boulders and on rocky slopes, rarely in scrub, 3200–4250 m. Map 46, p. 142.

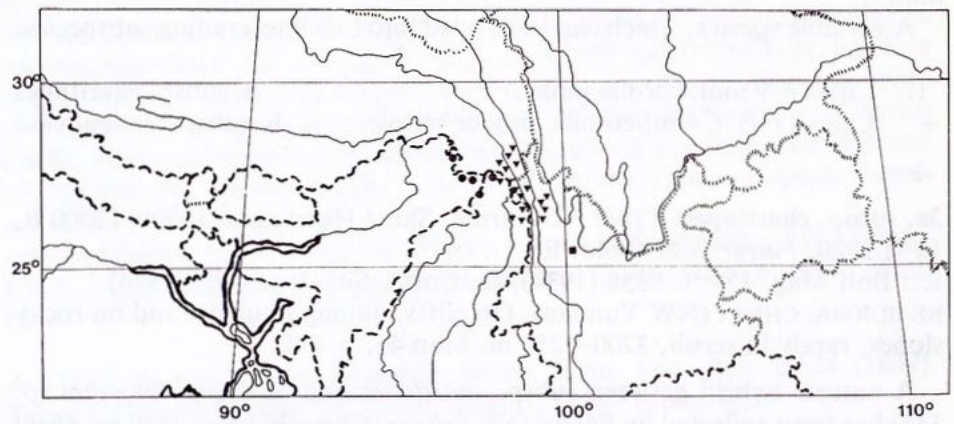
A natural hybrid between subsp. *charitopes* and *R. campylogynum* (p. 145) has been collected by Farrer (NE Burma, Chawchi pass, 3350 m, 16 vii 1920, *Farrer* 1726).




MAP 45. ● *R. glaucophyllum* var. *glaucophyllum*; ■ var. *tubiforme*; ▼ *R. luteiflorum*.




MAP 46. ■ *R. charitopes* subsp. *charitopes*; ● subsp. *tsangpoense*; ▼ *R. shweliense*.




MAP 47. ● *R. pruniflorum*; ■ *R. brachyanthum* subsp. *brachyanthum*; ▼ subsp. *hypolepidotum*.

**3b.** subsp. **tsangpoense** (Kingdon Ward) Cullen, Notes R.B.G. Edinb. 36:114 (1978). Fig. 2q, p. 16.

Syn.: *R. tsangpoense* Kingdon Ward, Gard. Chron. 86:504 (1929). Type: China, SE Tibet, Doshong La, 12–13000 ft, 24 vi 1924, *Kingdon Ward* 5844 (holo. BM, iso. E).

*R. curvistylum* Kingdon Ward, Plant Hunting on the Edge of the World 375 (1930) nomen nudum.

*R. tsangpoense* var. *curvistylum* [Kingdon Ward ex] Cowan & Davidian, Rhodo. Yearbook 3:90 (1948). Type: China, SE Tibet, Doshong La, *Kingdon Ward* 5843 (holo. BM, iso. E).

CHINA (S Xizang). Slopes, rocks, open mountainsides, 2450–4100 m. Map 46, p. 142.

Subsp. *tsangpoense* is a northern vicariad of subsp. *charitopes*; though they do not overlap geographically, they approach very closely, and there is no very clear morphological separation between them. The name *curvistylum* has been applied to a plant collected at the locus classicus of *tsangpoense*, which is in no way different from the type of the latter. However, material cultivated as *R. tsangpoense* var. *curvistylum* (often as *Kingdon Ward* 5843) is different—it is a plant with very small, narrowly elliptic, acute leaves, and is probably a hybrid between subsp. *tsangpoense* and *R. campylogynum*.

**4. (136.) R. shweliense** Balfour f. & Forrest, Notes R.B.G. Edinb. 13:293 (1922). Type: China, Yunnan, Shweli/Salween Divide, 10–11000 ft, vi 1919, *Forrest* 18151 (holo. E).

Very similar to *R. charitopes*, differing as follows: leaves narrowly elliptic to narrowly obovate, 32–40 × 15–16 mm; corolla (only one poor specimen available) c. 11 mm, yellowish flushed pink; style puberulent over the whole of its length.

CHINA (SW Yunnan). Open cliffs and grassy slopes, 3050–3350 m. Map 46, p. 142.

This species is known from only two collections, the type and *Forrest* 24154. There is only one poor flower available on the sheets, but it shows quite clearly that the corolla is totally elepidote and not 'densely to moderately scaly' as described by Cowan & Davidian (*Rhodo. Yearbook* 3: 87, 1948). This characteristic must have been described from material cultivated as *R. shweliense*; all such material that I have seen is either *R. glaucophyllum* or a hybrid of it.*

**5. (137.) R. pruniflorum** Hutchinson in Stevenson (ed.), The Species of Rhododendron 302 (1930). Type: NE Burma, Seinghku Wang, 11000 ft, vii 1926, *Kingdon Ward* 7045 (holo. K, iso. E).

Syn.: *R. tsangpoense* var. *pruniflorum* (Hutchinson) Cowan & Davidian, Rhodo. Yearbook 3:90 (1948).

*R. sordidum* Hutchinson, Rhodo. Soc. Notes 3:286 (1932). Type: Assam, *Kingdon Ward* 8415 (iso. E).

Shrub to 1 m, with shredding, brownish bark. Leaves obovate or narrowly obovate, rounded to the apex and base, 30–42 × 14–25 mm, dark green

* A plant from Rowallane seen for the first time this year (1980) may prove to be genuine *R. shweliense*.

and ± elepidote above, densely lepidote beneath, the smaller scales almost contiguous, pale yellow, clouded or milky. Inflorescence 4–6-flowered, pedicels lepidote, 20–30 mm, rachis obvious, 4–8 mm, lepidote, glabrous. Calyx lobes 3·5–5 mm, rounded at the apex, lepidote at the base and on the margin. Corolla campanulate, 10–13 mm, tube 5–8 mm, dull crimson to plum purple, elepidote outside. Stamens with filaments pubescent over most of their length. Capsule ovoid, 4–6 mm.
INDIA (Arunachal Pradesh), NE BURMA. Sheltered slopes and thickets, 3050–3950 m. Map 47, p. 142.

A distinct species, more closely related to *R. brachyanthum* than to *R. charitopes*.

**6. (138.) R. brachyanthum** Franchet, Bull. Soc. Bot. Fr. 33:234 (1886).

Shrub to 2 m. Leaves narrowly elliptic to narrowly obovate, acute to rounded at the apex, cuneate at the base, 35–55 × 12–20(–23) mm, upper surface dark green, lower surface with scales more than 2 × their own diameter apart, the smaller scales clear or milky. Inflorescence 3–7(–10)-flowered, pedicels lepidote, 12–25(–30) mm, rachis distinct, more than 4 mm, lepidote or very rarely minutely puberulent. Calyx lobes rounded at the apex, slightly glaucous, lepidote at the base and sometimes around the margin. Corolla campanulate, pale or greenish yellow, 10–20 mm, tube 6–11 mm, elepidote or sparsely lepidote outside. Capsule ± globose or ovoid-globose, c. 8 mm.

The species varies in the density of scales on the lower leaf surface; two subspecies are distinguishable:

1. Scales on the mature lower leaf surface very sparse and distant, sometimes entirely deciduous . . . **a.** subsp. **brachyanthum**
\+ Scales much closer, up to their own diameter to 2–3 × their own diameter apart . . . . . **b.** subsp. **hypolepidotum**

**6a.** subsp. **brachyanthum**. Type: China, Yunnan, in monte Tsang chan prope Tali, *Delavay* 159 (holo. P—n.v., iso. E).
Ic.: Gard. Chron. 70:7 (1921); Millais, Rhododendrons, ser. 2, opp. p. 168 (1924).
CHINA (C Yunnan). Scrub and thickets, 3050–3350 m. Map 47, p. 142.

Subsp. *brachyanthum* is entirely restricted to the area around Tali, and is separated from the much more widespread subsp. *hypolepidotum* by about 160 km.

**6b.** subsp. **hypolepidotum** (Franchet) Cullen, Notes R.B.G. Edinb. 36:114 (1978).
Syn.: *R. brachyanthum* var. *hypolepidotum* Franchet, Journ. de Bot. 12:262 (1898). Type: China, Yunnan, Tsekou, Se la, *Soulié* 1027 (holo. P—n.v., iso. E).
*R. hypolepidotum* (Franchet) Balfour f. & Forrest, Notes R.B.G. Edinb. 13:266 (1922).
*R. charitostreptum* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 13:244 (1922). Type: NE Upper Burma, Imaw Bum, 11–12000 ft, 2 vii 1919, *Kingdon Ward* 3302 (holo. E).

Ic.: Millais, Rhododendrons, ser. 2, opp. p. 168 (1924); Bot. Mag. 155: t. 9259 (1931–2); Ic. Corm. Sin. 3: t. 4004 (1974).
NE BURMA, CHINA (NW Yunnan, SE Xizang). Dry, open situations in forest and scrub, rarely epiphytic, 3050–4000 m. Map 47, p. 142.

Subsp. *hypolepidotum* is much more widespread than subsp. *brachyanthum* and much more variable, particularly in the density of the scales on the lower leaf surface. Some specimens have very abundant darker scales, whereas others have these very distant, though the yellow scales may be fairly close. In general, the closer the yellow scales, the more likely they are to have the milky appearance characteristic of those of *R. pruniflorum*.

XXII. Subsection **Campylogyna** (Hutchinson) Sleumer, Bot. Jahrb. 74:531 (1949).
Syn.: Series *Campylognyum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 182 (1930); sensu Davidian in Rhodo. Yearbook 8:78 (1954).

Small, usually prostrate shrublets, more rarely ascending shrubs. Young growth lepidote, glabrous or sparsely pubescent. Leaves evergreen, small, papillose, often whitish or silvery beneath, with distant, small vesicular scales which are decidouous except around the margin. Inflorescence terminal, 1–2(–3)-flowered, pedicels lepidote, rigid and accrescent in fruit. Calyx 5-lobed or undulate. Corolla campanulate, pruinose, pink to purple. Stamens 10, ± actinomorphically arranged, filaments pubescent towards the base. Ovary sparsely lepidote, style impressed, sharply deflexed, elepidote, glabrous, thickening upwards. Capsule erect, lepidote. Seeds unwinged and obscurely finned.
Type species: *R. campylogynum* Franchet.

A very distinct subsection containing one very variable species, showing similarities on the one hand to *R. genestierianum* (p. 148) in its papillose leaves with distant scales, pruinose, often purplish campanulate corolla, and, on the other, to *R. pumilum* (subsection Uniflora, p. 120) in its growth habit, inflorescence and fruit.

**1. (139.) R. campylogynum** Franchet, Bull. Soc. Bot. Fr. 32:10 (1885). Type: China, Yunnan, in rupibus graniticis montis Tsang chan supra Tali, 14 vi 1884, *Delavay* (holo. P.—n.v.). Pl. 2i. Fig. 1l, p. 15 & 4ar, p. 21.
Syn.: *R. caeruleo-glaucum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:34 (1920). Type: China, SE Tibet, Tsarong, Salween/Kiu chiang Divide, vii 1919, *Forrest* 19181 (holo. E).
*R. cremastum* Balfour f. & Forrest, op. cit.: 39. Type: China, NW Yunnan, Mekong/Salween Divide, vii 1917, *Forrest* 14266 (holo. E).
*R. glauco-aureum* Balfour f. & Forrest, op. cit.: 46. Type: China, Yunnan, Shweli/Salween Divide, vii 1918, *Forrest* 17544 (holo. E).
*R. charopoeum* Balfour f. & Forrest, op. cit.: 245 (1922). Type: NE Burma, Chawchi pass, 11–13000 ft, *Farrer* 1670 (holo. E).

*R. damascenum* Balfour f. & Forrest, op. cit.: 254. Type: China, NW Yunnan, Se la, *Soulié* (holo. E).

*R. myrtilloides* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 13:276 (1922). Type: NE Burma, ridge of Naung chaung in Nwai Divide, 15000 ft, 15 vii 1914, *Kingdon Ward* 1785 (holo. E).

*R. cerasiflorum* Kingdon Ward, Gard. Chron. 93:277 (1933) nomen nudum.

*R. rubriflorum* Kingdon Ward, Rhodo. Assoc. Yearb. Suppl. 240 (1934) nomen nudum.

*R. campylogynum* var. *celsum* Davidian, Rhodo. Yearbook 8:83 (1954). Type: China, Yunnan, eastern flank of Tali range, 11–12000 ft, *Forrest* 4151 (holo. E).

*R. campylogynum* var. *charopoeum* (Balfour f. & Forrest) Davidian, loc. cit.

*R. campylogynum* var. *cremastum* (Balfour f. & Forrest) Davidian, loc. cit.

*R. campylogynum* var. *myrtilloides* (Balfour f. & Kingdon Ward) Davidian, op. cit.: 84.

Ic.: Bot. Mag. 158: t. 9407A (1935); Cox, Dwarf Rhododendrons t. 12 & p. 93 (1973); Ic. Corm. Sin. 3: t. 4009 (1974).

Creeping, prostrate or decumbent shrublet up to 60 cm (–1 m), more rarely an erect or ascending shrub. Young growth sparsely lepidote, glabrous or pubescent. Leaves obovate or narrowly elliptic, obtuse or rarely subacute at the apex, tapered to the base, (10–)14–25(–34) × (4–)7–12 mm, dark green and sparsely pubescent along the midrib above, papillose and often whitish or silvery beneath, glabrous and with distant, deciduous scales. Inflorescence 1–2(–3)-flowered, pedicels sparsely lepidote and pubescent, 25–50 mm, up to 70 mm in fruit. Calyx lobes oblong or obovate, sometimes obscure, usually 4–7 mm, glabrous and usually elepidote. Corolla pink to red or purple, (10–)13–20(–23) mm, tube 7–12 mm, glabrous, elepidote and pruinose outside, sparsely pubescent within the tube. Capsule borne on the accrescent and rigid pedicels, ovoid-cylindric, 7–9 mm, sparsely lepidote.

INDIA (Arunachal Pradesh), NE BURMA, CHINA (N, NW, W, C & SW Yunnan, S & SE Xizang). On cliffs and ledges and in moorland and scrub, 2750–4250(–4900) m. Map 48, p. 147.

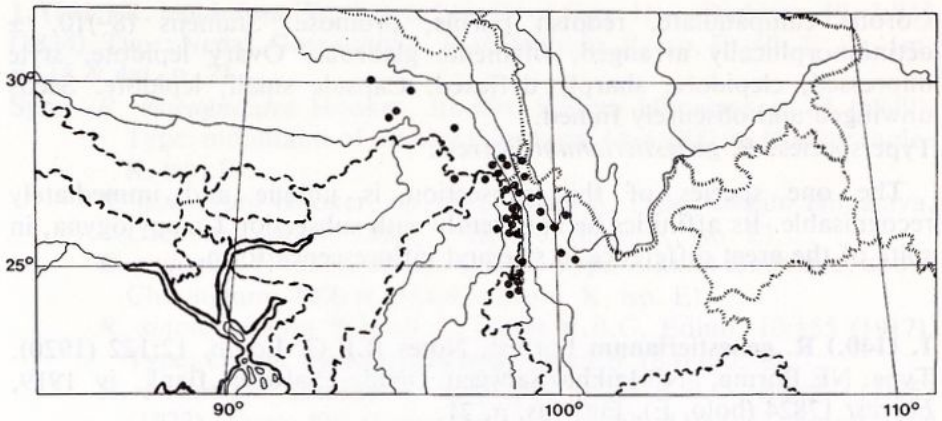
A variable species as to leaf size and shape and corolla colour and size. None of the variation is either correlated or geographically significant.

XXIII. Subsection **Genestieriana** (Cowan & Davidian) Sleumer, Bot. Jahrb. 74:531 (1949).

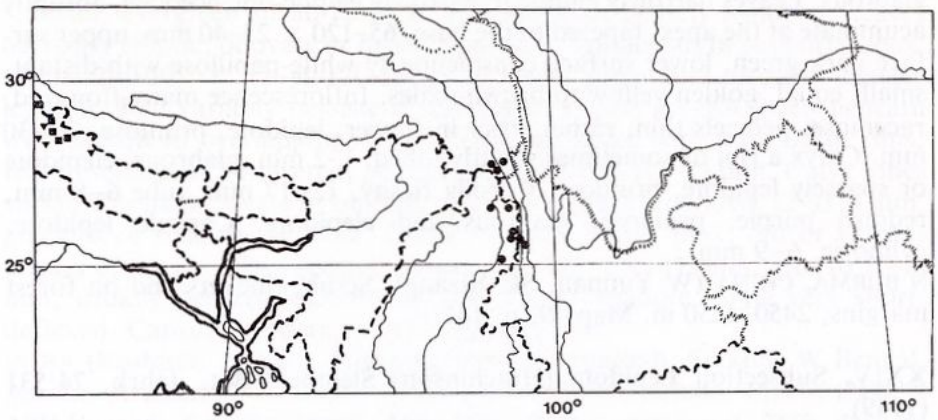
Syn.: Series *Glaucum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 294 (1930) pro parte.

Series *Glaucophyllum* subseries *Genestierianum* Cowan & Davidian, Rhodo. Yearbook 3:91 (1948) pro parte.

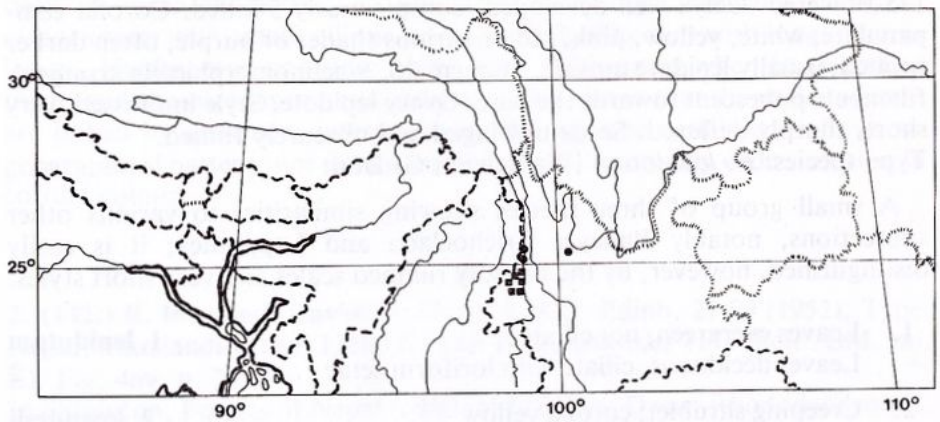
Free-growing shrubs. Young growth lepidote, glabrous. Leaves evergreen, conspicuously white-papillose beneath with small, distant, equal scales. Inflorescence terminal, many-flowered, racemose, rachis well-developed, pedicels pruinose. Calyx rim-like or scarcely lobed, pruinose.




MAP 48. ● *R. campylogynum*.




MAP 49. ● *R. genestierianum*; ■ *R. lowndesii*; ▼ *R. cowanianum*.




MAP 50. ● *R. caesium*; ■ *R. lepidostylum*.

Corolla campanulate, reddish purple, pruinose. Stamens (8–)10, ± actinomorphically arranged, filaments glabrous. Ovary lepidote, style impressed, elepidote, sharply deflexed. Capsule small, lepidote. Seeds unwinged and obscurely finned.
Type species: *R. genestierianum* Forrest.

The one species of this subsection is unique and immediately recognisable. Its affinities lie apparently with subsection Campylogyna, in spite of the great difference in size and inflorescence form.

**1. (140.) R. genestierianum** Forrest, Notes R.B.G. Edinb. 12:122 (1920). Type: NE Burma, N'Maikha/Salween Divide, Salween flank, iv 1919, *Forrest* 17824 (holo. E). Fig. 4as, p. 21.
Syn.: *R. mirabile* Kingdon Ward, Gard. Chron. 92:465 (1932) nomen nudum.
Ic.: Bot. Mag. 156: t. 9310 (1933); Ic. Corm. Sin. 3: t. 4012 (1974).

Shrub to 5 m; bark of older branches smooth, purplish, young shoots glabrous. Leaves narrowly elliptic to narrowly elliptic-oblanceolate, abruptly acuminate at the apex, tapered to the base, 65–120 × 25–40 mm, upper surface dark green, lower surface conspicuously white-papillose with distant, small, equal, golden yellow to brown scales. Inflorescence many-flowered, racemose, pedicels thin, rather strict in flower, lepidote, pruinose, 20–30 mm. Calyx a rim or sometimes slightly lobed, 1–2 mm, glabrous, elepidote or sparsely lepidote, pruinose. Corolla fleshy, 12–17 mm, tube 6–8 mm, reddish purple, pruinose, glabrous and elepidote. Capsule lepidote, cylindric, 6–9 mm.
N BURMA, CHINA (W Yunnan, SE Xizang). Scrub, thickets and on forest margins, 2450–4250 m. Map 49, p. 147.

XXIV. Subsection **Lepidota** (Hutchinson) Sleumer, Bot. Jahrb. 74:531 (1949).
Syn.: Series *Lepidotum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 437 (1930) pro parte.

Small shrubs to 2 m. Leaves evergreen or deciduous, the lower surface with scales with broad, translucent rims. Inflorescence terminal, 1–5-flowered. Calyx well developed, conspicuously 5-lobed. Corolla campanulate, white, yellow, pink, red or various shades of purple, often darker spotted, usually lepidote outside. Stamens 10, ± actinomorphically arranged, filaments pubescent towards the base. Ovary lepidote. Style impressed, very short, sharply deflexed. Seeds unwinged and obscurely finned.
Type species: *R. lepidotum* [Wallich ex] G. Don.

A small group of three species showing similarities to various other subsections, notably Baileya, Trichoclada and Lapponica; it is easily distinguished, however, by the broadly rimmed scales and very short styles.

| | | |
|---|---|---|
| 1. | Leaves evergreen, not ciliate . . . . . | **1. lepidotum** |
| + | Leaves deciduous, ciliate with loriform setae . . . . . | 2 |
| 2. | Creeping shrublet; corolla yellow . . . . . | **2. lowndesii** |
| + | Upright shrub; corolla purplish pink . . . . | **3. cowanianum** |

**1. (141.) R. lepidotum** [Wallich ex] G. Don, Gen. Hist. Dichlam. Pl. 3:845 (1834). Type: Nepal, Gossainthan, *Wallich* (holo. K, iso. E). Pl. 2j; fig. 1m, p. 15 & 4at, p. 21.

Syn.: *R. elaeagnoides* Hooker, Rhodo. Sikkim Himalaya t. 23 (1849). Type: mountains of Sikkim Himalaya, 14–15000 ft, *Hooker* (holo. K, iso. E).

*R. obovatum* Hooker, op. cit., consp. 6. Type: Sikkim Himalaya, Lachoong valley, 12000 ft, *Hooker* (holo. K, iso. E).

*R. salignum* Hooker, op. cit. t. 23A. Type: Sikkim Himalaya, above Choongtam, 7000 ft, *Hooker* (holo. K, iso. E).

*R. sinolepidotum* Balfour f., Notes R.B.G. Edinb. 10:155 (1917). Type: China, Yunnan, Likiang, *Delavay* 18 (holo. E).

*R. cremnastes* Balfour f. & Farrer, Notes R.B.G. Edinb. 13:253 (1922). Type: NE Upper Burma, Chimili, 11000 ft, *Farrer* 1196 (holo. E).

Ic.: Royle, Ill. Bot. Himal. t. 64 (1839); Bot. Mag. 78: t. 4657 (1852) & 80: t. 4802 (1854); Schneider, Ill. Handb. Laubh. 2:479 (1909); Millais, Rhododendrons, opp. p. 146 (1917); Ic. Corm. Sin. 3: t. 4010 (1974).

Small, evergreen shrub to 2 m. Young shoots densely lepidote. Leaves narrowly elliptic, obovate or rarely lanceolate, coriaceous or subcoriaceous, (6–)10–24(–30) × (3–)4–12(–16) mm, dark green and usually densely lepidote with variably persistent scales above, pale greyish green beneath with distant to overlapping, large, brownish scales with translucent rims. Inflorescences 1–2-flowered, pedicels lepidote, (10–)12–25 mm. Calyx lobes variable in shape, ovate or oblong, rarely spathulate, rounded, (2–)3–4 mm, greenish or reddish, lepidote. Corolla white, yellow, pink, red or various shades of purple, often spotted darker, (10–)12–15(–17) mm, tube to 7(–8) mm, usually densely lepidote outside. Ovary lepidote. Style very short, deflexed. Capsule lepidote, ± cylindric, 4–6 mm.

INDIA (Kashmir, Punjab, Himachal & Uttar Pradesh, Sikkim, W Bengal, Assam, Arunachal Pradesh), NEPAL, BHUTAN, NE BURMA, CHINA (NW & NW Yunnan, S & SE Xizang). Moorland, slopes, open forest, 2450–4550 m. Map 52, p. 164.

A very widespread and variable species. Leaf size and shape are particularly variable, and a number of segregates have been described on the basis of these characters: *R. obovatum* with large, obovate leaves, *R. elaeagnoides* with small, elliptic leaves, and *R. salignum* with long, narrow leaves. Hooker was uncertain about their distinctness when he described them, and the copious material now available shows that the various forms are linked by numerous intermediates and that the variability follows no geographical pattern; nor does it correlate with the equally wide variation in corolla colour.

**2. (142.) R. lowndesii** Davidian, Notes R.B.G. Edinb. 21:99 (1952). Type: Nepal, Marsiandi valley, 13500 ft, 2 vii 1950, *Lowndes* 1174 (holo. BM, iso. E). Fig. 4av, p. 21.

Ic.: Stainton, Forests of Nepal t. 100 (1972); Cox, Dwarf Rhododendrons t. 18 (1973).

Small, creeping shrublet up to 25 cm. Stems loriform-setose and filiform-acicular pubescent. Leaves deciduous, thin, narrowly elliptic to oblanceolate, rounded at the mucronate apex, tapered to the base, 15–25 × 6–11 mm, margins slightly crenate and loriform-ciliate, upper surface dark green and filiform-acicular pubescent, very sparsely lepidote with dried-out scales, lower surface pale green, lepidote with distant, yellow scales with broad, translucent margins. Inflorescence 1–2-flowered, pedicels 15–20 mm, somewhat accrescent and rigid in fruit, usually loriform-setose and sparsely lepidote. Calyx lobes oblong-ovate, rounded, greenish or reddish, sparsely lepidote, loriform and filiform-acicular ciliate, 2·5–3·5 mm. Corolla yellow, sometimes spotted or streaked with red, 13–15 mm, outside of the tube sparsely to densely lepidote. Ovary lepidote. Capsule cylindric, sparsely lepidote, c. 5 mm.
NEPAL. Rock crevices, ledges and peaty banks, 3800–4550 m. Map 49, p. 147.

**3. (143). R. cowanianum** Davidian, Notes R.B.G. Edinb. 21:99 (1952). Type: Nepal, Langtang lateral valley, 3650 m, *Polunin* 175 (holo. BM, iso. E). Fig. 4au, p. 21.
Ic.: Stainton, Forests of Nepal t. 99 (1972).

Deciduous shrub, 0·3–2·3 m. Shoots pale brown, glabrous, ± elepidote. Leaves thin, oblong-elliptic, broadly elliptic or obovate, 42–65 × 22–30 mm, margins loriform-ciliate, upper surface dark green, lepidote, filiform-acicular pubescent along the veins, lower surface pale green, lepidote with distant, pale brown, broadly rimmed scales. Inflorescences 3–5-flowered, pedicels 10–20 mm, lepidote and sparsely puberulent. Calyx lobes reddish, lepidote, glabrous or rarely with a few short loriform cilia, 4–6 mm. Corolla purplish pink, 14–20 mm, very sparsely lepidote outside. Stamens 10. Ovary lepidote. Capsule ovoid-cylindric, lepidote, 8–11 mm.
NEPAL. Open slopes in forest, 3200–3950 m. Map 49, p. 147.

A distinct species of rather uncertain affinities. It was originally placed in subsection Trichoclada (*Trichocladum* series) because of its deciduous leaves, but it differs from that group in scale type and inflorescence, and is more closely allied to *R. lepidotum*.

XXV. Subsection **Baileya** Sleumer, Bot. Jahrb. 74:531 (1949).
Syn.: Series *Lepidotum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 437 (1930) pro parte.

Small shrubs. Leaves evergreen. Scales crenulate, particularly those on the lower leaf surfaces, where they are overlapping and flaky. Inflorescence terminal, several-flowered, rachis elongate. Corolla campanulate. Stamens 10, ± actinomorphically arranged, the filaments variably, though densely hairy. Ovary lepidote, style impressed, sharply deflexed, shorter than the stamens. Capsule small, lepidote. Seeds unwinged and obscurely finned.
Type species: *R. baileyi* Balfour f.

*R. baileyi*, the only species of the subsection, is quite distinct in possessing crenulate scales and a sharply deflexed style. In the former character it is similar to subsection Saluenensia (p. 114), which, however, is very different in most other respects. It is, in general, closely related to subsection Lepidota (p. 148), particularly *R. lepidotum*.

**1. (144.) R. baileyi** Balfour f. in Notes R.B.G. Edinb. 11:23 (1919). Type: a cultivated plant supposedly derived from *Bailey* 5, seed collected in S Tibet (holo. E).

Syn.: *R. thyodocum* Balfour f. & Cooper, Notes R.B.G. Edinb. 11:148 (1919). Type: Bhutan, Champa Pumthang, 14000 ft, 23 ix 1914, *Cooper* 2224 (holo. E).

Ic.: Bot. Mag. 148: t. 9842 (1922); Gard. Chron. 89:385 (1931); Ic. Corm. Sin. 3: t. 4011 (1974).

Shrub, 0·5–2 m. Leaves very narrowly elliptic to elliptic, rarely obovate or ovate, obtuse to rounded at the apex, cuneate to rounded at the base, (21–)30–50 × (10–)14–19(–26) mm, upper surface densely lepidote when young, the scales quickly deciduous, lower surface usually dark brown with dense, overlapping scales. Inflorescence (4–)5–8-flowered, rachis elongate, pubescent, pedicels 12–22 mm, lepidote. Calyx 5-lobed, the lobes ± deltoid, (1·5–)2–4 mm, lepidote, often fringed with loriform setae. Corolla magenta to purple, often with darker spots, 12–14·5 mm, tube 5–7(–9) mm, usually densely lepidote outside, especially on the tube. Capsule lepidote, 5–7·5 mm.

INDIA (Sikkim), BHUTAN, CHINA (S Xizang). Forests, hillsides, screes or rocks, 3050–4250 m. Map 43, p. 137.

A uniform and easily recognised species. One specimen, *Ludlow, Sherriff & Hicks* 20659, has remarkable dendroid hairs fringing the calyx.

XXVI. Subsection **Trichoclada** (Balfour f.) Cullen, Notes R.B.G. Edinb. 36:115 (1978).

Syn.: Series *Trichocladum* Balfour f., Trans. Bot. Soc. Edinb. 27:80–88 (1916).

Subgenus *Pseudazalea* Sleumer, Bot. Jahrb. 74:525 (1949).

Small shrubs to 2 m. Young growth often loriform-setose, always lepidote. Leaves mostly deciduous or subdeciduous, more rarely evergreen, glabrous or with an indumentum of filiform-acicular and/or loriform hairs. Scales variously coloured, vesicular. Inflorescence terminal, 2–5-flowered. Calyx variably developed, rim-like to clearly and often unequally lobed, usually loriform-ciliate. Corolla funnel-campanulate, yellow, sometimes tinged with red, variably spotted, lepidote and sometimes loriform-setose outside. Stamens 10, filaments variably pubescent, ± actinomorphically arranged. Ovary lepidote, style impressed, sharply deflexed, at least before anthesis, glabrous or rarely puberulent in the lower part. Capsule lepidote. Seeds unwinged and obscurely finned.

Type species: *R. trichocladum* Franchet.

A small group of intricately related species. Sleumer (1949), placing great weight on the deciduous nature of the leaves, regarded it as a subgenus. However, the leaves of the various species are variable in this respect, and all are very similar to *R. megeratum* (p. 136) in subsection Boothia, and seem best treated as a subsection within section Rhododendron.

The plants themselves are extremely variable, both in terms of the precocity of their flowers, the deciduousness of their leaves and their indumentum. Many species have been described on the basis of these

characters, but these cannot be maintained when the available material is surveyed critically.

1. Leaves definitely evergreen, coriaceous, with bluish bloom, strongly revolute; ovary densely loriform-setose as well as lepidote . . . . . **1. lepidostylum**
+ Leaves deciduous or subdeciduous, not coriaceous, without bluish bloom; ovary glabrous or rarely slightly setose at the apex 2

2. Scales markedly unequal, the larger c. 2 × the diameter of the smaller, the smaller close, usually brownish, greyish or purple when mature . . . . . **4. mekongense**
+ Scales all ± equal, golden, distant . . . . . 3

3. Leaves with the lower surface and midrib with an indumentum of straight or slightly curved hairs; lower surface shining white-papillose . . . . . **2. caesium**
+ Leaves with the lower surface and midrib with a dense indumentum of strongly twisted and curled hairs; lower surface pale green or brown, not as above . . . . . **3. trichocladum**

**1. (145.) R. lepidostylum** Balfour f. & Forrest, Notes R.B.G. Edinb. 12:124 (1920). Type: China, Yunnan, summit of Jangtzow shan, Shweli/Salween Divide, 11–11500 ft, vi 1919, *Forrest* 18143 (holo. E).
Ic.: Rhodo. Yearbook 1963: t. 7; Cox, Dwarf Rhododendrons, t. 33 (1973).

Shrub 0·5–1·5 m. Young growth lepidote and densely loriform-setose. Leaves evergreen, coriaceous, revolute, with long-persistent bluish bloom, obovate or obovate-elliptic, ± rounded at apex and base, 30–35 × 15–18 mm, loriform setose with straight setae beneath and on margins and petiole; scales equal, golden, distant, upper surface glabrous and elepidote. Inflorescence 2(–3)-flowered, pedicels c. 20 mm, loriform-setose and lepidote. Corolla 20–33 mm, tube 10–12 mm, clear yellow, sometimes with orange spots, lepidote and sparsely loriform-setose outside. Ovary densely setose as well as lepidote, style lepidote at the base or more usually elepidote. Capsule cylindric, c. 10 mm, the loriform setae usually persistent at least in part.
CHINA (SW Yunnan). Boulders, cliffs and ledges, 3050–3650 m. Map 50, p. 147.

The bluish, coriaceous leaves make this the most easily recognised species of the subsection. In the type the style is slightly lepidote at the base; in other specimens it is completely elepidote.

**2. (146.) R. caesium** Hutchinson, Gard. Chron. 94:102 (1933). Type: a cultivated plant said to be from seed of *Forrest* 26798 (holo. K, iso. E).

Shrub, 1–2 mm. Young growth sparsely lepidote. Leaves subdeciduous, flat or rarely slightly revolute, ± oblong-elliptic or rarely oblong-ovate, 30–42 × 13–18 mm, apex subacute or rounded, base rounded or somewhat cuneate, the lower surface with an indumentum of distant, straight or

slightly curved loriform setae, which also occur on the margins and petioles, the surface white-papillose and with distant, equal, golden scales, upper surface glabrous and elepidote. Inflorescence (1–)2–3-flowered, pedicels 12–15 mm, sparsely lepidote. Calyx obscurely lobed, lobes 1–2 mm, sparsely lepidote and loriform-ciliate. Corolla yellow, c. 18 mm, tube 9–10 mm, lepidote and glabrous outside. Ovary lepidote, glabrous. Capsule cylindric, c. 10 mm.

CHINA (SW & C Yunnan). Rocky slopes, 2450–3050 m. Map 50, p. 147.

**3. (147.) R. trichocladum** Franchet, Bull. Soc. Bot. Fr. 33:234 (1886). Type: China, Yunnan, in monte Tsang chan, *Delavay* (holo. P—n.v., iso. E). Pl. 21; fig. 2r, p. 16 & 4aw, p. 21.

Syn.: *R. xanthinum* Balfour f. & W. W. Smith, Trans. Bot. Soc. Edinb. 27:87 (1916). Type: China, Yunnan, Shweli/Salween Divide, vi 1913, *Forrest* 12066 (holo. E).

*R. lithophilum* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 13:275 (1922). Type: NE Burma, western spur of Imaw Bum, 12000 ft, 2 vii 1919, *Kingdon Ward* 3305 (iso. E).

*R. oulotrichum* Balfour f. & Forrest, Notes R.B.G. Edinb. 13:281 (1922). Type: China, Yunnan, Shweli/Salween Divide, western flank, 10000 ft, viii 1912, *Forrest* 8905 (holo. E).

*R. lophotogynum* Balfour f. & Forrest, nomen nudum.

Ic.: Bot. Mag. 151: t. 9073 (1925–6).

Shrub to 1·5 m, usually flowering precociously. Young growth lepidote and usually with an indumentum of twisted or curled loriform setae. Leaves deciduous, flat, obovate or obovate-elliptic, 24–40 × 10–20 mm, ± rounded at the apex, cuneate at the base, petiole and lower surface with a ± dense indumentum of twisted and curled loriform setae, scales ± equal, large, golden, distant, upper surface with straight loriform setae and/or puberulent, sometimes lepidote. Inflorescence 1–3-flowered, pedicels lepidote and with numerous loriform setae, 8–13 mm. Calyx lobed, often unequally so, lobes 2–5 mm, lepidote and loriform-ciliate. Corolla yellow or greenish yellow, occasionally tending to orange, 18–23 mm, tube 8–11 mm, lepidote and variably loriform-setose outside. Ovary lepidote, rarely with a few loriform setae towards the apex. Style sometimes puberulent at the base. Capsule cylindric, 8–10 mm, lepidote, sometimes with a few persistent setae.

N BURMA, CHINA (C & SW Yunnan). Slopes, rocky places, scrub, cliffs, 2450–3350 m. Map 44, p. 137.

Distinguished from the sympatric *R. lepidostylum* and *caesium* by strong morphological characters, and from the largely allopatric *R. mekongense* by weaker characters (indumentum, scales, pedicel length) reinforced by a distinct and ± non-overlapping distribution area. *R. trichocladum* shows considerable variation in the density (though not the type) of its indumentum. Plants with setose ovaries have been called *lophotogynum*; those with setose corollas, *xanthinum*; those with an extremely dense indumentum, *oulotrichum*; and those with very sparse indumentum, *lithophilum*. All of these variants are of sporadic occurrence within the overall distribution and grade into each other completely.

**4. (148.) R. mekongense** Franchet, Journ. de Bot. 12:263 (1898).

Shrubs to 2 m, often flowering precociously. Young growth lepidote and variably loriform-setose with straight or curved setae. Leaves ± deciduous, flat, mostly ± obovate, more rarely obovate-elliptic, 25–45(–65) × 14–21 (–27) mm, ± rounded at the apex, cuneate at the base, petiole loriform-setose; lower surface variably loriform-setose, usually with at least some setae on the base of the midrib and on margins, the setae straight or slightly curved; scales very unequal, dense, the larger c. 2 × the diameter of the smaller, the smaller usually rapidly becoming greyish, purple or almost black; upper surface puberulent at least along the midrib, rarely lepidote. Inflorescence 2–4-flowered, pedicels (11–)15–22 mm, variably lepidote, usually loriform-setose, at least towards the base. Calyx usually obscurely lobed, lobes up to 2·5 mm, rarely one lobe considerably longer (up to 7 mm), lepidote, loriform-ciliate or glabrous. Corolla yellow to greenish yellow, sometimes flushed with red, 17–23 mm, tube 8–11 mm, lepidote and glabrous outside. Ovary lepidote, style sometimes puberulent at base. Capsule lepidote, cylindric, 9–11 mm.

A very variable species with a wide distribution area; four intergrading varieties can be distinguished:

1. Leaves loriform-setose over the whole upper surface . . . **d.** var. **longipilosum**
+ Leaves without loriform setae on the upper surface . . . . 2
2. Loriform setae very sparse, restricted to petioles and leaf margins and sometimes at the base of the midrib beneath . . **c.** var. **rubrolineatum**
+ Loriform setae more widespread, present on at least some of the following: lower leaf surface, pedicels and calyx lobes, as well as on petioles and leaf margins . . . . . 3
3. Calyx loriform-ciliate; pedicels usually loriform-setose over their whole length . . . . . **a.** var. **mekongense**
+ Calyx glabrous; pedicels not setose, or setose only at the base . **b.** var. **melinanthum**

**4a.** var. **mekongense.** Type: China, Yunnan, vallée du Mekong, à Sela entre le Mekong et Saluen, 28 vi 1895, *Soulié* (holo. P—n.v., iso. E). Fig. 4ax, p. 21.

Syn.: *R. viridescens* Hutchinson, Gard. Chron. 94:116 (1933). Type: a cultivated specimen said to originate from seed of *Kingdon Ward* 5829 (holo. K, iso. E).

*R. rubroluteum* Davidian, Quart. Bull. Amer. Rhodo. Soc. 29:144 (1975). Type: a cultivated specimen said to be from seed of *Kingdon Ward* 5489 (holo. E).

NEPAL, NE BURMA, CHINA (NW Yunnan, S & SE Xizang). Scrub, forest margins, slopes, 2900–4400 m. Map 53, p. 166.

Very similar to var. *melinanthum*, with which it overlaps in some areas, but extending further north and west. The remarkable gap in its distribution

(from eastern Tibet to Nepal) is partially filled by var. *longipilosum*, but is still striking. Whether or not it represents an actual situation or lack of collections from intermediate areas at the right time of year is uncertain; but there is no doubt that the Nepal plant (one specimen, *Stainton* 580) is the same as that from China. The name *R. viridescens* has been applied to an almost completely evergreen variant, known only in cultivation. The recently described *R. rubroluteum* is also unknown from the wild; it is typical of var. *mekongense* except that the corollas are flushed with red.

**4b.** var. **melinanthum** (Balfour f. & Kingdon Ward) Cullen, Notes R.B.G. Edinb. 36:115 (1978). Fig. 4ay, p. 21.

Syn.: *R. melinanthum* Balfour f. & Kingdon Ward, Trans. Bot. Soc. Edinb. 27:85 (1916). Type: China, Yunnan, Ka-gwr-pw glacier valley, 12–14000 ft, vi 1913, *Kingdon Ward* 406 (holo. E).

*R. chloranthum* Balfour f. & Forrest, Notes R.B.G. Edinb. 12:98 (1920). Type: China, Yunnan, Li-ti-ping, 11000 ft, vi 1917, *Forrest* 13900 (holo. E).

*R. semilunatum* Balfour f. & Forrest, op. cit. 13:292 (1922). Type: China, Yunnan, Mekong/Yangtze Divide, ascent of Wei hsi pass, 10000 ft, ix 1904, *Forrest* 698 (holo. E).

Ic.: Bot. Mag. 147: t. 8903 (1921).

NE BURMA, CHINA (NW Yunnan, SE Xizang). Forest, forest margins, scrub and slopes, 3350–4250 m. Map 53, p. 166.

**4c.** var. **rubrolineatum** (Balfour f. & Forrest) Cullen, Notes R.B.G. Edinb. 36::115 (1978).

Syn.: *R. rubrolineatum* Balfour f. & Forrest, Notes R.B.G. Edinb. 12:160 (1920). Type: see below.

INDIA (Arunachal Pradesh), CHINA (NW Yunnan, S & SE Xizang). Rocks, slopes, forest margins, rarely in swamps, 3350–4250 m. Map 53, p. 166.

A taxon of sporadic occurrence throughout the area of *R. mekongense*, identifiable by its almost complete lack of loriform setae, and red-tinged corollas. It was described on the basis of an unnumbered Forrest specimen (holo. E), said to come from the Tali range. However, there is nothing else like it known from the Tali area, but the specimen (which was enclosed in a letter from Forrest to I. B. Balfour) matches well with another collection made in the same year from the Kari pass, which Balfour and Forrest designated as a paratype (*Forrest* 13914). It is possible that the original type specimen was collected at 'Kari' rather than 'Tali'. One branch of the paratype specimen bears a few lateral inflorescences, which may indicate natural hybridisation with some member of subsection Triflora; most plants in cultivation under the name '*rubrolineatum*' show the same feature, and may well derive ultimately from this collection.

**4d.** var. **longipilosum** (Cowan) Cullen, Notes R.B.G. Edinb. 36:115 (1978).

Syn.: *R. trichocladum* var. *longipilosum* Cowan, Notes R.B.G. Edinb. 19:186 (1936). Type: SE Tibet, Migyitun, 10–11000 ft, vii 1935, *Kingdon Ward* 11915 (holo. E).

N BURMA, CHINA (NW Yunnan, S & SE Xizang). Slopes, thickets and scrub, 3050–4000 m. Map 53, p. 166.

XXVII. Subsection **Afghanica** Cullen, Notes R.B.G. Edinb. 36:122 (1978).
Syn.: Series *Triflorum* subseries *Hanceanum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 771 (1930) pro parte.

Low shrub. Leaves evergreen, the lower surface with moderately spaced pale, translucent or yellowish scales. Inflorescence terminal, a distinct and elongate many-flowered raceme with a conspicuous rachis. Calyx conspicuously 5-lobed. Corolla campanulate with short tube and spreading limb. Stamens ± actinomorphically arranged. Ovary 5-locular, lepidote, style impressed, sharply deflexed. Seeds unwinged and obscurely finned.
Type species: *R. afghanicum* Aitchison & Hemsley.

The one species of this subsection is highly distinctive. Its inflorescence is almost unique in the Sino-Himalayan representatives of the genus, and renders it easily identifiable. It was formerly placed in the *Triflorum* series, where, together with *R. hanceanum* (here treated as a member of subsection Tephropepla, p. 126), it formed the *Hanceanum* subseries. The two species are only superficially alike, and are not in any way related to the species of subsection Triflora. *R. afghanicum* is probably related to subsections Boothia (p. 133) and Camelliiflora (p. 138).

**1. (149.) R. afghanicum** Aitchison & Hemsley, Journ. Linn. Soc. 18:75 (1880). Type: Afghanistan, Kurrum valley, abundant from 7–8000 ft, at Shendtoi Kaiwas, *Aitchison* (holo. K).
Ic.: Journ. Linn. Soc. 19: t. 21 (1882); Bot. Mag. 147: t. 8907 (1921).

Low shrub to 0·5 m. Young growth lepidote and sometimes puberulent. Leaves narrowly elliptic to elliptic, 47–80 × 13–25 mm, thick, apex ± obtuse, base rounded-cuneate, lower surface pale green, scales 1–2 × their own diameter apart, upper surface dark green, elepidote, puberulent along the main vein at the base (and along the petiole). Inflorescence rachis 20–50 mm, flowers 12–16, pedicels densely lepidote. Calyx lobes variable in shape, from narrowly triangular to oblong, apex acute or rounded, 4–6 mm, lepidote, often margined with scales. Corolla white or greenish white, with tubular base and rotate limb, tube 6–8 mm, lobes c. 5 mm, elepidote and glabrous outside, sparsely pilose within the tube. Stamens 10, exserted, filaments pilose towards the base. Capsule lepidote, ± cylindric, c. 7 mm. AFGHANISTAN, PAKISTAN. Cliffs and forests, 2000–3000 m. Map 51, p. 159.

Known from several collections from the Kurrum valley, which crosses the border between Afghanistan and Pakistan.

Section **Pogonanthum** G. Don, Gen. Hist. Dichlam. Pl. 3:843 (1834).
Syn.: [Genus] *Osmothamnus* De Candolle, Prodr. 7:715 (1839).
Section *Osmothamnus* (De Candolle) Maximowicz, Rhodo. Asiae Or. 15 (1870).
Series *Anthopogon & Cephalanthum* sensu Hutchinson in Stevenson (ed.), The Species of Rhododendron 4 & 198 (1930).
Series *Anthopogon* sensu Cowan & Davidian, Rhodo. Yearbook 2:64 (1947).

Small shrublets up to 2 m, with characteristic, pineapple-like smell. Leaves evergreen, variable, small, densely lepidote with characteristically

lacerate scales: these may have a domed centre or not, and are frequently arranged in several tiers, due to different lengths of stalk. Leaf-bud scales deciduous or persistent. Inflorescence terminal, a condensed, many-flowered, head-like racemose umbel; bud scales always fringed with large, branched, dendroid hairs. Pedicels very short. Calyx somewhat zygomorphic, conspicuously 5-lobed. Corolla hypocrateriform or funnel-shaped-hypocrateriform, white, pink, red, purplish or yellow, pilose, lepidote or glabrous outside, always with a prominent ring of hairs inside the throat. Stamens 5–10, not exserted from the corolla tube, filaments puberulous towards the base or glabrous. Ovary small, lepidote, very rarely elepidote and/or puberulent; style very short, clavate, not exserted from the corolla tube. Capsule lepidote, short. Seeds unwinged and with obscure fins.
Type species: *R. anthopogon* D. Don.

A very distinct section, recognisable by its characteristic smell, scale type, presence of branched hairs on the inflorescence bud scales, hypocrateriform corollas and non-exserted stamens and styles. The species in the group are difficult to define, as the varying characters are not well correlated either with each other or with geographical distribution. Several of the species are known from only a few collections, and may prove, on re-collection, to be more variable than they appear to be at present, which may well suggest further reductions in the number of taxa recognised. The closest allies of the section appear to be section Rhododendron subsections Lapponica (p. 92) and Rhododendron (p. 110), but there is no doubt that the group is distinct enough to warrant recognition at sectional rank.

1. Leaves with whitish loriform setae on the upper surface . . 2
\+ Leaves without setae on the upper surface though they may be present on the margins . . . . . 3

2. Procumbent shrublet; calyx lobes 5–6 mm . **5. pogonophyllum**
\+ Erect shrub to 1 m; calyx lobes 1–2 mm . . . **13. radendum**

3. Under scales of the lower leaf surface as dark as, or darker than, those of the upper tiers; all scales brown to dark brown . . 4
\+ Under scales golden yellow, paler in colour than those of the upper tiers, which may be variously coloured . . . . 6

4. Corolla tube densely pilose outside . . . **3. laudandum**
\+ Corolla tube glabrous outside . . . . . 5

5. Stamens 5; leaves dark chocolate-brown beneath, 5–9 mm broad **4. rufescens**
\+ Stamens (5–)6–8(–10); leaves various shades of brown beneath, not as above, 8–16 mm broad . . . . **2. anthopogon**

6. Corolla lobes pubescent on the inside for some distance from the throat of the tube, usually prominently veined; scales uniform, pale yellow, ± plastered on the surface . . . **11. fragrans**
\+ Corolla lobes scarcely pubescent on the inside, not prominently veined; scales usually heterogeneous, not plastered to the leaf surface . . . . . 7

7. Calyx lobes 1–2·5 mm; leaves linear, linear-oblong or narrowly oblanceolate, 4 or more × longer than broad . **12. trichostomum**
+ Calyx lobes 2·5–7 mm; leaves oblong, oblong-lanceolate, elliptic or almost orbicular, up to 3 × longer than broad . . . 8
8. Leaf-bud scales persistent and conspicuous . . . . 9
+ Leaf-bud scales deciduous . . . . . 10
9. Corolla yellow with densely lepidote tube; leaves 9–15 mm long . . . . . **7. sargentianum**
+ Corolla white or pink, rarely yellowish, tube elepidote; leaves 15–50 mm long . . . . . **6. cephalanthum**
10. Stamens 8–10; corolla funnel-hypocrateriform . **1. collettianum**
+ Stamens 5(–6); corolla hypocrateriform . . . . . 11
11. Scales clearly in several tiers, very few or none of them with domed, glandular centres . . . . **10. primuliflorum**
+ Scales usually somewhat plastered to the leaf surface, most of them with domed, glandular centres . . . . . 12
12. Corolla tube pilose outside, lobes 2·5–4 mm . . **8. kongboense**
+ Corolla tube glabrous outside, lobes 1–2·5 mm **9. anthopogonoides**

**1. (150.) R. collettianum** Aitchison & Hemsley, Journ. Linn. Soc. 18:75 (1881). Type: Described from Afghanistan (Shendtoi to ridges of Sikaram, 10–13000 ft).
Ic.: Journ. Linn. Soc. 19: t. 20 (1882); Bot. Mag. 114: t. 7019 (1888).

Shrub to 1 m. Leaf-bud scales deciduous. Leaves ± elliptic, 30–40 × 13–17 mm, rounded to the base, tapered to the acute, mucronate apex, pale green and elepidote above, pale greenish brown to brown with dense, overlapping and ± plastered scales all of the same golden brown colour beneath. Inflorescence somewhat elongate, c. 16–20-flowered, pedicels short, lepidote. Calyx lobes 5–5·5 mm, sparsely lepidote outside, margins lacerate-ciliate with loriform setae, inner surface puberulent. Corolla white (often pink in bud), funnel-hypocrateriform, tube 10–13 mm, lobes 6–8 mm, glabrous and elepidote outside, tube pilose within. Stamens 8–10. Ovary lepidote. Capsule lepidote, c. 5 mm, scarcely exceeding the calyx.
AFGHANISTAN, PAKISTAN. Steep rocky and stony slopes, 3050–3900 m. Map 52, p. 164.

**2. (151.) R. anthopogon** D. Don, Mem. Wern. Soc. 3:409 (1821).

Small shrub to 1 m, often closely and intricately branched. Leaf-bud scales persistent or not. Leaves ovate or elliptic, rarely almost orbicular, (10–)14–35 × 8–16 mm, rounded to the base and to the subacute, mucronate or rarely slightly emarginate apex, above dark green, lepidote or elepidote, beneath dark brown (rarely rather pale) with dense, overlapping scales in 2–3 tiers, those of the lowest tier as dark as, or darker than the rest. Inflorescence dense, many-flowered, pedicels short, lepidote, puberulent or entirely glabrous. Calyx lobes oblong, 3·5–4·5 mm, usually somewhat lepidote outside, margin loriform-ciliate, inner surface variably pubescent.

Corolla usually white or pink, rarely cream or yellowish, tube 6–12 mm, lobes 4–7·5 mm, glabrous and elepidote outside, densely pilose within the tube. Stamens (5–)6–8(–10). Ovary lepidote. Capsule 4–5 mm, lepidote, scarcely exceeding the calyx.

Two subspecies may be recognised. Though they differ essentially in only one character, they do show geographical replacement:

1. Leaf-bud scales deciduous . . . . **a.** subsp. **anthopogon**
+ Leaf-bud scales persistent . . . . **b.** subsp. **hypenanthum**

**2a.** subsp. **anthopogon.** Type: Nepal, in Alpe immensa nivosa, Gossain Than Nepalensium dicta, *Wallich* (holo. K). Fig. 4bb, p. 21.

Syn.: *R. haemonium* Balfour f. & Cooper, Notes R.B.G. Edinb. 9:283 (1916). Type: Bhutan, Pumo La, Timpu, 13000 ft, 15 v 1915, *Cooper* 3903 (holo. E).

*R. anthopogon* var. *haemonium* (Balfour f. & Cooper) Cowan & Davidian, Rhodo. Yearbook 2:68 (1947).


MAP 51. ● *R. anthopogon* subsp. *anthopogon*; ■ subsp. *hypenanthum*; ▼ *R. afghanicum*.

Ic.: Schneider, Ill. Handb. Laubh. 2:319 (1909).
NEPAL, INDIA (Uttar Pradesh, W Bengal, Sikkim, Arunachal Pradesh), BHUTAN, CHINA (S Xizang). Open slopes and hillsides, 3350–4900 m. Map 51, p. 159.

**2b.** subsp. **hypenanthum** (Balfour f.) Cullen, Notes R.B.G. Edinb. 37:327 (1979).
Syn.: *R. hypenanthum* Balfour f., Notes R.B.G. Edinb. 9:291 (1916). Type: described on the basis of a number of syntypes from the W Himalaya (all at E).
Ic.: Royle, Ill. Bot. Himal. t. 64 (1839).
INDIA (Kashmir, Himachal & Uttar Pradesh), NEPAL, BHUTAN. Open slopes and ledges, rarely in sparse forest, 3350–4500 m. Map 51, p. 159.

Essentially a western vicariant of subsp. *anthopogon*, but with a distinct outlier in Bhutan.

**3. (152.) R. laudandum** Cowan, Notes R.B.G. Edinb. 19:222 (1937).
Small shrub, usually up to 0·6 m, rarely taller; leaf-bud scales usually persistent but not very conspicuous. Leaves oblong to ovate or almost orbicular, 11–17 × 6–9 mm, rounded or tapered to the base, rounded to the slightly mucronate apex, dark green or brownish and elepidote above, dark chocolate-brown beneath with dense, overlapping scales borne in 2–3 tiers, those of the lowermost tier as dark as, or darker than, the others. Inflorescence dense, many-flowered. Calyx lobes 5–6 mm, oblong, narrowly elliptic or obovate, densely lepidote outside, ciliate with long, loriform cilia and pubescent inside. Corolla white or pink, rarely yellowish, tube 4·5–11·5 mm, lobes 3·5–6 mm, tube laxly to densely pilose outside, mouth of the tube densely pilose inside. Stamens 5–6. Ovary lepidote or lepidote and rather sparsely puberulent. Capsule very small.
Two rather intergrading varieties can be distinguished:

1. Leaves less than 2 × longer than broad; corolla tube laxly pilose outside; corolla usually white . . . . **b.** var. **temoense**
\+ Leaves 2 or more × longer than broad; corolla tube densely pilose outside; corolla usually pink . . **a.** var. **laudandum**

**3a.** var. **laudandum.** Type: China, S Tibet, Tsari, Lapu, 15000 ft, *Ludlow & Sherriff* 2160 (holo. BM, iso. E).
CHINA (SE Xizang). Rocky hillsides, 4250–4550 m. Map 54, p. 166.

**3b.** var. **temoense** [Kingdon Ward ex] Cowan & Davidian, Rhodo. Yearbook 2:73 (1947). Type: China, S Tibet, Doshong La, 12–13000 ft, 24 vi 1924, *Kingdon Ward* 5848 (holo. E).
CHINA (SE Xizang). Moraines and open slopes, 2900–4700 m. Map 54, p. 166.

**4. (153.) R. rufescens** Franchet, Journ. de Bot. 9:396 (1895). Type: China, Sutchuen occidentale sur les montagnes de Tongolo, *Soulié* (holo. P—n.v., iso. E).

Syn.: *R. daphniflorum* Diels, Acta Horti Gotob. 1:180 (1921). Type: China, Nord Szechuan, Dongrego, 4300 m, 21 vii 1922, *Smith* 3700 (iso. E).

Small shrub, 0·3–1 m, often with twisted and intricate branching. Leaf-bud scales deciduous. Leaves elliptic-oblong, rarely ovate, 10–20 × 5–9 mm, ± rounded at base and apex, dark glossy green above, beneath with dark brown, dense, overlapping scales borne in 2–3 tiers, those of the lowermost tier as dark as, or darker than, the rest. Inflorescences up to 12-flowered, pedicels short, elepidote or sparsely lepidote. Calyx lobes oblong, 3–4 mm, sparsely lepidote or elepidote outside, erose-ciliate with loriform cilia on the margins, glabrous inside. Corolla white, tube 5·5–9·5 mm, lobes 3·5–5·5 mm, often sparsely lepidote outside, mouth of the tube rather sparsely pilose inside. Stamens 5. Ovary lepidote. Capsule lepidote, scarcely exceeding the calyx.

CHINA (C Sichuan). Open, rocky places, 3900–4600 m. Map 54, p. 166.

There is one specimen from Muli (SW Sichuan), *Rock* 16084, which is probably this species, but it is in early flower and cannot be certainly identified.

**5. (154.) R. pogonophyllum** Cowan & Davidian, Rhodo. Yearbook 2:75 (1947). Type: Bhutan, Tang Chu, Ritang, 14–15000 ft, *Ludlow & Sherriff* 3216 (holo. E).

Small, procumbent shrublet. Leaf-bud scales persistent. Leaves elliptic to obovate, c. 10 × 4–5 mm, upper surface elepidote but beset with whitish loriform setae, undersurface brown with dense scales borne in 2–3 tiers, those of the lowermost tier golden, paler than the others. Inflorescence 2–4-flowered, pedicels very short, lepidote. Calyx lobes obovate, 5–6 mm, elepidote and glabrous outside, margins densely loriform-ciliate, inner surface densely puberulent. Corolla white to pink, glabrous and elepidote outside, tube 8 mm, lobes 5 mm, mouth of the tube densely pilose within. Stamens 6. Ovary densely lepidote. Capsule unknown.

BHUTAN. Rocky places, 4250–4700 m. Map 54, p. 166.

Known only from the type and one other collection (*Ludlow & Sherriff* 3428).

**6. (155.) R. cephalanthum** Franchet, Bull. Soc. Bot. Fr. 32:9 (1885).

Variably sized, often contorted and sometimes prostrate shrub, 0·1–1·2 m, often with very thick lower stem. Leaf-bud scales persistent and very conspicuous. Leaves broadly elliptic to suborbicular, 15–47 × 7–23 mm, base usually rounded, apex obtuse or rounded, rarely emarginate, upper surface dark, glossy green, usually elepidote, lower surface fawn to brown, rarely dark brown or rusty with dense, overlapping scales in 2–3 tiers, those of the lower tier golden, paler than those of the upper tiers. Inflorescence dense, many-flowered; pedicels short, lepidote. Calyx lobes oblong, (3–)4–7 mm, lepidote or elepidote outside, margins usually ciliate with loriform cilia

(rarely margined with scales), inner surface glabrous or slightly puberulent. Corolla white or pink, rarely yellowish, tube 6·5–14 mm, lobes (3–)4–8 mm, tube elepidote and glabrous outside, lobes often bearing a few scales on their backs, mouth of the tube densely pilose inside. Stamens 5(–7). Ovary lepidote. Capsule scarcely exceeding the calyx.

Two subspecies, differing mainly in size, can be recognised:

1. Leaves 12–26 × 7–15 mm; corolla tube 6·5–13 mm . . . **a.** subsp. **cephalanthum**

\+ Leaves 25–47 × 18–23 mm; corolla tube 13–14 mm . . . **b.** subsp. **platyphyllum**

**6a.** subsp. **cephalanthum.** Type: China, Yunnan, in cacumine montis Koua-la-po prope Hokin, 26 v 1884, *Delavay* 59 (holo. P—n.v., iso. E). Fig. 4az, p. 21.

Syn.: *R. chamaetortum* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 9:218 (1916). Type: China, Tibeto-Yunnan frontier, Ka-gwr-pu (Ka kar po) glacier valley, 15000 ft, vi 1913, *Kingdon Ward* 431 (holo. E).

*R. crebreflorum* Hutchinson & Kingdon Ward, Notes R.B.G. Edinb. 16:173 (1931). Type: Assam, Delei valley, 13000 ft, *Kingdon Ward* 8337 (holo. BM, iso. E).

*R. nmaiense* Hutchinson & Kingdon Ward, op. cit.: 252. Type: E Upper Burma, ridge of Naung chaung, Nwai Divide, 12–13000 ft, 16 vii 1914, *Kingdon Ward* 1791 (holo. E).

*R. cephalanthum* var. *crebreflorum* (Hutchinson & Kingdon Ward) Cowan & Davidian, Rhodo. Yearbook 2:70 (1947).

*R. cephalanthum* var. *nmaiense* (Hutchinson & Kingdon Ward) Cowan & Davidian, op. cit.: 71.

Ic.: Gard. Chron. 91:133 (1932); Cox, Dwarf Rhododendrons 76 (1973); Ic. Corm. Sin. 3: t. 4101 (1974).

INDIA (Arunachal Pradesh), N BURMA, CHINA (N, NW & C Yunnan, S & SE Xizang). Open meadows, moorland, rocky slopes, 3050–4500 m. Map 55, p. 166.

**6b.** subsp. **platyphyllum** (Franchet ex Balfour f. & W. W. Smith) Cullen, Notes R.B.G. Edinb. 37:327 (1979). Fig. 4ba, p. 21.

Syn.: *R. cephalanthum* var. *platyphyllum* [Franchet ex] Diels, Notes R.B.G. Edinb. 7:211 (1912) nomen nudum. Type: China, Yunnan, in cacumine montis Tsang chan supra Tali, 27 vi 1887, *Delavay* (holo. P—n.v., iso. E).

*R. platyphyllum* [Franchet ex] Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:259 (1916).

NE BURMA, CHINA (NW & C Yunnan). Cliffs and ledges, 3050–3350 m. Map 55, p. 166.

Subsp. *platyphyllum* is, essentially, a large-sized variant of subsp. *cephalanthum*, reasonably distinct both morphologically and geographically. Cytological observations on the two taxa would be interesting, but subsp. *platyphyllum* is not available in cultivation.

**7. (156.) R. sargentianum** Rehder & Wilson, Pl. Wils. 1:504 (1913). Type: China, western Szechuan, Mupin, 3000–3600 m, *Wilson* 1208 (iso. E).
Ic.: The Garden 84:324 (1920); Gard. Chron. 91:57 (1932); Ic. Corm. Sin. 3: t. 4105 (1974).

Small shrub to 0·6 m. Leaf-bud scales persistent. Leaves elliptic, 9–15 × 5–8 mm, tapered to the base, apex rounded with conspicuous mucro, dark green and elepidote above, lower surface brown or pale brown with densely overlapping scales arranged in 2–3 tiers, those of the lowermost tier golden, paler than the others. Inflorescence 5–12-flowered, pedicels lepidote, 5–7 mm. Calyx lobes oblong-obovate, obtuse, c. 3 mm, sparsely lepidote outside, the margins conspicuously loriform-ciliate, the inner surface puberulent. Corolla whitish to yellow, tube c. 8 mm, lobes c. 4 mm, the tube and bases of the lobes conspicuously lepidote outside and also somewhat puberulent with short, filiform-acicular hairs; mouth of the tube densely pilose inside. Stamens 5. Capsule sparsely lepidote, c. 4 mm.
CHINA (C Sichuan). Exposed rocks, 3000–3600 m. Map 55, p. 166.

*R. sargentianum* is represented in herbaria by very few collections. Material in cultivation under *Wilson* 1208 (the type number) is more variable than the herbarium material (e.g. some plants have pure white flowers), but the significance of this variation is uncertain.

**8. (157.) R. kongboense** Hutchinson, Bot. Mag. 160: t. 9492 (1937). Type: China, Tibet, Doshong La, *Kingdon Ward* 5850 (holo. K, iso. E).

Spindly, thin, branched shrub to 1 m. Leaf-bud scales deciduous. Leaves oblong or elliptic-oblong, 13–28 × 6–12 mm, rounded to the base and the subacute apex, upper surface usually persistently lepidote, lower surface fawn to pale brown with dense, ± overlapping, plastered scales, all similar and pale brown, most with well-developed domed centres. Inflorescence many-flowered, pedicels short, lepidote. Calyx lobes 3–4 mm, ± oblong or somewhat obovate, lepidote or elepidote, glabrous outside, margins loriform-ciliate, sometimes with scales as well, inner surface glabrous. Corolla pink to red, rarely pinkish white, tube 6–8 mm, lobes 2·5–4 mm, tube variably pilose outside, densely pilose at the mouth inside and sometimes also well down into the tube. Stamens 5. Ovary lepidote. Capsule lepidote, scarcely exceeding the calyx.
CHINA (S Xizang). Cliffs, moraines, rocky slopes and moorland, occasionally in marshy places, 3200–4700 m. Map 56, p. 168.

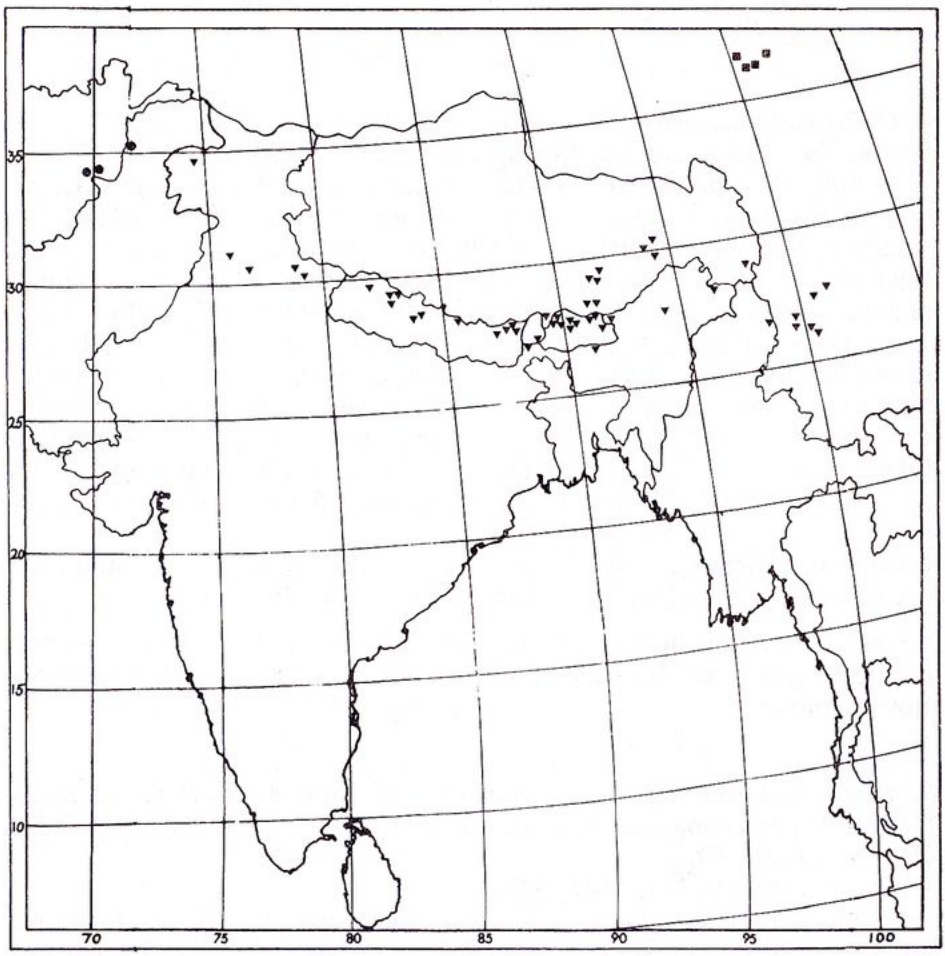
Very similar to some variants of *R. primuliflorum*, with which it has been confused in the past. It differs, however, in scale type, leaf shape, habit and flower colour.

**9. (158.) R. anthopogonoides** Maximowicz, Bull. Acad. Petersb. 23:350 (1877). Type: China occidentalis, Terra Tangutica (prov. Kansu), 1872, *Przewalski* (iso. E).
Ic.: Ic. Corm. Sin. 3: t. 4103 (1974).

Shrub to 1·6 m. Leaf-bud scales deciduous. Leaves ovate-elliptic, (20–)25–40 × (10–)11–21 mm, rounded at the base, rounded to somewhat tapered to the mucronate apex, sparsely lepidote or elepidote above,

beneath pale brown with scales which are all borne ± at one level, overlapping, plastered to the surface, all with well developed domed centres and narrow, scarcely lacerate rims. Inflorescence dense, many-flowered. Pedicels pubescent, elepidote. Calyx lobes 3–4·5 mm, oblong-obovate, glabrous and elepidote outside, margin erose and with a few scales, glabrous within. Corolla white or greenish white, rarely flushed pink, tube 5–10 mm, lobes relatively small, 1·5–3 mm, scarcely overlapping, densely pilose at the throat and inside the tube. Stamens 5. Ovary lepidote, sometimes pubescent. Capsule lepidote, 4–4·5 mm.
CHINA (Quinghai, Gansu). Scrub and forest margins, 3050–3350 m. Map 52.

Very distinct in its scale type and its very dense inflorescences of flowers with curiously solid-looking corollas with short lobes, and characteristic calyces.




MAP 52. ■ *R. anthopogonoides*; ● *R. collettianum*; ▼ *R. lepidotum*.

**10. (159). R. primuliflorum** Bureau & Franchet, Journ. de Bot. 5:95 (1891). Type: Thibet, inter Lhassa et Batang, 10 v 1890, *Bonvalot & Prince Henri d'Orleans* (iso. E). Fig. 4bd, p. 21.

Syn.: *R. acraium* Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:209 (1916). Type: China, Yunnan, mountains of Chungtien plateau, 12–13000 ft, vii 1913, *Forrest* 10652 (holo. E).

*R. cephalanthoides* Balfour f. & W. W. Smith, op. cit.: 216. Type: China, Yunnan, E flank of the Likiang Range, 11–11500 ft, v 1906, *Forrest* 2182 (holo. E).

*R. clivicolum* Balfour f. & W. W. Smith, op. cit.: 221. Type: China, Yunnan, mountains in the NE of the Yangtze bend, 11–12000 ft, vii 1913, *Forrest* 10585 (holo. E).

*R. cremnophilum* Balfour f. & W. W. Smith, op. cit.: 223. Type: China, Yunnan, mountains of the Chungtien plateau, 13000 ft, vii 1914, *Forrest* 12631 (holo. E).

*R. gymnomiscum* Balfour f. & Kingdon Ward, Notes R.B.G. Edinb. 9:230 (1916). Type: China, Tibeto-Yunnan frontier, Ka-gwr-pw glacier, 14000 ft, vi 1913, *Kingdon Ward* 505 (holo. E).

*R. lepidanthum* Balfour f. & W. W. Smith, op. cit.: 245. Type: China, Yunnan, Lichiang range, 11–14000 ft, v 1913, *Forrest* 10034 (holo. E).

*R. tsarongense* Balfour f. & Forrest, Notes R.B.G. Edinb. 11:150 (1919). Type: China, SE Tibet, Tsarong, on Ka gwr po, 14000 ft, *Forrest* 14334 (holo. E).

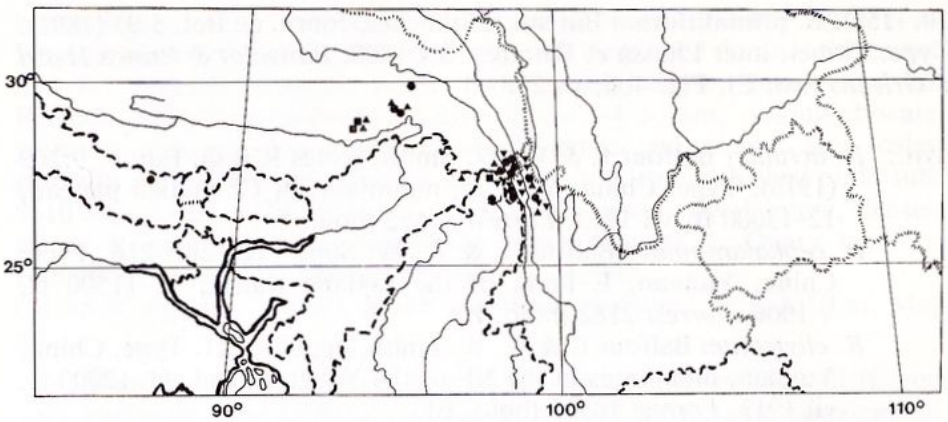
*R. primuliflorum* var. *cephalanthoides* (Balfour f. & W. W. Smith) Cowan & Davidian, Rhodo. Yearbook 2:79 (1947).

*R. primuliflorum* var. *lepidanthum* (Balfour f. & W. W. Smith) Cowan & Davidian, loc. cit.

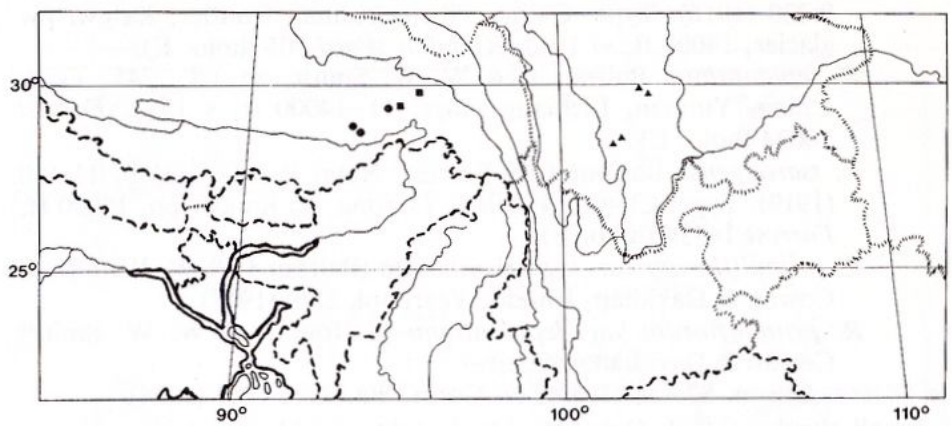
Ic.: Gard. Chron. 87:453 (1930); Ic. Corm. Sin. 3: t. 4107 (1974).

Small shrub to 1(–1·5) m. Leaf-bud scales quickly deciduous. Leaves narrowly elliptic or oblong-narrowly elliptic, more rarely elliptic, 11–30 (–35) × 5–10(–14) mm, tapered or ± rounded to the base, tapered or rounded to the apex, dark, glossy green, lepidote or elepidote above, beneath pale brown to brown with dense, overlapping scales arranged in 2–3 tiers, the tiers often very clearly distinguished, scales of the lowermost tier golden yellow, paler than those of the upper tiers; margins ciliate with loriform setae or eciliate. Inflorescence dense, several-flowered, pedicels short, lepidote or elepidote, pubescent or glabrous. Calyx lobes oblong, often acute, (2·5–)3–5(–6) mm, usually lepidote outside, margins variably lepidote and/or loriform-ciliate, inner surface variably puberulent. Corolla white, rarely flushed pink or entirely pink, often yellowish orange towards the base of the tube, tube 6–10(–12) mm, lobes (3–)3·5–5(–6) mm, tube usually glabrous outside, more rarely sparsely pilose or somewhat lepidote, densely pilose inside at the throat. Stamens 5(–6). Capsule lepidote, c. 4–5 mm.

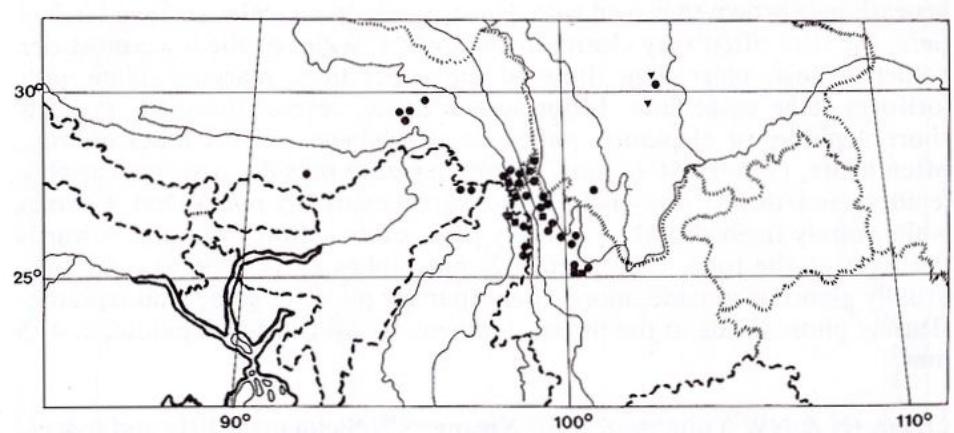
CHINA (N & NW Yunnan, S & SE Xizang, SW Sichuan). Cliffs and ledges, stony or rocky slopes, rarely on forest margins, 3350–4600 m. Map 57, p. 169.




MAP 53. ● *R. mekongense* var. *mekongense*; ■ *var. longipilosum*; ▼ var. *melinanthum*; ▲ var. *rubrolineatum*.




MAP 54. ● *R. laudandum* var. *laudandum*; ■ var. *temoense*; ▼ *R. pogonophyllum*; ▲ *R. rufescens*.




MAP 55. ● *R. cephalanthum* subsp. *cephalanthum*; ■ subsp. *platyphyllum*; ▼ *R. sargentianum*.

A very variable species, particularly with regard to leaf and corolla indumentum and scaling; the following variants, with the names that have been applied to some of them, are found:

(a) Leaves and corolla glabrous (*R. tsarongense, gymnomiscum, clivicolum, primuliflorum* sensu stricto).
(b) Leaves ciliate, corolla glabrous (*R. acraium, cremnophilum*).
(c) Leaves glabrous, corolla pilose.
(d) Leaves ciliate, corolla pilose (*R. cephalanthoides*).
(e) Leaves ciliate, corolla lepidote (*R. lepidanthum*).
(f) Leaves glabrous, corolla lepidote.

These variants are not geographically distinguished, and none of them appears to be of any taxonomic significance. Some of the variants with pilose corollas approach *R. kongboense* (p. 163); distinctive characters are given under that species.

There is also a specimen from Gansu (Kansu, *Farrer* 88) which seems most likely to belong to *R. primuliflorum*, in spite of the wide geographical gap between it and the rest of the species. It was described as *R. praeclarum* Balfour f. & Farrer (*Notes R.B.G. Edinb.* 9:261, 1916), but the material is inadequate for its recognition as a separate species.

**11. (160.) R. fragrans** (Adams) Maximowicz, Rhodo. Asiae Or. 16 (1870). Type: described from USSR, NE Siberia, non Paxton in Paxton's Bot. Mag. 10:147 (1843), which is an elepidote hybrid, thought to be *R. viscosum* x *? catawbiense*.

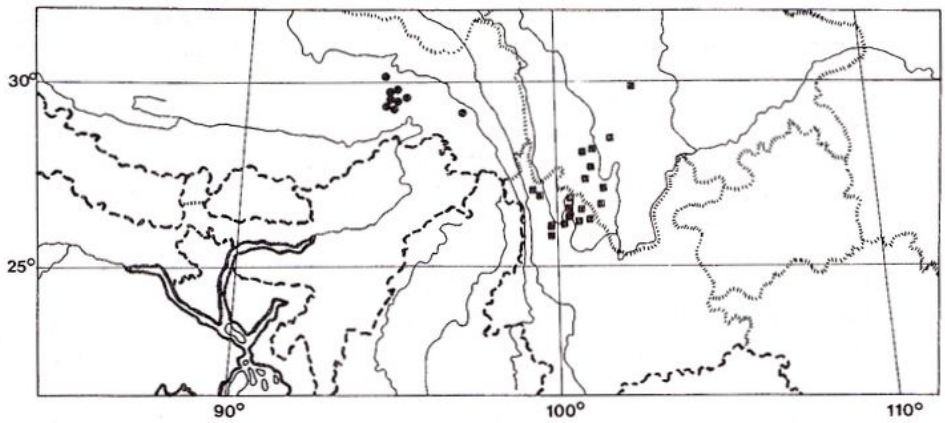
Syn.: *Azalea fragrans* Adams, Mem. Soc. Mosc. 5:92 (1808).
*Osmothamnus fragrans* (Adams) De Candolle, Prodr. 7:715 (1839).
*O. pallidus* [Turczaninow ex] De Candolle, loc. cit. Type: USSR, in rupibus Alpium Baicalensium, *Turczaninow*.
*R. adamsii* Rehder, Publ. Arn. Arb. 9:190 (1921). Type: as for *R. fragrans*.

Ic.: Busch, Fl. Sib. et Or. Ext. fasc. 2:20 (1915) as *R. anthopogon*.

Small shrub to 0·5 m. Leaf-bud scales deciduous. Leaves oblong-elliptic to oblong-ovate, 10–20 × 5–10 mm, somewhat revolute, tapered to rounded at the base, tapered to the obtuse apex, above dark glossy green, elepidote, somewhat rugose, beneath pale yellowish with dense, overlapping, ± plastered scales. Inflorescence 7–15-flowered, pedicels lepidote. Calyx lobes 1–3 mm, ovate, obtuse, fringed with dense loriform cilia. Corolla pale pink to pink, lobes usually with prominent darker veins, tube 6·5–8·5 mm, glabrous and elepidote outside, villous-pilose within, the lobes 4·5–6 mm, pilose within for some distance from the throat of the tube. Stamens 5(–6). Ovary lepidote. Capsule lepidote, 3–6 mm.

USSR (Siberia: Angara-Sayan, Dauria, River Lena area, Okhotsk), MONGOLIA. Forming thickets in the alpine zone. (Cf. Busch, *Fl. Sib. et Or. Ext.* fasc. 2:21 for a distribution map of this species under the name *R. anthopogon*).

A well-marked species, similar to, but quite distinct from, *R. primuliflorum*, with which it has been confused in most of the horticultural literature.




MAP 56. ● *R. kongboense*; ■ *R. trichostomum*.

**12. (161.) R. trichostomum** Franchet, Journ. de Bot. 9:396 (1895). Type: described on the basis of several syntypes from China, Yunnan & SW Szechuan—*Delavay* 2211, 2626 (both iso. E), *Soulié* 150 (iso. E), 764 (n.v.), *Pratt* 254 (n.v.). Fig. 4be, p. 21.

Syn.: *R. fragrans* sensu Franchet, Bull. Soc. Bot. Fr. 34:284 (1887) non (Adams) Maximowicz.

*R. ledoides* Balfour f. & W. W. Smith, Notes R.B.G. Edinb. 9:243 (1916). Type: China, Yunnan, mountains in the NE of the Yangtze bend, 13000 ft, ix 1913, *Forrest* 11246 (holo. E).

*R. radinum* Balfour f. & W. W. Smith, op. cit.: 268. Type: China, Yunnan, Lichiang range, 11–12000 ft, vi 1913, *Forrest* 10278 (holo. E).

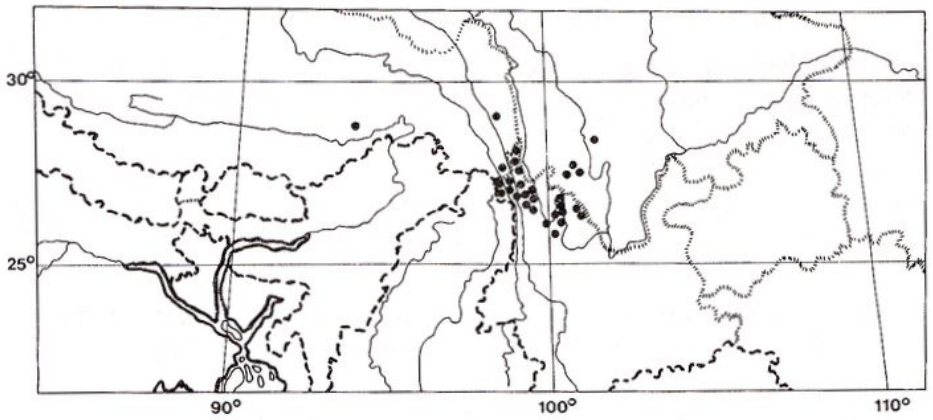
*R. sphaeranthum* Balfour f. & W. W. Smith, op. cit.: 278. Type: China, Yunnan, mountains of the Fengkow valley, 12–13000 ft, vi 1914, *Forrest* 12505 (holo. E).

*R. trichostomum* var. *ledoides* (Balfour f. & W. W. Smith) Cowan & Davidian, Rhodo. Yearbook 2:84 (1947).

*R. trichostomum* var. *radinum* (Balfour f. & W. W. Smith) Cowan & Davidian, loc. cit.

Ic.: Bot. Mag. 146: t. 8831 (1920); Cox, Dwarf Rhododendrons pl. 2 (1973); Ic. Corm. Sin. 3: t. 4104 (1974).

Small, intricately branched shrub, 0·3–1(–1·5) m, often forming ± globose bushes. Leaf-bud scales usually deciduous, rarely a few persisting but not conspicuous. Leaves linear, oblong or oblanceolate, 12–30 × 3–5(–6) mm, 4 or more × longer than broad, usually strongly revolute, tapered to the base, ± rounded to the slightly mucronate or emarginate apex, upper surface green, lepidote or not, lower surface usually pale brown with dense, overlapping scales borne in 2–3 tiers, very rarely somewhat plastered, scales of the lowermost tier golden, paler than the others. Inflorescence many-flowered, ± globose, pedicels short, usually lepidote, occasionally puberulent as well, rarely glabrous and elepidote. Calyx lobes oblong or narrowly triangular, 1–2·5 mm, usually lepidote outside, loriform-ciliate on the margins, variably puberulent inside. Corolla white or pink, tube 4·5–8(–10) mm, lobes 1·5–3·5(–5) mm, tube glabrous outside,




MAP 57. ● *R. primuliflorum*.

lobes generally with a few scales on the backs, mouth of the tube variably pilose inside. Stamens 5(–6). Ovary lepidote. Capsule lepidote, 2–4 mm.
CHINA (N & NW Yunnan, SW & C Sichuan). Open slopes and in scrub or forest and thicket margins, 3400–4600 m. Map 56, p. 168.

A variable species, particularly in leaf and flower size. The species and varieties formerly recognised appear to be merely horticultural selections from the general variation, and to have no taxonomic significance. Several specimens (*Kingdon Ward* 4465, 5183 and *Rock* 9134) are from very large, robust plants with large leaves and flowers, and are perhaps hybrids between *R. trichostomum* and *R. primuliflorum*.

*R. hedyosmum* Balfour f., *Notes R.B.G. Edinb.* 9:234, 1916 (*R. trichostomum* var. *hedyosmum* (Balfour f.) Cowan & Davidian, *Rhodo. Yearbook* 2:84, 1947) is the name given to a large-flowered variant occurring in cultivation but not in the wild. It is probably a hybrid of *R. trichostomum* with some other species of the section.

**13. (162.) R. radendum** Fang, Contr. Biol. Lab. Sci. Soc. China 12:62 (1939). Type: China, Szechuan, SW of Kangtinghsien (formerly Tatsienlu), 3040 m, 19 v 1930, *Cheng* 921 (holo. CHENGDU—n.v.).

Small shrub to 1 m. Leaf-bud scales deciduous. Leaves obovate-lanceolate or ovate, revolute, 10–18 × 3–6 mm, broadly tapering at the base, tapering or rounded to the acute or obtuse apex, lepidote and loriform-setose on the upper surface and margin, densely lepidote and loriform-setose beneath. Inflorescence 8–10-flowered, pedicels lepidote and loriform-setose. Calyx lobes 1–2 mm, lepidote outside, margins loriform-setose, glabrous within. Corolla purplish white, 8–10 mm, lepidote outside, pilose within the tube and at the mouth. Stamens 5. Ovary lepidote. Capsule unknown.
CHINA (NW Sichuan).

Apparently only known from the type collection. From the description, it seems similar to *R. trichostomum* but is distinguished by the presence of loriform-setae on the leaves and pedicels and by the lepidote corolla tube.

## DOUBTFUL AND IMPERFECTLY KNOWN TAXA

**R. amphichlorum** Ingram, Rhodo. & Camellia Yearbook 23:49 (1969). Described on the basis of cultivated material, and presumably a variant or hybrid of *R. campylogynum*.

**R. bivelatum** Balfour f., Notes R.B.G. Edinb. 10:85 (1917). Type: China, Yunnan, dry hills behind Mo-tsou, alt. 850 m, *Maire* 137 (holo. E). Known from only one poor specimen, and likely to be a chance hybrid of *R. augustinii* subsp. *chasmanthum*.

**R. campylogynum** vars **leucanthum** Ingram and **eupodum** Ingram, Rhodo. & Camellia Yearbook 23: 49 & 50 (1969). Cultivated variants of *R. campylogynum*.

**R. chrysolepis** Hutchinson & Kingdon Ward in Stevenson (ed.), The Species of Rhododendron 161 (1930). Type: Upper Burma, valley of the Seinghku, 7–8000 ft, *Kingdon Ward* 6808 (iso. E). Known only from two fruiting specimens.

**R. leptocarpum** Nuttall, Hooker's Kew Journ. 6:256 (1854). Syn.: *R. pumilum* Nuttall, op. cit. 5:354 (1853) non Hooker. Based on fruiting material collected by Booth in 'Bootan'.

**R. macrocarpos** Griffith, Itin. Notes 138 (1848). Type: Bootan, towards Sanah, 6800 ft, *Griffith* (n.v.). Possibly *R. dalhousiae* var. *dalhousiae*.

## IDENTIFICATION OF SPECIMENS

This list includes the identifications of all numbered herbarium specimens studied during the preparation of this revision. Material grown under these numbers in gardens will not necessarily belong to the same species as the herbarium specimen.

*Abbay* 2 edgeworthii.
*Anderson* 767 anthopogon subsp. anthopogon.
*Aitchison* 92, 194 collettianum.
*Aufschnaiter* 14800 nivale subsp. nivale.
*Bailey* 73 lepidotum.
*Batholomew* 193 setosum.
*Beer* 2236 cinnabarinum subsp. cinnabarinum; 25461 setosum; 25463 lepidotum; 25629 camelliiflorum; 25649 cinnabarinum subsp. cinnabarinum; 25663 setosum; 25686 camelliiflorum; 25671 cinnabarinum subsp. cinnabarinum.
*Bennet & Naithani* 3152 edgeworthii; 3162 keysii.
*Biltmore Herbarium* 4463 minus var. minus.
*Biskram* 2279 anthopogon subsp. hypenanthum.
*Bisset* 3643 keiskei.
*Bodinier* 299 micranthum; 1519 rigidum.
*Bodinier & Ducloux* 122, 123 siderophyllum; 124, 124b scabrifolium var. spiciferum; 125 scabrifolium var. pauciflorum; 218 pachypodum.
*Bor* 12395 anthopogon subsp. anthopogon; 12617, 14550, 14760 anthopogon subsp. hypenanthum; 16071, 18170, 18378 formosum.
*Bor & Ram* 18621 anthopogon subsp. anthopogon; 18639 pendulum; 19087 glaucophyllum var. glaucophyllum; 19089, 19204, 19220 cinnabarinum subsp. cinnabarinum; 19360 setosum; 19374 anthopogon subsp. anthopogon; 19410, 19676 setosum; 19700 anthopogon subsp. anthopogon; 19786 setosum; 19787 anthopogon subsp. anthopogon; 20022 pendulum; 20174 lepidotum; 20420 setosum; 20455 anthopogon subsp. anthopogon; 20484, 20801 nivale subsp. nivale.
*Bowes-Lyon* 2031 cinnabarinum subsp. cinnabarinum; 2098 nivale subsp. nivale; 3069, 3173, 6077, 15043 cinnabarinum subsp. xanthocodon.
*Bozeman et al.* 9113 minus var. minus.
*Bretschneider* in *Forbes* 250 mucronulatum.
*Carles* 10 mucronulatum.
*Cavalerie* 54 liliiflorum; 3883, 4403 lyi; 4624 spinuliferum; 4628 ciliicalyx; 7624, 7825 lyi; 8181 scabrifolium var. spiciferum.
*Cave* 189 baileyi; 1377 anthopogon subsp. anthopogon; 1378, 1551 setosum; 1552 anthopogon subsp. anthopogon; 1740 baileyi; 2273 anthopogon subsp. hypenanthum; 2322 triflorum var. triflorum; 2358, 2360 glaucophyllum var. glaucophyllum; 2383 anthopogon subsp. anthopogon; 4780 setosum; 4790 camelliiflorum; 6270 glaucophyllum var. glaucophyllum; 6721 cinnabarinum subsp.; 6725 lepidotum; 6728 anthopogon subsp. anthopogon; 6729 setosum; 6733 triflorum var. triflorum; 6734 maddenii subsp. maddenii; 6735 dalhousiae var. dalhousiae; 6737 ciliatum; 6741 pendulum; 6932 glaucophyllym var. glaucophyllum; 6934 indet.; 7044 lepidotum; 7139 anthopogon subsp. anthopogon; 9000 camelliiflorum.
*Chand* 6414 formosum.
*Chapman* 70, 109, 159 nivale subsp. nivale.
*Chen* 2644 racemosum; 2720 campylogynum; 2740 cephalanthum subsp. cephalanthum.
*Cheo & Yen* 261 micranthum; 321 mucronulatum.
*Chevalier* 30896 fleuryi.
*Chiao* 1843 thymifolium; 2646, 2837 mucronulatum.
*Chiao & Fan* 703 nitidulum var. omeiense.
*Ching* 523 thymifolium; 524 capitatum; 525 anthopogonoides; 603 capitatum; 608 thymifolium; 615 anthopogonoides; 871, 951 capitatum; 20322, 20325. 20327 cuneatum; 20328 telmateium; 20496, 20599, 20600 yungningense; 20601 russatum; 20608 yungingense; 20650 russatum x rupicola; 20859 rupicola var. rupicola; 20860 russatum; 20862 yungningense; 20863 rupicola var. chryseum; 20867 russatum; 20871 rupicola var. rupicola 21609 orthocladum var. longistylum; 21952, 21961 russatum; 21962 hippophaeoides; 21965, 21970, 21998 russatum; 30031 cuneatum; 30126 impeditum; 30156 cuneatum; 30159 impeditum; 30198 cuneatum. 30233 telmateium; 30249 rupicola var. rupicola.
*Chu* 2306 lutescens; 2333 davidsonianum; 2382 polylepis; 2384 petrocharis; 2389 lutescens; 2610 moupinense; 2755 trichanthum; 2764 cephalanthum subsp. cephalanthum; 2903 lutescedns; 3728, 3731, 3897 moupinense.
*Chung* 81599 liliiflorum; 81632 levinei aff.; 83353 liliiflorum; 83504 levinei aff.
*Clemens* 1455 micranthum; 6300a,b,c,d micranthum; 6301 mucronulatum.
*Coolidge & Carpenter* 102 veitchianum.
*Cooper* 1 cinnabarinum subsp. cinnabarinum; 46 setosum; 47, 91, 237, 295, 743, 744 lepidotum; 745, 747 cinnabarium subsp. cinnabarinum; 1282, 1454 maddenii subsp. maddenii; 1456 keysii; 1516, 1547 virgatum subsp. virgatum; 1741, 1805 lepidotum; 1937 cinnabarinum subsp. cinnabarinum; 2146, 2154 cinnabarinum subsp. xanthocodon; 2223 lepidotum; 2224 baileyi; 2490 setosum; 2523, 2552 lepidotum; 2581 cinnabarinum subsp. cinnabarinum; 2648 cinnabarinum subsp.; 2756 edgeworthii; 2819 virgatum subsp. virgatum; 2922 cinnabarinum subsp. cinnabarinum; 3064, 3151 virgatum subsp. virgatum; 3235 anthopogon subsp. anthopogon; 3236 lepidotum; 3256 cinnabarinum subsp.; 3346 virgatum subsp. virgatum; 3383 keysii; 3423 maddenii subsp. maddenii; 3479 lepidotum; 3482 setosum; 3483 nivale subsp. nivale; 3485 anthopogon subsp. anthopogon; 3493 cinnabarinum subsp.; 3541 triflorum var. triflorum; 3569 lepidotum. 3588 virgatum subsp. virgatum; 3806 dalhousiae var. dalhousiae; 3815 virgatum subsp. virgatum; 3819 cinnabarinum subsp. cinnabarinum; 3831 triflorum var. triflorum; 3838 nivale subsp. nivale; 3873 cinnabarinum subsp.; 3876 pendulum; 3879 edgeworthii; 3903 anthopogon subsp. anthopogon; 3913 keysii; 3935 dalhousiae var. dalhousiae; 3957 maddenii subsp. maddenii; 3959 camelliiflorum; 3998 cinnabarinum subsp. xanthocodon; 4003 setosum; 4009 baileyi; 4083 camelliiflorum; 4128 lepidotum; 4285 baileyi; 4804, 4979 cinnabarinum subsp.; 4980 maddennii subsp. maddenii; 4982 cinnabarinum subsp.; 5738 anthopogon subsp. hypenanthum; 5928 lepidotum; 5975 burmanicum.
*Cox & Hutchison* 300A, B, C, 302, 321 formosum var. inaequale; 373 indet.; 374 nuttallii; 375 indet.; 420 micromeres; 421 edgeworthii; 438 maddenii subsp. maddenii; 579 cinnabarinum subsp. cinnabarinum; 585 dalhousiae var. dalhousiae; 586 triflorum var. triflorum.
*Creech & de Vos* 1134 lepidotum.
*Cubitt* 385 veitchianum.
*Cunningham* 5 racemosum; 35, 517 davidsonianum; 540 lutescens; 620 trichostomum.
*Cuthbert* 685 minus var. minus.
*David* 17703 mucronulatum.
*Davis* 17519 ferrugineum; 17549 hirsutum.
*Delavay* 9 maddenii subsp. crassum; 18 lepidotum; 122 campylogynum; 159 brachyanthum subsp. brachyanthum; 267 fastigiatum; 267 bis polycladum; 271 campylogynum; 273 trichocladum; 293 yunnanense; 297 scabrifolium var. scabrifolium; 299 racemosum; 360 fastigiatum & telmateium; 737 fastigiatum & polycladum; 837 rigidum; 838 racemosum; 2060

*Forrest* (cont.)

12714 primuliflorum; 12754 cephalanthum subsp. cephalanthum; 12878 virgatum subsp. oleifolium; 12911 rupicola var. rupicola; 12934 saluenense subsp. saluenense; 12942 megeratum; 12968, 13258 saluenense subsp. chameunum; 13302 brachyanthum subsp. hypolepidotum; 13303 campylogynum; 13313 saluenense subsp. saluenense; 13383, 13443 saluenense subsp. chameunum; 13518 campylogynum; 13526 cephalanthum subsp. playphyllum; 13527 scabrifolium var. scabrifolium; 13532 virgatum subsp. oleifolium; 13544 oreotrephes; 13545 saluenense subsp. saluenense; 13550 brachyanthum subsp. hypolepidotum; 13574 megeratum; 13709 campylogynum; 13724 virgatum subsp. oleifolium; 13725 xanthostephanum; 13726 trichocladum; 13732 scabrifolium var. scabrifolium; 13733 pleistanthum; 13739, 13740 racemosum; 13741 pleistanthum; 13761 cuneatum; 13768 telmateium; 13773 racemosum; 13791, 13792, 13793, 13794 hippophaeoides var. hippophaeoides; 13798 racemosum; 13799, 13800 hippophaeoides var. hippophaeoides; 13803, 13804 racemosum; 13841 primuliflorum; 13842 hippophaeoides var. hippophaeoides; 13847 telmateium; 13872 saluenense subsp. chameunum; 13899 polycladum; 13900 mekongense var. melinanthum; 13902 gemmiferum; 13904 saluenense subsp. chameunum; 13905 dasypetalum; 13914 mekongense var. rubrolineatum; 13915 russatum; 13931 oreotrephes; 13947 rupicola var. chryseum; 13985 saluenense subsp. chameunum; 13987 nivale subsp. boreale; 13992 oreotrephes; 14000 rupicola var. chryseum; 14004 campylogynum; 14005 rupicola var. chryseum; 14007 edgeworthii; 14018 nivale subsp. boreale; 14030 primuliflorum; 14040 nivale subsp. boreale; 14042 primuliflorum; 14043 saluenense subsp. chameunum; 14052 brachyanthum subsp. hypolepidotum; 14054 saluenense subsp. saluenense; 14055 cephalanthum subsp. cephalanthum; 14059 megeratum; 14074 tapetiforme x rupicola var. chryseum; 14085 tapetiforme; 14135 heliolepis var. brevistylum; 14139 primuliflorum; 14160 mekongense var. mekongense; 14210 heliolepis var. brevistylum; 14240 edgeworthii; 14266 campylogynum; 14291 heliolepis var. brevistylum; 14334 primuliflorum; 14336 saluenense subsp. chameunum; 14344 cephalanthum subsp. cephalanthum; 14347 oreotrephes; 14372 rubiginosum; 14452 rubiginosum; 14518 primuliflorum; 14535 oreotrephes; 14750 cephalanthum subsp. cephalanthum; 14754 heliolepis var. brevistylum; 14761 rubiginosum; 14787 oreotrephes; 14788 cephalanthum subsp. cephalanthum; 14796 oreotrephes; 14801 cephalanthum subsp. cephalanthum; 14807, 14808, 14815 primuliflorum; 14865 campylogynum; 14900 rupicola var. chryseum; 14908 saluenense subsp. saluenense; 15002 pleistanthum; 15004 angustinii subsp. chasmanthum; 15024 mekongense var. mekongense; 15033 polycladum; 15035 mekongense var. melinanthum; 15051 rubiginosum; 15071 heliolepis var. brevistylum; 15074 lepidotum; 15076 impeditum; 15077, 15079, 15080, 15081, 15082 primuliflorum; 15085 telmateium; 15086 primuliflorum; 15087 trichostomum; 15088 primuliflorum; 15090 rupicola var. rupicola; 15091 impeditum & fastigiatum; 15092, 15093 primuliflorum; 15094 telmateium; 15096 trichostomum; 15103 scabrifolium var. scabrifolium; 15120 telmateium; 15125 rupicola var. rupicola; 15126, 15127 primuliflorum; 15129 indet.; 15132 telmateium; 15137 trichostomum; 15154 telmateium; 15155 primuliflorum; 15159 complexum; 15166, 15169 primuliflorum; 15201 impeditum; 15203 mollicomum; 15204 tatsienense; 15205 racemosum; 15208 tatsienense; 15210 telmateium; 15218 cuneatum; 15219 rubiginosum; 15222 oreotrephes; 15225 cuneatum; 15241 saluenense subsp. chameunum; 15245 primuliflorum; 15249 fastigiatum; 15250 racemosum; 15251 hippophaeoides var. hippophaeoides; 15255, 15256 telmateium; 15258 rupicola var. rupicola; 15259, 15260, 15261 trichostomum; 15263 tatsienense; 15264, 15265 hippophaeoides var. hippophaeoides; 15266

*Forrest* (cont.)

racemosum; 15267 complexum; 15268 telmateium; 15269 complexum; 15270 rupicola var. rupicola; 15271 primuliflorum; 15275 heliolepis var. heliolepis; 15280 yunnanense; 15288 megeratum; 15345 cephalanthum subsp. cephalanthum; 15356 tapetiforme; 15361 rubiginosum; 15367 rupicola var. rupicola; 15370 telmateium; 15371 primuliflorum; 15372 telmateium; 15388 hippophaeoides var. hippophaeoides; 15390 tatsienense; 15391 rupicola var. rupicola; 15392, 15393 complexum; 15395 rupicola var. rupicola; 15397 oreotrephes; 15398, 15399 primuliflorum; 15400 complexum; 15403. 15406 primuliflorum; 15407 telmateium; 15409 primuliflorum; 15410 polycladum; 15411 primuliflorum; 15418 oreotrephes; 15427 cuneatum; 15440 russatum; 15446 tatsienense; 15448 cuneatum; 15449 trichostomum; 15450 hippophaeoides var. hippophaeoides; 15451 orthocladum var. orthocladum; 15452 trichostomum; 15459 hippophaeoides var. hippophaeoides; 15462 racemosum; 15464 cuneatum; 15465 oreotrephes; 15466 primuliflorum; 15467, 15468 telmateium; 15470 mekongense var. mekongense; 15478 cephalanthum subsp. platyphyllum; 15487 brachyanthum subsp. brachyanthum; 15496 mekongense var. rubrolineatum; 15501 heliolepis var. heliolepis; 15503, 15504 scabrifolium var. scabrifolium; 15522 maddenii subsp. crassum; 15576 rigidum; 15577 racemosum; 15578 rigidum; 15580 cephalanthum subsp. cephalanthum; 15581 rigidum; 15583 xanthostephanum; 15589 rigidum & sulfureum; 15594 sulfureum; 15602 pleistanthum; 15612, 15613, 15614, 15615, 15617 fastigiatum; 15625 yunnanense; 15639 telmateium; 15640 orthocladum var. orthocladum; 15641 tatsienense; 15642 complexum; 15643, 15645 telmateium; 15658 trichocladum; 15667 roseatum; 15688 zaleucum; 15761 rubiginosum; 15770 sulfureum; 15774 megacalyx; 15776 trichocladum; 15782 sulfureum; 15885 yunnanense; 15887 maddenii subsp. crassum; 15899 valentinianum; 15908 campylogynum; 15933 heliolepis var. heliolepis; 15958 telmateium; 15959 primuliflorum; 15972 telmateium; 15999 maddenii subsp. crassum; 16005 sulfureum; 16032 pachypodum; 16045 heliolepis var. heliolepis; 16076 zaleucum; 16077 megacalyx; 16112, 16113 primuliflorum; 16114 trichostomum; 16115, 16117, 16118, 16119 primuliflorum; 16121 oreotrephes; 16128 hippophaeoides var. hippophaeoides; 16129 cuneatum; 16130 trichostomum; 16131, 16133 trichostomum; 16134 lepidotum; 16143 saluenese subsp. chameunum; 16146 primuliflorum; 16152 heliolepis var. brevistylum; 16214 virgatum subsp. oleifolium; 16249 tatsienense; 16250 hemitrichotum; 16252 rupicola var. muliense; 16257 telmateium; 16263 hippophaeoides var. hippophaeoides; 16265 yunnanense; 16270 intricatum; 16277 impeditum; 16282 yungingense; 16284 impeditum; 16285, 16291 oreotrephes; 16292 impeditum; 16295 primuliflorum; 16296, 16300 telmateium; 16305 nivale subsp. boreale; 16306 primuliflorum; 16307 nivale subsp. boreale; 16308 primuliflorum; 16311 trichostomum; 16312 primuliflorum; 16313 telmateium; 16349 russatum; 16356 primuliflorum; 16357 pleistanthum; 16360 angustinii subsp. chasmanthum; 16362, 16365 pleistanthum; 16363 cephalanthum subsp. cephalanthum; 16368 mekongense var. melinanthum; 16371, 16374 russatum; 16436 primuliflorum; 16449 saluenense subsp. chameunum; 16450 tapetiforme; 16500 nivale subsp. boreale; 16541 primuliflorum; 16545 nivale subsp. boreale; 16543 oreotrephes; 16558 megeratum; 16559 virgatum subsp. oleifolium; 16570 rubiginosum; 16576 heliolepis var. brevistylum; 16577 tapetiforme; 16579, 16580 rupicola var. chryseum; 16584 oreotrephes; 16590, 16593, 16595 primuliflorum; 16597, 16597a rubiginosum; 16646 primuliflorum; 16692 augustinii subsp. chasmanthum; 16701, 16707 cephalanthum subsp. cephalanthum; 16712 primuliflorum; 16739 saluenense subsp. saluenense; 16790 yunnanense; 16812 pubescens; 16816 yunnanense; 16977, 16981 telmateium; 16982 trichostomum; 16983 impeditum; 16985 telmateium;

*Forrest* (cont.)

16989 yunnanense; 16995 complexum; 16999 orthocladum var. orthocladum; 17018 oreotrephes; 17034, 17035 impeditum; 17036 intricatum; 17038 yunnanense; 17042 tatsienense; 17044 yunnanense; 17073 intricatum; 17087, 17091, 17093, 17101, 17106 primuliflorum; 17107 orthocladum var. orthocladum; 17115 rupicola var. muliense; 17116, 17117, 17118 impeditum; 17126, 17127 telmateium; 17130 cephalanthum subsp. cephalanthum; 17132 yungningense; 17134 nivale subsp. boreale; 17164, 17165 trichostomum; 17168 primuliflorum; 17220, 17227 indet.; 17293 russatum; 17294 nivale subsp. boreale; 17296, 17297, 17299 rupicola var. rupicola; 17305 oreotrephes; 17340 rubiginosum; 17342 augustinii subsp. chasmanthum; 17352 megeratum; 17354 trichostomum; 17361, 17364 primuliflorum; 17395 oreotrephes; 17414 pleistanthum; 17416 tatsienense; 17423 mekongense var. rubrolineatum; 17430 oreotrephes; 17439, 17441, 17442, 17443 rupicola var. rupicola; 17449, 17456 augustinii subsp. chasmanthum; 17464 rubiginosum; 17476, 17479 augustinii subsp. chasmanthum; 17483 rubiginosum; 17494 roseatum; 17501, 17506 trichocladum; 17524, 17539 roseatum; 17544 campylogynum; 17559 roseatum; 17569, 17572 maddenii subsp. crassum; 17588 virgatum subsp. oleifolium; 17592 sulfureum; 17593 zaleucum; 17596 valentinianum; 17600 zaleucum; 17622 heliolepis var. heliolepis; 17631 pachypodum; 17665 pseudociliiipes; 17675 roseatum; 17693 megacalyx; 17694, 17724 zaleucum; 17731 heliolepis var. heliolepis; 17735 rubiginosum; 17737 sulfureum; 17750, 17753 trichocladum; 17758 roseatum; 17765 maddenii subsp. crassum; 17824 genestierianum; 17825 rubiginosum; 17856 zaleucum; 17866 sulfureum; 17900 pseudociliipes; 17920 rubiginosum; 17937 zaleucum; 17941 trichocladum; 17958 roseatum; 17963 valentinianum; 17964 roseatum; 18000 yunnanense; 18007 campylogynum; 18010, 18022 trichocladum; 18023 zaleucum; 18030 campylogynum; 18041 cephalanthum subsp. platyphyllum; 18042 zaleucum; 18092 tephropeplum; 18099 megacalyx; 18113 maddenii subsp. crassum; 18125 sulfureum; 18143 lepidostylum; 18151 shweliense; 18152 sulfureum; 18173, 18210 maddenii subsp. crassum; 18216 sulfureum; 18218 rubiginosum; 18231 sulfureum; 18240 heliolepis var. heliolepis; 18270 pseudociliipes; 18278 maddenii subsp. crassum; 18281 megacalyx; 18300 maddenii subsp. crassum; 18312 heliolepis var. heliolepis; 18329 genestierianum; 18349 trichocladum; 18355 pseudociliipes; 18368 zaleucum; 18447 indet.; 18450 trichocladum; 18454 heliolepis var. heliolepis; 18456 trichocladum; 18470 zaleucum; 18507 valentinianum; 18538, 18567 maddenii subsp. crassum; 18607 pseudociliipes; 18614 rubiginosum; 18648 polycladum; 18649 oreotrephes; 18652 telmateium; 18655 rupicola var. chryseum; 18665 campylogynum; 18667 rubiginosum; 18671 saluenense subsp. chameunum; 18677 oreotrephes; 18737 yunnanense; 18744 zaleucum; 18746 genestierianum; 18749 zaleucum; 18754 campylogynum; 18770 cephalanthum subsp. platyphyllum; 18771 pseudociliipes; 18782 trichocladum; 18785 rubiginosum; 18787 sulfureum; 18798 rubiginosum; 18815 indet.; 18817 maddenii subsp. crassum; 18818 valentinianum; 18900 virgatum subsp. oleifolium; 18903 augustinii subsp. chasmanthum; 18905 saluenense subsp. saluenense; 18906 augustinii subsp. chasmanthum; 18907 heliolepis var. brevistylum; 18909 mekongense var. melinanthum; 18913 primuliflorum; 18918 calostrotum subsp. keleticum; 18919 cephalanthum subsp. cephalanthum; 18933 rubiginosum; 18939 nuttallii; 18942 megeratum; 18944 nuttallii; 19015 rubiginosum; 19017 primuliflorum; 19149 virgatum subsp. oleifolium; 19152 saluenense subsp. saluenense; 19160 edgeworthii; 19170, 19172 saluenense subsp. saluenense; 19179 rubiginosum; 19181 campylogynum; 19183 saluenense subsp. saluenense; 19184 edgeworthii; 19187 rupicola var. chryseum; 19189 heliolepis var. brevistylum; 19190 brachyanthum subsp. hypolepidotum; 19194 mekongense var. melinanthum;

*Forrest* (cont.)

19195 nivale subsp. boreale; 19198 brachyanthum subsp. hypolepidotum; 19200 oreotrephes; 19201 tapetiforme; 19202 primuliflorum; 19206 oreotrephes; 19207 brachyanthum subsp. hypolepidotum; 19209 heliolepis var. brevistylum; 19210 rubiginosum; 19214 heliolepis var. heliolepis; 19216 brachyanthum subsp. hypolepidotum; 19218 saluenense subsp. saluenense; 19219 rubiginosum; 19222 saluenense subsp. saluenense; 19381 pachypodum; 19383, 19383A rubiginosum; 19384 sulfureum; 19385 rigidum; 19400 yunnanense agg.; 19404 racemosum; 19412 pleistanthum; 19437 saluenense subsp. chameunum; 19440 russatum; 19443, 19444 yunnanense; 19445, 19446 mekongense var. melinanthum; 19447, 19450, 19456 polycladum; 19458 russatum; 19479 saluenense subsp. saluenense; 19481 campylogynum; 19492 cephalanthum subsp. cephalanthum; 19497 mekongense var. melinanthum; 19500 oreotrephes; 19541 brachyanthum subsp. hypolepidotum; 19544 oreotrephes; 19570 megeratum; 19597 nivale subsp. boreale; 19607, 19655 rupicola var. chryseum; 19674 tapetiforme; 19676 nivale subsp. boreale; 19696 virgatum subsp. oleifolium; 19698 augustinii subsp. chasmanthum; 19701 pleistanthum; 19702 primuliflorum; 19719 rupicola var. rupicola; 19814, 19825 augustinii subsp. chasmanthum; 19844 monanthum; 19866 rupicola var. chryseum; 19871 campylogynum; 19872 brachyanthum subsp. hypolepidotum; 19896 rupicola var. chryseum; 19912 mekongense var. melinanthum; 19913 saluenense subsp. saluenense; 19915 calostrotum subsp. keleticum; 19917 genestierianum; 19918 saluenense subsp.; 19919 calostrotum subsp. keleticum; 19930 mekongense var. mekongense; 19956 monanthum; 19990 cephalanthum subsp. cephalanthum; 19991 primuliflorum; 19993 rupicola var. chryseum; 19994 saluenense subsp. chameunum; 20005 heliolepis var. heliolepis; 20021 xanthostephanum; 20055 primuliflorum; 20058, 20062 cephalanthum subsp. cephalanthum; 20063, 20064 augustinii subsp. chasmanthum; 20067 virgatum subsp. oleifolium; 20094 megacalyx; 20095 rubiginosum; 20118 maddenii subsp. crassum; 20172 saluenense subsp. chameunum; 20176, 20185 pleistanthum; 20196 primuliflorum; 20208 tapetiforme; 20230 tephropeplum; 20235, 20255 calostrotum subsp. keleticum; 20282 primuliflorum; 20307 maddenii subsp. crassum; 20332 megeratum; 20356 monanthum; 20388 nuttallii; 20407 yunnanense; 20422 saluenense subsp. chameunum; 20429 primuliflorum; 20430 yunnanense; 20432 rupicola subsp. muliense; 20434 yunnanense; 20450 intricatum; 20452 primuliflorum; 20453 telmateium; 20454 impeditum; 20457 telmateium; 20460 yungingense; 20461 telmateium; 20462 nivale subsp. boreale; 20463 yungingense; 20464 rupicola var. rupicola; 20465 primuliflorum; 20476 trichostomum; 20477 telmateium; 20480 trichostomum; 20481 oreotrephes; 20482 tatsienense; 20484 racemosum; 20485 yunnanense; 20486 tatsienense; 20488 orthocladum var. orthocladum; 20489 oreotrephes; 20490 tatsienense x siderophyllum; 20492 impeditum; 20507 oreotrephes; 20512 telmateium; 20525 mollicomum; 20536 yunnanense; 20553 telmateium; 20625 rubiginosum; 20627 orthocladum var. orthocladum; 20628 trichostomum; 20629 oreotrephes; 20630 tatsienense; 20631 racemosum; 20638 telmateium; 20648 tatsienense x siderophyllum; 20651 orthocladum var. orthocladum; 20657 yunnanense; 20689, 20693 lepidotum; 20698 yungningense; 20708 rupicola var. rupicola; 20714 tapetiforme; 20715 nivale subsp. boreale; 20781 campylogynum; 20783 oreotrephes; 20793, 20795 pleistanthum; 20824 mekongense var. longipilosum; 20833 calostrotum subsp. keleticum; 20835 brachyanthum subsp. hypolepidotum; 20840 oreotrephes; 20843 rupicola var. chryseum; 20845 genestierianum; 20861, 20864 calostrotum subsp. keleticum; 20879 monanthum; 20880 xanthostephanum; 20884 tephropeplum; 20896 calostrotum subsp. riparium; 20897 megacalyx; 20899 nuttallii; 20906 megeratum; 20912 saluenense subsp. saluenense; 20917 maddenii subsp. crassum;

*Forrest* (cont.)
20923, 20926 pleistanthum; 20928 nivale subsp. boreale; 20932 virgatum subsp. oleifolium; 20949 telmateium; 20950 russatum; 20954 campylogynum; 20956 rupicola var. chryseum; 20970 intricatum; 20973 augustinii subsp. chasmanthum; 20975 saluenense subsp. chameunum; 20977 intricatum; 20980, 20981 primuliflorum; 20987 mekongense var. melinanthum; 21006 oreotrephes; 21026 russatum; 21027 rubiginosum; 21028 intricatum; 21029 primuliflorum; 21030 cuneatum; 21031 intricatum; 21032 primuliflorum; 21046 telmateium; 21053 saluenense subsp. saluenense; 21054 rupicola var. muliense; 21059 cuneatum; 21105 pachypodum; 21109 racemosum; 21110 rubiginosum; 21114 tatsienense; 21135 scabrifolium var. scabrifolium; 21136 rubiginosum; 21147 yunnanense; 21163 tatsienense; 21181 scabrifolium var. scabrifolium; 21195 racemosum; 21198 tatsienense; 21214 racemosum; 21215 tatsienense; 21216 mollicomum; 21225 racemosum; 21239 telmateium; 21241 orthocladum var. orthocladum; 21248 intricatum; 21252 racemosum & tatsienense; 21253 trichostomum; 21257 oreotrephes; 21265 saluenense subsp. chameunum; 21270 tatsienense; 21274 orthocladum var. orthocladum x impeditum; 21276 telmateium; 21282 yungingense; 21283 rupicola var. rupicola; 21288 orthocladum var. orthocladum; 21299 trichostomum; 21306, 21321 racemosum; 21344 intricatum; 21345 rupicola var. muliense; 21347 rubiginosum; 21348 heliolepis var. brevistylum; 21351 racemosum; 21358 yunnanense; 21369 cuneatum; 21377 telmateium; 21387 impeditum; 21426, 21442 tatsienense; 21451 trichostomum; 21456 cuneatum; 21462 hippophaeoides var. occidentale; 21463 xanthostephanum; 21470 yunnanense; 21476 hippophaeoides var. occidentale; 21485 heliolepis var. brevistylum; 21487 polycladum; 21488 racemosum; 21490 russatum x rupicola var. rupicola; 21492 nivale subsp. australe; 21507 fastigiatum; 21512, 21516 lepidotum; 21528 polycladum; 21529 russatum x rupicola var. rupicola; 21533 fastigiatum & rigidum; 21534 racemosum; 21547 nivale subsp. australe; 21549 racemosum; 21559 polycladum; 21560 racemosum; 21564 edgeworthii; 21577 telmateium; 21582 maddenii subsp. crassum; 21583 cephalanthum subsp. cephalanthum; 21518 fastigiatum; 21679 saluenense subsp. saluenense; 21680 nuttallii; 21690 indet.; 21692 genestierianum; 21695 megacalyx; 21699 mekongense var. mekongense; 21701 megeratum; 21706 tephropeplum; 21707 xanthostephanum; 21714 edgeworthii; 21715 rubiginosum; 21716 virgatum subsp. oleifolium; 21726 maddenii subsp. crassum; 21749 rupicola var. chryseum; 21756, 21757 calostrotum subsp. keleticum; 21760, 21772 saluenense subsp. saluenense; 21776 mekongense var. melinanthum; 21778 xanthostephanum; 21811 micromeres; 21822 oreotrephes; 21825 monanthum; 21835 oreotrephes; 21921 racemosum; 21922 telmateium; 21923 cephalanthum subsp. cephalanthum; 21931 lepidotum; 21932 telmateium; 21936 maddenii subsp. crassum; 21948 cuneatum; 21959, 21965, 21965A racemosum; 21972, 21974 nivale subsp. australe; 21988 orthocladum var. longistylum; 21994 oreotrephes; 22013 heliolepis var. brevistylum; 22049 pubescens; 22052 mollicomum; 22066 hemitrichotum; 22197 cuneatum; 22206 rubiginosum; 22295 russatum x rupicola var. rupicola; 22299 polycladum; 22300 campylogynum; 22320 primuliflorum; 22348 oreotrephes; 22370 racemosum; 22372 tatsienense; 22420 racemosum; 22440, 22441 lepidotum; 22472 tatsienense; 22493 racemosum; 22511 gemmiferum; 22517 russatum; 22548 cuneatum; 22562, 22563, 22565, 22570, 22587, 22590 racemosum; 22594, 22596 russatum; 22598 racemosum; 22652, 22653 xanthostephanum; 22654 monanthum; 22655 genestieranum; 22659 calostrotum subsp. keleticum; 22661, 22662 oreotrephes; 22666 saluenense subsp. saluenense; 22723 brachyanthum subsp. hypolepidotum; 22749, 22750 calostrotum subsp. keleticum; 22751 nuttallii; 22756 mekongense var. melinanthum; 22774 pleistanthum; 22822 megacalyx; 22831 edgeworthii; 22833 virgatum subsp. oleifolium; 22834 megeratum; 22856 micromeres; 22858 indet.; 22908 mekongense var. mekongense; 22934 saluenense subsp. saluenense; 22935 calostrotum subsp. keleticum; 22953 hemitrichotum; 22965 saluenense subsp. chameunum; 22968 complexum; 22969 polycladum; 22971 complexum; 22972 yungningense; 22998 maddenii subsp. crassum; 22999 mekongense var. melinanthum; 23000 rubiginosum; 23001 maddenii subsp. crassum; 23002 racemosum; 23004 gemmiferum; 23005 hippophaeoides var. hippophaeoides; 23006 xanthostephanum; 23007 pleistanthum; 23016, 23021 maddenii subsp. crassum; 23024 polycladum; 23091 primuliflorum; 23092 racemosum; 23093, 23094 primuliflorum; 23095 racemosum; 23097 primuliflorum; 23098 hippophaeoides var. hippophaeoides; 23099 racemosum; 23100 yunnanense; 23101 hippophaeoides var. hippophaeoides; 23102 fastigiatum; 23103 yungningense; 23104 rubiginosum; 23108 polycladum; 23109 hippophaeoides var. occidentale; 23110 rigidum; 23112 nivale subsp australe; 23113 fastigiatum; 23136 virgatum subsp. oleifolium; 23137 heliolepis var. brevistylum; 23138, 23139 polycladum; 23140 nivale subsp. australe; 23141 polycladum; 23142, 23143 nivale subsp. australe; 23145 polycladum; 23146 nivale subsp. australe; 23147 polycladum; 23148 nivale subsp. australe; 23149 hippophaeoides var. hippophaeoides; 23152 nivale subsp. australe; 23153, 23154 polycladum; 23155 pleistanthum; 23156 fastigiatum; 23272, 23273, 23274, 23275, 23276 racemosum; 23277 tatsienense; 23278, 23279, 23280, 23281 racemosum; 23286, 23287 edgeworthii; 23288, 23289 campylogynum; 23291 xanthostephanum; 23292 heliolepis var. brevistylum; 23296 maddenii subsp. crassum; 23312 oreotrephes; 23313 rigidum; 23314 yunnanense; 23315 oreotrephes; 23317 tatsienense; 23320 cephalanthum subsp. cephalanthum; 23322, 23323, 23324 primuliflorum; 23348, 23352, 23355 cuneatum; 23356 gemmiferum; 23357 rupicola var. rupicola; 23358, 23359 russatum x rupicola var. rupicola; 23360 telmateium; 23361 polycladum; 23362 nivale subsp. australe; 23363, 23364 russatum x rupicola var. rupicola; 23365 polycladum; 23366, 23367 russatum x rupicola var. rupicola; 23369 nivale subsp. australe; 23370 russatum x rupicola var. rupicola; 23372 virgatum supsp. oleifolium; 23397, 23398 russatum x rupicola var. rupicola; 23851 pleistanthum; 24047 virgatum subsp. oleifolium; 24094 lepidostylum; 24097 genestierianum; 24101 zaleucum; 24109 trichocladum; 24131 sulfureum; 24132 zaleucum; 24138 valentinianum; 24154 shweliense; 24160 trichocladum; 24188 rubiginosum; 24223 zaleucum; 24228 virgatum subsp. oleifolium; 24229 sulfureum; 24231 campylogynum; 24235 sulfureum; 24283 pseudociliipes; 24285 genestierianum; 24286 lepidostylum; 24301, 24308 pseudociliipes; 24332 heliolepis var. heliolepis; 24343 valentinianum; 24346 megacalyx; 24391 pseudociliipes; 24451 roseatum; 24470 pseudociliipes; 24483 roseatum; 24496 maddenii subsp. crassum; 24523 calostrotum subsp. calostrotum; 24535 rubiginosum; 24561 edgeworthii; 24562 zaleucum; 24570 campylogynum; 24571 cephalanthum subsp. cephalanthum; 24572 calostrotum subsp. calostrotum; 24574 rupicola var. rupicola; 24575 trichocladum; 24576 rupicola var. rupicola; 24577 heliolepis var. heliolepis; 24578 campylogynum; 24601 rupicola var. rupicola; 24618 yunnanense; 24633 lepidostylum; 24688, 24729 megacalyx; 24730, 24747 maddenii subsp crassum; 24762, 24771 heliolepis var. heliolepis; 24774 dendricola; 24782 maddenii subsp. crassum; 24831 genestierianum; 24955 campylogynum; 24986 rupicola var. rupicola; 24991 cephalanthum subsp. cephalanthum; 25011 calostrotum subsp. calostrotum; 25012, 25016 rupicola var. rupicola; 25262 lepidostylum; 25281 trichocladum; 25340 suffureum; 25417 yunnanense; 25422 genestierianum; 25428 rubiginosum; 25430 campylogynum; 25446 yungchangense; 25449 rubiginosum;

*Forrest* (cont.)

25484 pseudociliipes; 25493 cephalanthum subsp. cephalanthum; 25496 fastigiatum; 25497 hippophaeoides var. occidentale; 25498 polycladum; 25499 rupicola var. rupicola; 25500 russatum; 25501 rupicola var. rupicola; 25502 russatum; 25503 calostrotum subsp. riparioides; 25504 saluenense subsp. chameunum; 25506 calostrotum subsp. riparioides; 25508 saluenense subsp. chameunum; 25509 mekongense var. melinanthum; 25523 rupicola var. rupicola; 25526 yungningense; 25528, 25529, 25532 rupicola var. rupicola; 25542 calostrotum subsp. riparioides; 25553 russatum; 25557 oreotrephes; 25560 saluenense subsp. chameunum; 25570 charitopes subsp. charitopes; 25572 tephropeplum; 25574 maddenii subsp. crassum; 25575 brachyanthum subsp. hypolepidotum; 25576 zaleucum; 25581 charitopes subsp. charitopes; 25586 maddenii subsp. crassum; 25588 micromeres; 25606, 25609, 25611 zaleucum; 25612 micromeres; 25613 charitopes subsp. charitopes; 25617 monanthum; 25624 nuttallii; 25629 maddenii subsp. crassum; 25631 sulfureum; 25632 edgeworthii; 25637 sulfureum; 25644 tephropeplum; 25683 calostrotum subsp. riparioides; 25706 campylogynum; 25707 nivale subsp. australe; 25714 tephropeplum; 25754 sulfureum; 25765 zaleucum; 25766 tephropeplum; 25767 maddenii subsp. crassum; 25772 yungchangense; 25775 tephropeplum; 25779 micromeres; 25789 charitopes subsp. charitopes; 25790, 25796, 25799 zaleucum; 25808 charitopes subsp. charitopes; 25815 zaleucum; 25817 calostrotum subsp. riparium; 25820 tephropeplum; 25835 saluenense subsp. chameunum; 25836 dendricola; 25843 brachyanthum subsp. hypolepidotum; 25847 charitopes subsp. charitopes; 25851, 25852 sulfureum; 25853 nuttallii; 25854, 25857 maddenii subsp. crassum; 25858 monanthum; 25865 taggianum; 25895 saluenense subsp. chameunum; 25904 polycladum; 25907 rupicola var. rupicola; 25914 augustinii subsp. rubrum; 25921, 25922 calostrotum subsp. riparioides; 25923 saluenense subsp. chameunum; 25938 rubiginosum; 25941 rupicola var. rupicola; 25955 russatum; 25981, 25982 fastigiatum; 25988 mekongense var. melinanthum; 25999 megacalyx; 26001 heliolepis var. brevistylum; 26005, 26014 genestierianum; 26068 maddenii subsp. crassum; 26091 megacalyx; 26093 indet.; 26109 maddenii subsp. crassum; 26112 valentinianum; 26113 sulfureum; 26115 lepidostylum; 26120 maddenii subsp. crassum; 26122, 26145 indet.; 26190 pseudociliipes; 26303 sulfureum; 26347 virgatum subsp. oleifolium; 26355 edgeworthii; 26384 ciliipes; 26414 sulfureum; 26417 dendricola; 26419 genestierianum; 26422 sulfureum; 26423 edgeworthii; 26431, 26439 tephropeplum; 26440 taggianum; 26441 dendricola; 26444 psuedociliipes; 26447 sulfureum; 26457 tephropeplum; 26459 dendricola; 26461 pseudociliipes; 26462 dendricola; 26463 yunnanense; 26464, 26472 pseudociliipes; 26473 brachyanthum subsp. hypolepidotum; 26474 oreotrephes hybrid; 26482 rubiginosum; 26486 yunnanense; 26488 rubiginosum; 26529 yunnanense; 26615 pseudociliipes; 26617 megacalyx; 26618 edgeworthii; 26635 sulfureum; 26636 micromeres; 26755 indet.; 26765 campylogynum; 26798 caesium; 26806 yunnanense; 26808 genestierianum; 26923 maddenii subsp. crassum; 26928 heliolepis var. brevistylum; 26961 heliolepis var. heliolepis; 26979 zaleucum; 26987 rupicola var. rupicola; 26988, 26991 campylogynum; 27043 pseudociliipes; 27065 calostrotum subsp. calostrotum; 27101 megacalyx; 27103 zaleucum; 27109 pseudociliipes; 27110 maddenii subsp. crassum; 27117 trichocladum; 27118 campylogynum; 27119 rupicola var. rupicola; 27121 calostrotum subsp. calostrotum; 27122 cephalanthum subsp. cephalanthum; 27150 maddenii subsp. crassum; 27188 trichocladum; 27357 campylogynum; 27378 genestierianum; 27380 zaleucum; 27404, 27405 yunnanense; 27455 tephropleplum; 27458 sulfureum; 27473 rubiginosum; 27489 heliolepis var. brevistylum; 27497 calostrotum subsp. calostrotum; 27501 cephalanthum subsp. cephalanthum; 27503,

*Forrest* (cont.)

27569 campylogynum; 27571, 27591 rupicola var. rupicola; 27593 maddenii subsp. crassum; 27598 oreotrephes; 27603 zaleucum; 27611 tephropeplum; 27615 maddenii subsp. crassum; 27617 edgeworthii; 27621 megacalyx; 27622 sulfureum; 27628 pseudociliipes; 27631 rubiginosum; 27638 taggianum; 27642 heliolepis var. brevistylum; 27655 pseudociliipes; 27656 campylogynum; 27658 calostrotum subsp. calostrotum; 27660 trichocladum; 27661, 27669 pseudociliipes; 27670 tephropeplum; 27685 indet.; 27686 micromeres; 27687 dendricola; 27688 pseudociliipes; 27689, 27690 dendricola; 27715 valentinianum; 27722 dendricola; 27724 maddenii subsp. crassum; 27725, 27731 pseudociliipes; 27737, 27738 dendricola; 27739 caesium; 27745 yunnanense; 27758 genestierianum; 27759 pseudociliipes; 27769 edgeworthii; 27776 maddenii subsp. crassum; 27786 heliolepis var. heliolepis; 27789 maddenii subsp. crassum; 27803 zaleucum; 27804 trichocladum; 27808 megacalyx; 27810 rupicola var. rupicola; 27812 calostrotum subsp. calostrotum; 27814 maddenii subsp. crassum; 27817, 27818, 27820 zaleucum; 27821 maddenii subsp. crassum; 27823 indet.; 27824 maddenii subsp. crassum; 27825 roseatum; 27829 sulfureum; 27830 valentinianum; 28236 rubiginosum; 28241 cephalanthum subsp. platyphyllum; 28249 pachypodum; 28250 mekongense var. longipilosum; 28252 sulfureum; 28253 calostrotum subsp. riparium; 28254 campylogynum; 28256, 28260 fastigiatum; 28263 calostrotum subsp. riparium; 28264 rigidum; 28265 sulfureum; 28266 brachyanthum subsp. brachyanthum; 28277 calostrotum subsp. riparium; 28282 cephalanthum subsp. platyphyllum; 28284 sulfureum; 28287 fastigiatum; 29289 trichocladum; 28295 racemosum; 28297 rigidum; 28299 heliolepis var. heliolepis; 28300 fastigiatum; 28302 cephalanthum subsp. cephalanthum; 28305 edgeworthii; 28307 rigidum; 28311, 28312, 28319 maddenii subsp. crassum; 28321 cephalanthum subsp. platyphyllum; 28326 rigidum; 28339 saluenense subsp. chameunum; 28340 primuliflorum; 28341 fastigiatum; 28342 lepidotum; 28343 rupicola var. rupicola; 28344 telmateium; 28346 pachypodum; 28347, 28360 indet.; 29106 trichocladum; 29107 cephalanthum subsp. cephalanthum; 29108 virgatum subsp. oleifolium; 29110 pachypodum; 29112 fastigiatum; 29115 xanthostephanum; 29119 brachyanthum subsp. brachyanthum; 29121 rubiginosum; 29122 pleistanthum; 29123 edgeworthii; 29248 hemitrichotum; 29249 rupicola var. miliense; 29250 trichostomum; 29251 nivale subsp. boreale; 29266 intricatum; 29267 primuliflorum; 29268 impeditum; 29269 telmateium; 29270, 29271 trichostomum; 29272 rupicola var. muliense; 29273 hemitrichotum; 29283 primuliflorum; 29286, 29287 saluenense subsp. chameunum; 29288 primuliflorum; 29289 heliolepis var. brevistylum; 29290 polycladum hybrid; 29297 rubiginosum, 29304 rupicola var. rupicola; 29307 edgeworthii; 29323 yunnanense; 29330, 29331 tatsienense; 29335 primuliflorum; 29336 trichostomum; 29337 yungningense; 29338 telmateium; 29342 trichostomum; 29559 roseatum; 29581 zaleucum; 29616 roseatum; 29651 zaleucum; 29655 tephropeplum; 29666 calostrotum subsp. calostrotum; 29682 trichocladum; 29687 yunnanense; 29790 maddenii subsp. crassum; 29809 megacalyx; 29820 maddenii subsp. crassum; 29894 rupicola var. rupicola; 29928 calostrotum subsp. calostrotum; 29937 campylogynum; 29939 maddenii subsp. crassum; 29988 calostrotum subsp. riparium; 30388 tephropeplum; 30393 edgeworthii; 30395 rupicola var. rupicola; 30416 campylogynum; 30419 megacalyx; 30527 mekongense var. melinanthum; 30540 calostrotum subsp. riparioides; 30541 rupicola var. rupicola; 30543 saluenense subsp. chameunum; 30883 campylogynum; 30885 complexum; 30889 rupicola var. rupicola; 30891 saluenense subsp. chameunum; 30910 oreotrephes; 30911 saluenense subsp. ?; 30936 trichostomum; 30938 telmateium; 30940 hemitrichotum; 30941 impeditum; 30942 rupicola var. muliense; 30967 campylogynum; 30977 heliolepis var. heliolepis; 30997 fastigiatum; 30999 brachyanthum subsp. brachyanthum.

*Fox & Godfrey* 3029 minus var. minus.
*Fox, Godfrey & Woods* 2205 minus var. minus.
*Gardner* 501 cowanianum.
*Garrett* 640 veitchianum; 756 surasianum; 1180 ludwigianum.
*Gebauer* 2735 dendricola.
*Godfrey* 60643 minus var. chapmanii.
*Gould* 303B dalhousiae var. rhabdotum; 2086 setosum; 2250 nivale subsp. nivale.
*Griffiths* 2225, 2226 virgatum subsp. virgatum; 2228 triflorum var. triflorum; 2229 camelliiflorum; 2234 maddenii subsp. maddenii; 2237 dalhousiae var. dalhousiae.
*Hamilton* 1034 lepidotum; 1083 anthopogon subsp. anthopogon.
*Hanbury Tracy* 167 nivale subsp. nivale.
*Handel-Mazzetti* 494 siderophyllum; 609 racemosum; 613 siderophyllum; 1353 augustinii subsp. chasmanthum; 1414 amundsenianum; 1485 concinnum; 1506 tsaii x hippophaeoides var. hippophaeoides; 2403 pleistanthum; 2622 impeditum; 2623 rupicola var. muliense; 2882 hemitrichotum; 3032, 3773 trichostomum; 6131 pachypodum; 6237 pleistanthum; 6244 virgatum subsp. oleifolium; 6253 scabrifolium var. scabrifolium; 6862 rupicola var. rupicola; 6897 racemosum; 7544 telmateium; 8440 saluenense subsp. saluenense; 8619 scabrifolium var. spiciferum; 8621 scabrifolium var. pauciflorum; 8833 rubiginosum; 8857 cephalanthum subsp. cephalanthum; 9058 campylogynum; 9122 nuttallii; 9306 rupicola var. chryseum; 9307 saluenense subsp. saluenense; 9762 heliolepis var. brevistylum; 9952 virgatum subsp. oleifolium
*Hansen & Smitinand* 12627 veitchianum.
*Hara et al.* 5113 cinnabarinum subsp. cinnabarinum.
*Harbison* 136, 168, 626, 656a, 749 minus var. minus.
*Harper* 26, 1785, 1895, 3574 minus var. minus.
*Hedge & Wendelbo* 8975 collettianum.
*Hemeling* 135, 324 micranthum.
*Henry, A.* 5414 augustinii subsp. augustinii; 8897 nitidulum var. omeiense; 9110 concinnum; 9110A siderophyllum; 9369 scabrifolium var. spiciferum; 9369B spinuliferum; 10524 pachypodum; 10572, 10572B, 10619 spinuliferum; 11983 rufosquamosum; 13666 excellens.
*Henry, M. G.* 1495 minus var. chapmanii.
*Herbarium Flora SSSR* 3640 mucronulatum.
*Hosie* 31 yunnanense; 33 scabrifolium var. scabrifolium; 34 racemosum.
*Hosseus* 201 veitchianum; 401 ludwigianum.
*Hsia* 2143 mucronulatum; 2371 micranthum.
*Hu* 8203, 8280, 8287, 8290, 8292, 8298, 8301, 8307 ambiguum; 8312, 8321 nitidulum var. omeiense; 8324 ambiguum; 8327 concinnum; 8398, 8400, 8706 lutescens; 8863, 8866, 8868, 8870, 8872 hanceanum.
*Hummel* 4244, 4358, 4510 capitatum.
*Hutchinson, Matthews & Riley* 210 ferrugineum.
*Ikonnikov-Galitsky* 711 dauricum.
*Kanai, Shresta & Adhikari* 6746, 6747 cowanianum.
*Karo* 11 dauricum.
*Keenan, Aung & Hia* 3246 veitchianum.
*Kerr* 512 veitchianum; 3238 surasianum; 5322 veitchianum; 5570, 8670 ludwigianum; 21022, 21028A veitchianum; 21046 lyi.
*King* 60 mucronulatum; 78, 593 micranthum; 4219 lepidotum.
*King's Collectors* 4318 lepidotum.
*Kingdon Ward* 4 johnstoneanum; 269A telmateium; 269B hippophaeoides var. hippophaeoides; 270 racemosum; 293 pleistanthum; 365 oreotrephes; 406 mekongense var. melinanthum; 431 cephalanthum subsp. cephalanthum; 505 primuliflorum; 540 rupicola var. chryseum; 541 nivale subsp. boreale; 576 saluenense subsp. chameunum; 585 saluenense subsp. saluenense; 587 oreotrephes; 789 heliolepis var. brevistylum; 793 campylogynum; 795 tapetiforme; 905 lepidotum; 1528 trichocladum; 1538 dendricola; 1568 zaleucum; 1628 megacalyx; 1629 edgeworthii; 1757 maddenii subsp. crassum; 1785, 1789 campylogynum; 1790 calostrotum

*Kingdon Ward* (cont.)
subsp. calostrotum; 1791 cephalanthum subsp. cephalanthum; 1794 rupicola var. rupicola; 1817 maddenii supsp. crassum; 1906 heliolepis var. heliolepis; 3038 edgeworthii; 3039 zaleucum; 3095 megeratum; 3097 trichocladum; 3136 dendricola; 3146 campylogynum; 3156 zaleucum; 3172 campylogynum; 3189 calostrotum subsp. keleticum; 3190 oreotrephes; 3191 valentinianum; 3196 megeratum; 3248 maddenii subsp. crassum; 3299 oreotrephes; 3302 brachyanthum subsp. hypolepidotum; 3303 campylogynum; 3304 rupicola var. rupicola; 3305 trichocladum; 3365 cephalanthum subsp. cephalanthum; 3390 calostrotum subsp. keleticum; 3391, 3610 campylogynum; 3722 monanthum; 3776 pachypodum; 3919 yunnanense; 3952 racemosum; 3952A pubescens; 3953 pubescens; 3998 trichostomum; 4023 rupicola var. muliense; 4050 hemitrichotum; 4102 telmateium; 4160 primuliflorum; 4184 intricatum; 4186 impeditum; 4268 telmateium; 4308 rubiginosum; 4309 oreotrephes; 4322 yunnanense; 4341 cuneatum; 4344 yunnanense; 4413 impeditum; 4429 rupicola var. muliense; 4444 impeditum; 4457 racemosum; 4465 trichostomum; 4486 cuneatum; 4491 yunnanense; 4583 lepidotum; 4679 nivale subsp. boreale; 4733 telmateium; 4973 hemitrichotum; 4974 yunnanense; 4994 hemitrichotum; 5004 scabrifolium var. scabrifolium; 5016 racemosum; 5022 rubiginosum; 5030 p.p. cuneatum; 5031 pleistanthum; 5035 hippophaeoides var. hippophaeoides; 5036 racemosum; 5037 cuneatum; 5050 racemosum; 5061 pleistanthum; 5065 orthocladum var. orthocladum & telmateium; 5066 hemitrichotum; 5089 rubiginosum; 5092 intricatum; 5103 cuneatum; 5106 trichostomum; 5128 intricatum; 5129 cuneatum hybrid; 5130 impeditum; 5135 intricatum; 5140 thymifolium; 5147 impeditum; 5148 impeditum & impeditum hybrid; 5151 telmateium; 5152 rupicola var. muliense; 5158 telmateium x intricatum; 5160 racemosum; 5161 thymifolium; 5179 telmateium; 5183 trichostomum; 5184 impeditum; 5188 telmateium; 5196 nivale subsp. boreale; 5198 telmateium; 5200 primuliflorum; 5210 oreotrephes; 5256 primuliflorum; 5287 hippopophaeoides; 5292 racemosum; 5295, 5295A heliolepis var. brevistylum; 5298, 5299 rupicola var. rupicola; 5300 mekongense var. rubrolineatum; 5318 saluenense subsp. chameunum; 5327 rupicola var. chryseum; 5329 primuliflorum; 5337 rupicola var. chryseum & tapetiforme; 5358 saluenense subsp. chameunum; 5384 primuliflorum; 5385 tapetiforme; 5421 virgatum subsp. oleifolium; 5428 rubiginosum; 5430 calostrotum subsp. keleticum; 5436 saluenense subsp. saluenense; 5437 brachyanthum subsp. hypolepidotum; 5439 edgeworthii; 5440 seinghkuense; 5441 maddenii subsp. crassum; 5442 monanthum; 5446 xanthostephanum; 5447 dendricola; 5466 nuttallii; 5478 monanthum; 5481 brachyanthum subsp. hypolepidotum; 5482 calostrotum subsp. riparium; 5501 dendricola; 5641 kongboense; 5644 bulu; 5648 triflorum var. triflorum; 5667 nivale subsp. nivale; 5673 kongboense; 5686 bulu; 5687 triflorum var. triflorum; 5694 lepidotum; 5714 bulu; 5733 laudandum var. laudandum; 5735 nivale subsp. nivale & bulu; 5777, 5778, 5779 nivale subsp. nivale; 5790 oreotrephes; 5792 nivale subsp. nivale; 5828 calostrotum subsp. riparium; 5829 mekongense var. mekongense; 5842 campylogynum; 5843, 5844 charitopes subsp. tsangpoense; 5848, 5849 laudandum var. temoense; 5850 kongboense; 5851 mekongense var. rubrolineatum; 5856 pumilum; 5862 nivale subsp. nivale; 5874 cinnabarinum subsp. xanthocodon; 5876 uniflorum var. uniflorum; 5922, 5950 nivale subsp. nivale; 5994 lepidotum; 6020, 6021 kongboense; 6026 cinnabarinum subsp. xanthocodon; 6087 calostrotum subsp. riparium; 6091 campylogynum; 6224 calostrotum subsp. riparium; 6250 megeratum; 6251 micromeres; 6257 keysii; 6263 triflorum var. triflorum; 6273 leucaspis; 6278 auritum; 6286 megacalyx; 6291 leucaspis; 6301 pemakoense; 6303 tephropeplum; 6313 flavantherum; 6325, 6354 scopulorum; 6676, 6711 dendricola; 6751 xanthostephanum; 6769 horlickianum;

*Kingdon Ward* (cont.)
6781 megacalyx; 6793 seinghkuense; 6794 tephropeplum; 6806 trichocladum; 6807 edgeworthii; 6834 tephropeplum; 6848 micromeres; 6884 uniflorum var. imperator; 6903 calostrotum subsp. riparium; 6914 cephalanthum subsp. cephalanthum; 6924 pruniflorum; 6934 saluenense subsp. saluenense; 6960 tapetiforme; 6961 pumilum; 6967 cephalanthum subsp. cephalanthum; 6984 calostrotum subsp. riparium; 6985 campylogynum; 7001 nivale subsp. nivale; 7012 saluenense subsp. saluenense; 7045 pruniflorum; 7046 brachyanthum subsp. hypolepidotum; 7048 rupicola var. rupicola; 7058 nivale subsp. nivale; 7061, 7062 calostrotum subsp. riparium; 7108 heliolepis var. brevistylum; 7121 triflorum var. triflorum; 7136 maddenii subsp. crassum; 7188, 7550 pruniflorum; 7553 calostrotum subsp. riparium; 7633 tapetiforme; 8016 walongense; 8038 nuttallii; 8046 boothii; 8052 edgeworthii; 8111 megacalyx; 8113 boothii; 8144 indet.; 8165 tephropeplum; 8168 monanthum; 8169 micromeres; 8202 tephropeplum; 8205 megacalyx; 8206 edgeworthii; 8225 megeratum; 8229 calostrotum subsp. riparium; 8239 cinnabarinum subsp. xanthocodon; 8257 pruniflorum; 8259 trichocladum; 8260 pemakoense; 8326 micromeres; 8335 cephalanthum subsp. cephalanthum; 8342 pumilum; 8385 lepidotum; 8400 maddenii subsp. crassum; 8414 campylogynum; 8415 pruniflorum; 8522 kasoense; 8545 maddenii subsp. crassum; 8578 concinnoides; 9170 horlickianum; 9254 seinghkuense; 9361 horlickianum; 9371 chrysodoron; 9402 taggianum; 9403 horlickianum; 9416 tephropeplum; 9478 triflorum var. triflorum; 9519 mekongense var. longipilosum; 9584 maddenii subsp. crassum; 9609 rupicola var. chryseum & nivale subsp. nivale; 9620 mekongense var. melinanthum; 9633 indet.; 9710 rupicola var. rupicola; 10005 tapetiforme x rupicola var. rupicola; 10129 micromeres; 10372 xanthostephanum; 10379 edgeworthii; 10402 megacalyx; 10486 cinnabarinum subsp. xanthocodon; 10500 pruniflorum; 10521 tapetiforme & nivale subsp. nivale; 10531 rupicola var. rupicola x nivale subsp. nivale; 10532 calostrotum subsp. riparium; 10533 rupicola var. rupicola; 10542 anthopogon subsp. anthopogon; 10544 campylogynum; 10582 saluenense subsp. ? & calostrotum subsp. riparium; 10595 nivale subsp. nivale; 10716 nivale subsp. nivale & tapetiforme; 10842 kongboense; 10870 campylogynum; 10929 edgeworthii; 10940 micromeres; 11016 nivale subsp. nivale; 11029 xanthostephanum; 11366 lindleyi; 11382 virgatum subsp. virgatum; 11451 maddenii subsp. crassum; 11456 lindleyi; 11463 glaucophyllum var. tubiforme; 11464 megeratum; 11531 edgeworthii; 11541 keysii; 11549 triflorum var. triflorum; 11568 cinnabarinum subsp. xanthocodon; 11591 lepidotum; 11610 nivale subsp. nivale; 11641 baileyi; 11676 nivale subsp. nivale; 11801 indet.; 11803 anthopogon; 11804 nivale subsp. nivale; 11909 micromeres; 11915 mekongense var. longipilosum; 11925 pumilum; 11951 kongboense; 11970 laudandum var. laudandum; 12120 nivale subsp. nivale; 12134 micromeres; 12414 boothii; 13014 edgeworthii; 13021 indet.; 13151 oreotrephes; 13195, 13230 monanthum; 13235 genestierianum; 13365 rupicola var. rupicola; 13370 tapetiforme; 13461 dendricola; 13500 indet.; 13611 dalhousiae var. rhabdotum; 13632 edgeworthii; 13644 boothii; 13661 megeratum; 13672 glaucophyllum var. tubiforme; 13680 lepidotum; 13699 anthopogon subsp. anthopogon; 13701 nivale subsp. nivale; 13760 keysii; 13770 maddenii subsp. crassum; 13777 lepidotum; 13948 maddenii subsp. crassum; 14003 micromeres; 15005 tapetiforme; 19239 walongense; 19244, 19325 virgatum subsp. virgatum; 19404 maddenii subsp. crassum; 19433 edgeworthii; 19448 triflorum var. triflorum; 19450 calostrotum subsp. riparium; 19573 mekongense var. rubrolineatum; 19591 pumilum; 19606 nivale subsp nivale; 19620 pruniflorum; 20601 dendricola; 20629 indet.; 20651 dendricola; 20681 indet.; 20836 megacalyx; 20837 zaleucum; 20919 indet.; 20926, 21003 cinnabarinum subsp. tamaense; 21005 maddenii subsp. crassum; 21007 micromeres; 21021 cinnabarinum subsp. tamaense; 21079 mekongense var. mekongense; 21512 dendricola; 21909 indet.; 21921 burmanicum; 22200 johnstoneanum.

*Kingdon Ward* (cont.)
*Ko* 50397 levinei.
*Koelz* 25244 formosum var. formosum.
*Komarov* 1212 dauricum.
*Kubo & Togasi* 1342 keiskei.
*Lace* 231 anthopogon subsp. hypenanthum; 319 lepidotum; 558, 1578 anthopogon subsp. hypenanthum; 1993 lepidotum; 2208 dalhousiae var. dalhousiae; 2222 edgeworthii; 2244 cinnabarinum subsp. cinnabarinum; 2252 triflorum var. triflorum; 2253 lindleyi; 5632, 5750 veitchianum.
*Lancaster* 17 cinnabarinum subsp. cinnabarinum.
*Lee* 3476 nitidulum var. omeiense.
*Li* 11178 micranthum; 11180 mucronulatum.
*Licent* 839 micranthum; 2898 micranthum & capitatum; 3152 micranthum; 4530 thymifolium.
*Limpricht* 1320 petrocharis.
*Litwinow* 1116 micranthum.
*Lowndes* 950 anthopogon subsp. hypenanthum; 1004 lepidotum; 1174 lowndesii.
*Ludlow & Sherriff* 7 cinnabarinum subsp. cinnabarinum; 15 triflorum var. triflorum; 88 setosum; 123 lepidotum; 173 triflorum var. triflorum; 175, 176 lepidotum; 184 keysii; 190 camelliiflorum; 218 maddenii subsp. maddenii; 253 camelliiflorum; 569, 570 maddenii subsp. maddenii; 582 dalhousiae var. dalhousiae; 583 dalhousiae var. rhabdotum; 588 keysii; 589 camelliiflorum; 590 micromeres; 634 lepidotum; 647 cinnabarinum subsp. cinnabarinum; 661 cephalanthum subsp. cephalanthum; 716 lepidotum; 1204 dalhousiae var. rhabdotum; 1205 dalhousiae var. dalhousiae; 1251 edgeworthii; 1266, 1269 lindleyi; 1279 virgatum subsp. virgatum; 1285 baileyi; 1309 pendulum; 1346 virgatum subsp. virgatum; 1353 triflorum var. triflorum; 1354 cinnabarinum subsp. xanthocodon; 1355 glaucophyllum var. tubiforme; 1356 ciliatum; 1360 dekatanum; 1361 megeratum; 1362 pumilum; 1365 amandum; 1475 anthopogon subsp. hypenanthum; 1565 anthopogon subsp. anthopogon; 1575 cinnabarinum subsp. xanthocodon; 1583 kongboense; 1598 nivale subsp. nivale; 1624, 1634 pumilum; 1647 charitopes subsp. tsangpoense; 1649 calostrotum subsp. riparium; 1653 anthopogon subsp. anthopogon; 1666 megeratum; 1675 triflorum var. triflorum; 1692 cameliiflorum; 1702, 1715 lindleyi; 1741 pumilum; 1751 micromeres; 1756 anthopogon subsp. anthopogon; 1757 cinnabarinum subsp. xanthocodon; 1771 calostrotum subsp. riparium; 1773 pumilum; 1779 nivale subsp. nivale; 1780 lepidotum; 1788 nivale subsp. nivale; 1796 primuliflorum; 1855 lepidotum; 1863 triflorum var. triflorum; 1881 charitopes subsp. tsangpoense; 1882 campylogynum; 1889 pumilum; 1890 mekongense var. rubrolineatum; 1894 cinnabarinum subsp. xanthocodon; 1895 ludlowii; 1896 mekongense var. longipilosum; 1904 keysii; 2108 micromeres; 2109 mekongense var. longipilosum; 2160 laudandum var. laudandum; 2225, 2244 lepidotum; 2300 nivale subsp. nivale; 2332 maddenii subsp. crassum; 2334 keysii; 2338 maddenii subsp. crassum; 2378 pumilum; 2447 lepidotum; 2505 megeratum; 2552 pumilum; 2622 bulu; 2643 cinnabarinum subsp. xanthocodon; 2654 campylogynum; 2727 cinnabarinum subsp. xanthocodon; 2745 edgeworthii; 2759 megeratum; 2760 camelliiflorum; 2761 megeratum; 2762 pumilum; 2764 indet.; 2765 camelliiflorum; 2828 anthopogon subsp. anthopogon; 2836 edgeworthii; 2837, 2843 dalhousiae var. rhabdotum; 2853 camelliiflorum; 2856 glaucophyllum var. tubiforme; 2857 micromeres; 2891 dalhousiae var. dalhousiae; 2896 baileyi; 2898 pendulum; 2917, 2940, 2944 dalhousiae var. rhabdotum; 2952 edgeworthii; 2980 lindleyi; 2992, 3039 keysii; 3050 cinnabarinum subsp. xanthocodon; 3061 triflorum var. triflorum; 3082 anthopogon subsp. anthopogon; 3095 glaucophyllum var. glaucophyllum; 3111 lepidotum; 3132 edgeworthii; 3136 dalhousiae var. rhabdotum;

*Ludlow & Sherriff* (cont.)
3147 maddenii subsp. maddenii; 3184 glaucophyllum var. glaucophyllum; 3202 baileyi; 3216 pogonophyllum; 3217 anthopogon subsp. anthopogon; 3221 setosum; 3254 lepidotum; 3267 camelliiflorum; 3289 lepidotum; 3324 camelliiflorum; 3400 anthopogon subsp. anthopogon; 3428 pogonophyllum.

*Ludlow, Sherriff & Taylor* 3641, 3644 sulfureum; 3657 megeratum; 3664 charitopes subsp. tsangpoense; 3666 xanthostephanum; 3709, 3720 edgeworthii; 3726 xanthostephanum; 3728 edgeworthii; 3736 micromeres; 3751, 3752 charitopes subsp. tsangpoense; 3761 cinnabarinum subsp. xanthocodon; 3778 charitopes subsp. tsangpoense; 3784 pumilum; 3785 calostrotum subsp. riparium; 3801 cinnabarinum subsp. xanthocodon; 3805, 3830 nivale subsp. nivale; 3925 pumilum; 3975 calostrotum subsp. riparium; 3999 nivale subsp. nivale; 4277 bulu; 4361 cinnabarinum subsp. xanthocodon; 4440, 4496 bulu; 4711, 4711a calostrotum subsp. riparium; 4738A, B, campylogynum; 4765, 4765A campylogynum; 4784, 4826 nivale subsp. nivale; 4916 charitopes subsp. tsangpoense; 4996 bulu; 5198 campylogynum subsp. tsangpoense; 5198a, 5237 charitopes subsp. tsangpoense; 5283 nivale subsp. nivale; 5559 pumilum; 5560 campylogynum; 5565 charitopes subsp. tsangpoense; 5664 bulu; 5769 charitopes subsp. tsangpoense; 5847 campylogynum; 5848 charitopes subsp. tsangpoense; 5855 calostrotum subsp. riparium; 5883 cinnabarinum subsp. xanthocodon; 5950 nivale subsp. nivale; 6213 bulu; 6342 pumilum; 6349, 6349a cinnabarinum subsp. xanthocodon; 6533, 6556 pumilum; 6560 cinnabarinum subsp. xanthocodon; 6576 brachyanthum subsp. hypolepidotum; 6580 sulfureum; 6581 edgeworthii; 6582 xanthostephanum; 6583 kaoense; 6588 calostrotum subsp. riparium; 6633 micromeres; 6656 baileyi; 6660 pendulum; 7660 anthopogon subsp. hypenanthum; 7736 lepidotum; 8825 kongboense; 8653 nivale subsp. nivale; 8654 kongboense; 8824, 9537 nivale subsp. nivale; 9538, 9574 kongboense; 9575, 9979 nivale subsp. nivale.

*Ludlow, Sherriff & Elliot* 10039 cinnabarinum subsp. cinnabarinum; 11610, 11804 nivale subsp. nivale; 12010, 12014 triflorum var. triflorum; 12024 virgatum subsp. virgatum; 12117 nuttallii; 12120 nivale subsp. nivale; 12231 scopulorum; 12248 maddenii subsp. maddenii; 12253 virgatum subsp. virgatum; 12264 scopulorum; 12326 virgatum subsp. virgatum; 12348 auritum; 12354, 12370 scopulorum; 12374, 12395 triflorum var. triflorum; 12397 bulu; 12528 kongboense; 12469 cinnabarinum subsp. xanthocodon; 12485 triflorum var. triflorum; 12490 baileyi; 12505 mekongense var. mekongense; 12515 virgatum subsp. virgatum; 12525 pendulum; 12535 glaucophyllum var. tubiforme; 12536 keysii; 12548, 12550, 12595 maddenii subsp. maddenii; 13035 nuttallii; 13045 charitopes subsp. tsangpoense; 13077 nuttallii; 13110 oreotrephes; 13113 charitopes subsp. tsangpoense; 13118 mekongense var. mekongense; 13120 pemakoense; 13123 calostrotum subsp. riparium; 13124 cephalanthum subsp. cephalanthum; 13125 nivale subsp. nivale; 13133 laudandum var. temoense; 13147 cinnabarinum subsp. xanthocodon; 13163 oreotrephes; 13166 laudandum var. temoense; 13181A, B campylogynum; 13183 pumilum; 13269 kongboense; 13276 campylogynum; 13283 indet.; 13316, 13520 bulu; 13527, 13535 kongboense; 13546 triflorum var. triflorum; 13549 leucaspis; 13550 virgatum subsp. virgatum; 13570 auritum; 13592 pemakoense; 13603 megacalyx; 13613, 13614 oreotrephes; 13618 boothii; 13622 oreotrephes; 13625 tephropeplum; 13633A kongboense; 13645 virgatum subsp. virgatum; 13672, 13698, 13699 kongboense; 13701 nivale subsp. nivale; 13705, 13732, 13761 oreotrephes; 13780, 13794 calostrotum subsp. riparium; 13872 nivale subsp. nivale; 13985 lepidotum; 14023 laudandum var. temoense; 14029 campylogynum; 14030 calostrotum subsp. riparium; 14101 lepidotum; 14244 mekongense var. mekongense; 14295, 14297 campylogynum; 15004 triflorum var. triflorum; 15008 kongboense; 15013 oreotrephes; 15021 triflorum var. triflorum; 15030 kongboense; 15039 oreotrephes; 15041 cephalanthum subsp. cephalanthum; 15058 nivale subsp. nivale; 15059 oreotrephes; 15073 calostrotum subsp. riparium; 15078 cephalanthum subsp. cephalanthum; 15096, 15107 charitopes subsp. tsangpoense; 15109, 15113 cephalanthum subsp. cephalanthum; 15161 pumilum; 15171 campylogynum; 15193 mekongense var. rubrolineatum; 15208 nivale subsp. nivale; 15277 mekongense var. rubrolineatum; 15284 pumilum; 15286 cephalanthum subsp. cephalanthum; 15321 oreotrephes; 15356, 15499 lepidotum; 15650, 15668 nivale subsp. nivale; 15729 bulu; 15751, 15752 kongboense; 15796 calostrotum subsp. riparium; 15835 ciliatum.

*Ludlow, Sherriff & Hicks* 15841 virgatum subsp. virgatum; 16019 ciliatum; 16027 cinnabarinum subsp. cinnabarinum; 16054 virgatum subsp. virgatum; 16062 triflorum var. triflorum; 16099 anthopogon subsp. hypenanthum; 16117 pendulum; 16126 cinnabarinum subsp. xanthocodon; 16157 setosum; 16184 lindleyi; 16206 virgatum subsp. virgatum; 16246 cinnabarinum subsp. ?; 16294 nivale subsp. nivale; 16392 keysii; 16378 edgeworthii; 16419 anthopogon subsp. anthopogon; 16442 baileyi; 16492, 16493 cinnabarinum subsp. xanthocodon; 16510 lepidotum; 16523 dalhousiae var. rhabdotum; 16524 maddenii subsp. maddenii; 16578, 16604, 16681, 16752, 16865 lepidotum; 16927 camelliiflorum; 17447 baileyi; 17498 ciliatum; 17521 cinnabarinum subsp. xanthocodon; 17531 camelliiflorum; 17550 anthopogon subsp. anthopogon; 18683 ciliatum; 18687 virgatum subsp. virgatum; 18732 keysii; 18739 lindleyi; 18771 pendulum; 18777 edgeworthii; 18877 dalhousiae var. rhabdotum; 18881 triflorum var. triflorum; 18887 glaucophyllum var. tubiforme; 18888 pendulum; 18889 cinnabarinum subsp. cinnabarinum; 18921 cinnabarinum subsp. xanthocodon; 18927 keysii; 18956 setosum; 18960 nivale subsp. nivale; 19049 baileyi; 19140, 19234 lepidotum; 19277 camelliiflorum; 19481 keysii; 19848 indet.; 19849 triflorum var. triflorum; 20205 maddenii subsp. maddenii; 20366 lepidotum; 20488 camelliiflorum; 20489 dalhousiae var. rhabdotum; 20535 lindleyi; 20581 keysii; 20613 glaucophyllum var. tubiforme; 20615 triflorum var. triflorum; 20622 cinnabarinum subsp.; 20623 glaucophyllum var. tubiforme; 20627 pendulum; 20655A anthopogon subsp. hypenanthum; 20659 baileyi; 20686 pumilum; 20825 micromeres; 20900 lepidotum; 21170 anthopogon subsp. hypenanthum; 21184 pumilum; 21257 dalhousiae var. rhabdotum; 21282 glaucophyllum var. tubiforme; 21283, 21293 cinnabarinum subsp.; 21297 baileyi; 21299 keysii; 21457 baileyi.

*McCosh* 277 cinnabarinum subsp. cinnabarinum; 362 nivale subsp. nivale.

*McGregor* 534 surasianum.

*McLaren* 3 maddenii subsp. crassum; 10 ambiguum; 22, 33, 35 siderophyllum; 50, 56 pachypodum; 63 cephalanthum subsp. cephalanthum; 80, 82 calostrotum subsp. riparioides; 86 indet.; 91 pachypodum; 94 saluenense subsp. chameunum; 98a ciliipes; 99 dendricola; 113, 115, 115A cephalanthum subsp. cephalanthum; 122 maddenii subsp. crassum; 126, 128 pachypodum; 129 maddenii subsp. crassum; 139, 147 pachypodum; 159A indet.; 160, 164, 168, 169 pachypodum; 171, 290 ambiguum; 401 lutescens; A41 virgatum subsp. oleifolium; A158 edgeworthii; A193 campylognum; AA1, AA3 spinuliferum; AA6 siderophyllum; AA10 spinuliferum; AA11 siderophyllum; AA12 scabrifolium var. spiciferum; AA14 spinuliferum; AA16 siderophyllum; AA17 scabrifolium var. pauciflorum; AA19 siderophyllum; AA20, AA22 spinuliferum; AA23 siderophyllum; AA24, AA27 spinuliferum; AA31, AA33 scabrifolium var. pauciflorum; AA35, AA37 spinuliferum; AA39 scabrifolium var. pauciflorum; AA40 siderophyllum; AA41, AA43 scabrifolium var. pauciflorum; AA45 spinuliferum; AA46 siderophyllum; AA49, AA52 spinuliferum; AA54, AA58 scabrifolium var. pauciflorum; AA71,

*McLaren* (cont.) AA72, AA163, AA167, AA169 scabrifolium var. spiceriferum; AD71 concinnum; AD94 trichanthum; AD97 pachypodum; AD99 edgeworthia; AD108 concinnum; AF332 trichanthum; AF456 davidsonianum; AF473 polylepis; AF475 thymifolium; AG392, AG395 davidsonianum; AG398, AH279 polylepis; AH281 davidsonianum; AH306, AH312 polylepis; AH368 davidsonianum; B3 fastigiatum; C13 virgatum subsp. oleifolium; C24 racemosum; C33 edgeworthii; C36, C38 rubiginosum; C41 trichocladum; C42 pleistanthum; C50 yunnanense; C64 sulfureum; C77 xanthostephanum; C78 virgatum subsp. oleifolium; C100 scabrifolium var. scabrifolium; C184 caesium; C190 fastigiatum; C193 campylogynum; C208 brachyanthum subsp. brachyanthum; D17 rubiginosum; D30 augustinii subsp. hardyi; D41 rubiginosum; D95, D96 rupicola var. rupicola; D110 rubiginosum; D148 heliolepis var. brevistylum; D210 saluenense subsp. chameunum; D215 mekongense var. mekongense; D230 campylogynum; D262, D264 russatum; D265 polycladum; D266 edgeworthii; D281 augustinii subsp. rubrum; D289 oreotrephes; D303 edgeworthii; K30 scabrifolium var. scabrifolium; K37A hippophaeoides var. hippophaeoides; L15A, L17A spinuliferum; L22 siderophyllum; L23 spinuliferum; L24, L25 scabrifolium var. pauciflorum; L32A spinuliferum; L33 siderophyllum; L34 scabrifolium vars.; L35 siderophyllum; L36A, L37A spinuliferum; L41 virgatum subps. oleifolium; L99A racemosum; L110A campylogynum; L112A trichocladum; L133A heliolepis var. heliolepis; L135A campylogynum; L138A cephalanthum subsp. platyphyllum; P17 rubiginosum; P19 yunnanense agg.; P23 cuneatum; P30 scabrifolium var. scabrifolium; P37 hippophaeoides var. hippophaeoides; P38 oreotrephes; P41 hippophaeoides var. hippophaeoides; P51 telmateium; P68 primuliflorum; P69 oreotrephes; P70 cuneatum; P74 telmateium; P90 rupicola var. rupicola; P91 saluenense subsp. chameunum; P92 yungningense; P99 lepidotum; P102 primuliflorum; S17, S33, S39 scabrifolium var. scabrifolium; U11 spinuliferum; U15A scabrifolium var. pauciflorum; U19A scabrifolium var. scabrifolium; U21A, U23A scabrifolium var. spiciferum; U27A pleistanthum; U31A racemosum; U46A edgeworthii; U50A spinuliferum; U52A scabrifolium var. scabrifolium; U63A pleistanthum; U65A spinuliferum; U74A rubiginosum; U77A pleistanthum; U82A spinuliferum; U84A scabrifolium var. scabrifolium; U87A scabrifolium var. pauciflorum; U93A spinuliferum; U133 pleistanthum; U136 siderophyllum; U139 pleistanthum; U161 spinuliferum; U186 spinuliferum; U189 rigidum; U191 racemosum; Z3 nivale subsp. boreale; Z5 concinnum; Z11 polylepis; Z13 trichanthum; Z14 dendrocharis.

*McLaren Miscellaneous Collection* 7 edgeworthii; 15, 23 spinuliferum; 25 scabrifolium var. spiciferum; 27 sulfureum; 32, 34, 37 spinuliferum; 39 racemosum; 44 fastigiatum; 133 heliolepis var. heliolepis; 135 campylogynum.

*Mali* 14 lepidotum.

*Malyschev* 4600 burjaticum.

*Maximowicz* 13300 dauricum.

*Merrill* 9563 micranthum.

*Metcalf* 17359 levinei.

*Meyer* 1334, 1825 micranthum.

*Moldenke & Moldenke* 9211 ferrugineum.

*Monbeig* 5 rubiginosum; 164 edgeworthii; 167 augustinii subsp. chasmanthum.

*Morton* 16, 197 nivale subsp. nivale.

*Mullens & Rogers* 67057 minus var. minus.

*Murata* 11555 keiskei.

*Mussot* 265 nivale subsp. boreale; 266 thymifolium.

*Nicolson* 1669 veitchianum.

*Nilsson-Ehle* 816 dauricum.

*Nooteboom* 835 veitchianum.

*Parkinson* 4037. 7463 anthopogon subsp. hypenanthum; 7464 lepidotum.

*Parmanand* 147a anthopogon subsp. hypenanthum; 530, 1092 lepidotum.

*Petelot* 4210 lyi.

*Philbrick* 221 ferrugineum; 241 hirsutum.

*Pisgah* 4463 minus var. minus.

*Plantae Banatus Exs.* 89 myrtifolium.

*Plantae Bulgaricae Exs.* 173 myrtifolium.

*Plantae Japonicae Exs.* 138, 424 keiskei.

*Poilane* 12672 maddenii subsp. crassum; 12680, 16165, 32181, 32183, 32930, 32940, 32948, 35885 lyi.

*Polunin* 56/282 anthopogon subsp. hypenanthum; 175 cowanianum; 352 nivale subsp. nivale; 551 cowanianum; 7401 ferrugineum.

*Polunin, Sykes & Williams* 4, 28 nivale subsp. nivale; 300, 1065 lepidotum; 1141 nivale subsp. nivale; 1345 lowndesii; 2057 anthopogon subsp. hymenanthum; 2161 lepidotum; 2205 nivale subsp. nivale; 2359 lepidotum; 3486 lowndesii; 4061 anthopogon subsp. hypenanthum; 4548 lepidotum; 4629 anthopogon subsp. hypenanthum.

*Pratt* 267 websteranum var. websteranum; 521 flavidum var. flavidum; 787 thymifolium; 802 nitidulum var. omeiense.

*Purdom* 50, 55 micranthum; 113 mucronulatum; 440, 1112 capitatum.

*Put* 384 ludwigianum; 3323, 3718, 3749 surasianum.

*Radford & Stewart* 1673 minus var. minus.

*Rau* 10525 anthopogon subsp. hypenanthum; 10542 lepidotum.

*Reid* 471, 472 anthopogon subsp. hypenanthum.

*Ribu & Rohmoo* 776 lepidotum; 937 anthopogon subsp. anthopogon; 992 setosum; 994 lepidotum; 1118 cinnabarinum subsp. cinnabarinum; 6182 edgeworthii; 6480 anthopogon subsp. anthopogon; 6526, 6558 setosum.

*Richardson* 59 nivale subsp. nivale.

*Rock* 5* saluenense subsp. chameunum; 15 xanthostephanum; 17 virgatum subsp. oleifolium; 21 mekongense; 28 rubiginosum; 34 indet.; 56 saluenense subsp. chameunum; 58 calostrotum subsp. keleticum; 70 genestierianum; 71 rubiginosum; 93 brachyanthum subsp. hypolepidotum; 95 megeratum; 96 oreotrephes; 105 campylogynum; 110 saluenense subsp. saluenense; 122 mekongense var. mekongense; 129 heliolepis var. heliolepis; 130 heliolepis var. brevistylum; 132 campylogynum; 133 maddennii subsp. crassum; 135 edgeworthii; 137 rubiginosum; 145 heliolepis var. brevistylum; 146 mekongense var. melinanthum; 152 saluenense subsp. saluenense; 160 rubiginosum; 165 oreotrephes; 168 heliolepis var. brevistylum; 175 saluenense subsp. chameunum; 178 calostrotum subsp. riparioides; 179 rigidum; 181 augustinii subsp. chasmanthum; 183 virgatum subsp. oleifolium; 184, 186, 187, 189, 190 rubiginosum; 199 augustinii subsp. hardyi; 3012 rufosquamosum; 3048, 3054 pachypodum; 3099, 3101 virgatum subsp. oleifolium; 3107 yunnanense agg.; 3108 racemosum; 3123 virgatum subsp. oleifolium; 3131 rubiginosum; 3137 trichocladum; 3142 sulfureum; 3152 fastigiatum; 3158 trichocladum; 3166 yunnanense; 3167 racemosum; 3240 yunnanense agg.; 3269 yunnanense; 3274 racemosum; 3275 tatsienense; 3292 yunnanense; 3357 primuliflorum; 3360 telmateium; 3370 rubiginosum; 3421 racemosum; 3431 telmateium; 3432 primuliflorum; 3446 yunnanense; 3455 hippophaeoides var. hippophaeoides; 3473 cuneatum; 3481 racemosum; 3483, 3483a cuneatum; 3486 rubiginosum; 3498 hippophaeoides var. hippophaeoides; 3500 trichostomum; 3501 heliolepis var. heliolepis; 3505 impeditum; 3507, 3510 racemosum; 3511 oreotrephes; 3514 russatum; 3563 cuneatum; 3575 telmateium; 3583 oreotrephes; 3584, 3585, 3592, 3594 rubiginosum; 3600, 3604 primuliflorum; 3629, 3670 racemosum; 3689 rubiginosum; 3690 mollicomum; 3738 primuliflorum; 3818 telmateium; 3866 rupicola var.

* Rock numbers 1–199 are those of his last Chinese collection, made in 1948–9.

*Rock* (cont.)
rupicola; 3867 complexum; 3897 hippophaeoides var. hippophaeoides; 3926 tatsienense; 3939 telmateium; 3943 primuliflorum; 3944 racemosum; 3945 mollicomum; 3970 complexum; 3974 hippophaeoides var. hippophaeoides; 3978 oreotrephes; 4014 yunnanense agg.; 4023 fastigiatum; 4057 scabrifolium var. scabrifolium; 4081 cuneatum; 4118 telmateium; 4153 trichostomum; 4170 cuneatum; 4171 russatum & rupicola var. rupicola x russatum; 4172 rubiginosum; 4213 oreotrephes; 4239 virgatum subsp. oleifolium; 4247 tatsienense; 4255 lepidotum; 4256 telmateium; 4257 trichostomum; 4258 rupicola var. rupicola; 4260 oreotrephes; 4261 russatum x rupicola var. rupicola; 4272, 4274 rubiginosum; 4238 rupicola var. rupicola; 4416 oreotrephes; 4512 lepidotum; 4947 saluenense subsp. chameunum; 4955 fastigiatum; 5118 racemosum; 5122 oreotrephes; 5123 hippophaeoides var. hippophaeoides; 5124, 5126 orthocladum var. orthocladum; 5136, 5138 trichostomum; 5201 telmateium; 5209 trichostomum; 5220 telmateium; 5222 yunnanense; 5246 saluenense subsp. chameunum; 5391 russatum x rupicola var. rupicola; 5392 cuneatum; 5488 rupicola var. muliense; 5514 cuneatum; 5544 intricatum; 5547 primuliflorum; 5593, 5597 telmateium; 6002, 6031 yunnanense; 6073 rubiginosum; 6270 heliolepis var. heliolepis; 6274 trichocladum; 6323 cephalanthum subsp. cephalanthum; 6334 fastigiatum; 6353 calostrotum subsp. riparioides; 6354 campylogynum; 6369 edgeworthii; 6370 maddenii subsp. crassum; 6414 rupicola var. chryseum; 6460, 6473 thymifolium; 6525 rigidum; 6534 fastigiatum; 6745 edgeworthii; 6826 yunnanense; 6827 racemosum; 6828 rubiginosum; 6830 hippophaeoides var. hippophaeoides; 6999, 7377 edgeworthii; 7640 rubiginosum; 7649 zaleucum; 7651 sulfureum; 7865 edgworthii; 7954 pseudociliipes; 7969 indet.; 7995 telmateium; 8117, 8119 oreotrephes x zaleucum; 8120 racemosum; 8122 oreotrephes hybrid; 8124, 8125 oreotrephes x zaleucum; 8149 rubiginosum; 8166 oreotrephes x zaleucum; 8178 yunnanense agg.; 8191 cuneatum; 8194 8195, 8199 rubiginosum; 8200 racemosum; 8201, 8204 rubiginosum; 8206 racemosum; 8208 hippophaeoides var. hippophaeoides; 8209 rubiginosum; 8229 racemosum; 8243, 8246 scabrifolium var. scabrifolium; 8261 fastigiatum; 8266 scabrifolium var. scabrifolium; 8317, 8319, 8331 cuneatum; 8345 tatsienense; 8362 cuneatum; 8364 tatsienense; 8390 heliolepis var. brevistylum; 8407 rigidum; 8418 oreotrephes; 8419 rubiginosum; 8426 edgeworthii; 8429 rigidum; 8432 edgeworthii; 8433 maddennii subsp. crassum; 8434 oreotrephes; 8435 maddenii subsp. crassum; 8437 yunnanense; 8441 cuneatum; 8474 xanthostephanum; 8509 cuneatum; 8512 racemosum; 8524 yunnanense; 8527 hippophaeoides var. hippophaeoides; 8532 oreotrephes; 8551, 8554 mollicomum; 8561 rubiginosum; 8565, 8566 yunnanense; 8567 rigidum; 8574 yunnanense; 8598, 8599 oreotrephes; 8602 russatum; 8610 oreotrephes; 8632 virgatum subsp. oleifolium; 8651 yunnanense; 8716 rubiginosum; 8722 mekongense var. melinanthum; 8723 mekongense var. mekongense; 8774 augustinii subsp. chasmanthum; 8775 virgatum subsp. oleifolium; 8776 edgeworthii; 8787 megeratum; |8789 oreotrephes; 8822 saluenense subsp. chameunum; 8831 brachyanthum subsp. hypolepidotum; 8847 nivale subsp. boreale; 8849 tapetiforme; 8866 oreotrephes; 8869, 8878 cephalanthum subsp. cephalanthum; 8887 augustinii subsp. chasmanthum; 8889 rubiginosum; 8890 saluenense subsp. saluenense; 8935 saluenense subsp. chameunum; 8936 russatum; 8937 saluenense subsp. saluenense; 8944 polycladum; 8949, 8954, 8955 rupicola var. rupicola; 8974 orthocladum var. orthocladum x hippophaeoides var. hippophaeoides; 9028 saluenense subsp. chameunum; 9031, 9031a primuliflorum; 9034 telmateium; 9064 megeratum; 9068 oreotrephes; 9071 edgeworthii; 9074 cephalanthum subsp. cephalanthum; 9080 saluenense subsp. chameunum; 9081 campylogynum; 9083 brachyanthum subsp. hypolepidotum; 9094

*Rock* (cont.)
rupicola var. rupicola; 9114 oreotrephes; 9116 megeratum; 9150 mekongense var. mekongense; 9151 saluenense subsp. saluenense; 9154, 9158 oreotrephes; 9160, 9163 augustinii subsp. chasmanthum; 9173 russatum; 9176 saluenense subsp. chameunum; 9181 rubiginosum; 9186 oreotrephes; 9192, 9194 russatum; 9250 oreotrephes; 9251 saluenense subsp. chameunum; 9268 nivale subsp. boreale; 9282 saluenense subsp. saluenense; 9311 nivale subsp. boreale; 9314 trichostomum; 9319 rupicola var. chryseum; 9321 nivale subsp. boreale; 9352 oreotrephes; 9357, 9358 cephalanthum subsp. cephalanthum; 9359 primuliflorum; 9362 rupicola var. rupicola; 9365 rupicola var. chryseum; 9368 primuliflorum; 9370 rupicola var. rupicola; 9391, 9398 heliolepis var. brevistylum; 9427 saluenense subsp. chameunum; 9477 heliolepis var. brevistylum; 9482 campylogynum; 9484 gemmiferum; 9489 primuliflorum; 9491 cephalanthum subsp. cephalanthum; 9492 nivale subsp. australe; 9493 fastigiatum; 9494 nivale subsp. australe; 9495, 9496 fastigiatum; 9502 maddenii subsp. crassum; 9503, 9504 edgeworthii; 9506 xanthostephanum; 9510 nivale subsp. australe; 9511 oreotrephes; 9519 nivale subsp. australe; 9523 russatum x rupicola var. rupicola; 9527 rupicola var. rupicola; 9536 heliolepis var. brevistylum; 9554 russatum x rupicola var. rupicola; 9572 oreotrephes; 9596 rigidum; 9614 scabrifolium var. scabrifolium; 9662 saluenense subsp. chameunum; 9663 rupicola var. rupicola; 9693 saluenense subsp. chameunum; 9722, 9726, 9731, 9740, 9751 rupicola var. rupicola; 9754 hippophaeoides var. hippophaeoides; 9762 heliolepis var. heliolepis; 9815 racemosum; 9960 saluenense subsp. saluenense; 10052 heliolepis var. heliolepis; 10068 brachyanthum subsp. hypolepidotum; 10073 campylogynum; 10079 saluenense subsp. saluenense; 10081 rupicola var. chryseum; 10082 saluenense subsp. saluenense; 10100 calostrotum subsp. keleticum; 10102, 10115, 10116 saluenense subsp. saluenense; 10122 calostrotum subsp. keleticum; 10126 rupicola var. chryseum; 10130 nuttallii; 10149 genestierianum; 10168 maddenii subsp. crassum; 10175 saluenense subsp.; 10176 campylogynum; 10194 brachyanthum subsp. hypolepidotum; 10197 oreotrephes; 10213 tephropeplum; 10222 maddenii subsp. crassum; 10223 micromeres; 10233 saluenense subsp. saluenense; 10362 heliolepis var. brevistylum; 10544 lepidotum; 10550 oreotrephes; 10552 cuneatum x hippophaeoides var. hippophaeoides; 10553 telmateium; 10572, 10600 tatsienense; 10884 heliolepis var. brevistylum; 10914 rupicola var. chryseum; 10917, 10919 brachyanthum subsp. hypolepidotum; 10924, 10935 cephalanthum subsp. cephalanthum; 10937 augustinii subsp. chasmanthum; 10943 rubiginosum; 10954 oreotrephes; 10969 mekongense var. mekongense; 10986 oreotrephes; 10991 brachyanthum subsp. hypolepidotum; 11000 oreotrephes; 11001, 11005 saluenense subsp. saluenense; 11006 megeratum; 11010 11012 saluenense subsp. saluenense; 11014 oreotrephes; 11019 cephalanthum subsp. cephalanthum; 11071 rubiginosum; 11072 heliolepis var. heliolepis; 11079 mekongense var. mekongense; 11086, 11088 tapetiforme; 11089 cephalanthum subsp. cephalanthum; 11091, 11092, 11093, 11098, 11109 tapetiforme; 11126 rupicola var. chryseum; 11128 oreotrephes; 11130 tapetiforme; 11132, 11141 oreotrephes; 11148 rupicola var. chryseum; 11160 campylogynum; 11166 maddenii subsp. crassum; 11167 micromeres; 11172 brachyanthum subsp. hypolepidotum; 11188 calostrotum subsp. keleticum; 11198 rupicola var. chryseum; 11202 genestierianum; 11219 virgatum subsp. oleifolium; 11222 megacalyx; 11228 tephropeplum; 11233 nuttallii; 11238 saluenense subsp. saluenense; 11243 rupicola var. rupicola; 11249 nivale subsp. australe; 11258 oreotrephes; 11260 trichostomum; 11262 oreotrephes; 11263 rubiginosum; 11264, 11265 racemosum; 11267, 11268 rigidum; 11271 cuneatum; 11276 maddenii subsp. crassum; 11277, 11278 edgeworthii; 11280 yunnanense; 11284 russatum x rupicola var. rupicola; 11287

*Rock* (cont).

cuneatum; 11288 rigidum; 11294, 11295, 11296 russatum; 11298 oreotrephes; 11299 xanthostephanum; 11300 oreotrephes; 11303 fastigiatum; 11304 nivale subsp. australe; 11305 campylogynum; 11308 xanthostephanum; 11315 hippophaeoides var. occidentale; 11318 russatum; 11319 polycladum; 11320 saluenense subsp. chameunum; 11323 cephalanthum subsp. cephalanthum; 11362 lepidotum; 11363, 11364. 11365 hippophaeoides var. hippophaeoides; 11368 cuneatum; 11387 oreotrephes; 11392, 11393 cuneatum; 11401 trichostomum; 11403 racemosum; 11418 pleistanthum; 11419 oreotrephes x zaleucum; 11422 yunnanense; 11424 racemosum; 11429 oreotrephes; 11434 rupicola var. rupicola; 11455 cephalanthum subsp. cephalanthum; 11465 telmateium; 11468 primuliflorum; 11469 impeditum; 11476 racemosum; 11506 saluenense subsp. saluenense; 11704 heliolepis var. heliolepis; 11713 scabrifolium var. scabrifolium; 11728, 11730 spinuliferum; 11738 siderophyllum; 11742 scabrifolium var. pauciflorum; 11745 scabrifolium var. scabrifolium; 12191 capitatum; 12368, 12370 thymifolium; 12371, 12376 capitatum; 12411 thymifolium; 12471, 12518, 12467 capitatum; 12723 anthopogonoides; 12731 capitatum; 13279 anthopogonoides; 13303 thymifolium; 13596, 13600, 13605, 13611, 13622, 13634 capitatum; 13636 anthopogonoides; 15004 micranthum; 16005 trichostomum; 16017 intricatum; 16037 oreotrephes; 16044 impeditum; 16081 telmateium; 16084 rufescens; 16100 primuliflorum; 16114 pleistanthum; 16115 impeditum; 16136 davidsonianum; 16148 telmateium; 16151 hemitrichotum; 16155 yunnanense; 16158 racemosum; 16178 rupicola var. muliense; 16194 oreotrephes; 16207 telmateium & nivale subsp. boreale; 16221 intricatum; 16225 oreotrephes; 16228 telmateium; 16369 saluenense subsp. chameunum; 16450 trichostomum; 16467 telmateium; 16477 rupicola var. muliense x nivale subsp. boreale; 16479, 16480 rupicola var. muliense; 16675, 16676 trichostomum; 16959 campylogynum; 16963 calostrotum subsp. riparioides & cuneatum; 16970 mekongense var. melinanthum; 16982 oreotrephes; 16984 rubiginosum; 17001 rupicola var. rupicola; 17020 cephalanthum subsp. platyphyllum; 17025 calostrotum subsp. riparioides & cuneatum; 17026 heliolepis var. brevistylum; 17028 saluenense subsp. chameunum; 17035 rupicola var. rupicola; 17043 mekongense var. melinanthum; 17054 micromeres; 17055 taggianum; 17060 xanthostephanum; 17066 yunnanense; 17078, 17079 tephropeplum; 17080 sulfureum; 17083 megacalyx; 17087 edgeworthii; 17088 maddenii subsp. crassum; 17091, 17092 zaleucum; 17093 tephropeplum; 17099 megeratum; 17100 racemosum; 17108 calostrotum subsp. riparioides & cuneatum; 17109, 17117 saluenense subsp. chameunum; 17113 rupicola var. rupicola; 17131, 17133 oreotrephes; 17134 yungningense; 17153 cephalanthum subsp. cephalanthum; 17171, 17179 russatum; 17191, 17194 cuneatum; 17203 hippophaeoides var. hippophaeoides; 17207 pleistanthum; 17211 rubiginosum; 17214 orthocladum var. orthocladum; 17217 rubiginosum; 17219, 17223 trichostomum; 17281 complexum; 17283 hippophaeoides var. hippophaeoides; 17354 racemosum; 17357 rubiginosum; 17359 hippophaeoides var. hippophaeoides; 17381 tatsienense; 17383 siderophyllum; 17392, 17393, 17415 hemitrichotum; 17416, 17417, 17418 tatsienense; 17426 trichostomum; 17428 indet.; 17429 rubiginosum; 17431 tatsienense; 17432 trichostomum; 17435 tatsienense; 17440, 17441 racemosum; 17442 impeditum; 17459 rupicola var. muliense; 17470 websteranum var. yulongense; 17477. 17478 intricatum; 17482 rupicola var. muliense; 17489 telmateium x thymifolium; 17490 websteranum var. websteranum; 17502, 17509 rufescens; 17518 minyaense; 17519 thymifolium; 17532 rufescens; 17534 minyaense; 17557 intricatum; 17559 concinnum; 17562 nivale subsp. boreale; 17566 concinnum; 17570 davidsonianum; 17577 intricatum; 17588, 17594 concinnum; 17595 davidsonianum; 17599 trichanthum; 17623,

*Rock* (cont.)

17657, 17658 trichostomum; 17663 intricatum; 17693 rufescens; 17703 thymifolium; 17722 minyaense; 17724 rufescens; 17726 minyaense; 17727 concinnum; 17731 minyaense; 17735, 17736 concinnum; 17751 intricatum; 17996 trichostomum; 18011 rubiginosum; 18115 primuliflorum; 18119 rubiginosum; 18140 oreotrephes; 18144 intricatum; 18181 primuliflorum; 18189 rubiginosum; 18222 intricatum; 18223 impeditum; 18275 racemosum; 18334 cephalanthum subsp. cephalanthum; 18341 megeratum; 18351 oreotrephes; 18365, 18367 rupicola var. rupicola; 18369 mekongense var. melinanthum; 18380, 18381 calostrotum subsp. riparioides; 18384 rubiginosum; 18388 mekongense var. melinanthum; 18395 sulfureum; 18398 megacalyx; 18399 nuttallii; 18404 maddenii subsp. crassum; 18408 tephropeplum; 18410, 18411 zaleucum; 18412 tephropeplum; 18418 zaleucum; 18434 maddenii subsp. crassum; 18442 rupicola var. rupicola; 18450 saluenense subsp. chameunum; 18453, 18454 saluenense subsp. riparioides; 18456, 18457 oreotrephes; 18458 hippophaeoides var. occidentale; 18460 orthocladum var. longistylum; 18462 russatum; 18470, 18475 micromeres; 18476 indet.; 18512, 18542 rupicola var. rupicola; 18700 taggianum; 21997 saluenense subsp. saluenense; 22011 cephalanthum subsp. cephalanthum; 22012 megacalyx; 22013 genestierianum; 22014 xanthostephanum; 22019 edgeworthii; 22045 virgatum subsp. oleifolium; 22056 monanthum; 22063 rupicola var. chryseum; 22089 campylogynum; 22090 mekongense var. melinanthum; 22120 megeratum; 22136, 22137 rubiginosum; 22184 brachyanthum subsp. hypolepidotum; 22209 tephropeplum; 22214 micromeres; 22216 nuttallii; 22282 heliolepis var. heliolepis; 22288 tapetiforme; 22289 campylogynum; 22297 saluenense subsp. saluenense; 22302 fletcheranum; 22334 maddenii subsp. crassum; 22345 heliolepis var. brevistylum; 22348, 22431 calostrotum subsp. keleticum; 22437 heliolepis var. heliolepis; 22440 megacalyx; 22454 edgeworthii; 22494 virgatum subsp. oleifolium; 22495 xanthostephanum; 22496 saluenense subsp. saluenense; 22497 genestierianum; 22498 rupicola var. chryseum; 22634 virgatum subsp. oleifolium; 22659 fletcheranum; 22704 heliolepis var. brevistylum; 22705 heliolepis var. heliolepis; 22710 cephalanthum subsp. platyphyllum; 22715 calostrotum subsp. riparioides; 22760, 22762 oreotrephes; 22800 tapetiforme; 22803 nivale subsp. boreale; 22806 rupicola var. chryseum; 22809 nivale hybrid; 22810 tapetiforme; 22815 primuliflorum; 22823 saluenense subsp. chameunum; 22825 pleistanthum; 22829 tapetiforme; 22848 nivale subsp. boreale; 22859 saluenense subsp. chameunum; 22872 tapetiforme; 22901 primuliflorum; 22947 brachyanthum subsp. hypolepidotum; 22954 saluenense subsp. saluenense; 22957 saluenense subsp. chameunum; 22958 saluenense subsp. saluenense; 22962 campylogynum; 22963, 22964 cephalanthum subsp. cephalanthum; 22968 saluenense subsp. saluenense; 22902, 22943 rupicola var. chryseum; 22974 heliolepis var. heliolepis; 23000 rubiginosum; 23002 mekongense var. mekongense; 23010 augustinii subsp. hardyi; 23031 megeratum; 23039 augustinii subsp. chasmanthum; 23040 edgeworthii; 23044 rubiginosum; 23079 rupicola var. rupicola; 23153 rupicola var. chryseum; 23164 cephalanthum subsp. cephalanthum; 23198 campylogynum; 23210 rupicola var chryseum; 23211, 23218 saluenense subsp. saluenense; 23220 mekongense var. melinanthum; 23221 saluenense subsp. saluenense; 23231 cephalanthum subsp. cephalanthum; 23249 heliolepis var. brevistylum; 23296 calostrotum subsp. riparioides; 23301, 23302 heliolepis var. brevistylum; 23310, 23316, 23317 nivale subsp. boreale; 23322 primuliflorum; 23330 saluenense subsp. chameunum; 23332 pleistanthum; 23360, 23398 rupicola var. chryseum; 23400 primuliflorum; 23467 rupicola var. rupicola; 23477 augustinii subsp. chasmanthum; 23483 megeratum; 23513 mekongense var. melinanthum; 23514 rubiginosum; 23540 rupicola var. chryseum; 23545 saluenense subsp. saluenense; 23546 saluenense

*Togashi* 138, 424, 1045, 1338, 1342 keiskei.
*Tomitaro & Makino* 102259, 102261, 102262 keiskei.
*Tsai* 50844 lutescens; 50853 racemosum; 50854 pleistanthum; 50904, 50906 yunnanense; 50928 tsaii; 51578 nuttallii; 55893 edgeworthii; 57621A, 57755 rubiginosum; 58152 rupicola var. rupicola; 58164 calostrotum subsp. calostrotum; 58168 campylogynum; 58171 mekongense var. melinanthum; 60277, 60413 nuttallii.
*Tsiang* 4201 indet.; 4788 maddenii subsp.; 5522 liliiflorum; 7836 indet.; 7887 liliiflorum; 7973, 7978, 7980 siderophyllum; 9193 lyi; 25545, 26265 levinei.
*Uno* 23354 mucronulatum; 24166 keiskei.
*Unwin* 3025 veitchianum; 3064 burmanicum.
*Van Beusekom & Phenglklai* 350 veitchianum.
*Vilmorin* 7167 ciliicalyx; 7170 lyi.
*Wager* 205 nivale subsp. nivale.
*Walsh* 135 nivale subsp. nivale.
*Wang* 93B hanceanum; 216 ambiguum; 20871 polylepis; 21024 trichanthum; 21036 augustinii subsp. augustinii; 21076 lutescens; 21150 concinnum; 21175 nivale subsp. boreale; 21660, 21745 micranthum; 21775 augustinii subsp. augustinii; 22466 moupinense; 22768 lutescens; 22890 indet.; 22941 polylepis; 22965 rubiginosum; 22977 augustinii subsp. chasmanthum; 23031 pleistanthum; 23226 hanceanum; 23448 nitidulum var. omeiense; 39398, 39447 liliiflorum; 40129 levinei; 40380 liliiflorum; 63246, 63259 impeditum; 63825 rupicola var. rupicola; 64826 rupicola var. chryseum; 64847, 64909, 64966, 64983 rupicola var. rupicola; 65551 rupicola var. chryseum; 66031, 66131 rupicola var rupicola; 66459 rupicola var. chryseum; 66464 nivale subsp. boreale x tapetiforme; 66472 nivale subsp. boreale; 67089, 67094, 67347 rupicola var. rupicola; 70807, 71025 telmateium; 71172 impeditum.
*Watt* 2463 anthopogon subsp. hypenanthum; 2464 lepidotum; 2504 anthopogon subsp. anthopogon; 2522, 3337 anthopogon subsp. hypenanthum; 5217 anthopogon subsp. anthopogon; 5218 lepidotum; 5363 lindleyi; 5378 cinnabarinum subsp. cinnabarinum; 5416, 5429, 5605 setosum; 5606 cinnabarinum subsp.; 5769 lepidotum; 5961 johnstoneanum; 6209 triflorum var. bauhiniiflorum; 6213, 6402 johnstoneanum; 6461 maddenii subsp. crassum; 6481 johnstoneanum; 6513 maddenii subsp. crassum; 6549, 6582 triflorum var. bauhiniiflorum; 6595 lindleyi; 6701 johnstoneanum; 6703 maddenii subsp. crassum; 6716 lindleyi; 6881 johnstoneanum; 6886 triflorum var. bauhiniiflorum; 7004 lindleyi; 7333 maddenii subsp. crassum; 8641 anthopogon subsp. hypenanthum; 8642 lepidotum; 11432 triflorum var. bauhiniiflorum; 13576 anthopogon subsp. hypenanthum; 13624 lepidotum; 13631 anthopogon subsp. hypenanthum.
*Williams* 596, 644, 725 cinnabarinum subsp. cinnabarinum.
*Wilson* 197 concinnum; 302, 608 augustinii subsp. augustinii; 660 micranthum; 879 moupinense; 882, 882A hanceanum; 1195 lutescens; 1196 amesiae; 1197A, 1199 lutescens; 1200 micranthum; 1201 concinnum; 1202 flavidum var. flavidum; 1204 longistylum; 1207 augustinii ssp. augustinii; 1207A polylepis; 1208 sargentianum; 1230 trichanthum; 1221A polylepis; 1225 websteranum var. websteranum; 1274, 1275 davidsonianum; 1319 nivale subsp. boreale; 1324C ambiguum; 1328 trichostomum; 1330 ambiguum; 1342 trichanthum; 1343 searsiae; 1345 lutescens; 1352 davidsonianum; 1526 micranthum; 1878 concinnum; 3420 polylepis; 3422 concinnum; 3426 davidsonianum; 3428 racemosum; 3444 amesiae; 3445 trichanthum; 3446, 3448 concinnum; 3452 flavidum var. psilostylum; 3453 rufescens; 3457 augustinii subsp. augustinii; 3460 nivale subsp. boreale; 3461 nitidulum var. nitidulum; 3462 websteranum var. websteranum; 3463 nivale subsp. boreale; 3464 flavidum hybrid; 3465 nivale subsp. boreale; 3466 intricatum; 3467 nivale hybrid; 3467A, 3468. 3469 nivale subsp. boreale; 3471 dendrocharis; 3934 intricatum; 3935 nitidulum var. nitidulum; 3935A nitidulum var. omeiense; 3936 minyaense; 3938 dendrocharis; 4269 nivale subsp. boreale.
*Yu* 493 dendrocharis; 537 hanceanum; 650 dendrocharis; 751 concinnum; 764 polylepis; 874 searsiae; 944 augustinii subsp. augustinii; 5135 hippophaeoides var. hippophaeoides; 5327 cuneatum; 5632 intricatum; 5752 nivale hybrid; 5981, 6066 thymifolium; 6190 telmateium; 6205 rupicola var. chryseum; 6465 telmateium; 6795 nivale subsp. australe; 6825 rupicola var. chryseum; 7040 rupicola var. muliense; 7050 nivale subsp. australe; 7083 telmateium; 7084, 7191, 7244 impeditum; 7860 saluenense subsp.; 7863 rupicola var. chryseum; 7870 mekongense var. melinanthum; 7887 rupicola var. chryseum; 7896 heliolepis var. brevistylum; 7905 heliolepis var. heliolepis; 7926 mekongense var. melinanthum; 7993 rubiginosum; 7962 pleistanthum; 7989 augustini subsp. chasmanthum; 7991 oreotrephes; 7994 nivale subsp. boreale; 7995 rupicola var. chryseum; 8611 saluenense subsp.; 8624 rupicola var. chryseum; 8630 campylogynum; 8645 saluenense subsp.; 8660 cephalanthum subsp. cephalanthum; 10566 mekongense var. melinanthum; 10681 calostrotum subsp. riparioides; 10682, 10687 rupicola var. rupicola; 10689 cuneatum hybrid; 10698 pleistanthum; 10700 oreotrephes; 10701 heliolepis var. heliolepis; 10779 rupicola var. chryseum; 10851 pleistanthum; 10925 racemosum; 10949 heliolepis var. brevistylum; 10961 rubiginosum; 10984 primuliflorum; 10993 racemosum; 11195, 11344 hippophaeoides var. hippophaeoides; 13680 racemosum; 13736 rupicola var. rupicola; 13740 complexum; 13785 saluenense subsp. chameunum; 13845 hippophaeoides var. hippophaeoides; 13880 racemosum; 13886 rubiginosum; 13893 racemosum; 13901 rubiginosum; 13913, 13919 heliolepis var. heliolepis; 13937 hippophaeoides var. hippophaeoides; 13984 mixed; 13986 heliolepis var. heliolepis; 14405 racemosum; 14436 rubiginosum; 14444 mixed; 14548 rupicola var. chryseum; 14641 rupicola var. muliense; 14647 primuliflorum; 14703 rubiginosum; 14803 thymifolium; 14843 hemitrichotum; 14917 yunnanense; 14957, 14990 rubiginosum; 15010 hippophaeoides var. hippophaeoides; 15011, 15012 racemosum; 15013 rubiginosum; 15014 yunnanense; 15027, 15092 cuneatum; 15094 rubiginosum; 15139 primuliflorum; 15155 telmateium; 15362 lepidotum; 15629 primuliflorum; 15641 saluenense subsp. saluenense; 15840 pachypodum; 16694 maddenii subsp. crassum; 17909 indet.; 18226 edgeworthii; 18265 indet.; 18729 virgatum subsp. oleifolium; 19030 cephalanthum subsp. cephalanthum; 19046 mekongense var. melinanthum; 19058 saluenense subsp. saluenense; 19314 calostrotum subsp.; 19315 brachyanthum subsp. hypolepidotum; 19340 campylogynum; 19358 rupicola var. chryseum; 19374 mekongense var. longipilosum; 19423 nuttallii; 19567 seinghkuense; 19568 megacalyx; 19583 genestierianum; 19631 edgeworthii; 19676 rubiginosum; 19741 rupicola var. rupicola; 19744 brachyanthum subsp. hypolepidotum; 19779 campylogynum; 19792 rupicola var. chryseum; 19803 cephalanthum subsp. cephalanthum; 19812, 19813 heliolepis var. brevistylum; 19919 xanthostephanum; 20052 brachyanthum subsp. hypolepidotum; 20066 calostrotum subsp.; 20193 dendricola; 20220 augustinii subsp. chasmanthum; 20227 monanthum; 20266 calostrotum subsp.; 20291 rubiginosum; 20293 monanthum; 20298 megeratum; 20337 mekongense var. melinanthum; 20561 maddenii subsp. crassum; 20581 indet.; 20595 seinghkuense; 20607 saluenense subsp. saluenense; 20608 rupicola var. rupicola; 20763 megeratum; 20849 xanthostephanum; 20962 edgeworthii; 20998 nuttallii; 21005 dendricola; 21021 xanthostephanum; 21030 nuttallii; 21031 maddenii subsp. crassum; 21049 dendricola; 21069 rubiginosum; 21070 seinghkuense; 21071 megeratum; 22101 micromeres; 22133 rupicola var. chryseum; 22163 saluenense subsp. saluenense; 22354 campylogynum; 22928 mekongense var. melinanthum; 22955 megeratum; 22962 edgeworthii; 22969 rubiginosum; 23243 mekongense var. melinanthum.
*Zimmermann* 673 lepidotum; 1810 setosum.

## RELATIONSHIPS OF THE SUBSECTIONS OF SECTION RHODODENDRON

The twenty-seven subsections of section Rhododendron recognised in this revision are related in a very intricate and reticulate manner. This reticulation is due to the fact that discontinuities in the relevant characters occur in an imprecisely correlated manner, so that larger groups, defined by correlated clusters of characters are not distinguishable. However, if tendencies rather than clear-cut diagnostic characters are considered, then the section can be broken down into five informal groups with one aberrant subsection. The disposition of these groups in relation to some of their important characteristics (tendencies) is shown in fig. 5, p. 186.

As can be seen from fig. 5, the most clear-cut division is that into those subsections which have sharply deflexed styles and those in which the style is straight or declinate. This character separates from the rest subsections XIX–XXVII, together with part of subsection I (*R. pendulum* and *R. seinghkuense*; as explained on p. 26, this subsection forms a coherent whole in spite of the variation in its stylar characters). Cutting across this division is another based on seed type, type of upper leaf epidermis, presence or absence of foliar (costal) sclereids and habit. In spite of the large number of independent characters associated in this cluster, it is not as important, taxonomically as the stylar one, as none of the characters is clear-cut. However, these tendencies, in combination with the stylar character, separate off another group: subsections I–IV.

Within the subsections that remain, three broad groups can be distinguished, based on general facies and the characteristics indicated in the figure. Again, these characters represent tendencies only, and cannot be used for the recognition of formal taxonomic groups. The first group of subsections contains V–VIII and XV–XVII. These all tend to be large shrubs, frequently have deciduous or subdeciduous leaves and often have axillary inflorescences. The second group consists of small shrubs whose upper leaves are frequently bract-like (i.e. with expanded petioles and reduced laminae); it contains subsections XII–XIV. The third groups consists of subsections IX–XI, and is made up of small plants whose upper leaves are rarely bract-like. Subsection Lapponica is also closely related to subsection Triflora (V), which explains why this group is inserted into the one mentioned above in the numerical sequence of the subsections used in the revision. Finally, subsection Micrantha (XVIII) does not fit conveniently anywhere in this scheme. In general facies and leaf type it appears to be most closely related to subsection Lapponica; but it has winged seeds like those of subsections I–IV and XIX–XX. It also has a number of unique characters—a very many-flowered, racemose inflorescence of very small, almost Ledum-like flowers with the corolla lobes considerably exceeding the tube.

Superimposed on this grouping are relationships indicated by other characters. Thus, subsections Saluenensia and Baileya both have crenulate scales; subsections Virgata, Rhodorastra, Saluenensia and Uniflora have pilose corollas. Subsections Maddenia and Triflora are linked through the intermediate species *R. zaleucum*; subsections Triflora and Lapponica are similarly linked by the intermediate *R. gemmiferum*; and *R. cuneatum* links subsections Lapponica and Heliolepida.

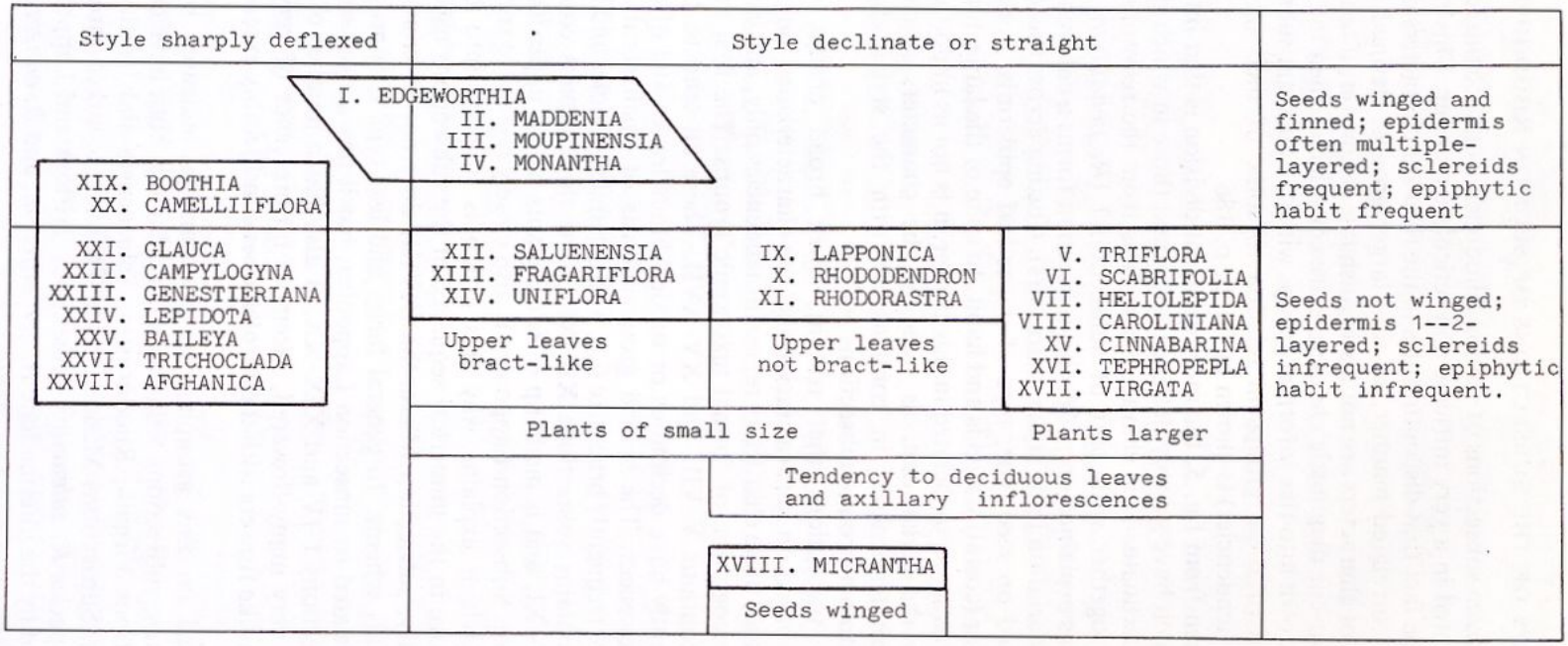



FIG. 5. Grouping of the subsections of section Rhododendron, with some of their important characters. For further information see p. 187.

Thus, the grouping of these subsections is a difficult matter, and any attempt to deduce phylogenetic relationships (cf. Hutchinson, *Rhodo. Yearbook* 1946:42–47) is purely speculative.

## Geographical Distribution

The distribution of sections Rhododendron and Pogonanthum is very wide, extending from eastern N America, across most of temperate Asia to C & E Europe. A full, interpretative discussion of the distribution of Rhododendron as a whole (including the southerly species of section Vireya) will have to await the publication of revisions of the other subgenera. In the meantime, some factual information on the species under consideration in this paper is given.

It is easily appreciated that the distribution of these species is concentrated in Asia, between 21° and 36° N and 74° and 108° E. The groups occurring outside this area are all very small: subsection Caroliniana (N America), subsection Rhododendron (Europe), subsection Rhodorastra (NE Asia), subsection Micrantha (NE Asia), *R. lapponicum* of subsection Lapponica (circumboreal), *R. keiskei* of subsection Triflora (Japan) and *R. fragrans* of section Pogonanthum (NE Asia). In the following discussion these 10 species are excluded, as are the other 25 species of subsection Lapponica, of whose distributions I have less detailed knowledge than of the rest (though examination of the maps published by the Philipsons (1975) suggests that they fall into similar patterns). Thus the following discussion covers 127 species.

The distribution of a large genus can be considered in two ways: a) by areas and the number of species within them; and, (b) by comparison of the individual distributions themselves. Both these approaches are adopted here.

### DISTRIBUTION BY AREAS

The 1° latitude/longitude square system provides a convenient and simple grid for the consideration of distribution over the large area in question. Table 1 (p. 188) shows the number of species occurring in each grid square over the area 21–36° N, 74–108° E. In the table the distribution appears as a sinuous band, beginning in the extreme north west (Afghanistan/Pakistan/Kashmir), running south east to c. 86° E (C Nepal), then due east to 92° E (Bhutan), then making a north east–south east arc between 93° and 97° E (China, Xizang), and then forming a solid block between 25° and 30° N and 98° and 101° E (China, W Yunnan and adjacent Xizang, adjacent Burma), finally running north east to 30° N 103° E (China, W Sichuan). To the north, south and east of this broad band are the individual records of isolated species such as *R. formosum* (p. 46), *R. veitchianum* (p. 55) and *R. anthopogonoides* (p. 163), which are somewhat separated from the main mass of the distribution.

The highest number of species per square, 36, occurs in 27° N 99° E, which is part of western Yunnan, and the other squares with more than 25 species are clustered around this, marking the centre of concentration of the two sections. Scores of more than 20 are also found to the west, in squares 28° N 91° E and 29° N 93° E, indicating a secondary centre in Bhutan and adjacent China (Xizang).

## TABLE 1

No. of species in each 1° latitude/longitude square.

For further explanation see p. 187

| | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 °E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | | 1 | | | | | |
| 35 | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 34 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | | | 1 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31 | | | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | 7 | 1 | | | | 2 |
| 30 | | | | | | 1 | 1 | | | | | | | | | | | | | | 5 | 4 | | | | | | | 9 | 11 | | | | | |
| 29 | | | | 1 | | | | | 3 | 1 | | | | | | | | | | 2 | 18 | 19 | 3 | 2 | 1 | 1 | | 7 | 5 | 6 | | | | | |
| 28 | | | | | | | | | 1 | 5 | 3 | 3 | 1 | | | | | 1 | 1 | 23 | 6 | | 20 | 27 | 32 | 11 | 14 | 5 | 6 | | | | | | |
| 27 | | | | | | | | | | | | | 2 | 11 | 17 | 17 | 18 | 22 | 14 | | | | | 1 | 32 | 36 | 20 | 5 | 4 | | | | | | |
| 26 | | | | | | | | | | | | | | 5 | | | | | | | | | | 3 | 28 | 21 | 15 | 4 | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | 2 | 1 | 1 | 4 | | | | 25 | 4 | 27 | 4 | 6 | | | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | 1 | | | | 1 | 1 | 1 | | | | | | | | | |
| 23 | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | 5 | | | | | |
| 22 | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | 1 | | | | | | | |
| 21 | | | | | | | | | | | | | | | | | | | | 1 | 1 | | | 1 | | | | | | | | | | | |
| °N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

TABLE 2

PERCENTAGE SIMILARITY OF SPECIES CONTENT USING SQUARE 27°N 99°E AS BASE.

| | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | °E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | | | | | | | | | | | | | | | | | 2 | |
| 29 | | | | | | | | 10 | 16 | | | | | | | | | |
| 28 | | | | | | | 8 | | | 16 | 20 | 51 | 33 | 25 | | | | |
| 27 | 2 | 2 | 2 | 2 | 5 | 5 | | | | | | 50 | ** | 35 | | | | |
| 26 | | | | | | | | | | | | 35 | 45 | 33 | | | | |
| 25 | | | | | | | | | | | | 25 | | 28 | | | | |
| °N | | | | | | | | | | | | | | | | | | |

TABLE 3

PERCENTAGE SIMILARITY OF SPECIES CONTENT USING SQUARE 27°N 90°E AS BASE.

FOR FURTHER EXPLANATION SEE P. 190

| | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | °E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | | | | | | | | | | | | | | | | | 0 | |
| 29 | | | | | | | | 12 | 10 | | | | | | | | | |
| 28 | | | | | | | 32 | | | 10 | 7 | 4 | 0 | 3 | | | | |
| 27 | 40 | 65 | 82 | ** | 60 | 48 | | | | | | 2 | 2 | 3 | | | | |
| 26 | | | | | | | | | | | | 7 | 5 | 3 | | | | |
| 25 | | | | | | | | | | | | 2 | | 2 | | | | |
| °N | | | | | | | | | | | | | | | | | | |

TABLE 4

PERCENTAGE SIMILARITY OF SPECIES CONTENT USING SQUARE 29°N 95°E AS BASE.

FOR FURTHER EXPLANATION SEE P. 190

| | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | °E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | | | | | | | | | | | | | | | | | 4 | |
| 29 | | | | | | | | 36 | ** | | | | | | | | | |
| 28 | | | | | | | 14 | | | 30 | 20 | 16 | 8 | 6 | | | | |
| 27 | 8 | 6 | 9 | 10 | 14 | 20 | | | | | | 14 | 16 | 8 | | | | |
| 26 | | | | | | | | | | | | 20 | 14 | 3 | | | | |
| 25 | | | | | | | | | | | | 15 | | 7 | | | | |
| °N | | | | | | | | | | | | | | | | | | |

If those squares with a score of 10 or more are considered to form the 'core' of the distribution, then some further comparisons can be made among these. Table 2 shows the percentage of species in common between square 27°/99° and the rest (the percentage is calculated as the number of species in common between the base square and any other, divided by the total number of species in the two squares considered together, multiplied by 100). It is easily seen that the degree of similarity between square 27°/99° and even the adjacent squares is quite low, and drops even more sharply to the west. This indicates a high degree of endemism in the individual squares of the main centre of concentration, as well as a marked lack of similarity in species composition between square 27°/99° and those further west.

Table 3 (p. 189) provides a similar representation based on square 27°/90° (Bhutan). Here the picture is rather different, with a much more gradual fall in percentage similarity in the nearer squares, though with a marked reduction in the scores E of 93°. In the western part of the range, clearly, the degree of endemism per square is much less than it is in the east. As in Table 1, the species in the east and west of the range are largely different.

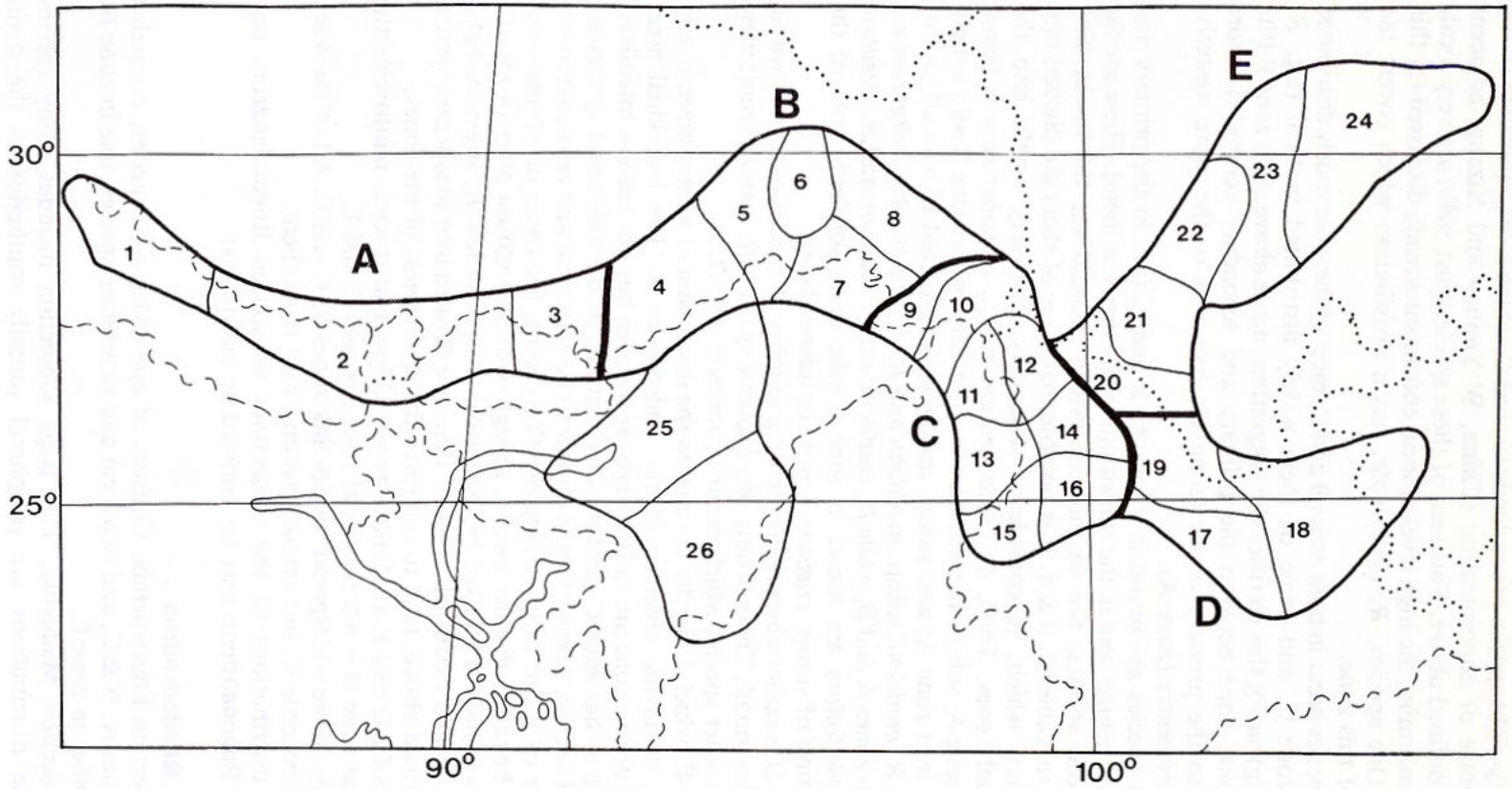
In summary, the eastern part of the range of distribution (China, W Yunnan and adjacent Xizang, adjacent Burma) forms the main centre of concentration of the sections, with a high degree of local endemism within it. The western part of the range forms a secondary centre with a lesser degree of local endemism. Species common to both centres are few. The area between the centres (most of which is in China, Xizang), contains species centred in both the east and the west, as well as endemics of its own, though, on the whole, and as might be expected from the numbers of species involved, it shows a greater degree of similarity with the eastern centre (see Table 4, p. 189), which is a percentage similarity table with square 29°/95° as the base).

## COMPARISON OF SPECIFIC DISTRIBUTION AREAS

The picture of the distribution of these rhododendrons already discussed is confirmed and extended by a comparison of the individual distributions. The method followed here has involved the tracing of outlines of the distributions of each species, as presented on maps 3–57, and then the superimposition of all of these (of the 127 species considered above, about 20 have been excluded from this process: these include the species in southern Burma, Thailand, Vietnam and the extreme south of Yunnan, leaving a total of approximately 100). The result is a pattern of areas as indicated on map 58 (p. 191). This shows the total distribution divided into 5 zones (indicated by A, B, C, D, E), each zone further subdivided to give a total of 26 areas (numbered 1–26 on the map). Of these 26 areas, two (25 & 26) are peripheral, accounting merely for the distributions of *R. formosum*, *R. johnstoneanum* and parts of the distributions of *R. maddenii* and *R. triflorum*, and will not be considered further.

The individual specific and subspecific distributions in relation to these zones and areas as shown in Table 5 (p. 196). The information in this table can be summarised as follows. Seven species are endemic to zone A, which corresponds more or less to the western subcentre mentioned above. Of these seven, only three are endemic to one or other of the numbered areas within zone A, the other four extending over two or three areas. This corresponds well with the conclusion arrived at above as to the type and degree of endemism in this subcentre. Ten species are endemic to zone B, which represents the area between the main centre and the western subcentre as defined above; six of these ten species are extremely local, being found only in area 4 or area 6; the others are more widespread.

Five species are found in both zones A and B. *R. anthopogon* occurs throughout the whole area (its total distribution extends further west as well), but the other four species only just extend into area 4 of zone B, being more widely distributed in zone A.




MAP 58. Zones (indicated by capital letters A–E) and areas (indicated by 1–26) of *Rhododendron* distribution. For further explanation see pp. 190–192.

Twenty-eight species are endemic to zone C, which is the equivalent of the main centre of concentration (China, W Yunnan and Xizang, adjacent Burma) defined above. Fourteen of these species (just 50%) are very local, again confirming the high level of local endemism already discussed for this centre. One species, *R. dendricola*, has a distribution which covers the whole of this zone.

Ten species occur in both zones B and C; most of them are widely distributed within zone C, and some of them widely distributed in both (e.g. *R. campylogynum*); this clarifies the suggestion, made above, that zone B (the transitional zone between the primary and secondary centres) is more similar to the primary centre (zone C) than it is to the more westerly, secondary centre (zone A).

Seven species are found in zones A, B and C (i.e. in the primary and secondary centres and in the transitional zone between them). These are the widespread species, few in number, which account for the low-scoring squares in Tables 2, 3 & 4. It is notable that three of them are divided into subspecies, which, if considered separately, fall very neatly into the individual zones. Thus, *R. cinnabarinum* subsp. *cinnabarinum* is found only in zone A; subsp. *xanthocodon* is almost entirely in zone B with a slight overlap into zone A; and subsp. *tamaense* is restricted to a small part of zone C. *R. maddenii* subsp. *maddenii* and *R. virgatum* subsp. *virgatum* are found in zones A and B, while *R. maddenii* subsp. *crassum* and *R. virgatum* subsp. *oleifolium* are found in zone C (the more southerly part of the distribution of subsp. *crassum* is not considered here).

Zone D is rather obscure, as the total number of species occurring within it is rather small. There is only one endemic species, *R. spinuliferum*; there are two other species which occur in zones C and D.

Zone E, which is hardly covered in the discussion of areas above, is very striking in having nineteen species endemic to it. The individual areas (20–24) of this zone are rather large, as the area has not been as intensively collected as has zone C, and the distributions of the individual species are not well known. Many of them appear to be very local and restricted to one or other of a few areas—Kangting (Tatsienlu), Mt Omei or Mupin—and tend to be rather distinct species, though with their closest allies in zone C.

Zones C and E are linked by five species, one of which (*R. augustinii*) also extends further eastwards. Two of them are divided into subspecies, which, as described above, tend to reinforce the distinctness of the zones.

Zones C, D and E are linked by six widespread species, reinforcing the view that zone D is a transitional zone between C and E.

Finally, three widespread species link zones B, C and E. All of them are centred on zone C, but extend east and west from there.

The distributions of the subsections of section Rhododendron, and section Pogonanthum may be summed up as follows:

Section **Rhododendron**

**I.** Subsection **Edgeworthia.** Consists of one widespread species, occurring in zones A, B & C, and two local and vicariating species, one in zone A, the other in zone C.

**II.** Subsection **Maddenia.** This large subsection includes many species whose distributions are peripheral (usually southerly) to the main

concentration. These species, which are not analysed in Table 5, are: *R. excellens, liliiflorum, kiangsiense, levinei, burmanicum, crenulatum, cuffeanum* (known only in cultivation), *formosum, johnstoneanum, rufosquamosum, lyi, fleuryi, carneum* (known only in cultivation), *veitchianum, surasianum* and *ludwigianum*. Of the rest, *R. maddenii* has the widest distribution, very like that of *R. edgeworthii*, but extending further south. Most of the other species occur within the broad distributional area of *R. maddenii*, with one species endemic to zone A, two endemic to zone B, nine endemic to zone C; one is found in zones B & C, and one in zones A & B, another in zones C & D. One species, *R. maddenii* itself, is found in zones A, B & C. No species of the subsection is found in zone E; here the subsection is replaced by its vicariant, the allied subsection Moupinensia. Many very clear examples of vicariism occur within the subsection, e.g. the subspecies of *R. maddenii, R. lindleyi/taggianum, R. dalhousiae/nuttallii* and *R. valentinianum/fletcheranum*.

**III.** Subsection **Moupinensia.** The three species of this subsection are endemic to zone E (see above).

**IV.** Subsection **Monantha.** This very small subsection is centred on zone C, where the whole distribution of *R. monanthum* is found. The other species are all very local.

**V.** Subsection **Triflora.** The distribution of this large subsection includes all five zones, though the bulk of the species is found in zone E. The occurrence of the subsection in zones A & B is due to two widespread species, *R. triflorum* and *R. oreotrephes*. Two species are endemic to zone C and eight to zone E. One species links zones C and D, two link zones C & E, three link zones C, D & E, one links zones A, B & C (*R. triflorum*), and one (*R. oreotrephes*) links zones B, C & E. A further species occurs in Japan, outside the area under consideration. This subsection has a much more easterly distribution than those considered above.

**VI.** Subsection **Scabrifolia.** Another easterly subsection, like subsection Triflora, to which it is closely related. It has no representatives in the Himalayas (zones A & B), and the species that occur in zone C are also distributed to the east. One species is endemic to zone D, three to zone E, and two species link zones C, D & E.

**VII.** Subsection **Heliolepida.** Like subsection Scabrifolia, this subsection is not represented in the Himalayas (zones A & B). One species occurs in zones C & E, one in zones C, D & E and one is endemic to zone E. A fourth species, *R. invictum*, occurs well to the north.

**VIII.** Subsection **Caroliniana.** Endemic to eastern N America and outside the area under consideration.

**IX.** Subsection **Lapponica.** The species of this subsection have not been analysed in any great detail here, as the current account of them is based entirely on the work of the Philipsons (1975). However, from a study of their account, and particularly the maps included in it, a few observations can be made. One species, *R. nivale*, is very widespread, occurring in all five zones; it is divided into three subspecies, one of which (subsp. *nivale*) is endemic to zones A & B, the second (subsp. *boreale*) to zones C & E, and the third (subsp. *australe*) to zone C. Of the other species, one is

endemic to zone B, seven to zone C, one (*R. amundsenianum*) to zone D, and six to zone E. Nine species occur in both zones C & E, and two species, *R. lapponicum* and *R. burjaticum*, have distributions outside the area under consideration.

**X.** Subsection **Rhododendron.** Occurring in C & E Europe, well outside the area under consideration.

**XI.** Subsection **Rhodorastra.** Occurring in NE Asia and not further considered here.

**XII.** Subsection **Saluenensia.** The two species of this subsection have a wide distribution, but come together in zone C, where the subsection appears to be centred; four of the six subspecies which comprise the two species occur in this zone. *R. calostrotum* occurs in zones B & C, but its representation in zone B is due to only one of its four subspecies (subsp. *riparium*). *R. saluenense* occurs in zones C & E.

**XII.** Subsection **Fragariflora.** A monotypic subsection, endemic to zone B.

**XIV.** Subsection **Uniflora.** Like subsection Monantha (see above) most of the species are very local endemics. Most of the distribution is in zones A & B, but the group just penetrates into zone C.

**XV.** Subsection **Cinnabarina.** This group has an overall distribution very like that of subsection Uniflora, being centred in zones A & B, but just extending into zone C with one subspecies of *R. cinnabarinum*.

**XVI.** Subsection **Tephropepla.** This is a rather scattered subsection, containing two aberrant species of doubtful relationship (see p. 127) which ae endemic to zone E. Of the others, one is endemic to zone B, and two are found in both zones B & C.

**XVII.** Subsection **Virgata.** A monotypic subsection, occurring in zones A, B & C. One subspecies is endemic to zone C, the other to zones A & B.

**XVIII.** Subsection **Micrantha.** Monotypic and occurring in NE Asia.

**XIX.** Subsection **Boothia.** Restricted to zones B & C, with three species endemic to zone B, two occurring in both zones B & C, and two endemic to zone C.

**XX.** Subsection **Camelliiflora.** Monotypic and endemic to zone A.

**XXI.** Subsection **Glauca.** Centred in zone C, where four species are endemic. One species is found in both zones A & B, and one in both zones B & C.

**XXII.** Subsection **Campylogyna.** Monotypic, occurring in zones B & C.

**XXIII.** Subsection **Genestieriana.** Monotypic, endemic to zone C.

**XXIV.** Subsection **Lepidota.** This subsection contains one very widespread species, occurring in zones A, B & C and further west, and two very local species endemic to zone A.

**XXV.** Subsection **Baileya.** Monotypic and endemic to zone A.

**XXVI.** Subsection **Trichoclada.** This subsection is centred in zone C, where three species are endemic. The other species links zones B & C and has an outlier in zone A (Nepal), which is not dealt with in Table 5.

**XXVII.** Subsection **Afghanica.** Monotypic, occurring on the Afghanistan/Pakistan border.

Section **Pogonanthum.** This section extends through all the zones, and two of its species occur to the north of the area under consideration (*R. fragrans, R. anthopogonoides*). Of the rest, one species is endemic to

zone A, one (*R. anthopogon*) occurs in both zones A & B and further west, two species are endemic to zone B, and two endemic to zone E. One species occurs in zones C & E and two in zones B, C & E.

The distributions of these supraspecific taxa can be categorised as follows:

i) Extending through all five zones: section Pogonanthum.
ii) Extending through zones A, B & C: subsections Edgeworthia, Maddenia, Virgata, Lepidota.
iii) Centred in zone C, some with small extensions east or west: subsections Monantha, Saluenensia, Glauca, Campylogyna, Genestieriana, Trichoclada.
iv) Centred in zone E, some with extensions westwards: subsections Moupinensia, Triflora, Scabrifolia, Heliolepida, Lapponica.
v) Very scattered: subsection Tephropepla.

This description of the distributions of sections Rhododendron and Pogonanthum raises many issues which will be important in the consideration of the phytogeography of the Sino-Himalaya and the evolution and dispersal of the genus *Rhododendron* as a whole. The patterns of vicariance shown by those species divided into subspecies (some of them discussed above) and such species groups as *R. pendulum/seinghkuense, R. lindleyi/taggianum, R. valentinianum/fletcheranum, R. tatsienense/davidsonianum/siderophyllum, R. hemitrichotum/mollicomum* and *R. auritum/xanthostephanum*, to mention only the most obvious examples, are very striking and suggestive, but further discussion of these points must be postponed until revisions of the other subgenera have been completed.

## ACKNOWLEDGEMENTS

Many people, too numerous to name individually here, have helped during the preparation of this revision; I hope that they will accept this general acknowledgement. However, I am particularly indebted to the Directors of the herbaria of the Royal Botanic Gardens, Kew, the Natural History Museum, London, Museum National d'Histoire Naturelle, Paris, and the New York Botanical Garden for facilities and the loan of specimens, and to Linda Mowat, Linda Richardson, Dorothy Brunton, Denise Taylor, Sally MacKay, Ken Grant, and Ross Eudall for assistance with maps and figures.

## MAJOR REFERENCES

In general references are given in full in the text and *loc. cit.* and *op. cit.* are used where further references to the same publication lie close to the original citation. It was, however, found convenient to use a date reference to the following frequently cited works.

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## TABLE 5

DISTRIBUTION OF THE SPECIES ACCORDING TO THE ZONES AND AREAS SHOW ON MAP 58, P. 191
FOR FURTHER EXPLANATION SEE P. 190

| | A | | | B | | | | | C | | | | | | | | D | | | E | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | (25) | (26) | |
| cowanianum | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| lowndesii | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pogonophyllum | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| pendulum | | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | Endemic to A |
| camelliiflorum | | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| baileyi | | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| dalhousiae | 1 | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| lindleyi | | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| keysii | | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| glaucophyllum | | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| ciliatum | | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| anthopogon | 1 | 2 | 3 | 4 | 5 | | | | | | | | | | | | | | | | | | | | | | Linking A & B |
| subsp. a | 1 | 2 | 3 | 4 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| subsp. b | 1 | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| dekatanum | | | | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| amandum | | | | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| leucaspis | | | | | | 6 | | | | | | | | | | | | | | | | | | | | | |
| ludlowii | | | | | | 6 | | | | | | | | | | | | | | | | | | | | | |
| scopulorum | | | | | | 6 | | | | | | | | | | | | | | | | | | | | | |
| auritum | | | | | | 6 | | | | | | | | | | | | | | | | | | | | | |
| fragariflorum | | | | 4 | 5 | | | | | | | | | | | | | | | | | | | | | | Endemic to B |
| laudandum | | | | 4 | 5 | 6 | | | | | | | | | | | | | | | | | | | | | |
| kongboense | | | | 4 | 5 | 6 | | 8 | | | | | | | | | | | | | | | | | | | |
| boothii | | | | 4 | 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | |
| pemakoense | | | | | | 6 | | | 9 | | | | | | | | | | | | | | | | | | |
| charitopes | | | | | 5 | 6 | | | | | 11 | | | | | | | | | | | | | | | | Linking B & C |
| subsp. a | | | | | | | | | | | 11 | | | | | | | | | | | | | | | | |
| subsp. b | | | | | 5 | 6 | | | | | | | | | | | | | | | | | | | | | |

TABLE 5 (cont.)

| | A | | | B | | | | | C | | | | | | | | D | | | E | | | | | (25) | (26) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| xanthostephanum | | | | | | | 7 | | 9 | 10 | 11 | 12 | | | | | | | | | | | | | | | |
| megeratum | | | | 4 | | | 7 | | 9 | 10 | 11 | 12 | 13 | | | | | | | | | | | | | | |
| mekongense | | | | | | | 7 | 8 | 9 | 10 | 11 | 12 | 13 | | 15 | | | | | | | | | | | | |
| megacalyx | | | | | | | 7 | 8 | 9 | 10 | 11 | 12 | | 14 | | 16 | | | | | | | | | | | |
| tephropeplum | | | | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | | | | | | | | | | | | |
| micromeres | | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | | | | | | | | | | | | | | Linking B & C |
| campylogynum | | | | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | | | | | | | | | (cont.) |
| calostrotum | | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | | | | | | | | | | |
| subsp. a | | | | | | | | | | | 11 | | 13 | | | | | | | | | | | | | | |
| subsp. b | | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | | | | | | | | | | | | | |
| subsp. c | | | | | | | | | | | | 12 | | | | | | | | | | | | | | | |
| subsp. d | | | | | | | | | | 10 | 11 | | | | | | | | | | | | | | | | |
| walongense | | | | | | | | | 9 | | | | | | | | | | | | | | | | | | |
| kasoense | | | | | | | | | 9 | | | | | | | | | | | | | | | | | | |
| flavantherum | | | | | | | | | 9 | | | | | | | | | | | | | | | | | | |
| pruniflorum | | | | | | | | | 9 | | | | | | | | | | | | | | | | | | |
| uniflorum | | | | | | | | | 9 | | | | | | | | | | | | | | | | | | |
| seinghkuense | | | | | | | | | | 10 | | | | | | | | | | | | | | | | | |
| fletcheranum | | | | | | | | | | 10 | | | | | | | | | | | | | | | | | |
| horlickianum | | | | | | | | | | 10 | | | | | | | | | | | | | | | | | |
| chrysodoron | | | | | | | | | | 10 | | | | | | | | | | | | | | | | | |
| luteiflorum | | | | | | | | | | | 11 | | | | | | | | | | | | | | | | |
| yungchangense | | | | | | | | | | | | | | | 15 | | | | | | | | | | | | Endemic to C |
| lepidostylum | | | | | | | | | | | | | | | 15 | | | | | | | | | | | | |
| shweliense | | | | | | | | | | | | | | | 15 | | | | | | | | | | | | |
| ciliipes | | | | | | | | | | | | | | | | 16 | | | | | | | | | | | |
| caesium | | | | | | | | | | | | | | | 15 | 16 | | | | | | | | | | | |
| ciliicalyx | | | | | | | | | | | | | | 14 | | 16 | | | | | | | | | | | |
| gemmiferum | | | | | | | | | | | | 12 | | 14 | | | | | | | | | | | | | |
| roseatum | | | | | | | | | | | | | 13 | | 15 | | | | | | | | | | | | |

TABLE 5 (cont.)

| | A | | | B | | | | | C | | | | | | | | D | | | E | | | | | (25) | (26) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| monanthum | | | | | | | | | | 10 | 11 | | | | | | | | | | | | | | | | |
| taggianum | | | | | | | | | | 10 | 11 | 12 | | | | | | | | | | | | | | | |
| valentinianum | | | | | | | | | | | 11 | | 13 | | 15 | | | | | | | | | | | | |
| pseudociliipes | | | | | | | | | | | 11 | | 13 | | 15 | | | | | | | | | | | | |
| zaleucum | | | | | | | | | | | 11 | | 13 | | 15 | | | | | | | | | | | | |
| genestierianum | | | | | | | | | | 10 | 11 | | 13 | | | | | | | | | | | | | | |
| brachyanthum | | | | | | | | | | 10 | 11 | 12 | | | | 16 | | | | | | | | | | | Endemic to C |
| subsp. a | | | | | | | | | | | | | | | | 16 | | | | | | | | | | | (cont.) |
| subsp. b | | | | | | | | | | 10 | 11 | 12 | | | | | | | | | | | | | | | |
| trichocladum | | | | | | | | | | 10 | 11 | | 13 | 14 | 15 | 16 | | | | | | | | | | | |
| sulfureum | | | | | | | | | | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | | | | | | | | | |
| dendricola | | | | | | | | | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | | | | | | | | | |
| cinnabarinum | | 2 | 3 | 4 | 5 | 6 | | 8 | | | | | | | | | | | | | | | | | | | |
| subsp. a | | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| subsp. b | | | 3 | 4 | 5 | 6 | | 8 | | | | | | | | | | | | | | | | | | | |
| subsp. c | | | | | | | | | | | 11 | | | | | | | | | | | | | | | | |
| pumilum | | 2 | 3 | 4 | 5 | 6 | 7 | | 9 | | | | | | | | | | | | | | | | | | |
| triflorum | | 2 | 3 | 4 | 5 | 6 | 7 | | 9 | | | | | | | | | | | | | | | | 26 | | |
| edgeworthii | | 2 | | 4 | 5 | | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | | | | | | | | | |
| maddenii | | 2 | 3 | 4 | | | 7 | | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | | | | | | | 26 | | Linking A, B & C |
| subsp. a | | 2 | 3 | 4 | | | 7 | | 9 | | | | | | | | | | | | | | | | | | |
| subsp. b | | | | | | | | | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | | | | | | | 26 | | |
| virgatum | | 2 | 3 | 4 | 5 | 6 | 7 | | 9 | 10 | 11 | 12 | | 14 | 15 | 16 | | | | | | | | | | | |
| subsp. a | | 2 | 3 | 4 | 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | |
| subsp. b | | | | | | | | | 9 | 10 | 11 | 12 | | 14 | 15 | 16 | | | | | | | | | | | |
| lepidotum | 1 | 2 | 3 | 4 | 5 | | 7 | | 9 | 10 | 11 | 12 | 13 | | 15 | | | | | | | | | | | | |
| pachypodum | | | | | | | | | | | | | | | | 16 | 17 | | | | | | | | | | Linking C & D |
| siderophyllum | | | | | | | | | | | | | | 14 | | 16 | 17 | 18 | | | | | | | | | |
| spinuliferum | | | | | | | | | | | | | | | | | 17 | 18 | 19 | | | | | | | | Endemic to D |

TABLE 5 (cont.)

| | A | | | B | | | | | C | | | | | | | | D | | | E | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | (25) | (26) | |
| trichostomum | | | | | | | | | | | | 12 | | 14 | | | | | | 20 | 21 | 22 | | | | | |
| heliolepis | | | | | | | | | | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | | 20 | 21 | | | | | | |
| saluenense | | | | | | | | | | 10 | 11 | 12 | | | | | | | | 20 | 21 | | | | | | Linking C & E |
| subsp. a | | | | | | | | | | 10 | | | | | | | | | | | | | | | | | |
| subsp. b | | | | | | | | | | | 11 | 12 | | | | | | | | 20 | 21 | | | | | | |
| yunnanense | | | | | | | | | | 12 | 13 | 14 | 15 | | | | | 20 | 21 | 22 | | | | | | | |
| augustinii | | | | | | | | | | 10 | 11 | 12 | | | | | | | | 20 | 21 | 22 | 23 | 24 | | | |
| subsp. a | | | | | | | | | | | | | | | | | | | | | | | 23 | 24 | | | |
| subsp. b, c, d | | | | | | | | | | 10 | 11 | 12 | | | | | | | | 20 | 21 | 22 | | | | | |
| scabrifolium | | | | | | | | | | | | | | 14 | | | 17 | 18 | 19 | 20 | | | | | | | |
| rigidum | | | | | | | | | | | | 12 | | 14 | | | | | 19 | 20 | 21 | | | | | | |
| racemosum | | | | | | | | | | | | 12 | | 14 | | | | | 19 | 20 | 21 | | | | | | |
| tatsiense | | | | | | | | | | | | 12 | | 14 | | | | | 19 | 20 | 21 | | | | | | Linking C, D & E |
| pleistanthum | | | | | | | | | | 10 | | 12 | | 14 | | | | | 19 | 20 | 21 | 22 | | | | | |
| rubiginosum | | | | | | | | | | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | 19 | 20 | 21 | 22 | | | | | |
| mollicomum | | | | | | | | | | | | | | | | | | | | 20 | | | | | | | |
| hemitrichotum | | | | | | | | | | | | | | | | | | | | | 21 | | | | | | |
| pubescens | | | | | | | | | | | | | | | | | | | | | 21 | | | | | | |
| rufescens | | | | | | | | | | | | | | | | | | | | | | 22 | | | | | |
| ambiguum | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |
| lutescens | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |
| sargentianum | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |
| hanceanum | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |
| longistylum | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |
| bracteanum | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | Endemic to E |
| searsiae | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |
| amesiae | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |
| moupinense | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |
| dendrocharis | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | |

TABLE 5 (cont.)

| | A | | | B | | | | | C | | | | | | | | D | | | E | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | (25) | (26) | |
| petrocharis | | | | | | | | | | | | | | | | | | | | | | | 23 | | | | Endemic to E |
| polylepis | | | | | | | | | | | | | | | | | | | | | | 22 | 23 | | | | (cont.) |
| trichanthum | | | | | | | | | | | | | | | | | | | | | | 22 | 23 | | | | |
| concinnum | | | | | | | | | | | | | | | | | | | | | 21 | 22 | 23 | | | | |
| davidsonianum | | | | | | | | | | | | | | | | | | | | | 21 | 22 | 23 | | | | |
| cephalanthum | | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | | 20 | 21 | 22 | | | | | |
| oreotrephes | | | | | | 6 | | 8 | | 10 | 11 | 12 | | 14 | | | | | | 20 | 21 | | | | | | Linking B, C & E |
| primuliflorum | | | | | 5 | | 7 | | 9 | 10 | 11 | 12 | | 14 | | | | | | 20 | 21 | 22 | | | | | |

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