THE REVISED RHODODENDRON CLASSIFICATION A NEW LOOK FROM EDINBURGH

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It is an historical fact that *Rhododendron* and Edinburgh have been synonymous to horticulturists and botanists alike since the early part of this century. It was at the Royal Botanic Garden at Edinburgh that an extensive species collection was built up and maintained while the results of botanical studies based on vast holdings of specimens collected in the wild were published from the Herbarium. It is appropriate that a modern assessment of this rich and variable genus, embodied in a revised classification, should also emanate from Edinburgh. It has been the work of Dr James Cullen, Deputy Keeper of the Herbarium (who has revised the lepidote or scaly-leaved rhododendrons) and Dr David Chamberlain (who has revised the elepidotes, or those without scales on their leaves). My husband and I were revising the Lapponicum rhododendrons (Philipson & Philipson, 1975) when this major revision was undertaken, and our work has been accepted and included in it. In addition, we have been responsible for the revision of some groups in the Azalea sections and their immediate allies.

I will not be discussing the Azalea group further here.

You may be tempted to ask why taxonomists undertake revisions and why they need to change some names and discard others, often leaving horticulturists in a state of bewilderment and confusion. In defence of botanists, I would like to explain that revisions are usually necessary after some years when we are able to look at a greater number of forms because larger collections have been amassed. Also, we will have a better understanding of the perplexing problem of what is a species, as new evidence becomes available from the latest methods of investigation. For example, the techniques of biochemistry have been used in the analysis of leaf waxes of *Rhododendron*, and the presence or kind of such compounds as flaveniods in different species has been studied. Scanning electron microscopy allows plant surfaces to be examined

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at high magnification and has shown similarities and differences in, for example, surface hairs. All these aspects, as well as the classical methods of morphological analysis of features of the plant body, and the correlation of geographical and ecological data, assist the botanist in a comprehensive survey of the situation which leads to both simplification and clarification.

Many are no doubt familiar with the British system of *Rhododendron* classification embodied in *The Species of Rhododendron* edited by Stevenson and published in 1930, which groups rhododendrons into categories called series. You may be unaware, however, that there have been a number of classifications going back two hundred years, compiled by botanists such as Linnaeus, Don, Maximovicz, Hooker, Rehder and Wilson, Nuttall and Clarke, to name the most important. I have no intention here of complicating the story by discussing their contributions to *Rhododendron* classification. These botanists were all concerned with what we now know are peripheral species only - species such as *R. ferrugineum* (the alpine rose of Europe) and its allies; *R. ponticum* from Turkey; *R. maximum* and a few allies from the New World; *R. dauricum* from Eastern Asia and Japan; azaleas of the old and new world; and a few species from the Malay Archipelago (which were placed in a separate genus *Vireya*).

The great heart of *Rhododendron* had yet to be discovered, and its richness and diversity lay unsuspected and certainly not provided for in the classifications of those times.

When the great flood of material poured into Britain in the shape of the collections from China, Burma and Tibet, made by Forrest, Rock and Kingdon Ward, there was an unprecedented increase in the size of some of the groups of the classification, especially those of the lepidotes and elepidotes as we know them. Obviously, these overflowing groups had to be broken down into smaller, more manageable units. This work was undertaken at Edinburgh in the early part of this century by Sir Isaac Bayley Balfour who held the joint posts of Professor of Botany at the University of Edinburgh and Regius Keeper of the Herbarium. When he died in 1919 his system continued to be used by Sir William Wright Smith and M H F Tagg of Edinburgh, and Dr John Hutchinson of Kew, and culminated in the publication of *The Species of Rhododendron*. This has been the *Rhododendron* bible in Britain and the USA, with slight modifications, from 1930 until the present day. All serious-minded rhododendron enthusiasts are familiar with the series and subseries as laid down in the book and which can be illustrated as in Fig. 1.

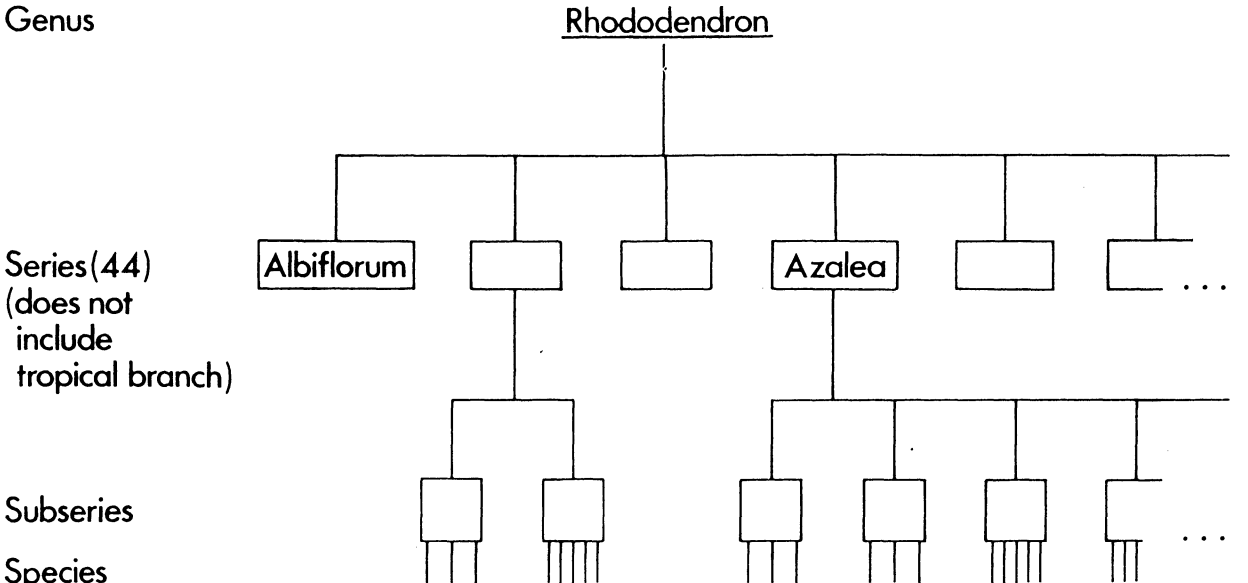

Fig. 1. Abbreviated scheme of the classification of Balfour (1930).

Plant classification is an orderly method of recording information. Moreover, we want that information to be easily retrievable so that we can use it, for example, to put a name to a plant. In addition, biologists attempt to construct classifications to reflect evolutionary trends; in other words, they attempt to show similarities by constructing different levels of relationship or hierarchies, in their classifications. This had already been done in the earlier works (i.e., before the publication of Balfour's classification) but as you can see from the diagram, Balfour did not use an hierarchical system above the series level. All these series have equal status; the scope and complexity of Azalea, for example, is reduced to a single series and equal to any of the other 43, and there is no attempt to group them into categories at a higher level of classification. It should be noted that the most important difference between species, which had come to be recognised over the years (i.e., the presence of absence of scales on the leaves) while tacitly assumed, is not used in the classification. In other words, lepidote series (those with scales) are not grouped together but kept separate from elepidote series (those without scales) - in fact, the series are alphabetically, and therefore artificially, arranged. Because of this, it is impossible to construct a key to the series. Indeed, the Balfourian system, as it has come to be known, demands a certain prior knowledge of the genus, which must be considered a major obstacle to even the most enthusiastic of users. It seems that Balfour had intended his classification only as a temporary one to accommodate the hundreds of new species which had been revealed by the collections from China. However, since 1930 it has settled down into universal use in Britain and USA, Australia and New Zealand; although a number of slight modifications have been made over the last 50 years, it had become what Dr Cullen so vividly describes as ossified, fossilised and anachronistic. Time was certainly ripe for a new look at the classification.

But there is another chapter in this story before we look at the Revision. This was written by Dr Hermann Sleumer of the Rijksherbarium in Leiden, Holland, who, after the war, worked on the ericaceous plants of a vast area, from Malaya to New Guinea. Sleumer was faced with the problem of dealing with a huge number of *Rhododendron* species (in fact, one third of the genus is concentrated in this area), and found that Balfour's classification, which did not even include the tropical *Vireya* species, was quite unsatisfactory for other forms from those regions. He therefore devised a new classification based on earlier work dealing with previously known groups, and including an extension of his own which adequately dealt with the tropical branch of the genus. He accepted in greater part the Balfourian groups, but as the category

series is seldom used in formal botanical classification, he treated series as subsections, building them into an hierarchical system.

So that we may better understand the background of the revised classification, we will look briefly at the major groupings of Sleumer's system (Fig. 2). In this classification there are eight subgenera, three of them Azalea and their allies (which do not concern us here), and five others. These are Hymenanthes, under which name are grouped the elepidote forms (excluding Azalea in the broad sense, of course) and four lepidote subgenera, Rhododendron, Pseudazalea, Rhodorastrum and Pseudorhodorastrum.

Subgenus Rhododendron is very variable and therefore has been broken down into three categories: (1) Section Rhododendron which contains the lepidote series and subseries of the familiar British system of Balfour; (2) Section Pogonanthum containing Series Anthopogon; and (3) Section Vireya, much sub-divided to contain the tropical lepidote species of the Malay, Indonesian and New Guinea regions, forms with which Sleumer was particularly involved, and for which he required a classification.

The remaining three subgenera consist of species with which we are all familiar. Pseudazalea contains *R. trichocladum* and its allies, Rhodorastrum comprises the Series Dauricum, and Pseudorhodorastrum contains *R. virgatum, R. racemosum,* and *R. scabrifolium* and its relatives.

Sleumer separated the first of these subgenera (Pseudoazalea) from the other lepidotes grouped under subgenus Rhododendron because of its deciduous or semi-deciduous habit. Rhodorastrum and Pseudorhodorastrum were separated because their inflorescences occur laterally on a shoot and not as a terminal head.

As we are discussing only major groupings within the classifications preceding the Revision, we will not further examine Sleumer's system which for some reason has never found favour among British and American horticulturists, who may have been daunted by its more formalized botanical structure. However, his system has been used quite extensively in Europe. But it is the simple Balfourian system with which horticulturists are familiar, and it is understandable that many resist the thought of a new classification which appears to abolish the well-known series. I have said appears to abolish deliberately, for actually the framework of the series still stands. The basic concept of groups formed from species-clusters centred on a typical form was the very real

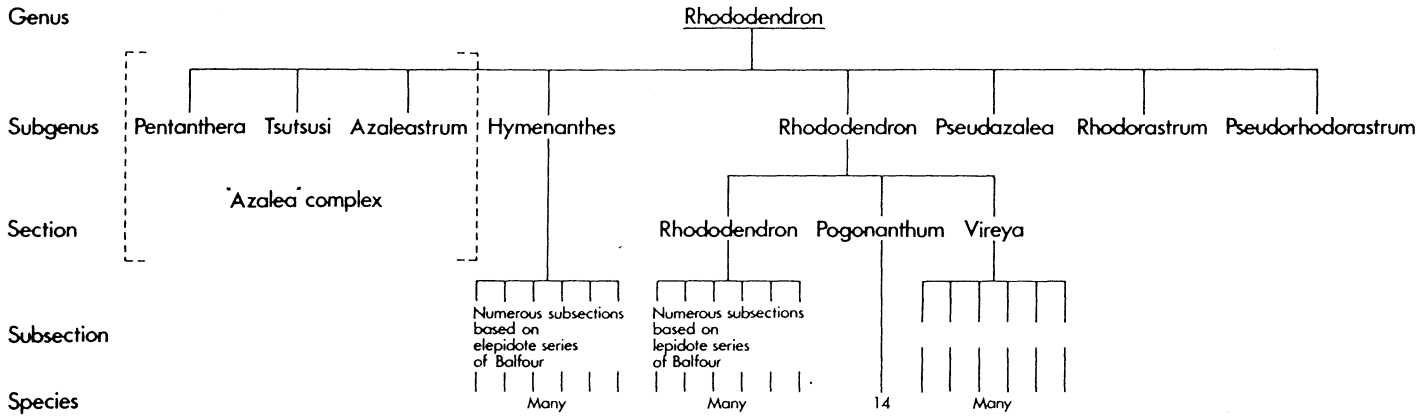

Fig. 2. Outline of the classification of Sleumer (1949).

contribution made by Balfour to the classification of *Rhododendron*. It was maintained by Sleumer in his system and adapted with certain modifications by Cullen and Chamberlain in the new revision. Certainly the names of the groupings have changed from series to subsection but the former series have merely changed into words ending in '-a' (to accord with Latin grammar); for example, Series Arboreum has become Subsection Arborea, so the groups remain very familiar.

You will find other changes however. Some species have been moved from one subsection to another, and some former subseries have been separated out and raised in rank to become subsections. These changes have been made because all the evidence now available shows relationships are much more clearly expressed between species when they occupy their new positions.

Let us look at the architecture of the new classification (Fig. 3). You will see that it is an hierarchical system dividing up the genus into subgenera - I cannot say how many until the Azalea revision is finalised.

We will discuss only the two subgenera Rhododendron and Hymenanthes which Dr Cullen and Dr Chamberlain have recently revised. In his system Dr Sleumer had already used a basic character to make the first big cleavage between the groups, the presence or absence of scales on the leaves. This subdivision was retained in the revision. All the forms which have no scales occur in subgenus Hymenanthes. These include most of the larger forms which are found in gardens and which are normally associated with the name of rhododendron. Hymenanthes is finally reduced to 24 subsections which are in fact the previous well-known series with some modifications:

So we have subsection Barbata from series Barbatum
" Thomsonia " " Thomsonii

As an example of a change in status of a subseries, we may note that subseries Argyrophyllum of Series Arboreum is raised to the equivalent of series (i.e., to the rank of subsection Argyrophylla).

Subgenus Rhododendron has required more subdivision because of the greater diversity of form shown by the scale-bearing species. There are three sections at this hierarchical level (as compared to only one in Hymenanthes), and they are the same as those already made in the Sleumer classification.

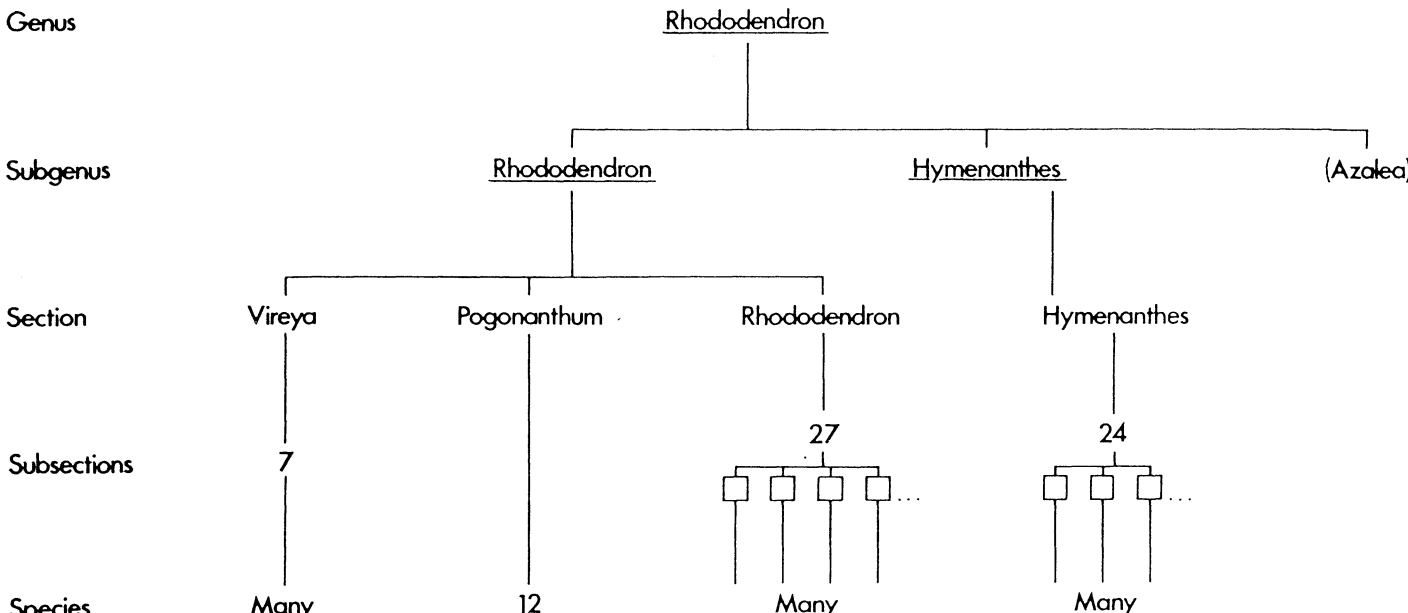

Fig.3. Outline of the revision of Cullen & Chamberlain (1978, 1979).

Section Vireya is the relatively recent work of Dr Sleumer and has not been under study in the present revision but accepted into it. Vireya is a huge section, involving seven subsections and some 300 species. We will not look at it further in this survey.

Section Pogonanthum is the revised Series Anthopogon. Its species have been reduced in number from 14 to 12 with 6 subspecies - groupings which more adequately express their relationship - and the status of the group has been raised from series to section, a move already made by Dr Sleumer. Such a change has been upheld in the revision because all the latest evidence, as well as the morphological features of these plants, indicates that they are distinct from other lepidote rhododendrons. So now they enjoy sectional rank, a move which I am sure will not be resisted by even the most determined of Balfourian adherents.

The third section, Rhododendron, is quite familiar to us. It contains 27 groups of lepidote species, previously known as series or subseries, and now sporting subsectional names as you already know, similar to previous names but ending in '-a':

e.g. Series Triflorum becomes Subsection Triflora
" Lapponicum " " Lapponica
" Maddenii " " Maddenia, etc.

You may wonder why the section Rhododendron in which these lepidote subsections are grouped, occurs in a subgenus which retains the name Rhododendron, while elepidote subsections occur in subgenus Hymenanthes. When a genus is divided up, as here, there is a nomenclatural rule which states that the division containing the type species must be known by the generic name. The first application of the name *Rhododendron* was made to the alpine rose, *R. ferrugineum,* by Linnaeus in 1753, which makes it the type. So the name *Rhododendron* must remain associated with *R. ferrugineum,* which thereby confers the name upon the subsection (subsection. Rhododendron instead of subsection. Ferruginea), on the section, and on the subgenus.

If we now compare the diagram of Sleumer's system (Fig. 2) with that of the revised classification of Cullen and Chamberlain (Fig. 3) we can see the major difference between the two is a reduction in the number of lepidote sub-genera. Dr Cullen, the author of this part of the revision, has decided in this new look that the character of deciduousness (often only partial) and that of lateral inflorescences (which may also occur in other species within the

subgenus Rhododendron) are not sufficient to separate them from the main group of the lepidote rhododendrons.

While horticulturists may not feel particularly affected by the alterations to the actual framework of the classification which we have been discussing in this article, their greatest concern is with the changes made within the subsections. The rhododendrons we cultivate in our gardens are representatives of variable populations in the wild, and these we attempt to confine within the 'straitjackets' of our man-made units of classification. It is imperative that in some cases we must broaden our concept of the species, and in this process some well-known names may be reduced to synonomy, or 'sunk', to use botanical jargon. It should be mentioned, however, that while such names may be lost from the botanical classification, they will continue to be used in some form because of their horticultural importance. Changes such as these may cause inconvenience for a while to growers, but they allow us to better understand the variability of form in which our rhododendrons exist in nature.

In conclusion, it is interesting to note that apart from ranking high in the horticultural world, *Rhododendron* is one of the largest genera of woody plants, and is the largest genus of its family, Ericaceae. It has been studied from many different aspects, the results of which are reflected in the classification as it stands today. It is unlikely that any further major changes will be made to its structure, although matters of detail will continue to be modified as new information becomes available. Biochemical investigations, for example, have as yet hardly been applied to *Rhododendron*, and may assist in substantiating or repudiating groupings within the present system.

It is encouraging to find that this genus, whose diversity and variability have been such a challenge to botanists for more than 200 years, is now yielding to investigations of many types. The present revision has swept away many inconsistencies and misinterpretations and provided a clear and simplified structure on which to base our understanding of this magnificent genus.

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