The Rhododendron Bud and its Relation to the Taxonomy of the Genus

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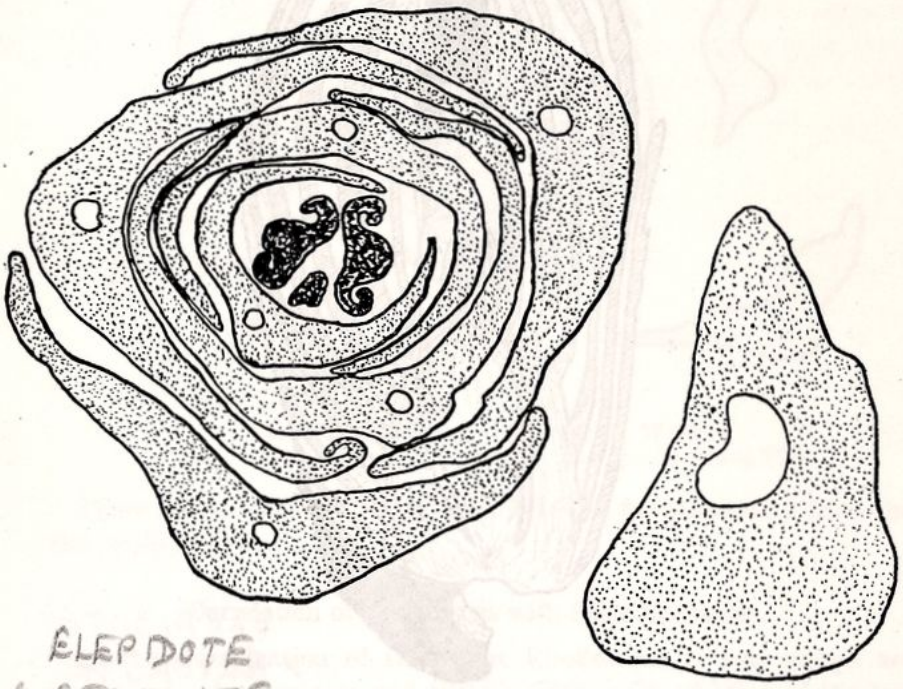
(WITH 3 FIGURES.)

It has already been pointed out by Sir Isaac Bayley Balfour (1) that the character of the bud construction in the genus *Rhododendron*,



ELEPIDOTE & REVOLUTE

FIG. 1. R. CERASINUM TAGG

previously regarded as of no importance, is a primary one which must be considered in any scheme of subdivision of the genus.

Two types of bud construction have been recognised—one revolute, the other convolute. It is suggested that these indicate two separate divisions of the genus.

The present investigation was undertaken to find out whether this

character was an absolute one and whether any other types of leaf-folding in the bud occurred.

In all, 223 species of *Rhododendron* were examined. While these embrace only about one-fifth of the total number of Rhododendron species, they include members of all the series recognised in "the Species of Rhododendron" (2), with the exception of six small and unimportant

FIG. 2. R. AGGLUTINATUM BALF. F. ET FORREST.

series not in cultivation. The material examined is, therefore, quite comprehensive.

The Revolute Chamber Bud.

In the revolute bud the bud-scales form a definite chamber at the bottom of which the young leaves develop. This type of bud is illustrated by *Rh. cerasinum* Tagg. and *Rh. agglutinatum* Balf. f. et Forrest, of which transverse (Fig. 1) and longitudinal (Fig. 2) sections are given.

The outer bud-scales which form the walls of the chamber are convolute in arrangement, and in the centre of this chamber stand the revolute foliage leaves. The latter are quite distinct from the former.

The Convolute Bud.

In the convolute type of bud both scale leaves and foliage leaves are convolute. There is no very sharp differentiation between the last bud-scale and the first foliage leaf. A transverse section of the bud of *Rh. imperator* Hutch. et Ward is selected as representative of this type (Fig. 3).

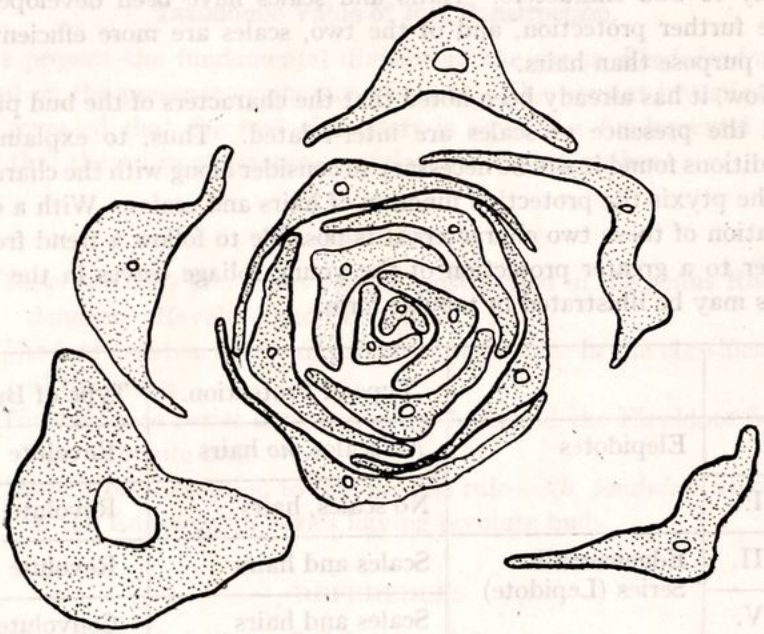


FIG. 3. R. IMPERATOR HUTCH. ET WARD.

LEPIDOTE & CONVOLUTE

There are no buds with structures differing fundamentally from the two types described.

Correlation of Leaf Ptyxis with Scale Character.

In the classification of the genus Rhododendron two groups are recognised—the Lepidote and the Elepidote. The folding of the leaf in the bud was found to run parallel with this grouping ; the Lepidotes have convolute buds and the Elepidotes revolute buds, and in each series there is, of course, only one type of bud. There is, however, one interesting exception to this general rule. This occurs in the Edgeworthii Series. In this series (Lepidote) the leaves are covered with a dense clothing of hairs which obscures the underlying scales. While the expectation is that all the species would have convolute buds, *R. pendulum* Hook. f. has leaves which are revolute in the bud.

Discussion of the Anomalous Condition in the Edgeworthii Series.

To explain the anomalous condition in the Edgeworthii Series it will be necessary to discuss bud and scale characters with reference to their evolution. The convolute type seems to be morphologically simple in that both scale and foliage leaves have the same ptyxis. The revolute type is more complex in that the ptyxis of the foliage leaves differs from that of the bud-scales. Considering bud protection alone, undoubtedly the revolute bud gives more protection to the young leaves than the convolute bud. But protection is not confined solely to bud characters. Hairs and scales have been developed to give further protection, and of the two, scales are more efficient for this purpose than hairs.

Now, it has already been noted that the characters of the bud ptyxis and the presence of scales are inter-related. Thus, to explain the conditions found it will be necessary to consider along with the character of the ptyxis the protective function of hairs and scales. With a combination of these two characters it is possible to follow a trend from a lesser to a greater protection of the young foliage leaves in the bud. This may be illustrated in tabular form.

		Type of Protection.	Type of Bud.
I.	Elepidotes	*No* scales, *no* hairs	Revolute
II.		No scales, hairs	Revolute
III.	Edgeworthii Series (Lepidote)	Scales and hairs	Revolute
IV.		Scales and hairs	Convolute
V.	Lepidotes	Scales, no hairs	Convolute

The revolute bud without additional protection may be considered to be the simplest condition (I). At the next step hairs are developed which give more protection (II). Then follows a stage in which both hairs and scales are present, the ptyxis still being revolute (III). With the additional protection of these hairs and scales, the revolute ptyxis is no longer necessary and a form with a convolute bud appears (IV). Finally, as scales give ample protection, hairs are not required, and thus in a last phase there is a convolute bud quite efficiently protected by scales (V).

The Edgeworthii Series are seen to occupy a middle or transitional place in the scheme.

Rh. pendulum Hook. f. is represented by stage III, and was the only species found in which the young leaves are protected by hairs, scales,

and the revolute ptyxis. That these three devices are not all required in the economy of the plant is evident from the fact that they are only to be found in one species. In the other species of the same series one of these factors, the more complex revolute ptyxis, gives way to the simpler convolute type (IV). This is exemplified by *Rh. bullatum* Franch.

It should be clearly understood that this investigation considers only the characters of the bud and makes no pretension of suggesting the evolutionary lines followed in the genus which would be indicated by other characters.

Taxonomic Value of Bud Construction.

At present the fundamental division of the genus *Rhododendron* is based on the presence or absence of scales. The present investigation has revealed that the bud characters is equally a fundamental one, and that these two characters are related one to the other.

Summary.

(1) There are only two types of bud construction in the genus Rhododendron—Revolute and Convolute.

(2) The bud construction is of primary importance in the classification of the genus.

(3) The Lepidote Series have convolute buds and the Elepidote Series have revolute buds.

(4) There is one exception to this general rule—*Rh. pendulum* Hook. f. in the Edgeworthii Series having revolute buds.

REFERENCES.

1. Balfour ex Hutch. in Notes, R.B.G. Edin. xii (1919), 49.
2. The Species of Rhododendron, 1930, published by the Rhododendron Society.