

**THE INTERNATIONAL
SCIENTIFIC
SERIES, VOL. LXXXVI.
ON BUDS AND STIPULES**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649111244

The international scientific series, Vol. LXXXVI. On buds and stipules by Sir John Lubbock

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SIR JOHN LUBBOCK

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CHAPTER I

ON BUDS

EVERYONE who loves a garden knows to his cost how susceptible young leaves are to cold—how often the bright promise of spring is ruined by late frosts. Buds offer also a tempting food to insects and other animals. Moreover, their development is generally a slow process, the buds for the following year being already formed, as a rule, during the previous summer, in many cases as early as June or July, and in some even a year and a half in advance. The protection of the buds is therefore one of the most important requisites in plant life—in cold countries against frost, in hot against the sun. During winter the young leaves lie snugly enclosed in several warm wraps, covered in many cases by furry hairs, and often still further protected from insects and browsing quadrupeds by gummy or resinous secretions.

The bud is a short shoot bearing a number of young leaves closely packed together. There is generally one

at the summit of each twig and in the axil of each leaf.

When the year is divided into favourable and unfavourable seasons, marked either by alternations of temperature or by drought and rain, there is often a marked difference between 'growing' and 'resting' buds. Moreover, among our own species there is often

a considerable difference between terminal and axillary buds, as, for instance, in the Black Poplar (*Populus nigra*).

The following figure (fig. 1), representing a young shoot of a Tulip Tree, is an illustration of the necessity for such protection. It will be seen that the outer (lower) leaf, which had only a single covering, has been killed by frost, while the succeeding one, which had two wraps, has escaped.

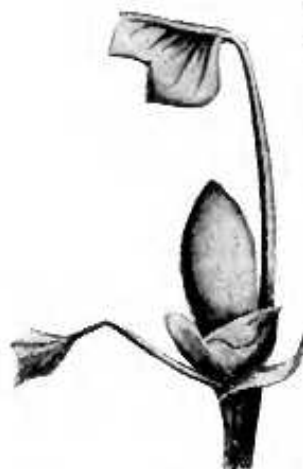


FIG. 1.—YOUNG SHOOT OF TULIP TREE (*Liriodendron*), $1\frac{1}{2}$ nat. size.

It is remarkable that some nearly allied genera, and even in certain cases species of the same genus, often differ in the method of the protection of the bud. This is the case, for instance, in the Willows and Poplars, the function being performed in the Poplars by stipules, in the Willows (though they possess stipules) by leaves.

The bud may either be protected by older organs, or its own outer envelopes may be modified for the purpose.

In some plants, especially those which are quick-

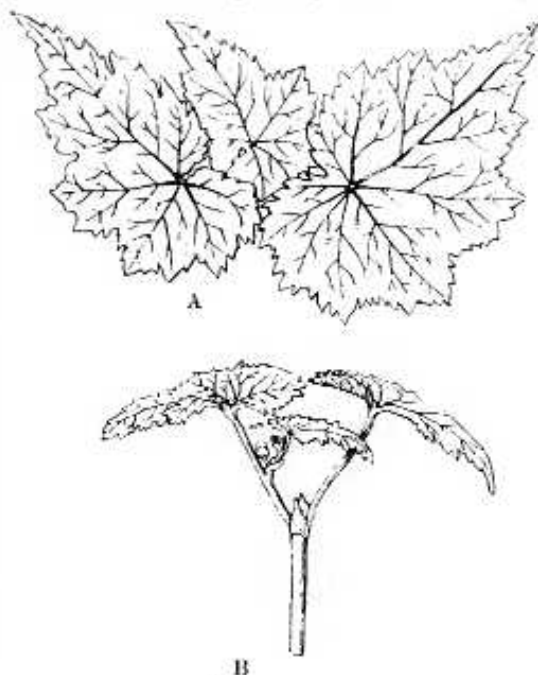


FIG. 2.—*BEGONIA*.

A, shoot seen from above. B, shoot seen from one side. Reducol.

growing or natives of tropical countries, the buds are comparatively naked and unprotected. Even in the tropics, however, though protection is not needed against cold, it is required against the burning sunlight and against drought.

In the Begonias (fig. 2), for instance, as Mr. Potter has pointed out (1),¹ the buds are shaded from the overpowering heat of the sun by the older leaves. Plants grown under artificial conditions do not show the arrange-



FIG. 3.

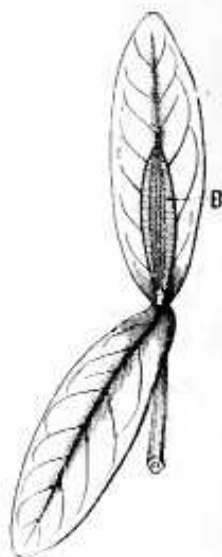


FIG. 4.

YOUNG LEAVES OF *HYPERICUM CALY CINUM*. Nat. size.

FIG. 3, seen from the side. FIG. 4, with one leaf turned back to show the younger, enclosed pair (B).

ment well, as the leaves are often drawn to one side or the other by the light. But Mr. Potter, who has had the opportunity of examining many species in a wild state, found that they were always more or less arranged as shown in fig. 2.

¹ The works referred to by these numbers (1, &c.) are given in the 'Bibliography' at the end of the book.

The figure also shows how admirably the peculiar form of the leaf is adapted to their mode of growth. In many other plants also the leaves, as they develop, successively protect the younger ones.

A somewhat similar case is afforded by *Urvaria* (figs. 105, 106, p. 70); and also by common Rhubarb,

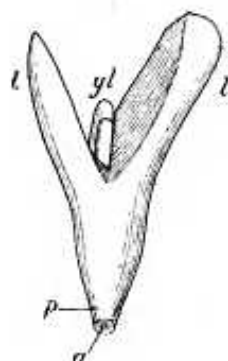


FIG. 5.—MESEMBRYANTHEMUM.

l, l, pair of leaves, connate, and sheathing in their lower half; *p*, from this point to the base the leaves are attached to the axis, and axillary buds arise exactly at this place; *a*, axis; *yl*, next younger pair of leaves.

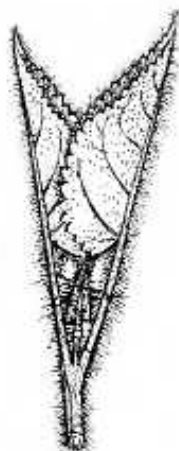


FIG. 6.—APEX OF SHOOT OF STACHYS SYLVATICA, showing two successive pairs of leaves. Nat. size.

where the delicate new leaves in the centre of the plant are protected by the large, horizontally spreading, older ones.

Figs. 3 and 4 show the arrangement in one of the St. John's Worts (*Hypericum calycinum*). Each pair of opposite leaves is at first apposed by their edges,

which touch all the way round, leaving between them an almond-shaped space, in which the next pair are enclosed; they in their turn surround the third, and so on.

Mesembryanthemum blandum has the leaves opposite, triquetrous, 3-5 cm. long, rounded on the dorsal edge, very shallowly grooved on the upper surface,

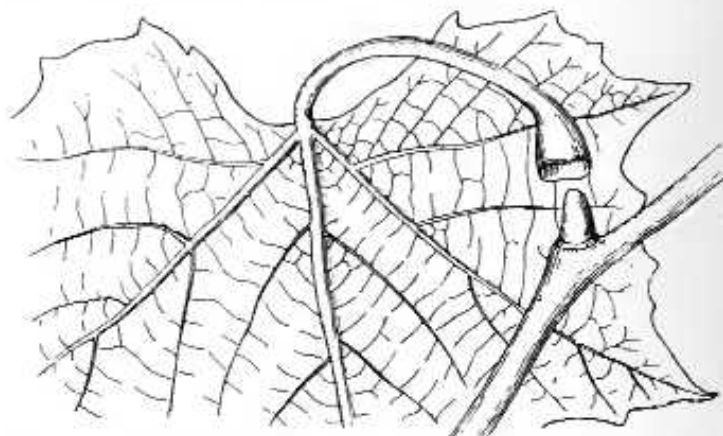


FIG. 7.—LEAF OF PLANE (*Platanus*), showing mode of protection of the young bud.

more decidedly so at the base, and connate there, forming a sheath 3-5 cm. long, which remains green after the stem it encloses has become ripened and brown. The middle line of the sheath—that is, the line of junction of the two leaves—becomes brown with age while the thicker portion is still green.

In other plants, as in *Stachys* (fig. 6), the leaves