A Hitherto Undescribed form of Adult Axis in the Genus *Batrachospermum*

THE genus *Batrachospermum* has always attracted interest as one of the few freshwater members of the Florideæ and on account of its distinctive appearance. Notwithstanding a general familiarity with the external form and early development of *Batrachospermum*, it has not been recognized previously that the old axes of some species may appear 'solid' in transverse section, either all or almost all trace of the primary central filament of cells being lost. Such a condition has been found to exist in three species of this genus (Fig. 1), and there is no reason for doubting that subsequent investigation may show it to occur in other non-ephemeral species. The three species mentioned have not been identified with certainty as comparison with type specimens has been impossible in present circumstances, but two undoubtedly belong to the Helminthoidea section of the genus. Only male plants of the third species, the one here illustrated, have been seen and hence its affinity remains in doubt.

Detailed study of one of the three species has shown the steps by which this 'solid' structure is attained, and these are to be described fully in a subsequent publication. Briefly, they are as follows: branches from the filaments which corticate the central filament from quite an early age actually penetrate the cells of this central filament in a manner similar to a parasitic fungus penetrating the host. Once inside, these invading filaments grow, branch and ultimately fill the upper part of the cell completely, as is shown in Fig. 1. In Fig. 2, which is a photograph of the same cell at a slightly lower level, the cell is almost full of invading filaments cut transversely. There may be so complete a disintegration of the cell wall at the upper end that all trace of it is lost. The diameter of the basal end of the cell is always much greater than at the apical end and there the wall may remain intact or else considerable remnants are to be seen as well as a space representing the area of the original lumen of the cell, traversed by a few filaments (Fig. 3). Filaments invading the central cells may pass from cell to cell in a longitudinal direction or they may enter at one side and directly pass out at the other side.

This secondary development in the centre of the axis is usually accompanied by a proportionately greater production of secondary branches of limited growth, resulting in an evenly cylindrical thallus. These axes may be stronger than the primary ones and hence may be of biological importance to the species.

The similarity of the general appearance of this secondary condition of the uniaxial type to the primary condition of the multiaxial type of construction in the Florideæ, such as is found in *Nemalion*, is so obvious that it needs no stressing: but the fundamental ontogenetic difference between the two types remains.

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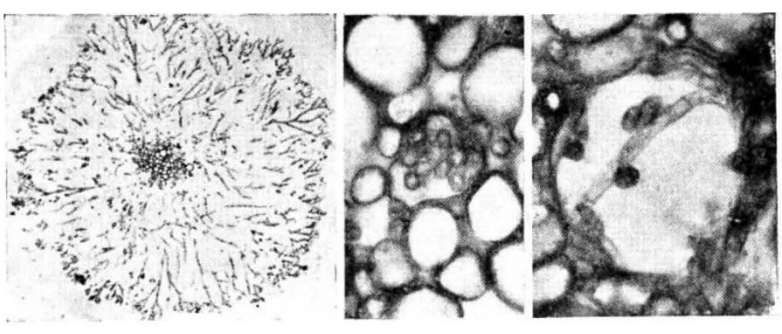
March 6.



1 2 3

(1) TRANSVERSE SECTION OF THALLUS OF *Batrachospermum sp.* NEAR APICAL END OF CENTRAL CELL (× 32). (2) AND (3) TRANSVERSE SECTIONS OF SAME CENTRAL CELL AS IN (1), THE FORMER BEING IN THE UPPER HALF OF THE CELL AND THE LATTER NEAR THE BASAL END (× 400).

Insect Transmission of the 'Swollen-Shoot' Virus in West African Cacao

DURING 1943–44, exploratory experiments were carried out at Tafo, Gold Coast Colony, to determine which insects might prove to be vectors of the well-known 'swollen-shoot' virus disease which is causing widespread destruction of native-grown cacao (*Theobroma Cacao* L.) in certain parts of West Africa, notably in the eastern province of the Gold Coast. Four recognizable 'strains' of the virus were tested, separately, in the experiments, namely:

I. Virulent strain. Characterized in the infected plant by the development of pronounced swellings in the recent ligneous growth; by a typical mosaic in the foliage especially noticeable in the newest leaves (flush) appearing after infection; and by death within a period rarely exceeding eighteen months in the case of plants infected when less than two years old.

II. Non-virulent strain. Swellings only, or at most an indeterminate chlorosis, not always present, in the foliage.

III. Non-virulent strain. Mosaic (mottling) only, of a pattern distinct from that shown by I, above.

IV. Non-virulent strain. Mosaic ('feather' type), quite distinct from the mosaics shown by I and III, above.

The following Hemipterous insects, all common on *Th. Cacao*, were used in the experiments:—Aphidæ: *Toxoptera aurantii* Boyer; Psyllidæ: *Mesohomotoma tessmanni* Aulm.; Coccidæ: *Ferrisiana virgata* (Ckll.), *Pseudococcus exitiabilis* Laing, *Pseudococcus citri* Risso.

All phases of the work, except the identifications of the coccids, for which I am indebted to specialists, were carried out by me personally. Prof. G. F. Ferris kindly determined *F. virgata* and *Ps. citri*, the identifications of other material of these species being confirmed by Dr. W. J. Hall; while Mr. F. Laing has been good enough to describe the new species of *Pseudococcus*, which appears to be indigenous on various forest trees and shrubs in the region, under the name *exitiabilis*.

Successful transmissions were obtained: (*a*) using the mealybugs, *F. virgata* and *Ps. exitiabilis*, with strain I of the virus; (*b*) using *Ps. exitiabilis* with strain II; and (*c*, *d*) using *Ps. citri* with strains III and IV, separately.