

species as *Adiantum pedatum*, *Thuja occidentalis*, *Lilium canadense*, *Calypso bulbosa*, *Lonicera canadensis*, *Solidago squarrosa*, *Aster macrophyllus*, and many other similar plants not found in Newfoundland, and which in eastern Canada "scrupulously avoid the more sterile areas." This explanation and the considerable lists of "calciphiles" indicate that the writer believes the vegetation to respond directly to the chemical character of the substratum.—GEO. D. FULLER.

Root tubercles of cycads.—Three papers on root tubercles of cycads, recording conflicting opinions, lay emphasis upon different features of these rather well known structures. ZACH³⁵ pays particular attention to the fungus hyphae, which branch profusely and become coiled together, after which the coils become digested. The fungus infests the tissues, causing the abnormal development, and the cell reacts by absorbing the fungus, a phenomenon which reminds the author of phagocytosis in animals. The relation is not symbiosis, but parasitism.

HOŘEJŠI³⁶ comes to the conclusion that the relation is symbiosis, and that the alga is the only cause of the abnormalities in the roots, the fungi and bacteria being merely the accompaniments of degeneration. The alga enters by the lenticels.

The third paper, by Miss SPRATT,³⁷ deals entirely with the life history of the alga, and gives a much more detailed account than has hitherto been available. She finds that the heterocysts are reproductive bodies, the contents of which break up into gonidia capable of reproducing the filament, as described by BRAND for *Nostoc*. The central body is described as a simple structure, incapable of anything but direct division. No reference is made to the work of OLIVE, whose technic and figures might have been helpful.

None of the three writers refer to the work of LIFE,³⁸ who described the mode of entrance of the alga and the general development of the root tubercle.—CHARLES J. CHAMBERLAIN.

Cretaceous flora of Japan.—SUZUKI³⁹ has described two conifers from the Upper Cretaceous of Japan as new. One of them is made the basis of a new genus (*Abiocalis*), and is said to be nearest to *Abies* among living forms;

³⁵ ZACH, FRANZ, Studie über Phagocytose in den Wurzelknöllchen der Cycadeen. Oesterr. Bot. Zeit. 60:49-55. pls. 2. 1910.

³⁶ HOŘEJŠI, J., Einiges über die symbiontische Alga in den Wurzeln von *Cycas revoluta*. Bull. Intern. Acad. Sci. Bohême 15:1-10. figs. 24. 1910.

³⁷ SPRATT, ETHEL ROSE, Some observations on the life history of *Anabaena Cyca-deae*. Ann. Botany 25:369-380. pl. 32. 1911.

³⁸ BOT. GAZ. 31:265-271. 1901.

³⁹ SUZUKI, Y., On the structure and affinities of two new conifers and a new fungus from the Upper Cretaceous of Hokkaido (Yezo). Bot. Mag. Tokyo 24:181-196. pl. 7. 1910.



Chamberlain, Charles Joseph. 1911. "Root Tubercles of Cycads." *Botanical gazette* 52(6), 493–493. <https://doi.org/10.1086/330699>.

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