

AN AMERICAN MEMOIR ON ETIOLATION STUDIES.

A. D. SELBY.

MacDougal, Daniel Trembly, Ph. D. "The Influence of Light and Darkness Upon Growth and Development." *Memoirs of the New York Botanical Garden*, Vol. II, pp. XIII and 319, with 174 figures in the text. New York, 1903, published by the Garden by the aid of the David Lydig Fund.

In the latest volume of the *Memoirs of the New York Botanical Garden*, Dr. MacDougal publishes the results of experimental observations on etiolation, begun in 1895 and continued till the close of 1902. Those from 1895 to 1899 were made at the University of Minnesota in portable dark chambers; from 1899 to 1902 in a specially constructed dark chamber in the Museum Building of the New York Botanical Garden. Ninety-seven species belonging to diverse classes have been cultivated in continuous darkness with control plants in the ordinary alternation of daylight and night. The species studied include "aquatics, creepers, climbers, succulents, mycorrhizal forms, geophilous plants and aerial shoots, mesophytes, and spiny xerophytes." These constitute the most comprehensive series of etiolation studies ever undertaken by a single individual, so far as known to the writer.

The details with respect to the several species are presented on pages 35 to 200, preceded by a historical resume of described etiolation phenomena from Ray (1686) and Hales (1727) to the present day, and followed by discussion of the various features of the results, covering 109 pages; also an excellent index.

One result of Dr. MacDougal's investigations has been to show the error of earlier investigators who attributed to light a retarding effect upon growth. His results have also contributed to the complexity of the phenomena. Many other of the older generalizations aside from the one already named must be modified in the light of his researches. It has been found that a large number of herbaceous biennials and perennials do not show an excessive elongation of the stems or shoots in darkness. To these belong *Aster divaricatus*, *Cypripedium montanum*, *Galium circaezans*, *Ipomea batatas*, *Phytolacca decandra*, *Saururus cernuus* and *Vagnera stellata*.

The effect of etiolation upon leaves is treated under the following heads:

Sterile and spore-bearing leaves of pteridophytes.

Etiolation of leaves of monocotyledons with parallel venation.

Etiolation of petiolate leaves of monocotyledons with open or reticulated venation.

Etiolation of leaves of dicotyledons arising from subterranean stems or bulbs.

Leaves of dicotyledons arising from aerial stems.

All the bearings of the work upon our conceptions of the phenomena of etiolation cannot be touched in a brief review. The following extract from page 228 may be of interest :

“ It is to be seen, therefore, that the phenomena of etiolation rest upon and consist in the behavior of plants consequent upon the absence of the morphogenic influence of light. Some species show an adaptation to this absence of light, or to the positive influence of darkness, by which the shoots or petioles are elongated in such a manner as to constitute an effort to escape from darkness or to attain illumination.”

Someone has suggested that etiolation gives us a means whereby we may determine which are the primitive elements of certain plant organs. For example, with leaves, the stipules persist in comparison with the leaf-blade. In such a case the completeness of the etiolation will influence the results. The present memoir will appeal to American botanists interested in the subject, containing as it does important contributions to our knowledge.
