A NEW LOCALITY FOR THE VENUS' FLY-TRAP (DIONAEA MUSCIPULA)

MR. JOHN BOYD, of Southern Pines, N. C., has been so kind as to send me a number of leaves of the Venus' fly-trap (*Dionaea muscipula*) from a locality in the southeastern corner of Moore County, central North Carolina, a station some distance from any previously recorded. Mr. Boyd writes that the traps range in color from maroon to pink and green. The fringes about the edge are maroon, pink or green. The plants are found growing in open beds, apparently having crowded out all other vegetation.

According to Dr. W. C. Coker,[1] this plant has a range more extensive than is generally assumed. He gives stations in Wayne, Lenoir, Jones, Duplin, Onslow, Sampson, Cumberland, Moore, Bladen, Pender, Columbus, New Hanover and Brunswick Counties, North Carolina, and in north and southeast Horry County and eastern Georgetown County, South Carolina. In other words, it ranges from New Bern, North Carolina, to Murrell's Inlet, South Carolina, and westward to Wayne County and two localities in Moore County, North Carolina. It is, however, very local, and the stations at which it occurs are often widely separated.

AUSTIN H. CLARK
U. S. NATIONAL MUSEUM

[1] *Jour. Elisha Mitchell Sci. Soc.*, Vol. 43, Nos. 3 and 4, July, 1928, pp. 221–228, map, pl. 33.

SCIENTIFIC BOOKS

TRAY AGRICULTURE

Soilless Growth of Plants: Use of Nutrient Solutions, Water, Sand, Cinder, etc. By CARLETON ELLIS and MILLER W. SWANEY. 155 pp., with 59 figures, including 3 color photographs. Reinhold Publishing Corporation, N. Y., 1938. Price, $2.75.

THE National Resources Committee, appointed by President Roosevelt, in reporting last year on the impact of science and invention upon our social and economic life, picked "tray agriculture" as one of the new developments fraught with great future potentialities. This book is welcome because it gives a practical summary of the authors' experience in this promising field, as well as some information selected from the rather scanty literature and experimental bulletins.

It has long been known that some plants, *e.g.*, bulbs which contain their own nutriment, can grow without soil. The well-known hyacinth vases did not enter Omar's mind when he wrote that "every hyacinth the garden wears dropped in her lap from some once lovely head"; but hyacinths, "Chinese lilies" and other plants have been raised in water or on wet pebbles by the hopelessly mid-Victorian housewife. By adding to the water small percentages of potassium, calcium, magnesium, phosphate and nitrate and very minute amounts of the so-called "trace elements," boron, manganese and zinc, we have what the authors term "nutrient solutions," for which a number of detailed formulae are given. By substituting for the flower vases shallow tanks, troughs or trays which may, if one prefers, be filled with sand, pebbles, cinders, etc., and arranging suitable apparatus for continuous or intermittent circulation and aeration of "nutrient solution," we have, according to size, a household or an industrial "plant" for raising plants without soil—by aquaculture, water-culture, tray agriculture, tank farming or (as suggested by W. F. Gericke in SCIENCE, 85: 177, 1937) hydroponics.[1]

Following a brief Foreword and Introduction, Chapter I discusses the chemistry of plant life; Chapter II, growth in mineral aggregates (sand culture and sub-irrigation methods); Chapter III, growth in nutrient solutions (which are here discussed); Chapter IV, household plant culture (flowers and vegetables); Chapter V, commercial aspects, with some striking photographs of large installations and their results, as well as reference to tanks adaptable to automobile trailers and to ocean-going vessels on long voyages; Chapter VI, special chemicals, including plant "hormones," auxins, colchicine[2] (for chromosome doubling), ethylene, ethylene chlorhydrin (*e.g.*, to shorten the dormancy period in potatoes), thiourea (to improve germination), heavy water; Chapter VII, common detriments, including soil diseases, chemical deficiencies, parasites ("animal, vegetable and bacterial"); Chapter VIII, eight nutrient formulas, with comments.

In the Introduction the authors state that they present "a concise and non-technical discussion of the chemistry of plant life and a review of the three recognized modifications of *soilless growth*, namely, *water-culture, sand-culture* and *sub-irrigation systems*. Numerous household experiments have been included, liberally supplemented by photographs, which may serve to enable the reader to carry on soilless growth experiments at home for the purpose of producing

[1] Professor Gericke (University of California) credits Knop (1859) for early experiments in this field and states: "In the late summer of 1935 a number of large growers of certain vegetables and flowers adopted liquid culture media on a large scale for the growing of crops and have (for two seasons) placed on the market products so grown to compete with those produced by agriculture."

[2] The extreme care necessary in handling this highly toxic alkaloid has been recently stressed, and should be referred to here.