

NOTES ON THE WATER LETTUCE, *Pistia stratiotes* LINN., AS A NURSERY OF INSECT LIFE

Some aquatic plants are known to have a deleterious effect on certain insects. Others by furnishing sustenance, protection from adverse climatic conditions and predacious enemies, etc., provide conditions that are favorable for their development. In association with the favorable conditions thus provided a few insects have become adapted to pass their immature stages with certain species of these plants most compatible with their existence.

The water lettuce, *Pistia stratiotes* Linn., is one of the plants that seems to be extremely favorable to insect life. This plant consists of a loose rosette of thick, spongy, wedge-shaped leaves. Large specimens of the plant may have from sixteen to twenty leaves, some of which frequently attain a length of more than nine inches. The inner leaves of the rosette may have a nearly vertical position while the older, outer leaves are more horizontal and lie close to the surface of the water. Plants of this species when occurring in tightly packed masses may have many more of the leaves upright than do those that are in loose groups. Although this plant floats on the water it usually rides low enough to bring the base of the rosette just beneath the surface which results in some water being present in the crown of the plant. *Pistia* has a wide distribution, being present in nearly all tropical and sub-tropical regions of the world. The importance of this plant as a nursery of insects that are of concern to man and animals first began to be recognized a number of years ago.

Moore ('10) seems to have first attracted the attention of entomologists to this plant by his discovery of the association of the immature stages of the mosquito, *Mansonia titillans* Walker, with *Pistia*. The eggs of this mosquito are deposited on the under side of the leaves of the plant and the larvae and pupae attach themselves with their air-tubes to the filamentous rootlets. They remain thus attached beneath the surface of the water during their early stages and obtain their supply of oxygen from the tissues of the plant. As an indication of how abundantly *Mansonia* may breed in connection with this plant it may be stated that the writer (Dunn, '18) has reported collecting fifty-one larvae from the roots of one plant.

Zetek ('20) reported *Anopheles* mosquitoes breeding among *Pistia* in the Canal Zone. He states, "Our joint inspection revealed larvae of *Anopheles albimanus* Wied., and *A. tarsimaculatus* Goeldi, to be plentiful among the leaves of the water lettuce."

Important observations have been made by Macfie and Ingram ('23) on the relation of *Pistia* to the breeding of mosquitoes and other biting insects in West Africa. They presented an extensive list of mosquitoes and Ceratopogonine midges that they found associated with this plant. Included in the list were six species of *Anopheles*.

Observations of a similar nature were made by Curry ('32) in discovering that the larvae of *Anopheles bachmanni* are found in the crowns of *Pistia* in the Canal Zone. In reporting on this he states, "Larvae of *A. bachmanni* are frequently encountered in the quiet inlets of Gatun Lake and other bodies of still water, but only within the crowns of water lettuce (*Pistia stratiotes*). Several of us have spent hours in pools where it was plentiful, searching both within and without the crowns of the plants, and not a single larva was found outside the circumference of the plants, where these had not been previously disturbed so as to dislodge the larvae."

A recent paper by Iyengar ('33) describes very interestingly the process by which three species of mosquitoes, *Mansonioides annuliferus*, *M. uniformis* and *M. indiana*, attach their eggs on the lower side of leaves of *Pistia* in south India.

The association of larvae of Tabanidae with *Pistia* plants seems to have been first observed by King ('26) in North Africa who writes of this as follows: "A few larvae of *Tabanus fasciatus niloticus* were obtained on 4th. March, 1925, near Renk, on the White Nile, their habitat being the Nile cabbage (*Pistia stratiotes* Linn.). They were by no means common, a search of a couple of hours yielding but seven specimens. They were lying submerged in the water, supported on the bases of the lower leaves in such a position that their caudal respiratory siphons could be extended to reach the surface of the water, and never more than a single larva occurred on an individual plant."

Lutz ('28) discovered a second species of Tabanidae, *Lepidosclaga lepidota*, living in the rosette of leaves of a *Pistia* near Maracay, Venezuela, and discusses this as follows: "A principios de octubre de 1925, nuestro sirviente de Laboratorio, encontró en la roseta de una *Pistia stratiotes* (vulgo repollito de agua) sobre la parte superior que siempre se mantiene seca, una larva de tabanido que llamó nuestra atención, . . . No nos parece que la presencia de la larva en la *Pistia* se obra de casualidad. Antes pensamos que sea una adaptación como la que se observa en las larvas de *Mansonia* para la misma planta, pues siendo ésta muy frecuentada por pequeños moluscos acuáticos que viven en la base de las hojas donde ponen sus huevos, la alimentación está de hecho garantizada, tanto más cuanto que la larva puede pasar fácilmente de una planta a otra. La *Pistia* se reproduce por estolones, y por eso hay siempre muchas plantas reunidas sobre la superficie de las aguas donde vegeta."

I have since been able to confirm the findings of Lutz by collecting the larvae of *Lepidosclaga lepidota* from the base of the leaves of *Pistia* on a number of occasions in Panama. The larvae of this species sometimes occur in considerable numbers among the leaves of these plants when the latter are thickly massed on the surface of pools of stagnant water.

Lastly I wish to report the finding of *Tabanus unicolor* Wied., in association with this plant in the Canal Zone. In July, 1929, I visited a pool of water near Gamboa, C. Z., several times for the purpose of collecting mosquito larvae. This pool was about forty feet in diameter, with but very little current and protected from wind action by high banks on two sides. Nearly the entire surface of the water was covered with *Pistia* and other aquatic plants. On one trip I collected a number of larvae of *Lepidosclaga* and also three other larvae that were larger in size and of a different appearance. These three larvae were nearly mature and were raised to adults. Upon their emergence the flies were sent to the late Dr. James S. Hine for definite classification and were found by him to be specimens of *Tabanus unicolor*.

Summary

Observations made in various parts of the world have shown that a number of species of blood-sucking insects that are of concern to man and animals are found to be closely associated with the water lettuce, *Pistia stratiotes*.

LITERATURE CITED

- Curry, D. P. 1932. Some observations on the *Nyssorhynchus* group of the *Anopheles* (Culicidae) of Panama. *Amer. Jour. Hygiene* 15: 568.
- Dunn, L. H. 1918. The lake mosquito, *Mansonia thillans* Walk., and its host plant, *Pistia stratiotes* Linn., in the Canal Zone, Panama. *Entomological News* 29: 294.
- Iyengar, M. O. T. 1933. Oviposition in mosquitoes of the sub-genus *Mansonioides*. *Indian Jour. Medical Research* 21: 101-102.
- King, H. H. 1926. A note on the bionomics of *Tabanus fasciatus niloticus* Aust. *Bull. Ent. Research* 16: 359.

- Lutz, A. 1928. Estudios de zoología y parasitología Venezolanas (pp. 59-60).
Rio de Janeiro.
- Macfie, J. W. S., and A. Ingram. 1923. Certain nurseries of insect life in West
Africa. *Bull. Ent. Research* 13: 294.
- Moore, H. W. B. 1910. Found at last. *The Daily Argosy, Demerara, British
Guiana.* Jan. 27, 1910. (Quoted by Dyar and Knab in *Entomological News*
29: 259.)
- Zetek, J. 1920. *Anopheles* breeding among water lettuce—A new habitat. *Bull.
Ent. Research* 11: 74.

LAWRENCE H. DUNN

GORGAS MEMORIAL LABORATORY
PANAMÁ, R. DE P.