

# COELOMOMYCES (BLASTOCLADIALES:COELOMOMY- CETACEAE) INFECTIONS IN LOUISIANA MOSQUITOES<sup>1</sup>

H. C. CHAPMAN AND D. B. WOODARD

Entomology Research Division, Agr. Res. Serv., U.S.D.A. Lake Charles, Louisiana

With a few exceptions (notably a record in the bug *Notonecta*), fungi of the genus *Coelomomyces* appear to be almost entirely restricted to mosquito hosts. Previously mosquitoes of the following species have been reported as hosts of *Coelomomyces* in this country: *Culex erraticus* (Dyar and Knab), *Culiseta inornata* (Wiliston), *Aedes vexans* (Meigen), *Uranotaenia sapphirina* (Osten-Sacken), *Anopheles crucians* Wiedemann, *Anopheles georgianus* King, *Anopheles punctipennis* (Say), *Anopheles Lum quadrimaculatus* Say, *Psorophora ciliata* (Fabricius), and *Psorophora howardii* Coquillett by Couch and Dodge (1947); *Aedes taeniorhynchus* (Wiedemann) by Lum (1963); *Aedes melanimon* Dyar by Kellen *et al.* (1963); and *Anopheles earlei* Vargas and *Anopheles walkeri* Theobald by Laird (1961).

During our field investigations in 1964

---

<sup>1</sup> In cooperation with McNeese State College, Lake Charles, Louisiana.

and 1965 in Calcasieu and Cameron Parishes in southwestern Louisiana, we observed larvae of *C. inornata*, *P. ciliata*, *P. howardii*, *Aedes vexans*, *A. taeniorhynchus*, *A. sollicitans* (Walker), *Culex restuans* Theobald, and *Culex salinarius* Coquillett parasitized by *Coelomomyces*. *A. sollicitans* and the two species of *Culex* represent new host records for this fungus. This report will encompass only field collections; these will be discussed under each species. This abundant infected material permitted intensive studies of sporangial germination and the morphology of the sporangia and hyphae and made it evident that the taxonomic waters were muddied to such an extent that the erection of one or perhaps more new species of *Coelomomyces* from new and old mosquito hosts would be necessary, (Dr. J. N. Couch, University of North Carolina, personal communication). We have therefore referred to the infections observed in these investigations as *Coelomomyces* sp.

Larvae were collected with dippers or nets and examined in the laboratory for *Coelomomyces*. Normally the infections are apparent because the formation of tremendous numbers of sporangia within the body usually gives the larva an orange or reddish hue. In the species we examined, this massive buildup of sporangia was usually seen only in the late fourth instar, except in *C. inornata* where it was often noted in second and third instar larvae.

*Aedes vexans*. Infected larvae (51) were collected from 6 localities on 15 occasions in January, February and early March 1965, in or adjacent to, wooded habitats. Although *A. vexans* occurs in prodigious numbers during late winter and early spring, the level of infection was less than 1 percent. No infections of associated species, *Aedes canadensis* (Theobald), *Aedes infirmatus* Dyar and Knab, *C. restuans*, *C. salinarius*, and *C. inornata*, were observed in the sites that produced infected *A. vexans*. Pupation of infected larvae was not observed. Larvae of *A. vexans* infected by *Coelomomyces* were previously known from Georgia (Couch and Dodge, 1945) and Minnesota (Laird, 1961).

*Aedes taeniorhynchus*. Infected larvae of *A. taeniorhynchus* were previously known only from Florida (Lum 1963). A single larva containing fungal spores was found in a collection of several hundred thousand larvae made in a salt marsh area near Big Lake in Cameron Parish in July 1965. Several infected specimens of *A. sollicitans* were collected at the same time from the same general area.

*Aedes sollicitans*. *A. sollicitans* represents a new host for *Coelomomyces*. All but 1 of 294 infected specimens of *A. sollicitans* were collected from a salt marsh area near Big Lake. Infected specimens were collected on 22 occasions extending over 4 months and beginning in mid-January 1965. Collections were made after the salt marshes had been flooded by rains or high tides. The level of infection in the field was well below 1 percent as it was not uncommon throughout the 4 months to collect 50-200 larvae in a

dip, especially when larvae were concentrated by receding waters in potholes and depressions.

Companion species in colder weather were *C. inornata*, *C. salinarius*, and *Anopheles bradleyi* King, and in warmer weather were *Psorophora confinnis* (Lynch-Arribálzaga), *P. ciliata*, *A. taeniorhynchus*, *C. salinarius*, and *A. bradleyi*. No infected specimens of associated species were found in areas that produced infected *A. sollicitans* except for several infected larvae of *C. inornata*. All visibly infected specimens of *A. sollicitans* died before pupation.

*Culex restuans*. *C. restuans* represents a new host record based on two collections in December 1964 and January 1965 of approximately 265 infected larvae from one small pond located adjacent to an oil field in a semi-wooded area near Lake Charles. The level of infection in *C. restuans* in this pond was 10-15 percent. Sporangia appeared to be less numerous in the larvae, and some pupation and adult emergence from infected larvae was observed. Dissection of emerged adults revealed numerous sporangia throughout the thorax. Such adults undoubtedly contribute to the dissemination of *Coelomomyces* in nature.

Although *C. restuans* is among the most abundant species in our area during colder weather (October-April), infected specimens were collected only from that one pool. Associated species were *C. salinarius*, *Culex territans* Walker, and *C. inornata*; only *C. inornata* was found to be infected in this pool.

*Culex salinarius*. *C. salinarius* represents a new host record based on the collection of one infected larva from a salt marsh near Cameron in March 1965. Apparently *C. salinarius* is an uncommon host of this fungus since we have examined many thousand larvae without finding more than one that was infected. The infected larva was collected in an area that consistently produced large numbers of infected larvae of *C. inornata*.

*Culiseta inornata*. Infected larvae of *C. inornata* have been reported previously

from Louisiana (Couch and Dodge, 1947), Mississippi (Laird, 1961), and Alberta, Canada (Shemanchuk, 1959).

We found several thousand larvae of *C. inornata* infected with *Coelomomyces* sp. in 35 collections made in 8 areas from late December 1964 to early April 1965, when breeding terminated because of warm weather. Infected larvae were collected in and adjacent to wooded areas as well as in open salt marshes. The level of infection in a large salt marsh in sight of the Gulf near Cameron consistently ranged from 20 percent to 40 percent; about 50 percent of the larvae of *C. inornata* were infected in a single collection from a pond on a wooded habitat adjacent to an oil field. All infected *C. inornata* died before pupation.

Larvae of *A. sollicitans* and *C. salinarius* often occurred in the salt marsh area that produced large numbers of infected larvae of *C. inornata*; only one larva of *C. salinarius* and none of *A. sollicitans* were infected.

*Psorophora ciliata*. Larvae of *P. ciliata* infected with *Coelomomyces* were previously reported only from Georgia by Couch and Dodge (1947).

A single collection of about 25 *P. ciliata* from a tire rut in a wooded area near Sulphur in 1965 yielded 1 infected larva. All associated larvae of *Psorophora ferox* (Humboldt) and *P. confinnis* were apparently uninfected.

*Psorophora howardii*. Infections of *Coelomomyces* in *P. howardii* were previously reported from South Carolina (Couch and Dodge, 1947) and Florida (Lum, 1963).

We collected 10 infected specimens on two occasions from transient shaded pools of water near Lake Charles in 1965. The larvae were in the third instar, and sporangial development was not noted until they reached the late fourth instar. Companion larve, *Aedes atlanticus* Dyar and

Knab, *P. ferox*, and *P. confinnis*, contained no visible infections.

Discussion. Our field observations indicate most species of *Coelomomyces* may infect only a single species of mosquito or that larvae of companion species are not available at the critical time required for infection to occur. We wonder how the *Coelomomyces* sp. of such cold weather species as *C. inornata* and *C. restuans* are carried through the period (May–October) when these mosquitoes are not present and their habitats are frequently flooded.

The apparent absence of *Coelomomyces* from our *Anopheles* spp. is surprising, especially since several species of *Coelomomyces* are not uncommon in *A. crucians*, *A. punctipennis*, and *A. quadrimaculatus*, in Georgia and North Carolina (Couch and Dodge, 1947; Umphlett and Couch, 1964.)

#### References

- COUCH, J. N., and DODGE, H. R. 1947. Further observations on *Coelomomyces* parasitic on mosquito larvae. J. Elisha Mitchell Sci. Soc. 63(1): 69–79.
- KELLEN, W. R., CLARK, T. B., and LINDEGREN, J. E. 1963. A new host record for *Coelomomyces psorophorae* Couch in California (Blastocladales: Coelomomycetaceae). J. Insect Pathol. 52(2): 167–73.
- LAIRD, M. 1961. New locality records for four species of *Coelomomyces* (Blastocladales: Coelomomycetaceae). J. Insect Pathol. 3:249–53.
- LUM, P. T. M. 1963. The infection of *Aedes taeniorhynchus* (Wiedemann) and *Psorophora howardii* Coquillett by the fungus *Coelomomyces*. J. Insect Pathol. 5(2):157–66.
- SHEMANCHUK, J. A. 1959. Note on *Coelomomyces psorophorae* Couch, a fungus parasitic on mosquito larvae. Can. Entomologist 91(11): 743–4.
- UMPHLETT, C. J., and COUCH, J. N. 1964. *Coelomomyces* in North Carolina A.S.B. Bull. 11(2):57.
- ACKNOWLEDGMENT. F. E. Glen, Jr., A. J. Mayeux, Jr., O. R. Willis and J. D. Hicks, Entomology Research Division, ARS, U.S.D.A., assisted in this study. Dr. J. N. Couch was kind enough to read the manuscript and offer advice.