best control. These data, although preliminary, indicate promising results and would appear to warrant more extensive investigation.

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EXPERIMENTAL INFECTIONS OF *ASCOGREGARINA LANYUENSIS* (APICOMPLEXA, LECUDINIDAE) IN *AEDES (STEGOMYIA)* SP. MOSQUITOES[1]

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Parasites of the genus *Ascogregarina* (formerly *Lankesteria*, then *Ascocystis;* Ward et al. 1982) naturally infect container-breeding mosquitoes. Mosquito larvae become infected by ingesting oocysts that are deposited into larval development sites by fecal contamination of infected adults, or disintegration of infected adults on the water surface. The parasite matures through several stages as the mosquito develops, and adults emerge with oocysts in the Malpighian tubules. Gregarine parasites usually do not have a significant effect on their natural mosquito hosts (McCray et al. 1970, Beier 1982). However, in cross-infection experiments using a range of culicid hosts, Walsh and Olson (1976) demonstrated that *Ascogregarina culicis* (Ross) caused extensive pathology and high larval mortality. *Ascogregarina lanyuensis* was recently described from *Aedes alcasidi* Huang in Taiwan along with 2 other new species of gregarines from mosquitoes (Lien and Levine 1980). This study examines the host susceptibility of 10 *Aedes (Stegomyia)* sp. mosquitoes for *A. lanyuensis*. Efforts were made to determine if the parasite can complete its life cycle in these experimental hosts, and to determine if any larval mortality resulted from gregarine infections.

Mosquitoes used in experiments were from laboratory colonies maintained at the Vector Biology Laboratory, University of Notre Dame. The *A. lanyuensis* parasites were from a laboratory stock maintained by mosquito passage, and originally derived from material used in the species description by Lien and Levine (1980). For each species, 5 groups of 100 first instar larvae were placed in 3-liter enameled pans with 1 liter of deionized water. Three of the 5 groups received 200,000 oocysts of *A. lanyuensis*, while the other 2 groups served as controls. A check on the viability of each batch of oocysts was made by exposing larval *Ae. alcasidi*, the natural host, to test doses and determining the incidence of infection. All groups of larvae were reared in an insectary at 27°C, 80% RH, and a photoperiod of 18L:6D. Larval nutrition was standardized by adding the same concentration of liver powder solution to each group.

Host susceptibility was determined by dissecting 50 fourth instar larvae in dilute methylene blue stain and microscopically examining the midgut for gamonts at 40× as described by Beier (1982). The degree of infection was rated on a relative scale from 1–5, according to the number of gamonts: 1, ≤10; 2, 10–50; 3, 50–100; 4, 100–200; and 5, > 200.

Larval mortality was determined for the remaining control and infected groups by counting pupae. To test for completion of the parasite life cycle, i.e. production of oocysts in adults, pupae were placed in 200 ml screened cups with 100 ml water, and allowed to emerge and die on the water surface. Dead adults were ground using a blender, and the solution was filtered to isolate oocysts as described by Beier (1982). To test for the presence and viability of oocysts, the filtrate was added to a pan of 100 first-instar *Ae. alcasidi*. Fourth instar larvae were dissected and examined for gamonts as described above.

Infections of *A. lanyuensis* were detected in every *Aedes* sp. tested (Table 1). Infection rates of 100% were found in the natural host, *Ae. alcasidi*, 2 other species in the Scutellaris Subgroup, and the 2 species tested in the Aegypti subgroup. The median degree of infection as determined by the number of gamonts/larva, was heaviest in the Scutellaris and Aegypti subgroups. The degree of susceptibility and intensity of infection was lower in the Albopictus and Annandalei subgroups. Also, sus-

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Table 1. Results of experimental infections of *Ascogregarina lanyuensis* in *Aedes* species.

Stegomyia subgroup	Species	% infected	Median degree of infection*
Scutellaris	*Ae. alcasidi* Huang	100	+++
	Ae. cooki Belkin	58	+
	Ae. kesseli Belkin	100	++
	Ae. malayensis Colless	100	+++
	Ae. tongae tabu Edwards	80	++
Albopictus	*Ae. albopictus* (Skuse) MALAYSIA	12	+
	Ae. albopictus (Skuse) TAIPEI	24	+
	Ae. albopictus (Skuse) TANA	60	+
	Ae. seatoi Huang	28	+
Aegypti	*Ae. aegypti* (Linnaeus) ROCK	100	++
	Ae. heischi Van Someren	100	++
Annandalei	*Ae. annandalei* (Theobald)	30	+

* Relative number of gamonts in the midgut: +=≤10, ++=10–50, +++=50–100.

ceptibility was variable among the 3 strains of *Ae. albopictus* (Skuse), ranging from 12–60%.

The parasite did not cause larval mortality in any of the species tested. The difference in mean larval mortality between control and infected groups did not exceed 3.5%. *Ascogregarina lanyuensis* completed its life cycle in all species tested.

This study shows that *A. lanyuensis* is capable of infecting and completing its life cycle in a range of *Aedes* species without causing host mortality. In the original description of this parasite from *Ae. alcasidi* in Taiwan, Lien and Levine (1980) found that *A. lanyuensis* could infect, but not complete its life cycle in *Aedes aegypti* (Linn), *Ae. albopictus* and *Armigeres subalbatus* (Coq.). Even though most other gregarines of mosquitoes can infect some aberrant (non-natural) hosts, infection rates and levels of infection are usually less than those found in the natural host (Sanders and Poinar 1973, Lien and Levine 1980, G. B. Craig, unpubl. data). Cross-infection studies with *A. culicis* (Walsh and Olson 1976) and *A. barretti* (G. B. Craig, unpubl. data) have demonstrated extensive pathology and high mortality in aberrant hosts. *Ascogregarina lanyuensis* differs from most gregarines in that it can complete its life cycle in aberrant hosts without producing host mortality. The higher levels of susceptibility and degree of infection in the Scutellaris and Aegypti subgroups suggest that this parasite evolved in association with species in some of the subgroups within the subgenus *Stegomyia* but not in others. Further studies are needed to elaborate these phylogenetic differences and to test mosquitoes outside the subgenus *Stegomyia* group.

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