NOTES ON *OMALONYX*

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The habits of *Omalonyx* are incompletely known. These strange-looking Succineids are known from South America (Brasil, Argentina, Paraguay, Uruguay, Bolivia, Venezuela) and the Lesser Antilles (Dominica, Guadeloupe, Trinidad). In this paper we are reporting their presence in Ecuador, St. Lucia and Antigua.

Several species of *Omalonyx* have been named: *Omalonyx unguis* (Férussac), *O. patera* Doering, *O. felina* Guppy, and *O. guadeloupensis* (Lesson) among others. In a recent work Parodiz (1963) compared two of the species: *O. unguis* and *O. patera*. Parodiz (personal communication, 1966) feels that *O. unguis* is associated with the Amazon system while *O. patera* seems to be in the Parana River system. He has identified our Ecuadorian specimens as *O. unguis* (Férussac).

We also have specimens from the Lesser Antilles and this paper will compare those with *Omalonyx unguis* from Ecuador. Some of the Lesser Antillean specimens seem to match the description of *O. felina* Guppy (those from Antigua) as described by Baker (1925, 1926) and others that of *O. guadeloupensis* (those from St. Lucia). We are not attempting to make a taxonomic evaluation here but merely a comparison of the habits, habitats, and some of the anatomical detail.

OMALONYX UNGUIS FROM ECUADOR

The animals Casual inspection of *Omalonyx* from Ecuador and *Omalonyx* from the Lesser Antilles reveals little difference. However, when one examines the radulae (Figs. 3, 5) and the jaws (Figs. 4, 6) of the two, one finds distinct differences. In comparing the radulae of our Ecuadorian specimens (Fig. 5) with the sketch of the radula of *O. unguis* from Argentina (Fig. 7) we also see rather distinctive differences; however, these may be the result of different individuals making the sketches. Further, in comparing our material with the sketch (Fig. 8) of *O. patera* we see little comparison. The central tooth and jaw of *O. felina* from Venezuela (Fig. 9) and *O. guadeloupensis* from Guadeloupe (pictured, Fig. 3) and those of St. Lucia and Antigua (not pictured) resemble one another enough that it is possible that the whole group may be one species.

Twenty-two *O. unguis* collected at random from the study area (see next section) in Ecuador were measured. The largest measured 38 mm in length and 13 mm wide when in the normal crawling position; the shell was 17 mm long and 10 mm wide. The smallest one measured 5 mm in length and 2 mm wide when crawling; its shell measured 3 X 2 mm.

Habitat type: *Omalonyx unguis* was found living at Limoncocha in the Oriente jungle region of Ecuador. Limoncocha is a small Quechua Indian village and jungle base for the Ecuadorian branch of the Instituto Linguistico de Verano. It is located at 00° 24' S Lat. and 76° 36' W Long. near the junction of the Rio Napo and Rio Jivino and is on the west bank of Lake Limoncocha at an elevation of 900 feet. Lake Limoncocha, which empties into the Rio Napo, is a fresh-water lake 1.5-2 miles long and 0.5-0.75 mile wide.

The study area: This was on the west bank of Lake Limoncocha. It extended about 10 feet along the bank and 20 feet into the water (Fig. 1). Vegetation, consisting mainly of the grass, *Hymenachne donacifolia* (Raddi) Chase and two members of the Pontederiaceae, *Eichornia crassipes* (Martius) Solms, water-hyacinth, and *Pontederia* sp., pickerel-weed, extends, in some areas, out into the lake about 100 feet from the bank. Surrounding the lake is a tropical rain forest. Animals common in the lake are *Ampullaria* sp., Piranha, and fresh-water sting rays.

Macro- and Microclimates of the study area: Weather data are collected thrice daily at Limoncocha. Maximum and minimum temperatures recorded during January, 1961, to March, 1964, were 31° C and 20° C, respectively. There is almost no seasonal temperature variation. The average annual rainfall for three years prior to this study was 107.8 inches. Two rainy seasons occur: April-May-June, and October-November. Humidities, based on 3 readings per day for a 3-year period, average 94.3% at 7 a.m., 73.5% at 1 p.m., and 92.5% at 7 p.m. These readings are taken at a distance of 200-300 feet from the lake so it may be assumed that the humidity in the microhabitat is even greater.

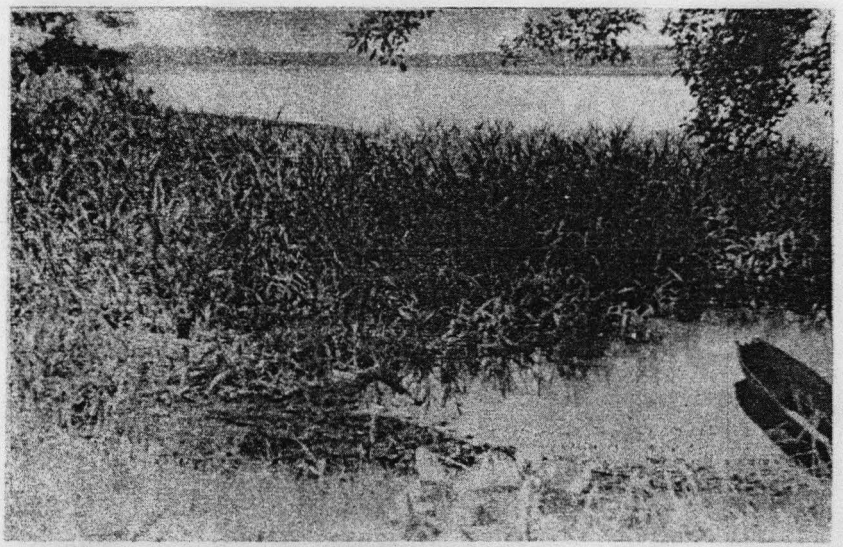
A 24-hour temperature check in September, 1964, gave the following results: air temperature over the lake (20 feet from the bank and 1 foot above the water) ranged from 20 to 26° C with a mean of 22.8° C whereas the lake water temperature (1 foot below the surface) in the same area fluctuated from 22 to 33° C with a mean of 28°3 C.

Distribution of Omalonyx *in the area:* Data gathered in the study area (limited to 20 feet from the bank because of depth) from 11 p.m., September 27, to 3:30 p.m., September 28, 1964 reveal that 63.8% of the snails were found 11-20 feet from the bank; the remaining 36.2% were within ten feet of the bank. There was no significant movement toward or away from the bank at any time during this period. It is possible that others were farther out in the lake also but equipment was not available for working farther out.

The grass, *Hymenachne donacifolia* (Raddi) Chase, was the choice site of 67.2% of the snails sampled while 25.8% were found on floating logs on boards which were often covered with algae. Three and one-half percent were on plants of the Pontederiaceae and 3.5% were swimming in the water. Of those found on the grass above the water, 91.4% were 0-6 inches high while the remainder, 8.6%, were 7-18 inches above water level. About 60% of these snails sampled were larger than 20 mm in length. Also found on the grass above the wwter were numerous *Omalonyx* egg masses (Fig. 1a).

Snail densities at three different times varied from 1.6 snails per sq. ft. to 0.5 snails per sq. ft. A canoe trip around the lake revealed *Omalonyx* to be present on all sides of the lake but they were more abundant on the west side where the growth of the grass was more extensive.

Habits: Movements of *O. unguis* were studied in several marking experiments. Identifying marks were made on the shells with nail polish. As is usually the case, the longer the time after release, the less the recapture rate. Only a general conclusion can be drawn from these data: that *O. unguis* does not move a great distance. The maximum movement reached by any of the snails up to the time of re-



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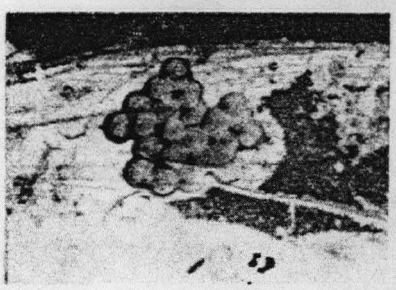

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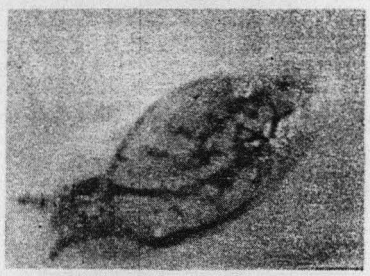

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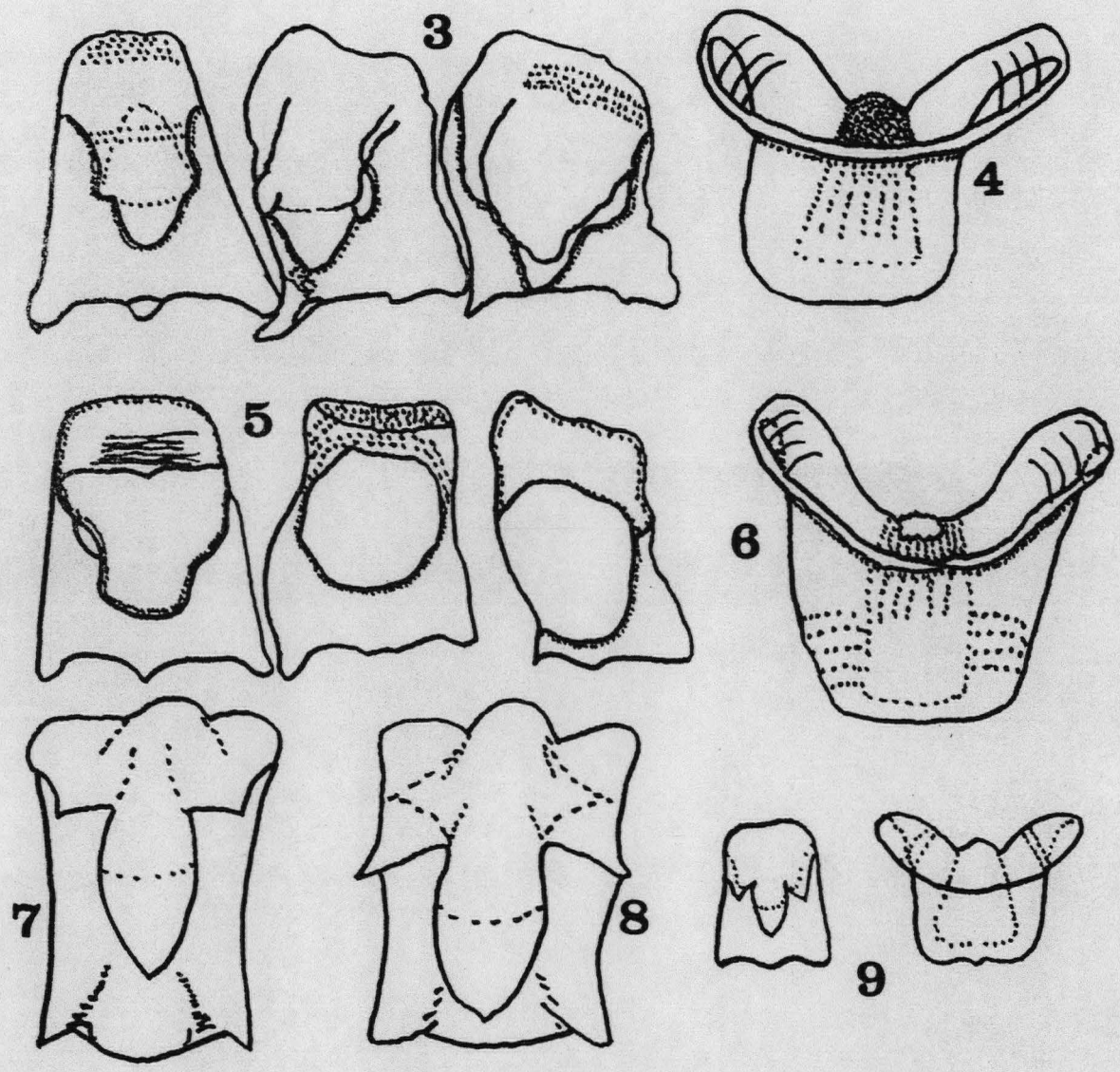
EXPLANATION OF FIGURES 1-2

1. Lake Limoncocha, the habitat of *Omalonyx unguis*.

1a. Clutch of *Omalonyx* eggs.

2. *Omalonyx felina* from Antigua.



EXPLANATION OF FIGURES 3-9

3. Radular components of *Omalonyx guadeloupensis* from Guadeloupe. Central tooth, first lateral, seventh lateral.

4. Jaw of *Omalonyx guadeloupensis from* Guadeloupe. Central tooth, first lateral, seventh lateral.

5. Radular components of *Omalonyx unguis* from Ecuador. Central tooth, first lateral, seventh lateral.

6. Jaw of *Omalonyx unguis* from Ecuador.

7. Central tooth of *Omalonyx unguis* from Argentina. (Copied directly from Parodiz, 1963).

8. Central tooth of *Omalonyx patera.* (Copied directly from Parodiz, 1963).

9. Central tooth and jaw from *Omalonyx felina* from Venezuela. (Copied directly from Baker, 1926).

capture was 6.1 m. On one occasion 2 empty, marked shells were found on top of a floating board. Since they swim 'upside down,' it is possible that, once painted, they become more conspicuous to subsurface predators.

Studies involving food preferences, mating, and egg deposition were conducted both in the field and in the laboratory. Plastic containers (17.5 X 12.5 X 7.5 cm) provided with 2.5 cm of lake water and vegetation from the lake were used to house the animals in the laboratory.

In the laboratory *Omalonyx unguis* was offered 4 types of vegetation taken from the study area and accepted all of the types. However, they showed a preference for the grass, *Hymenachne donacifolia*. Field studies supported the laboratory observations and, in addition, the snails were seen rasping on the algal growth on floating boards and logs. The other plants accepted were: *Eichornia crassipes* (Martius) Solms, *Pontederia* sp., and the fruit of *Ficus* sp. Of interest also was the observing of one *Omalonyx* rasping on the dying soft parts of another. Only the shell and a portion of its posterior remained.

Reproductive habits: From September through November mating pairs were found in the field and laboratory with no particular time of day preferred for this activity. All of the pairs were found after mating had begun so if there is a courtship, it was not observed. During coitus the snails faced in opposite directions, right sides adjacent, and each was bent into a crescent, the points of which were to the right side of each snail. The duration of the seven matings which were timed ranged from 45 minutes to 6 hours. In one case, coitus was terminated by a member of the pair moving clockwise, mounting its partner's dorsum and moving forward until the two were parallel, one on top of the other. Then, continuing in a clockwise direction, it began dismounting and the penis from each was then retracted. Two mating pairs were found in the field between October 25 and 26 and each pair placed in a plastic container. Each pair was again found in coitus twice during the next 6 days. In each case, eggs were laid from the 6th through the 16th day after the first mating. One pair deposited 6 egg clutches (61 eggs) during this period and the other laid 9 clutches (73 eggs). The first two egg masses deposited in each container had almost twice the number of eggs as subsequent clutches.

In the lake, egg masses were often found on the stems or leaves of *Hymenachne* while in the laboratory most clutches were deposited on the vertical sides of the containers with *Hymenachne* a second choice.

Eggs were usually deposited in clutches containing 4 to 20 with occasional drops of 1 to 3 eggs. The eggs, spherical and clear with a milky-looking center, measured 2 mm soon after deposition and were supported by a mass of transparent gelatinous material in an oval to circular single-layered clutch. One egg mass containing 17 eggs measured 16 X 19 mm.

OMALONYX FROM THE LESSER ANTILLES

Both the animals collected on St. Lucia and those from Antigua seem to be more amphibious than those from Ecuador. The Antiguan specimens (Fig. 2), for example, were taken from atop a steep bank adjacent to a stream which had been dammed to form a small water-supply reservoir. The animals were living beneath a large brushpile on soil which was merely moist—not wet. Dr. Malek (in conversation) reports that the St. Lucian specimens were found on vegetation along a bank and that he has seen one animal floating on vegetation in the water.

Omalonyx felina is very easy to raise in the laboratory. In small plastic containers with a little sand or filter paper, a coconut husk, and some lettuce for

food, they reproduce well. The average incubation period of a number of clutches of eggs (Fig. 1a) was 11 days. This compares favorably with the *O. unguis* figures of 9 to 13 days. From two adults we obtained over two dozen clutches of eggs with an average of 16 eggs per clutch but, just as with *O. unguis*, the numbers ranged from 1 to 2 dropped singly to 26 per clutch. Average incubation time was 11 days (range 9 to 12); again this compares favorably with *O. unguis* from Ecuador. Although we have had none reach maturity yet in our laboratory, it appears that, based on the growth rate, maturity will be reached in approximately three months from hatching.

ACKNOWLEDGEMENTS

We would like to thank Dr. J. J. Parodiz for his identification of *O. unguis* from Ecuador, Dr. Emile Malek who collected and donated the specimens from St. Lucia, Drs. V. Rudd and J. J. Wurdack of the U. S. National Museum for their identifications of the plants.

The senior author extends gratitude to the Instituto Linguistico de Verano (Limoncocha and Quito, Ecuador) for their friendly interest and the use of their facilities while in Ecuador.

The junior author is indebted to The American Philosophical Society which provided travel funds for another project. While in the area to work on it, there was also opportunity to observe and collect these animals.

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MANUSCRIPT RECEIVED AUGUST 26, 1967
ACCEPTED FOR PUBLICATION SEPTEMBER 2, 1967