

THE DISTRIBUTION OF CAMBARUS SLOANI BUNDY, IN OHIO¹

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The suggestion that *Cambarus sloani* might be found in southwestern Ohio was made in a letter from Dr. Edwin P. Creaser in 1937. Acting upon his suggestion, I began to look for this species and in September, 1938, *C. sloani* was taken in Shakers Creek, Warren County, Ohio. Further collecting westward and across the Great Miami proved the species to be common and often dominant in six counties.

SUMMARY OF DISTRIBUTION

C. sloani, now recorded for the first time from Ohio, is found in the southwestern corner of the state, west of the Great Miami and the Stillwater rivers, and south of the tributaries of Greenville Creek. The species has successfully crossed the Great Miami River in Warren and Hamilton counties and now occupies a few tributary streams to the east (Fig. 7). At the mouth of Clear Creek, Warren County, only a half mile east of the Great Miami, two specimens were taken with fifty *C. rusticus*. A small percentage of the crayfish populations in Taylors and Jordan creeks, Hamilton County, is composed of *C. sloani*. It was taken once in the Stillwater River system (two specimens in Dry Run, Madison Township, Montgomery County), but was not collected in Greenville Creek or its tributaries.

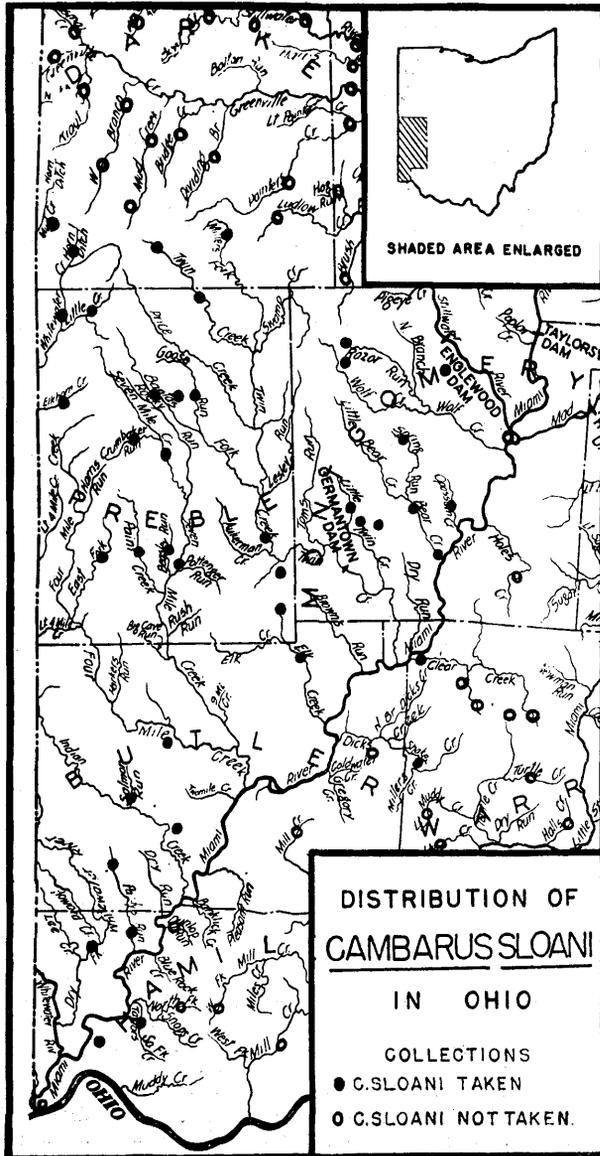
C. sloani has probably invaded Ohio from the Whitewater River system in Indiana, presumably in Darke and Preble counties where the headwaters of Seven Mile and Prices creeks closely approach the Whitewater system in the flat land;

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once the swamp forest of those counties. Seven Mile and Twin creeks contain the greatest concentration of this species



in Ohio. Curiously, none were found in Indian and Four Mile creeks, except in a few small tributaries.

No specimens have been taken from the Great Miami River itself. This river seems to be an unfavorable ecological system, even to the extent of retarding the spread of the species eastward. In recent years pollution may have become a barrier.

A specimen was taken in Shakers Creek, Warren County, a locality near the old Lebanon Canal bed. In this vicinity the Great Miami and the Little Miami drainage areas were connected from 1835 to 1865 by "Old Shakers Pond." *C. sloani* has not been taken in the Little Miami River drainage area. However, Little Muddy Creek would seem the most probable locality.

The species is known from Southern Indiana and recorded from "northern Kentucky" by Bundy. The distribution of *C. sloani* has not been well studied in Indiana. In that state it is known from the Whitewater, the White, the Muscatatuck, and the Blue rivers, all streams of southern and eastern Indiana. From the type locality at New Albany, Floyd County, Indiana, Dr. J. Sloan reports that this species is a burrower in banks of streams (Faxon, '85: 90). No burrowing habit has been observed in southwestern Ohio, except that shallow pockets have been cleaned out under flat stones.

Streams inhabited by *C. sloani* generally have a flat stone bottom. The stones are broken and well rounded by the action of the water. A lack of such stones may explain the absence of the species in Indian and Four Mile creeks, which also lack the stability of bank and bottom present in Twin Creek and Seven Mile Creek. *C. sloani* is most often found near algal beds and aquatic vegetation, and in aquaria the species consumes large quantities of plant material. Temperature does not seem to be an important factor in its distribution.

TAXONOMIC REMARKS

C. sloani belongs to the *Cambarus limosus* group, probably the most primitive division of the subgenus *Faxonius*. The male of this group is characterized by short thick gonopods, which are split for only a short distance from the tip. The annulus ventralis of the female is little sculptured and usually low and flat.

Characters.—Rostrum long with straight, slightly converging sides; excavation moderate with margins not thickened. Sides of acumen concave, forming, with the sides of the rostrum, sharp angles or small horny tips; rarely spines in adult. Spines normal in juvenile specimens. Broad, short median carina in rostrum. Postorbital ridges prominent but ends never spiniform. Cervical groove slightly sinuate and broken

above the more or less developed acute lateral spines. Areola wide (3 to 5 rows of dots). Carapace subquadrangular with no unusual granulations, but many closely set large dots (Fig. 2).

Antennal scale long, and broadest at or above the middle; medial margin uniformly curved. Epistoma broadly triangular with the two free edges elevated, elevation at the anterior tip bearing a small emargination.

Chelae with outer margin of hand keeled. Keel often divided by a closely set row of dots, forming almost a solid line down the margin. Two well developed rows of depressed tubercles on the inner margin of the palm, and usually a few irregular tubercles appear above these in old individuals. The medial margin of the movable finger also bears two rows of the same type of rounded tubercles, which diminish in size toward the distal end of the finger.

Form I.—Copulatory appendages of first abdominal segment short and thick, reaching to the coxopodite of the second or third walking leg. Hay ('95: 495) describes the rami with the outer tip turning out and the inner tip turning in. This is found to be true from a ventral aspect, that is, the outer tip curves laterally and the inner tip curves medially, but from side view the outer tip is straight and the inner tip is curved strongly outward. Outer ramus twice as thick as inner one and straight or only slightly recurved from lateral view. Body of appendage heaviest at or below the middle. Tufts of hair found on the base of the internal surface of the inner ramus and on the medio-ventral ridge near the basal articulation (Figs. 4 and 6).

Form II.—Copulatory appendages slightly shorter than Form I, and lacking the horny tip on the outer ramus. Instead, this part is bluntly rounded at the tip and has a uniform diameter throughout the distal half, which is increased twice in the basal portion. Internal ramus thicker and more closely joined to the external portion. The long gentle curvature of the inner ramus in Form II contrasts with the strong curvature near the tip in Form I. Thickest part of appendage at or above the middle. Tufts of hair ventrally and near the base may or may not be present (Figs. 1 and 3).

The annulus ventralis of the female as figured and described by Hay ('95: 496) seems to be inadequate for Ohio specimens. He does not mention the prominent diverging ridges along the anterior border nor does he refer to the deep furrows which they overhang. The elevated posterior border is a common character in the Ohio and Indiana specimens, but the tuberculation on the posterior rim amounts to no more than a general high area, as shown by my specimens (Fig. 5). This

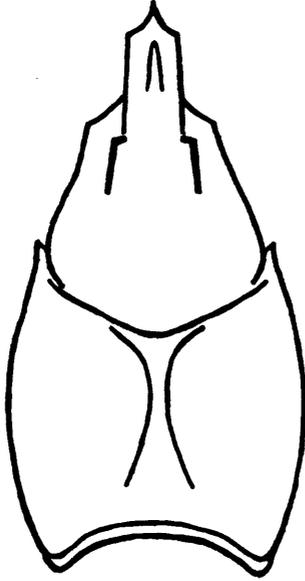
EXPLANATION OF PLATE

Cambarus sloani

- Fig. 1. Gonopod, Male II, outer view.
- Fig. 2. Carapace, dorsal view.
- Fig. 3. Gonopod, Male II, inner view.
- Fig. 4. Gonopod, Male I, outer view.
- Fig. 5. Annulus ventralis
- Fig. 6. Gonopod, Male I, inner view.
- Fig. 7. Distribution of *Cambarus sloani*.



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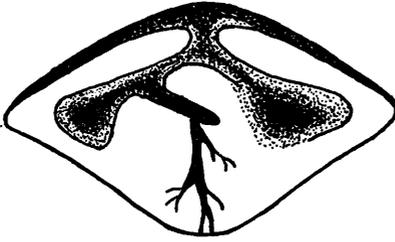
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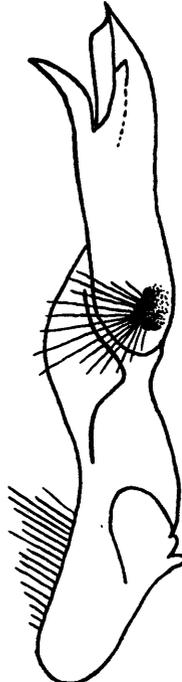
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posterior area is often cut by a deep medial furrow which extends anteriorly and bends to the observer's left, and is the posterior border of a prominent tubercle near the middle of the depressed area. The anterior border, nicely described by Bundy and Hay, is depressed below the sternal plates, which slope strongly downward to join the annulus.

Bundy ('76: 24) states that the "first abdominal legs short, bifid, outer part slightly longer, flattened, bent outward at apex, slightly recurved, acute; tubercles at inner base small." This describes Form I, especially from ventral view. He states that the third maxillipeds are smooth below, hairy within.

The basal segment of the telson is bispinous, according to his description, but this is not a specific character since many other species possess such spines.

Hay ('95: 496) describes the copulatory appendages as having "large inwardly projecting knobs at the base of the appendages." This projection, as Bundy states, is smaller in Form II than in Form I. The appendages in Form II often lack any basal articulation and are thus easily lost.

COLORATION OF CAMBRIUS SLOANI

The color resembles somewhat the members of the *propinquus* group. The green pigment, so prevalent in the *rusticus* group, is lacking. The coloration of the carapace is in shades of brown. The darkest color is found immediately in front of the cervical groove, and on the dorso-lateral portion of the posterior branchial regions. The middle of the areola often bears a dark stripe of brown. Within the concavity of the rostrum is always found light and dark brown in various patterns.

The abdomen of old individuals is marked with two irregular lines of dark pigment down the dorsum; in young specimens these may appear as a dark spot on each segment. The posterior margin of each segment is marked with a thin line of orange, extending over the tergum from one pleural lobe to the other.

The chelae are light flecked with dark, which at first sight, gives them the appearance of having coarse tuberculation. The tubercles on the dorsal anterior articulation of the carpus, the dorsal articulation of the movable finger, and the tips of both fingers are bright orange. Immediately behind the orange tips of the fingers are brownish, almost black bands.

The ventral portions of the body of clean individuals are nearly white, much lighter than any of the *rusticus* or *propinquus* group.

COPULATION RECORD

Oppossum Run, Sec. 23, Jefferson Twp., Montgomery Co., Ohio.
October 10, 1938.

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