

A NEW CRAYFISH FROM THE UPPER COASTAL PLAIN OF GEORGIA (DECAPODA, ASTACIDAE)

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The Advena Section of the genus *Procambarus* was erected by Hobbs (1942) to indicate the close affinities of six species and subspecies [*advena* (LeConte, 1856: 402); *geodytes* Hobbs (1942: 80); *pygmaeus* Hobbs (1942: 83); *r. rogersi* (Hobbs, 1938: 61); *r. ochlocknensis* Hobbs (1942: 89); and *r. campestris* Hobbs (1942: 90)] which inhabit certain areas of the Coastal Plain in Georgia and Florida. Because the former three species are so obviously more closely allied to one another than any one of them is to the three subspecies of *P. rogersi* Hobbs proposed that the Section consist of two groups which he designated the Advena and Rogersi Groups. The species herein described, while resembling the members of the Advena Group more closely than those of the Rogersi Group, is so distinct that it seems advisable to erect a monotypic group for its reception. Further, the first pleopod of the male is so modified that the definition of the Section must be revised in order that this disjunct species may be included within it.

ADVENA SECTION (HOBBS, 1942: 73)

Diagnosis.—The cephalodistal surface of the first pleopod of the first form male never terminates in a ridge or knob-like prominence but in a corneous, often-reduced cephalic process; if the cephalic process is absent, then the cephalodistal surface is almost flush with the centrocephalic process of the central projection, *or the terminal elements are directed distinctly caudad*. The mesial process is spiniform or blade-like, and directed distad *or caudad*; the central projection is decidedly the most conspicuous terminal element, and is either laterally compressed or directed across the cephalodistal tip of the appendage. The caudal element is present as a large bump or thumb- or lip-like knob. The rostrum is broad and short and without lateral spines; the areola is narrow or obliterated; the male has hooks on the ischiopodites of the third, or on the third and fourth pereopods; the chelae are depressed and bear a cristiform row of tubercles along the inner margin of the palm.

TRUCULENTUS GROUP

Diagnosis.—The terminal elements of first pleopod of first form male arise from the caudal side of the distal portion of the appendage and are directed caudad; the mesial process is completely obscured in lateral aspect by the central projection. The distal portion of appendage is greatly elongated in the longitudinal plane of the body (not the appendage). Hooks are present on the ischiopodites of the third pereopods of the male.

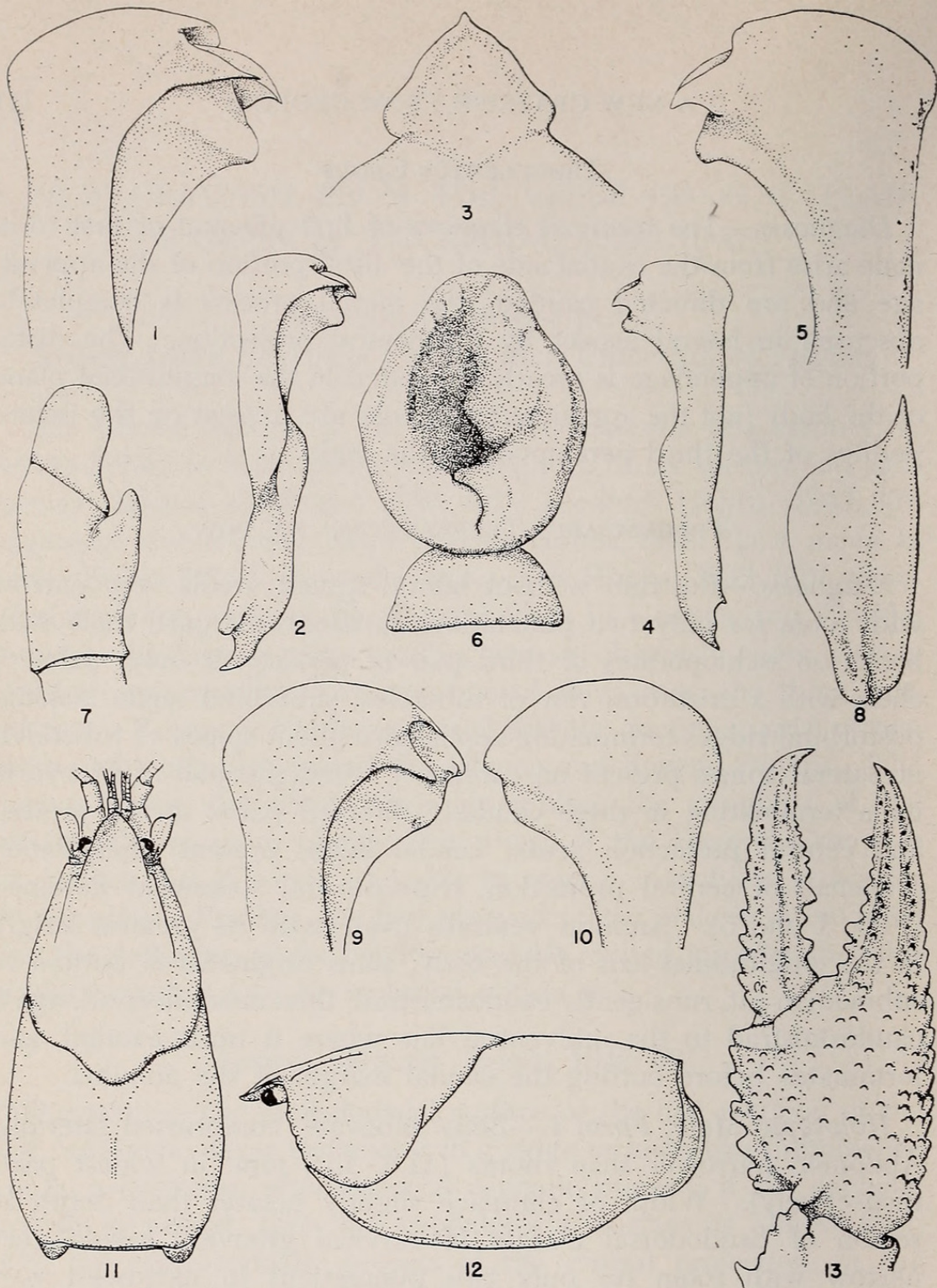
PROCAMBARUS TRUCULENTUS,¹ sp. nov.

Diagnosis.—Rostrum without lateral spines; areola very narrow with room for only two punctations in narrowest part; male with hooks on ischiopodites of third pair of pereopods only; palm of chela with a cristiform row of tubercles; suborbital angle lacking; postorbital ridges terminating cephalad without spines or tubercles; no lateral spines present on carapace. First pleopod of first form male terminating in three caudally directed parts: mesial process and central projection acute; caudal knob, present immediately proximad of central projection, truncate and somewhat flattened (Figs. 1 and 5). Annulus ventralis ovate with its greatest length in the longitudinal axis of the body; sinus originates in bottom of submedian pit, runs gently caudosinistrad, then caudodextrad, again caudosinistrad to the midventral line where it turns caudad, and terminates before cutting the caudal margin of the annulus.

Holotypic Male, Form I.—Body subovate, compressed laterally. Abdomen narrower than thorax (11.5 - 15.9 mm. in widest parts respectively). Width of carapace slightly greater than depth in region of caudodorsal margin of cervical groove. Areola very narrow with room for only two punctations in narrowest part (punctations widely spaced in two irregular rows); cephalic section of carapace 1.6 times longer than areola (length of areola about 39% of entire length of carapace).

Rostrum excavate above, almost reaching distal end of penultimate segment of antennule; margins converging, raised but not thickened; acumen indistinct; upper surface of rostrum smooth except for a single row of setiferous punctations at base of marginal ridges and two or three scattered ones. Subrostral ridges well defined but

¹ *L. trux*—savage, rough, ferocious; *L. lentus*—tenacious.



EXPLANATION OF PLATE

Procambarus truculentus

- Figs. 1 and 2—Mesial view of first pleopod of holotype.
 Fig. 3—Epistome of holotype.
 Figs. 4 and 5—Lateral view of first pleopod of holotype.
 Fig. 6—Annulus ventralis of allotype.
 Fig. 7—Basipodite and ichiopodite of third pereopod of holotype.
 Fig. 8—Antennal scale of holotype.
 Fig. 9—Mesial view of first pleopod of morphotype.
 Fig. 10—Lateral view of first pleopod of morphotype.
 Fig. 11—Dorsal view of carapace of holotype.
 Fig. 12—Lateral view of carapace of holotype.
 Fig. 13.—Upper surface of distal podomeres of cheliped of holotype.

scarcely evident in dorsal aspect. Postorbital ridges moderately strong, grooved, and terminating cephalad without spines or tubercles. Suborbital angle lacking, branchiostegal spine moderately strong. No spines present on sides of carapace. Surface of carapace punctate and polished dorsad, granulate laterad.

Abdomen shorter than carapace (27.3 - 31.7 mm.).

Cephalic section of telson with two spines in the dextral and three in the sinistral caudolateral corners.

Epistome (Fig. 3) subtriangular with a cephalomedian spine. Antennules of the usual form; however, no spine present on ventral surfaces of basal segments. Antennae extend caudad to second abdominal segment; antennal scale (Fig. 8) small with a strong spine on outer distal margin; lamellar portion gently rounded and broadest distad of middle.

Right chela (Fig. 13) moderately strong, depressed, and studded with tubercles. Inner margin of palm with a cristiform row of seven tubercles (left chela with eight). Fingers only slightly gaping. Opposable margin of dactyl with nine corneous tubercles on proximal four-fifths; between and distad of these is a single row of minute denticles. Mesial margin of dactyl with a row of strong ciliated tubercles which are progressively more squamous distad. Upper surface of dactyl with a well-defined submedian ridge which is flanked proximally by tubercles and distally by setiferous punctations. Lower surface of dactyl tuberculate proximad and bearing setiferous punctations distad. Opposable margin of immovable finger with a row of six large tubercles on proximal three-fifths, and a much larger one at base of distal fourth. Outer margin of immovable finger with a distinct ridge which bears a row of ciliated tubercles proximad, the latter giving way to a row of setiferous punctations distad. Proximal, inner, lower surface with a row of five prominent tubercles; outer proximal portion with scattered tubercles, and distal portion with setiferous punctations. Median ridge on upper surface of immovable finger flanked proximally by tubercles and distally by setiferous punctations. Near tip on outer margin of immovable finger is a large punctation bearing a heavy growth of setae; a similar punctation near tip of dactyl.

Carpus of first right pereopod about 1.6 times longer than broad; a well-defined longitudinal groove above; punctate except on inner surface which bears several spike-like tubercles (two distinctly

larger ones in middle, and two large ones somewhat below and distad of these two); in addition an irregular row of seven smaller ones along upper inner margin.

Merus punctate laterad and mesiad; upper surface with two very irregular rows of tubercles which are progressively larger distad; lower surface with a mesial row of eleven spike-like tubercles, and an outer row of eight; cephalad these two rows are joined by an oblique row of four similar tubercles.

Hooks on ischiopodites (Fig. 7) of third pereiopods only; hooks large with proximal surface excavate and setiferous. Bases of coxopodites of fourth and fifth pereiopods with ventrally projecting prominences; those on fourth large, heavy, and truncate; those on fifth smaller than those on fourth but more acute.

First pleopod (Figs. 1, 2, 4 and 5) reaching base of second pereiopod when abdomen is flexed. Tip terminating in three parts. Mesial process triangular with an elongate, acute, corneous tip; central projection corneous, short, and subtriangular; caudal element consists of a swollen and slightly compressed caudal knob lying immediately proximad of central projection. All three terminal elements directed caudad at about right angles to the main shaft of the appendage.

Allotypic Female.—Differs from the holotype in the following respect: Sides of epistome emarginate; cephalic section of telson with two spines in the dextral and one in the sinistral caudolateral corners; inner margin of palm of chela with a cristiform row of ten tubercles; other slight differences exist in the size and number of tubercles present on the several structures described for the holotype. Annulus ventralis (Fig. 6) deeply imbedded in sternum, subovate, with the greatest length in the longitudinal axis; deeply excavate (for course of sinus see Diagnosis). (See *measurements*.)

Morphotypic Male, Form II.—Differs from the holotype in the size and number of tubercles present on the several structures described, and while the three terminal elements of the first pleopod are present all are reduced and none corneous; the usual reduction of the secondary sexual characters is evident. (See Figs. 9 and 10, and *Measurements*.)

Color Notes.—Ground color of carapace grayish-tan; cephalic portion lighter than thoracic region, the latter dark green with a buff suffusion changing to buff along ventral margins. Cervical

groove, margins of rostrum, and postorbital ridges bluish-green. Abdomen grayish-buff with nondescript markings in cream and dark gray; pleura pale mauve on buff with a light greenish-gray line along base; telson and uropods with lateral portions and tips like pleura, otherwise colorless with grayish-green splotches. Ground color of chelae and pereiopods buff with greenish-blue and gray markings (particularly at joints and on upper surfaces); tubercles on chelae bluish-green as are the bases of joints of dactyls; row of tubercles on inner margin of palm greenish-blue at base but cream at tips; outer margins of chelae and lower surfaces light orange-buff with pink suffusions; tubercles on opposable margins of fingers cream. Lower portion of body and appendages whitish cream. Hair on ventral surface light gray.

Measurements—(In Millimeters)

		Holo- type	Allo- type	Morpho- type
Carapace—	Height	15.3	13.5	11.7
	Width	15.9	14.5	12.4
	Length	31.7	29.8	24.7
Areola—	Width6	.7	.5
	Length	12.0	11.0	9.2
Rostrum—	Width	4.7	4.5	4.2
	Length	4.7	4.4	4.1
Chela—	Length of inner margin of palm	7.8	7.0	5.5
	Width of palm	10.0	9.0	7.1
	Length of outer margin of hand	23.2	19.2	15.7
	Length of dactyl	14.9	12.0	10.0

Type Locality.—Boggy, seepage area 11 miles north of Lyons in Emanuel County, Georgia, on U. S. Highway 1. This seepage area lies on a gently sloping hill at the foot of which is a small sluggish creek. The area in which the crayfishes were found is approximately 200 feet up the hill from the creek, and probably only in rainy seasons is there any appreciable surface run-off into the stream. Conspicuous elements of the flora are pines, *Nyssa* sp., *Hypericum fasciculatum*, *Sarracenia flava*, *S. minor*, and *Lycopodium* sp. Other plants in the area are *Sarracenia psittacina*, *Syngonathus flavidulus*, *Cyanococcus* sp., *Erigeron vernus*, *Rhynchospora*

oligantha, *Drosera* sp., *Pogonia ophioglossoides*, *Juncus* sp., *Setiscapella subulata*, *Panicum* sp., *Pilostaxis racemosa*, and *Helenium* sp.²

Disposition of Types.—The holotypic male (No. 95670), allotypic female (No. 95671), and morphotypic male (No. 95672) are deposited in the United States National Museum. Of the paratypes one male, Form II, and one female are in the Museum of Comparative Zoology; one male, Form II, and one female in the Tulane Collection, and one male, Form I, 3 males, Form II, and 21 females are in my personal collection at the University of Virginia.

Range.—Jenkins, Emanuel, and Bulloch counties, Georgia. Apparently this species is confined to an area between the Ogeechee and Altamaha rivers in the upper Coastal Plain.

Specimens Examined.—GEORGIA: *Emanuel County*—5.5 miles northeast of Swainsboro, St. Hy. 56 (5-445-1b, 1 ♂ II, 1 ♀; 6.8 miles south of Swainsboro, U. S. Hy. 1 (6-1534-1, 1 ♂ II, 1 ♀); 11 miles north of Lyons, U. S. Hy. 1 (Type locality) (8-2337-3, 1 ♂ II, 6 ♀ ♀), (6-940-1, 3 ♀ ♀), (5-2541-1, 3 ♀ ♀), (8-0041-1, 1 ♂ I). *Bulloch County*—14.2 miles south of Millen, U. S. Hy. 25 (4-1744-3b, 1 ♂ I, 2 ♂ ♂ II, 3 ♀ ♀). *Jenkins County*—9.2 miles south of Millen, U. S. Hy. 25 (3-2739-6, 1 ♂ II, 1 ♀).

Relationships.—*Procambarus truculentus* is probably most closely allied to *Procambarus advena* (LeConte), but may readily be separated from it by the position assumed by the mesial process and central projection of the first pleopod of the male. The females of the two species are almost indistinguishable. While there are certain superficial resemblances of the first pleopod of the male of *truculentus* to that of the typical *Cambarus* pleopod it will be noted that in the former the mesial process is not evident in lateral aspect, whereas, the mesial process of the first pleopod of all species belonging to the genus *Cambarus* is always clearly seen in lateral view. Too, the prominent caudal knob is never so conspicuously evident in the latter.

Variations.—Considerable variation occurs among the specimens available. Particularly are the numbers of spines and tubercles on the cheliped variable; e.g., the inner margin of the palm may bear from seven to ten tubercles. The basal segment of the antennule

² Dr. A. M. Laessle of the University of Florida kindly identified these plants for me.

may or may not have a spine on its lower surface. The annulus ventralis may or may not show the low lateral tubercles shown in the drawing of the allotype. The mesial process of the first pleopod of the first form male from Bulloch County is broader throughout its length—not tapering as in the holotype.

Remarks.—In the rather small known range of *Procambarus truculentus* it occurs in colonies where each member apparently constructs its own complex burrow. These burrows are not unlike those described for *P. advena* (See Hobbs 1942: 78).

Unlike some of the more astute burrowing species, *P. truculentus* may be attracted to the surface of the water in the burrow thus obviating the necessity for laborious digging. Most of my specimens were collected by opening the mouth of a burrow with a spade and vigorously roiling the water. After this was done other burrows were similarly opened. When a number of them had been so treated, upon quietly approaching the open burrows, the crayfish were often seen at the surface of the water, lying in a horizontal position with one of the branchiostegites exposed, and thus relatively easily caught with the hand.

In order to determine the extent of some of the burrows they were carefully dissected, and it was found that while there were a number of passages that wound both vertically and horizontally, with several openings to the surface, there was usually only one passage which dipped much below the normal water table. Such passages were seldom more than two or three feet deep, and they usually had no more than one side branch.

The soil in the localities from which most of the specimens were taken is a black, sandy muck, and supports a dense growth of wire grasses, pitcher plants, and other bog-inhabiting plants. The water table fluctuates from the surface to about two feet below it.

The type locality has been visited in March, May, June, and August and in no instance was a first form male found; however, one of the males taken in August was brought into the laboratory where it moulted to first form in November. [Another second form male collected in another locality in April moulted in the laboratory during the following October.] In May more than a dozen burrows were examined, and all of them contained females with young approximately 10 mm. in length (from tip of rostrum to tip of telson). At this time no males could be found.

Procambarus truculentus is aggressively ferocious. On several occasions individuals placed in trays of shallow water have been observed to hurl themselves above the water surface in attempting to reach an object moved across the tray at a height of one foot. A previous "teasing" period was not required to elicit this aggressive response. The actual height of the jump was not measured but the animals can jump above the water surface when it is as little as two inches above the bottom of the container.

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