A NEW *CAMBARUS* OF THE *DIOGENES* SECTION FROM NORTH LOUISIANA

(DECAPODA, ASTACIDAE)

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The *Diogenes* section of the genus *Cambarus,* to which the new species described here belongs, was defined by Ortmann (1931: 146) to include those species with an ovate, depressed cephalothorax without lateral spines; rostrum without lateral spines; chelae short and broad, depressed, and ovate; areola very narrow or obliterated in the middle, and always distinctly longer than half of the cephalic section of the cephalothorax. Up until now seven species and a subspecies have been assigned to this section: *Cambarus diogenes diogenes* Girard (1852: 88), *C. diogenes ludovicianus* Faxon (1884: 144), *C. fodiens* (Cottle, 1863: 217), *C. hedgpethi* Hobbs (1948: 224), *C. byersi* Hobbs (1941: 118), *C. uhleri* Faxon (1884: 116), *C. carolinus* (Erichson, 1846: 96), *C. monongalensis* Ortmann (1905: 395), and a species described but unnamed by Hobbs (1942: 168).

Most of the material on which the description is based was collected in the vicinity of Ruston, Louisiana by Thomas H. Nickerson to whom I am indebted for these and other lots of crawfishes.

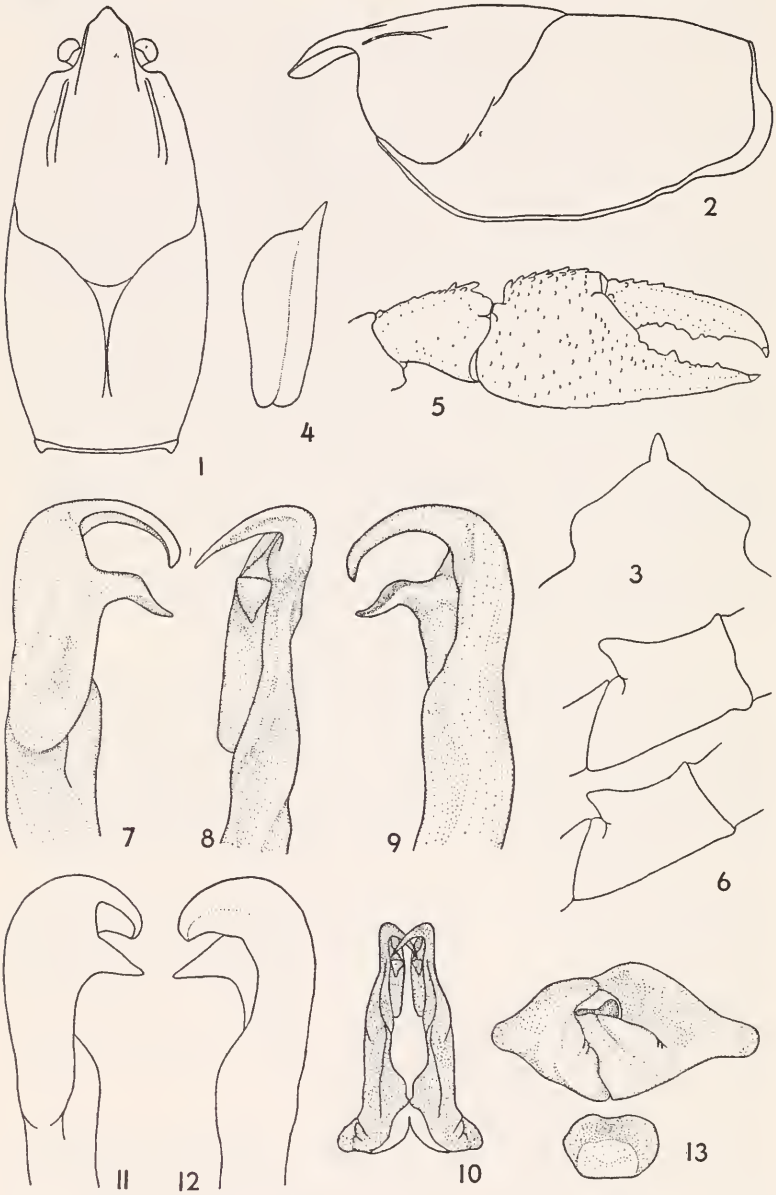
CAMBARUS **DISSITUS,** sp. nov.

Diagnosis.—Rostrum without lateral spines; antennal scale not extending beyond tip of rostrum; areola obliterated or very narrow in middle; chelae depressed apically, palm inflated; hooks on ischiopodites of third and fourth pereiopods; mesial process of first pleopod of form I male grooved so as to appear twisted; central projections of the two first pleopods recurved caudomesiad so that *in situ* they overlap in the mid-ventral line.

Holotype male, form I.—Body ovate; abdomen narrower than cephalothorax (10.0-12.5 mm in widest parts respectively). Width of cephalothorax (figs. 1, 2) equal to depth in region of caudodorsal margin of cervical groove (12.0-12.0 mm). Greatest width of cephalothorax slightly caudad of caudodorsal margin of cervical groove.

Areola obliterated in middle; cephalic section of cephalothorax 1.62 times as long as areola; length of areola about 38 percent of entire length of cephalothorax.

Rostrum directed cephaloventrad; upper surface shallowly excavate; margins converge slightly from base and turn abruptly mesiad at base of the acumen; no lateral spines, hence acumen is not distinctly set off from the rest of the rostrum. Rostrum with a few punctations at base; apical two-thirds glabrous. Rostral ridges weakly inflated. Postorbital ridges low and terminating anteriorly without spines. Branchiostegal spines minute, blunt.



Figures 1-13. *Cambarus dissitus*, sp. nov.: **1, 2,** cephalothorax of the holotype; **3,** epistome of the holotype; **4,** antennal scale of the holotype; **5,** chela and carpus of the holotype; **6,** hooks on the third and fourth pereiopods of the holotype; **7, 8, 9,** mesial, caudal and lateral views of the first pleopod of the holotype; **10,** ventral view of two first pleopods *in situ* on a paratype; **11, 12,** mesial and lateral views of the first pleopods of the morphotype; **13,** annulus ventralis of the allotype. Pubescence removed from all structures illustrated.

Surface of cephalothorax sparsely punctate dorsally and slightly granulate laterally.

Cephalic section of telson with one spine in each caudolateral corner.

Epistome (fig. 3) wider than long, terminating anteriorly in a strong median spine.

Eyes normal.

Antennules of usual form; a spine present on ventral side of basal segment.

Antennae broken (but, not extending beyond the caudal margin of the cephalothorax in any of the other specimens examined). Antennal scale (fig. 4) short, not reaching tip of rostrum; total length approximately one-fourth that of areola (2.5-10.5 mm); widest point distad of middle; lateral margin terminating in a strong spine.

Right chela (fig. 5) depressed; palm inflated; thickness of palm about 70 percent of its width (5.0-8.5 mm). Fingers curved ventrally from their bases, gaping for entire length; fingers punctate above and below; palm punctate above, sparsely granulate below. Palm with six tubercles along mesial margin. Immovable finger with six tubercles on basal two-thirds of opposable margin; third tubercle from base of finger largest. Dactyl with five tubercles on basal two-thirds of opposable margin; middle tubercle largest.

Carpus (fig. 5) longer than wide, slightly longer than mesial margin of palm (7.7-6.0 mm); with a well-defined longitudinal furrow above. Mesial margin with seven tubercles irregularly arranged, the largest one at the distal end. Under side with five small tubercles near mesial margin and two larger ones at distal end.

Hooks (fig. 6) present on ischiopodites of third and fourth pereiopods. Hooks simple; length of hook on third pereiopod about one-half the greatest width of the ischiopodite; length of hook on fourth pereiopod about one-third the greatest width of the ischiopodite.

Coxopodite of fourth pereiopod with a prominent, flattened, ventrocaudal longitudinal projection which meets anterior margin of coxopodite of fifth pereiopod.

First pleopod (figs. 7, 8, 9) reaching to middle of coxopodite of third pereiopod when abdomen is flexed; terminating in two distinct parts. Central projection corneous and bladelike, recurved caudomesiad at slightly greater than a right angle to main shaft of pleopod; fusion line of its two component elements clearly marked. Mesial process grooved so as to appear twisted; not bulbous; recurved caudolaterad at slightly more than a right angle to the main shaft of the pleopod. *In situ,* the central projections of the two pleopods overlap each other in the mid-ventral line (fig. 10). Mesial surface of the endopodite heavily bearded.

Morphotype male, form II.—Very similar to holotype in general appearance; areola slightly open (Table 1); chelae and hooks on

TABLE 1.
MEASUREMENTS (IN MILLIMETERS) OF *Cambarus dissitus* TYPES

	Holotype ♂ I	Allotype ♀	Morphotype ♂ II
Cephalothorax			
Length	27.5	29.0	25.5
Width (greatest)	12.5	14.0	11.5
Depth (greatest)	12.0	12.0	11.0
Areola			
Length	10.5	11.0	9.5
Width (at narrowest part)	0.0	0.1	0.2
Rostrum			
Length	4.7	4.5	4.2
Width at base	3.8	3.7	3.7
Antennal scale			
Length	2.5	2.2	2.5
Width (greatest)	1.0	1.1	1.0
Epistome			
Length	1.1	1.4	1.1
Width	2.4	2.6	2.3
Abdomen			
Length (including telson)	24.0	28.0	23.0
Chela			
Length of outer margin	17.0	15.0	14.0*
Length of dactyl	11.5	10.0	9.0
Width of palm	8.5	7.6	6.5
Thickness of palm (greatest)	5.0	4.5	4.0

* left chela measured on morphotype; right chela on other types.

ischiopodites of third and fourth pereiopods reduced. First pair of pleopods (figs. 11, 12) reaching to caudal margin of coxopodites of third pereiopods when abdomen is flexed; all processes reduced and non-corneous.

Allotype female.—Very similar to holotype in general appearance; areola slightly open (Table 1); chelae reduced. Caudoventral projections on coxopodites of fourth pereiopods undeveloped. Annulus ventralis (fig. 13) immovable, about 2.25 times wider than long; with a rounded depression on the anterior face, behind and ventral to which there is an irregular antero-ventrally projecting transverse ridge. The whole effect in ventral aspect resembles somewhat a baseball catcher's mitt standing on edge. The sinus originates in the right side of the anterior depression, runs ventrally and dextrad to the apex of the posterior ridge, then turns sinistrad to the midline on the posterior face of the annulus and terminates near the base. The sternites of the fourth and fifth thoracic segments are smooth and do not encroach on the annulus.

Type locality.—The holotype was dug from a shallow burrow near a stream three miles east of Choudrant, Lincoln Parish, Louisiana, on February 24, 1952 by T. H. Nickerson. The allotype and morpho-

type were dug from similar burrows two miles east of Choudrant on the same day. No other species of crawfishes was found at either locality.

Disposition of types.—The holotype, allotype and morphotype are deposited in the United States National Museum, numbers 98125, 98126, and 98127 respectively. The 31 paratypes are in the following collections: Academy of Natural Sciences of Philadelphia, American Museum of Natural History, Carnegie Museum, personal collection of Dr. Horton H. Hobbs, Jr. at the University of Virginia, and Tulane University.

Geographic distribution.—The type series of *Cambarus dissitus* were collected from four localities in northern Louisiana. These records and a summary of deposition of specimens are as follows: *Caldwell Parish:* 2 ♂♂ I, Kelly, December 24, 1953, W. E. Shell (TU 2998); *Lincoln Parish:* 2 ♂♂ I, three miles east of Choudrant, February 24, 1952, T. T. Nickerson (USNM 98125, TU 3124); 1 ♂ I, 2 ♂♂ II, 2 ♀♀, 1 ♂ juv., 2 ♀♀ juv., two miles east of Choudrant, February 24, 1952, T. H. Nickerson (USNM 98126 and 98127, TU 3123); 12 ♂♂ I, 7 ♀♀, 3 ♀♀ juv., Ruston, May 17, 1953, T. H. Nickerson (ANS, AMNH 11756, CM, HHH, USNM 98128, TU 3125).

Ecological and life history notes.—All collections have come from the upland shortleaf and longleaf pine hills of the State. The soils of this area are for the most part sand and sandy clay (longleaf pine hills) or sandy clay and silt of non-alluvial character (shortleaf pine hills) both of which are usually well drained and fairly dry (Viosca, 1933). All of the specimens were dug from shallow burrows, two along a stream, two in a hillside seepage area, the remainder in areas considerably farther removed from surface water.

Form I males were taken in February, May and December, mature females only in February and May. The smallest juvenile, a female with an 18.0 mm cephalothorax, was taken in May. The absence of smaller juveniles from all collections of *C. dissitus* is suggestive of an aquatic habitat for the immature stages, as in other species of the section, but it may represent merely the bias of the collectors.

Variation.—Body ratios from four samples (17 specimens) of form I males (Table 2) and two samples (8 specimens) of mature females (Table 3) show the greatest variability in the length of the rostrum, length of the antennal scale, and width of the areola. Although the rostrum, expressed as a proportion of cephalothoracic length, shows considerable variation in length, the length-width proportions are relatively constant in both males and females. The same appears to hold true for the antennal scale in relation to cephalothoracic length and in length-width ratios. In all except two specimens (TU 2998) the antennal scale was notably short and did not extend anteriorly to the tip of the rostrum. The only other species of the section with such a short antennal scale is *Cambarus byersi.*

The areola is obliterated in the middle in twenty (58.8 percent)

TABLE 2.

BODY PROPORTIONS OF FORM I MALE *Cambarus dissitus*

	Holotype	Paratypes					All Combined		
	USNM 98125	TU 2998 Range		Avg.	TU 3123	TU 3124	ex-TU 3125† Range	Avg.	Range	Avg.
Number of Specimens	1	2			1	1	12		17	
Cephalothorax Length, mm	27.5	24.2 – 25.5		—	31.5	29.0	24.0 – 30.5	—	24.0 – 31.5	—
Cephalothorax: Length/Width	2.20	2.04–	2.20	2.12	2.10	2.07	2.12– 2.29	2.18	2.04– 2.29	2.16
Cephalothorax: Length/Antennal Scale	11.00	10.20–	11.00	10.60	11.25	10.35	10.20– 13.25	11.22	10.20– 13.25	11.08
Cephalothorax: Length/Rostrum	5.85	6.72–	7.08	6.90	5.94	6.44	5.91– 6.78	6.28	5.85– 7.08	6.32
Cephalothorax: Length/Areola	2.62	2.55–	2.69	2.62	2.74	2.64	2.55– 2.79	2.68	2.55– 2.79	2.67
Cephalothorax: Length/Chela	1.62	1.46	*	1.46	1.54	1.32	1.35– 1.67	1.51	1.32– 1.67	1.50
Cephalothorax: Length/First Pleopod	3.67	3.45–	3.78	3.62	3.94	3.87	3.43– 3.99	3.80	3.43– 3.99	3.78
Cephalothorax: Width/Depth	1.04	1.09–	1.10	1.10	1.07	1.08	1.00– 1.17	1.09	1.00– 1.17	1.09
Head: Length/Antennal Scale	6.80	6.20–	6.91	6.56	7.14	6.61	6.40– 8.50	7.17	6.40– 8.50	7.04
Antennal Scale: Length/Width	2.50	2.44–	2.50	2.47	2.54	2.80	2.00– 2.50	2.32	2.00– 2.50	2.39
Rostrum: Length/Width	1.24	1.08–	1.13	1.08	1.23	1.13	1.04– 1.34	1.15	1.03– 1.34	1.15
Epistome: Length/Width	0.46	0.39–	0.43	0.41	0.54	0.44	0.44– 0.60	0.51	0.39– 0.60	0.49
Areola: Length/Width	‡	90.00–100.00		95.00	57.50	‡	90.00–105.00	‡	57.5 –105.00	‡
Chela: Length/Palm Width	2.00	2.03–	*	2.03	2.05	2.20	2.00– 2.40	2.10	2.00– 2.40	2.09
Chela: Length/Dactyl	1.48	1.67–	*	1.67	1.58	1.69	1.52– 1.68	1.61	1.48– 1.69	1.61
Chela: Palm Width/Palm Thickness	1.70	1.56–	*	1.56	1.67	1.67	1.64– 1.85	1.75	1.56– 1.85	1.73

* one specimen without chelae

‡ includes specimens with areola obliterated; no average calculated

† includes 1 ♂ I in collections of USNM, ANS, AMNH, CM, HHH.

TABLE 3.

BODY PROPORTIONS OF MATURE FEMALE *Cambarus dissitus*

	TU 3123* Range	TU 3123* Avg.	ex-TU 3125† Range	ex-TU 3125† Avg.	All Combined Range	All Combined Avg.
Number of Specimens	2		6		8	
Cephalothorax Length, mm	26.5 – **29.0**	—	29.0 – 31.0	—	26.5 – 31.0	—
Cephalothorax: Length/Width	**2.07**– 2.21	2.14	2.03– 2.32	2.21	2.03– 2.32	2.19
Cephalothorax: Length/Antennal Scale	10.60– **13.18**	11.89	10.34– 11.60	11.21	10.34– 13.18	11.38
Cephalothorax: Length/Rostrum	5.64– **6.44**	6.04	6.27– 7.38	6.67	5.64– 7.38	6.51
Cephalothorax: Length/Areola	**2.64**– 2.79	2.72	2.58– 2.86	2.74	2.58– 2.86	2.74
Cephalothorax: Length/Chela	**1.93**– 1.96	1.95	1.87– 2.07	1.95	1.87– 2.07	1.95
Cephalothorax: Width/Depth	1.00– **1.17**	1.09	1.00– 1.11	1.07	1.00– 1.17	1.08
Head: Length/Antennal Scale	6.80– **8.18**	7.49	6.72– 7.40	7.11	6.72– 8.18	7.21
Antennal Scale: Length/Width	**2.00**– 2.27	2.14	1.92– 2.45	2.23	1.92– 2.45	2.21
Rostrum: Length/Width	1.18– **1.22**	1.20	1.02– 1.27	1.12	1.02– 1.27	1.14
Epistome: Length/Width	0.48– **0.54**	0.51	0.40– 0.50	0.45	0.40– 0.54	0.47
Areola: Length/Width	47.50–**110.00**	78.75	35.00– 60.00	‡	35.00–110.00	‡
Chela: Length/Palm Width	**1.97**– 2.14	2.06	2.00– 2.46	2.15	1.97– 2.46	2.13
Chela: Length/Dactyl	**1.50**– 1.52	1.51	1.49– 1.65	1.58	1.49– 1.65	1.56
Chela: Palm Width/Palm Thickness	1.66– **1.69**	1.68	1.63– 1.75	1.69	1.63– 1.75	1.69

* includes allotype (ratios in bold face), USNM 98126.

‡ includes specimens with areola obliterated; no average calculated

† includes 1 ♀ in collections of USNM, ANS, AMNH, CM, HHH and TU.

of the specimens examined, but there is considerable variation with respect to sex and age, *e.g.,* obliterated in 64.7 percent of form I males, 33.3 percent of mature females, 50.0 percent of form II males, and 83.3 percent of the juveniles. However, where the areola is open it is only slightly so and is never less than 35 times longer than its narrowest width.

Relationships.—With the exception of having hooks on the ischiopodites of its third and fourth pereiopods as opposed to hooks on only the third pereiopods of other species in the *Diogenes* section, *Cambarus dissitus* appears to be more closely related to *C. fodiens, hedgpethi* and *byersi* than any others. The twisted appearance of the mesial process of the first pleopod of form I males and general bodily proportions place it nearest to *hedgpethi.*

The first pleopods of *Cambarus dissitus* show a superficial similarity in structure to those of *Procambarus tenuis* Hobbs (1950: 194). In *P. tenuis* the cephalic process is reduced and inconspicuous and the caudal element is lacking, leaving the central projection and the mesial process as the most conspicuous parts. These are produced in a manner very similar to those of the genus *Cambarus* in general, but resemble the arrangement in *C. dissitus* most closely in the midventrally crossed-over central projections. Thus, *P. tenuis,* a disjunct member of the *Blandingii* section of *Procambarus,* and *C. dissitus* perhaps show a closer approach in pleopod structure than any other two species of their respective genera.

Only two other crawfishes are known with crossed-over pleopods: *Orconectes clypeatus* (Hay, 1899: 122) and *O. beyeri* Penn (1950: 166).

Derivation of name.—The species name is derived from the Latin word *dissitus,* meaning "lying apart", in allusion to the unique position of the species in the *Diogenes* section.

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