PROC. BIOL. SOC. WASH.
98(4), 1985, pp. 1035–1041

A NEW BURROWING CRAYFISH (DECAPODA: CAMBARIDAE) FROM SOUTHWESTERN ARKANSAS

Horton H. Hobbs, Jr. and Henry W. Robison

Abstract.—*Fallicambarus* (*F.*) *harpi,* a burrowing crayfish, is described from two localities in the Caddo River (a tributary of the Ouachita River) basin of Pike County, Arkansas. It differs conspicuously from its closest relatives, *F.* (*F.*) *strawni* (Reimer, 1966) and *F.* (*F.*) *jeanae* Hobbs (1973), in possessing a free (never adnate) cephalic process on the first pleopod of the first form male.

The new crayfish described here is the fourth member of the nominate subgenus of *Fallicambarus* to be reported from Pike County, Arkansas: *F.* (*F.*) *strawni* (Reimer, 1966) occurs in the extreme western part of the county, *F.* (*F. spectrum* Hobbs (1973) in the north-central part (both in the Little Missouri River basin), and *F.* (*F.*) *jeanae* Hobbs (1973) and *F.* (*F.*) *harpi,* new species, in the northeastern part of the county in the Antoine River basin and the Caddo River basin, respectively. Only two other crayfishes, *F.* (*F.*) *macneesei* (Black, 1967) and *F.* (*F.*) *dissitus* (Penn, 1955), which range to the south and southeast, exhibit characteristics ascribed to the typical subgenus (see Hobbs 1973:463).

Fallicambarus (*Fallicambarus*) *harpi,* new species
Fig. 1

Diagnosis.—Antennal scale reduced; ventral surface of propodus of chela lacking row of stiff setae along lateral margin, tubercles of 2 ventral rows on merus of cheliped small but distinct; mesial ramus of uropod lacking distolateral spine. First pleopod of first form male almost straight and bearing small or well developed caudodistally directed cephalic process; mesial process little curved and directed caudally, and central projection strongly arched with apex directed proximally. Telson with transverse suture. Coxa of fourth pereiopod of male with very strong, compressed boss with rounded ventral margin. Chela slightly more than half as wide as long, and length of mesial margin of palm less than half width of palm. Annulus ventralis as figured: not broadly excavate anteriorly and not obscuring sclerite immediately caudal to annulus.

Holotypic male, form I.—Body subovate, somewhat compressed although branchiostegites somewhat inflated (Fig. 1a, k). Abdomen much narrower than cephalothorax (10.5 and 16.8 mm). Greatest width of carapace distinctly posterior to caudodorsal extremity of cervical groove and greater than height (16.8 and 15.1 mm). Aerola linear over much of its length which comprising 40.8 percent of entire length of carapace (45.6 percent of postorbital length). Rostrum with convergent, moderately thickened margins, contracting anteriorly forming short triangular acumen, apex of which corneous, slightly upturned, and extending just beyond base of penultimate podomere of antennular peduncle. Dorsal surface of rostrum

concave with submarginal row of setiferous punctations and few scattered ones between. Subrostral ridges well developed and evident in dorsal aspect along basal third of rostrum. Postorbital ridge strong, grooved dorsolaterally, merging imperceptibly with carapace anteriorly and somewhat swollen posteriorly. Suborbital angle obsolete. Branchiostegal spine represented by slight obtuse prominence at lower anterior extremity of cervical groove. Cervical spine lacking. Carapace punctate dorsally and laterally, with few weak tubercles in anteroventral branchiostegal region which conspicuously inflated.

Abdomen shorter than carapace (29.7 and 34.1 mm); pleura very short and rounded, only that of sixth segment with angular caudoventral margin; pleuron of first abdominal segment slightly overlapped by cephalic lobe of that of second. Cephalic section of telson (Fig. 1h) without spines; much of telson and uropods setose dorsally. Proximal podomere of uropod without spines. Both rami comparatively slender and bearing conspicuous median rib, that on mesial ramus extending almost to distal margin but lacking distal spine; mesial ramus also lacking distolateral spine, rib on proximal segment of lateral ramus terminating in spine, that on distal segment lacking spine and not reaching distal margin.

Cephalomedian lobe of epistome (Fig. 1g) subovate with marginal anterior and anterolateral areas elevated ventrally; main body comparatively long and lacking fovea. Ventral surface of proximal podomere of antennule lacking spine. Antennal peduncle without spines, flagellum broken but remainder reaching first abdominal tergum; antennal scale (Fig. 1l) almost 3 times as long as broad and widest at about midlength; mesiodistal margin of lamellar area sloping distolaterally from just beyond midlength to base of distolateral spine which reaching end of proximal third of penultimate podomere of antennular peduncle. Ventral surface of ischium of third maxilliped with lateral row of short plumose setae, mesial sector studded with clusters of stiff setae.

Right chela (Fig. 1m) about 1.7 times as long as broad, strongly depressed; mesial margin of palm little less than half width of palm and bearing row of 7 tubercles subtended laterally by row of 5 smaller ones (left with 6 and 5, respectively); dorsal surface of palm with widely scattered squamous tubercles and few punctations; lateral margin of chela with serrate row of tubercles extending from near base almost to midlength of fixed finger; ventral surface of palm with few scattered tubercles, 3 or 4 flanking mesial margin of ridge extending onto fixed finger, large tubercle present opposite base of dactyl. Opposable margin of fixed finger with row of 6, second from base largest, tubercles along proximal three-fifths; single large tubercle on lower level short distance beyond distalmost member of row; dorsal surface of finger with prominent submedian longitudinal ridge flanked by conspicuous punctations; distal half of lateral margin bearing row of 5 setiferous punctations. Opposable margin of dactyl with prominent tubercle in proximal excavation and with 5 tubercles between distal margin of excavation and base of distal fourth of finger, only proximalmost large, sizes of remaining four variable although not graduated; dorsal surface of finger with strong submedian longitudinal ridge flanked along proximal fourth of finger by tubercles and distally by large, deep punctations; mesial surface with subserrate row of tubercles decreasing in size distally; ventral surface like that of fixed finger, bearing submedian longitudinal ridge flanked by few small tubercles proximally and punctations along most of ridge.

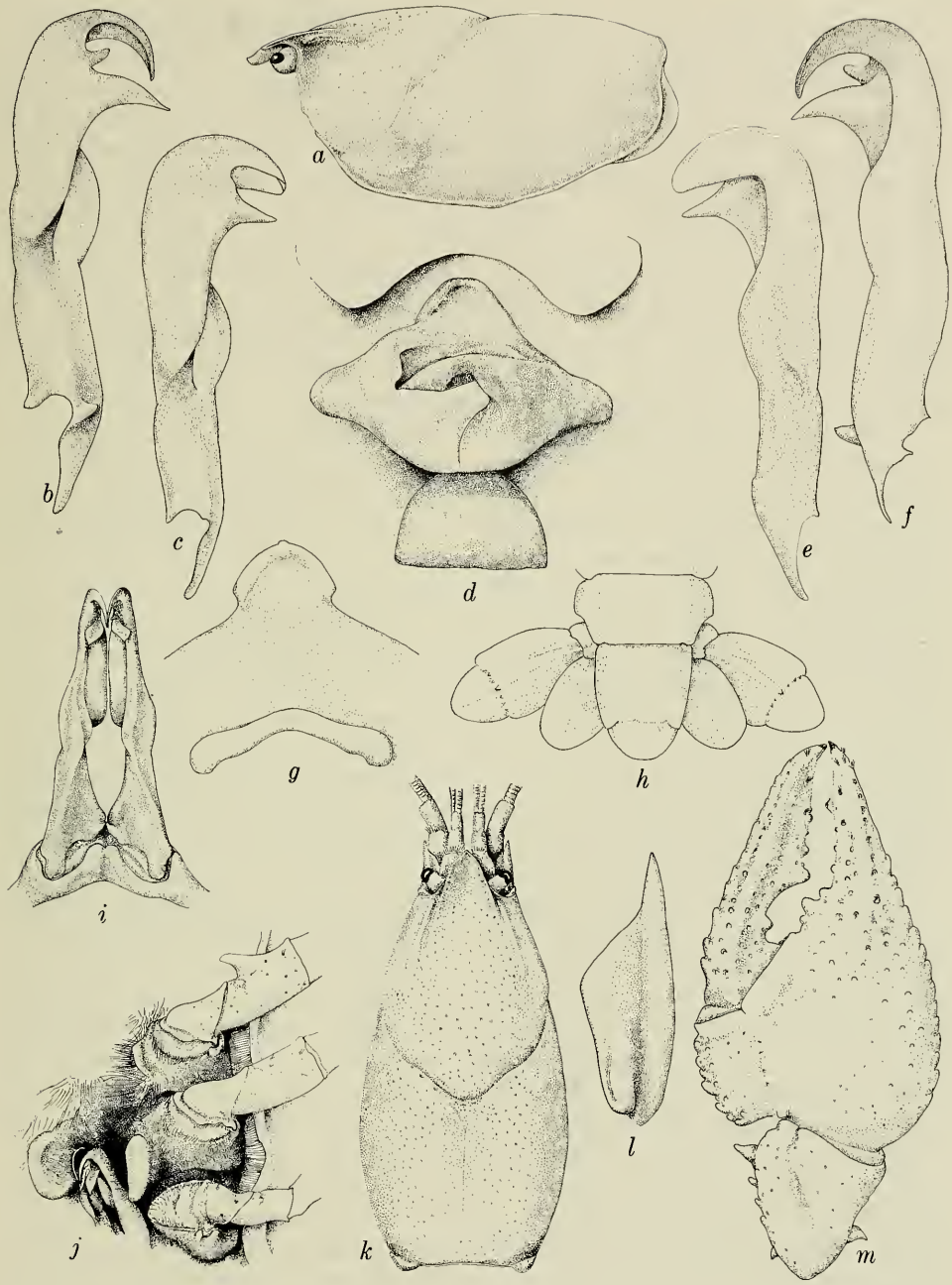

Fig. 1. *Fallicambarus* (*F.*) *harpi* (a, b, f, i, g, h, j, k, l, and m from holotype; c and e from morphotype, d from allotype): a, Lateral view of carapace; b, c, Mesial view of first pleopod; d, Annulus ventralis and adjacent sternal features; e, f, Lateral view of first pleopod; g, Epistome; h, Dorsal view of telson and uropods; i, Caudal view of first pleopods; j, Ventrolateral view of basal podomeres of third, fourth, and fifth pereiopods and first pleopods; k, Dorsal view of carapace; l, Right antennal scale; m, Dorsal view of distal podomeres of first pereiopod.

Carpus of cheliped with sinuous furrow and scattered punctations dorsally; dorsomesial surface tuberculate, mesial surface with row of 3 tubercles increasing in size distally, distalmost spinelike and directed mesiodistally; ventromesial surface with several small tubercles, some sublinearly arranged; distoventral margin with large tubercle on lateral condyle and another near median line; lateral surface punctate. Merus with dorsal surface tuberculate, tubercles of approximately same size and forming subserrate row along most of length of podomere, none conspicuously acute; mesial and lateral surfaces punctate; ventral surface with lateral row of 7 small tubercles and mesial one of 14, only distalmost conspicuously larger than others. Mesioventral margin of basioischial podomere with 1 or 2 very small tubercles distal to fracture suture. Chela of second pereiopod with marginal rows of setae on palm, and carpus with dorsal row of long setae; mesial surfaces of propodus and carpus lacking tufts of plumose setae.

Ischium of third pereiopod with simple hook extending proximally over basioischial articulation (Fig. 1j), not opposed by tubercle on basis. Coxa of fourth pereiopod with massive caudomesial boss, latter compressed laterally, rounded ventrally and disposed in longitudinal axis of body but tilted laterally; mesial and lateral surfaces of boss with setiferous punctations. Coxa of fifth pereiopod lacking boss but with setiferous ventral membrane.

First pleopods (Fig. 1b, f, i) reaching coxae of third pereiopods, lying deep within sternum and largely hidden by setae extending caudally and mesially from ventral margins of sternum and mesial borders of coxae of pereiopods. Proximomesial spur well developed. Appendages almost straight, not caudally inclined; terminal elements acute to subacute; tapering mesial process extending almost directly caudally; compressed, corneous, cephalic process, smallest of 3, projecting caudally and slightly distally from between mesial process and corneous scythelike central projection, tip of latter directed proximally (see Table 1).

Allotypic female.—Differing from holotype in other than secondary sexual features as follows: branchiostegal regions less inflated; rostrum with distinct, although short median carina near apex; tubercles absent in anteroventral branchiostegal region; epistome with shallow median fovea; chela markedly similar to that of male but only 3 tubercles in lateral row on mesial margin of chela, and opposable margin of dactyl with only 4 tubercles distal to excavation; distalmost tubercle of dorsal row on merus of cheliped subacute and ventral rows of tubercles consisting of 8 and 11 (8 and 10 on left member).

Annulus ventralis (Fig. 1d) capable of slight hingelike motion, somewhat spindle shaped, much broader than long, strongly sculptured with anteromedian furrow and tongue extending posterodextrally, fossa disappearing near midlength dextral to median line. Sinus originating in median depression and following tilted sinistral S-shaped course across median line terminating on caudal wall of annulus. Postannular sclerite half as wide as annulus and almost two-thirds as long as broad, obliquely truncate anteriorly and longitudinally ribbed in median elevated area. First pleopod although uniramous moderately well developed (see Table 1).

Morphotypic male, form II.—Differing from holotype in following respects: branchiostegites less inflated, resembling allotype; rostrum almost reaching end of penultimate podomere of antennular peduncle; telson not clearly divided by suture although caudal section distinctly set off by lateral emarginations; chela lacking row of tubercles on ventral surface of palm flanking base of ridge extending

Table 1.—Measurements (mm) of *Fallicambarus* (*F.*) *harpi*.

	Holotype	Allotype	Morphotype
Carapace:			
Entire length	34.1	36.0	29.3
Postorbital length	30.5	32.4	26.2
Width	16.8	16.7	13.7
Height	15.1	16.4	13.1
Areola:			
Width	0	0	0
Length	13.9	14.5	12.1
Rostrum:			
Width	4.6	5.2	4.1
Length	4.7	4.7	4.4
Chela:			
Length, palm mesial margin	6.9	5.3	4.3
Palm width	15.2	11.6	8.7
Length, lateral margin	26.1	20.8	15.6
Dactyl length	20.7	14.7	10.1
Abdomen:			
Width	10.5	11.2	8.8
Length	29.7	32.3	24.9

onto fixed finger; distal tubercle on dorsal surface of merus of cheliped acute; truncate hook on ischium of third pereiopod not reaching basioischial articulation. First pleopod (Fig. 1c, e) with mesial process much like that in first form male but cephalic process exceedingly reduced, hardly recognizable, and central projection much heavier, non-corneous, and not nearly so strongly recurved, its apex directed caudally and only slightly proximally (see Table 1).

Color notes.—Dorsum of cephalic region of carapace, including rostrum very dark, almost black, that of thoracic region greenish tan except for small black triangular spot in open anterior section of areola, narrow band bordering cervical groove, and another band adjacent to posterior margin of carapace; hepatic and mandibular adductor regions also black; orbital, antennal, mandibular, and branchiostegal regions greenish tan. Abdomen with broad median longitudinal, dark red stripe extending from second through fifth segment, becoming pale and disappearing before reaching caudal margin of sixth; lateral part of latter segment, telson, and uropods greenish tan with dark markings; mesial ramus of uropods with black median longitudinal rib. Dorsal surface of cheliped dark green with black suffusion becoming intense mesially so that dorsodistal border of merus, mesial part of carpus, tubercular area of palm, all of dorsum except tips of fingers and proximomesial part of fixed finger almost black; tips of fingers and lateral and ventral surfaces of entire cheliped pinkish to yellowish cream. Remaining pereiopods cream with greenish suffusion marking dorsal parts of podomeres from ischium through propodus, more intense on merus and propodus. Sternal elements and ventral surfaces of pereiopods cream to pinkish cream.

Size.—The largest specimen examined is a female having a carapace length of

39.6 (postorbital carapace length 35.8) mm. The smallest and largest first form males have corresponding lengths of 29.0 (25.8) mm, and 35.4 (31.5) mm, respectively.

Type-locality.—A seepage area located 0.2 mile east of Glenwood, Pike County, Arkansas (Sec. 1, R. 24W, T. 5S) on U.S. Highway 70, on the property of Milburn Dillard. This seep is located in a pasture in front of Mr. Dillard's house just north of the highway and is situated between a stock pond and the south end of a private airplane runway. All specimens found there were collected in the early evening as they crawled about in the wet grassy areas. Soil consisted of a sandy clay with some organic material. Grasses and sedges were abundant, and members of the genera *Pinus* and *Quercus,* and *Cornus florida* were growing in a wooded area to the north of the runway. Most of the crayfish were located by a Doberman Pinscher.

Range and specimens examined.—All of the specimens available came from two localities in the Ouachita River basin in Pike County, Arkansas: type-locality, 16 Apr 1982, 36 ♂ I, 13 ♂ II, 8 ♀, and 1 j ♂; 21 Apr 1982, 2 ♂ I, 4 ♀, Kyla Dillard, collector; and approximately 0.3 mile E of Glenwood on U.S. Highway 70, 18 Mar 1982, 6 ♂ I, 3 ♀, K.D., collector.

Disposition of types.—The holotype, allotype, and morphotype (USNM 217946, 217947, 217948, respectively), are deposited in the National Museum of Natural History, Smithsonian Institution as are the following paratypes: 41 ♂ I, 10 ♂ II, 12 ♀, and 1 j ♂. Also, paratypic series consisting of 1 ♂ I, 1 ♂ II, and 1 ♀, are deposited in the Museum National d'Histoire Naturelle, Paris, and in the Rijksmuseum van Naturlijke Historie, Leiden, The Netherlands.

Variations.—The shape of the rostrum is quite variable, ranging from that depicted in Fig. 1k to one in which the margins converge from the base, obliterating the basal limit of the acumen; also the upper surface may be deeply or shallowly concave and may or may not support a short anteriorly situated median carina. The branchiostegal region may or may not be conspicuously inflated, and the anteroventral branchiostegal region, always inflated, may appear bilobed. For the most part, the distribution of tubercles on the chelipeds is consistent, but the numbers vary slightly, and their sizes, particularly on the distal part of the merus, are often quite different, sometimes distinctly spiniform. Except for the degree of development of the cephalic process, which sometimes is quite small but always projecting caudodistally, the first pleopod exhibits only slight variations. The annulus ventralis may be almost fixed or may be movable through an arc of about 20 degrees.

Relationships.—*Fallicambarus* (*F.*) *harpi* has its closest affinities with *F.* (*F.*) *strawni* (Reimer, 1966) and *F.* (*F.*) *jeanae* Hobbs (1973), and, except for possessing a cephalic process on the first pleopod of the male, appears to share more in common with the latter than with the former. This is evident in the broad chela, features of the telson and uropod, the similar annulus ventralis, and the form of the boss of the coxa of the fourth pereiopods. It may be distinguished from *F.* (*F.*) *strawni* by possessing a proportionately broader chela, a cephalic process on the first pleopod that projects freely rather than being subadnate to the mesial process, and exhibiting a telson that is either divided by a transverse suture or possesses lateral emarginations that set off the posterior section. It differs from *F.* (*F.*) *jeanae* most conspicuously in possessing a cephalic process on the first

pleopod of the male and less obvious differences in the bosses on the coxae of the fourth pereiopods and in the annulus ventralis of the female.

Life history notes.—First form males were collected on March 18, April 16, and April 21, 1982. Ovigerous females or those carrying young have not been observed.

Etymology.—This crayfish is named in honor of George L. Harp, a friend and colleague of one of us (HWR), who has contributed greatly to our knowledge of the aquatic invertebrates of Arkansas.

Acknowledgments

We are grateful to Kyla Dillard for donating the specimens to us and extend our thanks to H. H. Hobbs III of Wittenberg University and C. W. Hart, Jr., of the Smithsonian Institution for their criticisms of the manuscript.

Literature Cited

Black, Joe B. 1967. A new crayfish of the genus *Cambarus* from southwest Louisiana (Decapoda; Astacidae).—Proceedings of the Biological Society of Washington 80(27):173–178, 12 figures.

Hobbs, Horton H., Jr. 1973. New species and relationships of the members of the genus *Fallicambarus*.—Proceedings of the Biological Society of Washington 86(40):461–481, 4 figures.

Penn, George Henry, Jr. 1955. A new *Cambarus* of the *Diogenes* Section from north Louisiana (Decapoda, Astacidae).—Tulane Studies in Zoology 3(4):73–81, 13 figures.

Reimer, Rollin DeWayne. 1966. Two new species of the genus *Cambarus* from Arkansas (Decapoda, Astacidae).—Tulane Studies in Zoology 13(1):9–15, 18 figures.

(HHH) Department of Invertebrate Zoology, Smithsonian Institution, Washington, D.C. 20560; (HWR) Department of Biology, Southern Arkansas University, Magnolia, Arkansas 71753.