

**A new species of troglobitic crayfish of the genus *Cambarus*,
subgenus *Aviticambarus* (Decapoda: Cambaridae), endemic to
White Spring Cave, Alabama**

John E. Cooper and Martha Riser Cooper

(JEC) North Carolina State Museum of Natural Sciences, P. O. Box 29555, Raleigh,
North Carolina 27626, U.S.A.;
(MRC) 209 Lynwood Lane, Raleigh, North Carolina 27609, U.S.A.

Abstract.—*Cambarus (Aviticambarus) veitchorum* is a rare, diminutive species of troglobitic crayfish endemic to White Spring Cave in the Tennessee River Valley, Limestone County, Alabama. It is most closely related to *C. (A.) hamulatus*, which occurs in subterranean waters of the Sequatchie Uplift in Alabama and Tennessee, and is less closely related to *C. (A.) jonesi*, with which it is syntopic and whose range encompasses both sides of the Tennessee River in Alabama. The new species differs from the other *Aviticambarus* in the relationships of the terminal elements of the gonopod (male first pleopod); the shape of the abdominal pleura and presence of spines at their caudoventral angles; the lack of spines or prominent tubercles on the mesial surface of the carpus; the attenuated podomeres of the pereopods, especially of the cheliped; the morphology of the epistome; and the structure of the annulus ventralis of the female.

Six species of troglobitic crayfishes, four described and two undescribed, are known to live in subterranean waters of northern Alabama. The described species are *Cambarus (Aviticambarus) hamulatus* (Cope 1881), which occurs in caves of the Sequatchie Uplift in Blount, Jackson, and Marshall counties; *Cambarus (Aviticambarus) jonesi* Hobbs & Barr, 1960, whose range encompasses both sides of the Tennessee River Valley, from Madison County west into Colbert and Lauderdale counties; *Orconectes (Orconectes) australis australis* (Rhoades 1941), known only from Jackson and Madison counties; and *Procambarus (Remoticambarus) pecki* Hobbs, 1967, reported from three caves along the Tennessee River, one each in Colbert, Lauderdale, and Morgan counties (see Hobbs et al. 1977). *Cambarus jonesi*, *P. pecki*, and the two unnamed species are endemic to Alabama, but the ranges of *C. hamulatus* and *O. a. australis* extend north into Tennessee.

Each of the two undescribed forms is known from but a single cave, one in Madison County and the other in Limestone County. The description of the former species has been submitted for publication, and the latter is described herein. Only seven specimens of this rare crayfish, six adults and a juvenile, have been collected.

Cambarus (Aviticambarus) veitchorum,
new species

Fig. 1

“Three new species.”—Cooper & Cooper, 1966:39 (p. p.); Cooper, 1967:14 (p. p.).
Cambarus (Aviticambarus) sp. A.—Bouchar, 1976:14, 15.

“Two crayfishes of subgenus *Aviticambarus*.”—Hobbs et al., 1977:5 (p. p.).

“Two undescribed troglobites.”—Hobbs et al., 1977:75 (p. p.).

C. (A.) sp. A.—Fitzpatrick, 1990:78.

Diagnosis.—Albinistic; eyes degenerate,

recessed, lacking pigment. Rostrum acarinate, excavate, margins narrow, slightly elevated, and parallel or subparallel to base of long acumen, which delimited by strong marginal spines; margins of acumen constricted at base, then broadly concave and strongly converging to acute, cephalodorsally directed apex; acumen comprising 35.0 to 43.2% (\bar{X} = 39.4) of rostrum length, latter constituting 23.3 to 25.9% (\bar{X} = 24.6) of total carapace length (TCL). Areola 5.1 to 7.4 (\bar{X} = 6.1) times as long as broad, constituting 40.0 to 43.1% (\bar{X} = 41.3) of TCL and 52.7 to 55.8% (\bar{X} = 54.6) of post-orbital carapace length (PCL), with 4 to 5 punctations across narrowest part. Cephalothorax subovate; carapace 1.4 to 2.3 (\bar{X} = 1.8) times wider than deep, dorsally punctate, laterally granulate. Cervical spines strong, usually 1 or 2 on each side. Branchiostegal spine strong; hepatic region with scattered weak tubercles. Suborbital angle obsolete, margin of orbit diagonal. Postorbital ridge moderately strong, groove obsolete and represented by row of minute punctations, cephalic margin with strong spine. Antennal scale 2.5 to 2.8 (\bar{X} = 2.7) times as long as wide, greatest width just distal to midlength; lateral margin thickened and terminating distally in strong spine.

Chela of cheliped attenuate, width of palm 15.1 to 21.9% (\bar{X} = 19.1) of total length of chela, latter 58.3 to 76.0% (\bar{X} = 64.6) of TCL and 64.4 to 98.4% (\bar{X} = 82.4) of PCL; palm subovate in cross section, 1.3 to 1.9 (\bar{X} = 1.4) times as wide as deep, 2.3 to 3.1 (\bar{X} = 2.6) times as long as wide; mesial margin of palm with 2 or 3 poorly defined rows of minute tubercles, 13 to 18 (usually 15-16) in mesial row, length of margin 45.4 to 51.0% (\bar{X} = 48.4) of total chela length. Fingers without gape, without dense setae at opposable bases; both fingers with longitudinal ridge dorsally and ventrally; opposable margin of fixed finger usually bearing 3 to 4 tubercles in addition to usual subconical one; mesial margin of dactyl punctate, with 1 to 3 small tubercles

near base; opposable margin of dactyl usually with 3 to 4 tubercles, one of which larger than others, subconical, and situated ventral to denticles; dactyl length 1.0 to 1.2 (\bar{X} = 1.1) times length of mesial margin of palm, 2.7 to 3.4 (\bar{X} = 2.8) times width of palm, and 50.1 to 59.4% (\bar{X} = 53.8) of total chela length. Carpus of cheliped subrectangular in dorsal outline, 1.5 to 2.5 (\bar{X} = 2.0) times as long as wide, mesial surface without spines or prominent tubercles. Merus of cheliped attenuate, 4.0 to 5.7 (\bar{X} = 4.6) times longer than deep, length 41.4 to 52.1% (\bar{X} = 45.8) of TCL and 54.5 to 67.4% (\bar{X} = 60.5) of PCL. Pleura of second through fifth abdominal segments with angular caudoventral corners, and spine at caudoventral apex of angle. Mesial ramus of uropod with foreshortened median keel, which lacking distal spine; cephalic section of telson with 2 cephalolateral spines each side.

Hook on ischium of third pereopod, that of form I male slightly overreaching basioischial articulation, not opposed by tubercle on basis; coxa of fourth pereopod of males with prominent caudomesial boss, which somewhat laterally compressed. Gonopods (first pleopods) of form I male symmetrical in caudal aspect, total length 21.0% of TCL, proximomesial apophyses widely separated; proximolateral lobe set off from rest of shaft by transverse groove; left gonopod in lateral aspect with moderate protuberance on cephalic border; central projection corneous, curved at greater than 90° angle to shaft, strongly tapering to subacute, proximomesially directed tip; subapical notch present, directed proximally; caudal portion of central projection with proximal margin twisted mesially; mesial process curved, somewhat expanded at base but tapering to subacute tip, which directed caudolaterally and extending caudally to level of tip of central projection or beyond; caudal knob absent; in mesial aspect, cephalic protuberance obvious, mesial surface lacking setae.

Annulus ventralis symmetrical, subovate,

1.8 times wider than long; caudal margin free, broadly convex, elevated, and dissected by sinus just dextral to midline, at which point caudosinistral terminus of wall plunging into expanded caudodextral terminus; lateral apices of caudal wall moderately expanded; cephalic margin of annulus arched, clearly delimited but fused to preannular sternite; cephalolateral margins relatively thick, slightly concave on each side of median arch; cephalic half of annulus with broad central depression, which extending into caudal half as oblique depression on each side of median C-shaped ridge surrounding caudosinistral terminus of caudal wall. Postannular sclerite about 3 times as wide as long, with sublinear caudal margin, broadly convex cephalic margin, and domed ventral surface bearing some small tubercles. Female first pleopod absent, slight protuberance at site on each side.

Measurements (mm) of type specimens provided in Table 1.

Holotypic male, form I.—Cephalothorax (Fig. 1A, D) subovate; carapace 1.7 times wider than deep. Areola 5.1 times as long as broad, constituting 43.1% of TCL (55.8% of PCL), with dense, small punctations, 5 or 6 across narrowest part; branchiocardiac grooves subparallel throughout most of length, caudally flared, with transverse eminence between caudal termini. Rostrum with narrow, somewhat elevated margins, parallel nearly to level of strong marginal spines, where moderately converging to bases of spines; margins of acumen slightly concave, converging strongly to corneous, cephalodorsally directed apical spine reaching distal margin of second article of antennular flagellum; acumen comprising 35.0% of rostrum length, latter constituting 24.0% of TCL; floor (dorsal surface) of rostrum with deep longitudinal excavation, apunctate except for small punctations proximal to marginal spines, and row of punctations bearing long, recumbent setae just mesial to each marginal ridge; subrostral ridge narrowly visible to base of marginal spines in dorsal aspect.

Table 1.—Measurements (mm) of types of *Cambarus (Aviticambarus) veitchorum*, new species.

	Holo-type	Allo-type	Morpho-type
Carapace			
Total length	16.7	14.5	15.9
Postorbital length	12.9	11.0	12.1
Length cephalic section	9.5	8.6	9.2
Width	6.1	5.5	6.2
Depth	3.5	3.1	3.6
Length rostrum	4.0	3.6	3.7
Length acumen	1.4	1.4	1.6
Areola			
Length	7.2	5.9	6.7
Width	1.4	1.0	0.9
Antennal scale			
Length	3.6	3.5	3.5
Width	1.3	1.3	1.3
Abdomen			
Length	18.2	15.8	17.3
Width	5.3	4.1	5.1
Cheliped (right)			
Length lateral margin chela	12.7	8.6	10.4
Length mesial margin palm	6.1	4.2	5.3
Width palm	2.3	1.7	2.1
Depth palm	1.8	1.1	1.6
Length dactyl	6.4	4.7	5.6
Length carpus	3.7	2.9	3.2
Width carpus	2.0	1.4	1.6
Length dorsal margin merus	8.7	6.0	7.7
Depth merus	1.9	1.5	1.8
Gonopod length	3.4	NA	3.4

Postorbital ridge fairly strong, groove obsolete and represented by row of small punctations; dorsal margin ridgelike, cephalic margin with strong spine. Branchiostegal spine strong; suborbital angle obsolete, orbital rim with slight concavity around base of antennal peduncle, dorsal to which rim oblique. Carapace dorsally punctate, laterally and dorsolaterally granulate; cephalic section 1.3 times longer than areola and constituting 56.9% of TCL; gastric region mostly glabrous, with some scattered punctations; carapace cephalolateral to cervical groove with small scattered tubercles, and row of same along ventral margin of cephalic portion of cervical groove. Cervical spines strong, 1 on each side. Abdomen

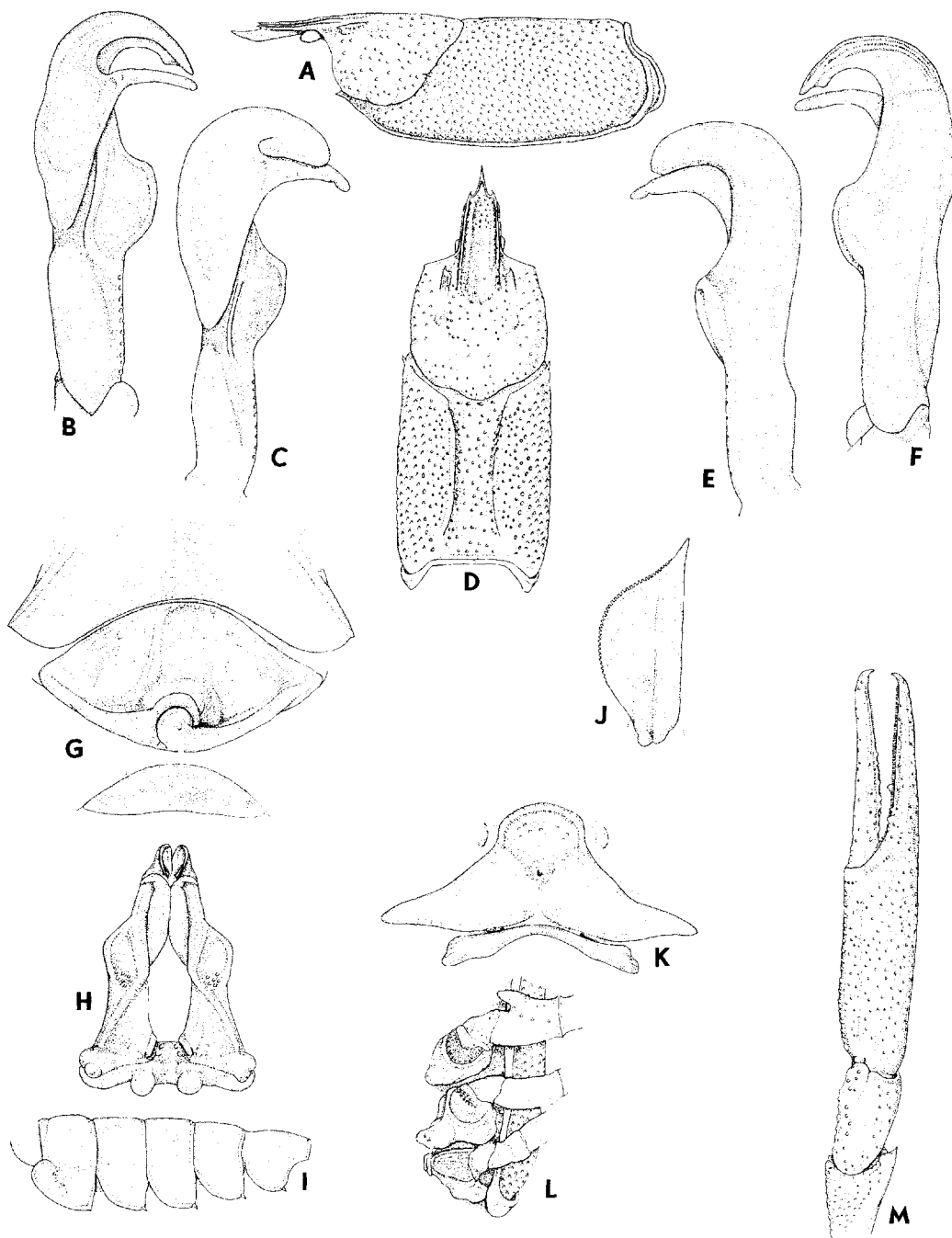


Fig. 1. *Cambarus (Aviticambarus) veitchorum*, new species (all from holotypic male, form I, except C, E, from morphotypic male, form II, and G, from allotypic female; setae not illustrated): A, lateral aspect of cephalothorax; B, C, mesial aspect of left gonopod (first pleopod); D, dorsal aspect of cephalothorax; E, F, lateral aspect of left gonopod; G, annulus ventralis and associated structures; H, caudal aspect of in situ gonopods; I, lateral aspect of abdomen; J, dorsal aspect of antennal scale; K, epistome; L, basal podomeres of third, fourth, and fifth pereopods; M, dorsal aspect of distal podomeres of right cheliped.

narrower and slightly longer than cephalothorax. Pleura of third through fifth abdominal segments (Fig. 1I) with curved cephaloventral margins, linear caudal margins, and acute caudoventral corners; second through fifth pleura with spine at apex of caudoventral angle. Proximal podomere of uropod with strong distomedian spine on both lobes, that on mesial lobe longer; mesial ramus of uropod with foreshortened median keel, which lacking distal spine, and long distal spine on lateral margin; lateral ramus with submedian ridge of cephalic section terminating in spine at transverse flexure, latter bearing row of 12 fixed spines (14 on left) across margin, and 1 large movable spine at lateral corner. Telson with 1 long stationary and 1 smaller movable spine at each caudolateral corner of cephalic section; lateral margins of caudal section somewhat converging caudally, caudal margin rounded.

Epistome (Fig. 1K) with cephalic lobe subrectangular in outline, wider than long, margins slightly thickened; cephalic border entire, rounded, without projection; lateral margins subparallel for about $\frac{3}{4}$ of length of lobe, lateral apices not thickened; lobe without constriction at base; floor (ventral surface) of lobe with 8 minute tubercles, and central concavity extending into central depression of body; depression narrow, with shallow median fovea; lamellae with cephalolateral margins broadly concave, lateral apices narrow, subangular; zygoma weakly arched, pits short, deep. Antennal peduncle with strong, procurved cephalolateral spine on basis, and strong, erect ventral spine on ischium; antennular peduncle with strong ventral spine at base of distal $\frac{1}{3}$ of proximal podomere. Antennal scale (Fig. 1J) 2.8 times as long as broad, widest just distal to midlength; lateral margin thickened, terminating in long distal spine (tip missing from spine on left side), which directed distolaterally, tip reaching base of distal $\frac{1}{4}$ of ultimate podomere of antennular peduncle; lamella about 2.1 times as wide as thickened lateral margin; distal margin of

lamella sloping proximomesially to mesial margin, latter gently curving proximally to widest point, then curving proximolaterally to base.

Third maxilliped with distolateral margin of ischium slightly produced, not spinelike; ventrolateral margin of ischium with row of punctations bearing short setae at base of longitudinal ridge; ventral surface of lateral half with scattered punctations bearing short setae, some punctations containing small squamous tubercles; ventral surface of mesial half with long, dense setae obscuring most of proximal area; mesial margin with about 18 denticles; tip of exopodite reaching base of distal $\frac{1}{4}$ of merus of endopodite. Right mandible with incisor ridge bearing 7 denticles; molar process in two parts, caudalmost with 2 round, adjacent tubercles, cephalicmost with single tuberculi-form mound.

Chela of cheliped (Fig. 1M) with palm subovate in cross section, 1.3 times wider than deep; mesial margin of palm 2.7 times longer than palm width, and length comprising about 50% of chela length; latter 76.0% of TCL (98.4% of PCL); dorsal surface of palm with small punctations bearing short setae, and several longer recumbent setae present; dorsal articular ridge fairly well defined, with subdistal clump of setae near midwidth; ventral surface of palm with small punctations bearing short setae, most punctations containing small squamous tubercles; ventral articular ridge well defined, with broad subdistal tubercle bearing several long setae at midwidth; lateral margin of palm rounded, punctate; mesial margin with 2 to 3 staggered rows of small tubercles, 18 to 19 in mesialmost row. Fingers without gape, without plumose setae at opposable bases; both fingers in dorsal aspect fairly straight, in lateral aspect gently curving distoventrally. Dactyl with longitudinal ridge dorsally and ventrally, with several small punctations on dorsal ridge near base, and 1 punctation bearing long setae at midlength; surfaces flanking ridges punctate, without grooves; mesial margin punctate,

but with several minute tubercles near base; dactyl comprising 50.1% of length of chela. Fixed finger with surfaces flanking dorsal and ventral ridges punctate; lateral surface of fixed finger punctate, some median punctations large and bearing prominent setae. Opposable margin of dactyl with single row of prominent denticles on entire length of finger, 5 small tubercles on proximal $\frac{1}{3}$ dorsal to row of denticles, and 1 larger subtriangular tubercle ventral to denticles at base of distal $\frac{1}{5}$ of finger; opposable margin of fixed finger with single row of prominent denticles on entire length, 3 small tubercles on proximal $\frac{1}{5}$ of finger dorsal to denticles (second from base largest), and larger subconical tubercle ventral to denticles at base of distal $\frac{2}{3}$ of finger.

Carpus of cheliped (Fig. 1M) subrectangular in dorsal outline, 1.9 times longer than wide; dorsal surface with shallow, nearly obsolete sulcus, mesial and lateral to which surface punctate and with short setae; ventral surface with strong distomesial spine, proximomesial to which is row of small tubercles; mesial margin without spines, with small scattered tubercles. Merus of cheliped without pronounced distodorsal spines or tubercles; dorsal ridge with 2 staggered rows of small tubercles, expanding distally into group of tubercles on dorsal, lateral, and mesial surfaces; rest of lateral and mesial surfaces with scattered small tubercles; ventrolateral ridge of merus with 16 or 17 scarcely discernible tubercles, and long distolateral spine near lateral articular prominence; ventromesial ridge with 16 or 17 small tubercles, slightly larger than those on ventrolateral ridge, and 1 long distal spine; area between ventral ridges punctate, with short setae; area between distal ends of ridges with some small tubercles. Ischium with row of 5 or 6 minuscule tubercles along ventral ridge, with several deep punctations and 2 minuscule tubercles lateral to them; dorsal surface with minuscule tubercles.

Hook on ischium of third pereopod (Fig. 1L) simple, distally flattened and moderate-

ly acute; tip overreaching basioischial articulation, not opposed by tubercle on basis. Coxa of fourth pereopod with prominent caudomesial boss.

See the "Diagnosis" for description of gonopod (Fig. 1B, F, H).

Allotypic female.—Except for secondary sexual characters, differing from holotype in following respects: Carapace 1.8 times wider than deep; areola 5.9 times longer than wide, constituting 40.7% of TCL (53.6% of PCL), with 3 to 4 punctations across narrowest part. Cephalic section of cephalothorax 1.5 times longer than areola and constituting 59.3% of TCL. Acumen comprising 38.9% of rostrum length, latter constituting 24.8% of TCL. Cervical spines 2 on left, 1 on right. Antennal scale 2.7 times longer than wide, tip of spine reaching distal margin of second article of antennular flagellum. Palm of chela of cheliped 1.5 times wider than deep; mesial margin of palm 2.5 times longer than palm width, and length comprising 48.8% of chela length; latter 59.3% of TCL (78.2% of PCL); mesial margin of palm with 14 to 15 minute tubercles in mesialmost row. Dactyl comprising 54.7% of chela length; mesial surface punctate, without tubercles; opposable margin with 2 small tubercles near base, and 1 small subtriangular tubercle ventral to denticles at proximal $\frac{1}{4}$ of finger. Opposable margin of fixed finger with 2 small tubercles near base, and subconical tubercle at base of distal $\frac{2}{3}$ of finger. Carpus of cheliped 2.1 times longer than wide; ventromesial ridge of merus with 12 or 13 small tubercles, plus large distal spine. Coxa of fourth pereopod without boss.

See the "Diagnosis" for description of annulus (Fig. 1G).

Morphotypic male, form II.—Differing from holotype in following respects: Areola 7.4 times longer than wide, constituting 42.1% of TCL (55.5% of PCL), with 4 punctations across narrowest part. Cephalic section of carapace 1.4 times longer than areola and constituting 57.9% of TCL. Acumen comprising 43.2% of TCL. Rostrum

with right margin and marginal spine extending farther cephalically than left margin and spine. Single small cervical spine on left side of carapace, none on right. Antennal scale 2.7 times longer than wide, tip of spine reaching distal margin of fourth article of antennular flagellum. Palm of chela of cheliped with mesial margin 2.5 times longer than wide, chela length 65.4% of TCL (86.0% of PCL); mesial margin of palm with 14 or 15 minuscule tubercles in mesialmost row. Dactyl comprising 53.8% of chela length; opposable margin of dactyl with 3 small tubercles near base (middle one slightly larger), 1 large subtriangular tubercle ventral to denticles at base of distal $\frac{1}{5}$ of finger, followed distally by 2 minuscule tubercles. Opposable margin of fixed finger with subconical tubercle situated just proximal to midlength. Carpus of cheliped 2.0 times longer than wide; ventrolateral ridge of merus with 14 or 15 scarcely discernible tubercles and small distolateral spine. Hook on ischium of third pereopod moderately well developed, not overreaching basioischial articulation.

Gonopods (Fig. 1C, E) reaching just beyond midlength of coxa of third pereopod when abdomen flexed; left gonopod in lateral aspect without juvenile suture; prominence on cephalic margin reduced; central projection noncorneous, fairly broad but tapering to rounded tip, which directed slightly proximocaudally; proximal margin of central projection slightly overlapping distal margin of mesial process; mesial process long, narrow, with constriction near tip; latter curved at slightly greater than 90° angle, tip extending well beyond apex of central projection.

Disposition of types.—The holotype, allotype, and morphotype are in the crustacean collections of the North Carolina State Museum of Natural Sciences (NCSM), Raleigh (catalogue numbers NCSM C-2544, C-2545, and C-2546, respectively), as are the following paratopotypes: 1 ♂ I, 1 ♀ (C-2547), 1 ♂ I, 1 j ♂ (C-2548).

Type locality.—Alabama, Limestone

County, subterranean stream in White Spring Cave, NW of Holland Gin (Tanner 7.5' USGS Quadrangle, Sec. 11, T.5S, R.4W). The cave is designated AL 242 in the cave cataloguing system of the Alabama Cave Survey, an official project of the National Speleological Society.

White Spring Cave is located in the Tennessee Valley north of the Tennessee River, within the southern boundaries of the Highland Rim of the Interior Low Plateaus. The cave is developed in rock of Mississippian age, probably the Fort Payne Chert. The extent of the cave is unknown because the accessible passage is only traversible for about 12 to 18 m beyond either of the two entrances. The northern entrance is at the western edge of a shallow surface depression, in which water from the cave stands during periods of elevated water level. We have observed troglobitic crayfish in the depression, where they were exposed to daylight. The stream within the cave flows generally southeast and south, and the water was moving slowly during both of our visits.

Range and specimens examined.—Known only from the type locality, where the following specimens have been collected: 2 ♂ I, 2 ♀, 24 Sep 1967, coll. J. Veitch, MRC, JEC; 1 ♂ I, 1 ♂ II, 1 j ♂, 4 Jul 1968, coll. A. Dobson, R. C. Graham, JEC.

Variations.—The range of variation in most characters is provided in the "Diagnosis" and in the discussions of the allotype and morphotype. The following additional variations have been noted. The number of tubercles on the opposable margin of the fixed finger of the chela (exclusive of the larger subconical tubercle) ranges from one in the two smallest animals, to two or three in the others; the number of tubercles on the opposable margin of the dactyl is usually greater and shows more variation, with two in the juvenile male and from three to six in the others. The number of cervical spines varies from one animal to another, and from one side of the body to the other. The juvenile male and the holotype have a

single spine on each side, the other form I males have two spines on each side, the morphotype and the smallest female have one spine on the left side and none on the right, and the allotype has two spines on the left and one on the right. One of the form I males has the usual two spines in the caudolateral corner of the cephalic section of the left side of the telson, but a single spine on the right side. The margins of the rostrum are more strongly convergent in the allotype and the juvenile male, and in both these specimens the merus is slightly longer than it is in the others. Sexual dimorphism is evident in the length of the chela, with form I males having chelae that exceed 75% of TCL, while the chelae of other males and females constitute 60 to 65% of TCL.

Size.—Adult TCL ranges from 13.5 mm (a female) to 16.7 mm (a form I male). The mean TCL of the four males is 15.9 mm, and of all six adults is 15.2 mm.

Life history notes.—Form I males were found in July and September. The largest of the two females collected in September exhibited oocytes (visible through the carapace) in a late stage of development, as well as highly developed cement glands. The small female collected at the same time contained oocytes in an early stage of development. As is the case with nearly all troglobitic crayfishes, no females carrying attached ova or young have been found.

Relationships.—*Cambarus veitchorum* is closely related to *C. hamulatus* and *C. jonesi*, and is syntopic with the latter. Although the gonopods of the form I and form II males of *C. veitchorum* are more like those of *C. jonesi* than those of *C. hamulatus*, as are the relative proportions of the areola, the overall facies of the new species argues for a somewhat closer relationship to *C. hamulatus*. The rostrum of both is very similar (and unlike that of *C. jonesi*), as are the shape of the antennal scale, the general shape and proportions of the chela and the cephalothorax, and the overall

structure of the annulus. In all three species the female lacks first pleopods.

Cambarus veitchorum is markedly different from both its closest relatives in the following characters: the configuration and spatial relationships of the terminal elements of the form I male gonopod, with the central projection directed caudomesially and the proximal margin of its caudal portion twisted mesially; the shape of the ventral margins of the third through fifth abdominal pleura, and the presence of a spine on the caudoventral angle of the second through fifth pleura; the absence of spines or prominent tubercles on the mesial surface of the carpus; the attenuated chela, carpus, and merus; the configuration of the cephalic lobe of the epistome; the reduced number of tubercles on the mesial surface of the dactyl; the greater number and very weak nature of the tubercles on the mesial margin of the palm and on both ventral ridges of the merus; the obsolete groove of the postorbital ridge; the very broad depression in the cephalic portion of the annulus; the lower number of tubercles on the opposable margins of both fingers; the comparative dearth of long, erect setae on the palm and fingers of the cheliped (also generally absent in *C. hamulatus*); and the diminutive adult size, with the maximum TCL of 16.7 mm, as opposed to 28.9 mm for *C. jonesi* (♂ I, NCSM C-198), and 35.2 mm for *C. hamulatus* (Hobbs et al. 1977: 76).

Crayfish associates.—The only other crayfish known to inhabit White Spring Cave is *C. jonesi*, which is far more abundant there than *C. veitchorum*. Both species were observed in very close proximity to each other, but no interactions between them were seen.

Etymology.—We take great pleasure in naming this species for John D. Veitch and Joyce Veitch of Decatur, Alabama, friends who introduced us to White Spring Cave and its owners, and who served as immensely cheerful hosts to a couple of mud-

dy cave biologists on more occasions than they would probably care to remember.

Suggested vernacular name: White Spring Cave Crayfish.

Acknowledgments

We are very grateful to John and Joyce Veitch for their hospitality and many kindnesses; to Mr. and Mrs. Rowe Sanderson, who gave us permission to collect in White Spring Cave; and to Arthur Dobson and Richard C. Graham, who accompanied JEC on the trip that yielded the morphotype. JEC expresses his sincerest gratitude to his co-author, to R. E. Ashton, Jr., J. E. Cooper, Jr., J. Perry, and especially to D. Howard and A. L. Braswell, without whose generosity this paper could never have been completed. Joseph F. Fitzpatrick, Jr., Steve Busack, and an anonymous reviewer, provided cogent comments on the manuscript. As always, we are immensely grateful to the late Horton H. Hobbs, Jr., for the splendid lessons he taught (not all of them about decapods).

Literature Cited

- Bouchard, R. W. 1976. Crayfishes and shrimps. Pp. 13–20 in H. Boschung, ed., *Endangered and threatened plants and animals of Alabama*.—*Bulletin of the Alabama Museum of Natural History* No. 2, 93 pp.
- Cooper, J. E. 1967. Animals in Alabama caves. Pp. 14–16 in J. Veitch, *The caves of Alabama*. Huntsville Grotto, National Speleological Society, Huntsville, Alabama, 51 pp.
- , & M. R. Cooper. 1966. Comments on Alabama cave biology. *Huntsville Grotto Newsletter* 7(5–6):37–41. Reprinted 1969, pp. 25–30 in W. T. Plummer, ed., *Speleo Digest*, Section 2. National Speleological Society, Huntsville, Alabama.
- Cope, E. D. 1881. *Orconectes hamulatus*. in E. D. Cope & A. S. Packard, Jr. *The fauna of the Nickajack Cave*.—*American Naturalist* 15:881–882.
- Fitzpatrick, J. F., Jr. 1990. Decapoda. Pp. 77–80 in S. C. Harris, *Preliminary considerations on rare and endangered invertebrates in Alabama*.—*Journal of the Alabama Academy of Sciences* 61(2):64–92.
- Hobbs, H. H., Jr. 1967. A new crayfish from Alabama caves with notes on the origin of the genera *Orconectes* and *Cambarus* (Decapoda: Astacidae).—*Proceedings of the United States National Museum* 123(3621):1–17.
- , & T. C. Barr, Jr. 1960. The origins and affinities of the troglobitic crayfishes of North America (Decapoda, Astacidae), I: the genus *Cambarus*.—*American Midland Naturalist* 64(1):12–33.
- , H. H. Hobbs, III, & M. R. Daniel. 1977. A review of the troglobitic decapod crustaceans of the Americas. —*Smithsonian Contributions to Zoology* 244:1–183.
- Rhoades, R. 1941. Notes on some crayfishes from Alabama caves, with the description of a new species and a new subspecies. —*Proceedings of the United States National Museum* 91(3129):141–148.