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Cambarus (*Tubericambarus*) *stockeri* (Decapoda: Cambaridae) a new species of plesiomorphic *Cambarus* from Georgia and Tennessee with zoogeographic affinity to *Cambarus* (*Depressicambatus*) *cymatilis*

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Cambarus (*Tubericambarus*) *stockeri* (Decapoda: Cambaridae) a new species of plesiomorphic *Cambarus* from Georgia and Tennessee with zoogeographic affinity to *Cambarus* (*Depressicambatus*) *cymatilis*

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Abstract.—A new species of crayfish, *Cambarus* (*Tubericambarus*) *stockeri*, is described from northern Georgia and southern Tennessee within the Ridge and Valley Physiographic Province of North America. Of the recognized members of the subgenus, it is the most physically divergent form discovered to date. It is easily distinguished from other recognized members of the subgenus, and all other members of the genus *Cambarus* Erichson 1846, by the extensive tuberculation of the chelae. *Cambarus* (*T.*) *stockeri* has tubercles over most of the dorsal and ventral chelae surface, a character state common in members of *Procambarus* Ortmann, 1905b. This new species was frequently found in association with *Cambarus* (*T.*) *acanthura,* Hobbs, 1981 and *Cambarus* (*Depressicambarus*) *cymatilis,* Hobbs, 1970 and shares a close zoogeographic association with the latter species.

Keywords: crayfish, dactyl morphology, *Lacunicambarus*, northern Georgia

Jezerinac (1993) erected the subgenus *Tubericambarus* for *Cambarus acanthura* Hobbs, 1981, formerly in the subgenus *Lacunicambarus* Hobbs, 1969 and *Cambarus thomai*, Jezerinac, 1993. The most easily diagnosed difference between the two subgenera was the dactyl length/palm length ratio. *Lacunicambarus* has a ratio of 1.9 or greater and *Tubericambarus* 1.8 or less. First form males of the new species, show a ratio between 1.8 and 1.5, clearly within the subgenus *Tubericambarus*. Additional separating character states given by Jezerinac were the tuberculation of the dorsal and ventral chelae palm surfaces. *Lacunicambarus* has two tubercle rows on the mesial dorsal palmer surface and, usually, a third row running from the proximal base of the second row to a distal knob at the base of the dactyl articulation. Scattered tubercles occasionally occur between the third and second row and infrequently lateral of the third row. *Tubericambarus* displays much greater chela tuberculation, having the mesial one-third to one-quarter of the dorsal palmer surface studded with tubercles that usually do not form distinct rows. In some individuals and populations of *Lacunicambarus* and *Tubericambarus* this subgeneric difference is not clear (C. A. Taylor, pers. comm.). The new species described herein falls within the definition of *Tubericambarus* and outside *Lacunicambarus* for this character state. Jezerinac (1993) reported that *Tubericambarus* spp. lacked tubercles on the ventral surface of the chela or had only one tubercle while *Lacunicambarus* spp. possessed one to three. The new species described herein is far outside the bounds of both subgenera for this character, having tubercles over the entire ventral surface. In addition, a new character state

shared by both subgenera, a corneous area between the caudolateral base of the central projection and mesial process has been discerned. It is not yet clear if this character state is unique to *Lacunicambarus* and *Tubericambarus*, but all other species from other subgenera of *Cambarus* Erichson, 1846, so far examined lack this character.

I first became aware of this taxon when Mr. G. Whitney Stocker of Denison University brought me a chela fragment taken from a collection made in Chatsworth, Georgia. He was searching for *Cambarus* (*Depressicambarus*) *cymatilis* Hobbs, 1970, at the time. Initially I thought the chela was from a *Procambarus*. Two years later, in 2007, while assisting Mr. David I. Withers of the Tennessee Natural Heritage Program in a search for additional *C. cymatilis* records in Tennessee, I excavated (after much difficulty) a mature female crayfish from a burrow in Bradley County. Immediately upon examination I recognized the specimen as a new species. Thereafter a three-year search ensued to garner sufficient material to describe the new taxon herein.

***Cambarus* (*Tubericambarus*) *stockeri*, new species
Fig. 1, Table 1

Diagnosis.—Pigmented; eyes not reduced. Rostrum with margins converging, not thickened, without marginal spines or tubercles; lacking median carina, shallowly excavated; acumen poorly defined. Carapace cylindrical in cross view, without cervical spines or tubercles. Branchiostegal tubercles well developed. Suborbital angle acute. Postorbital ridges weak, never ending in distinct spines or tubercles. Areola very narrow ($\overline{X}$ = 0.45 mm) with room for only a single row of punctuations in narrowest part, constituting, in adults, 36.6–43.9% ($\overline{X}$ = 41.6%) of entire length of carapace. Antennal scale 1.7–2.1 times as long as wide, broadest at distal end. Dorsomesial one-half to total surface of chelae palm with distinct to adpressed tubercles, mesialmost creating ill-formed row, normally consisting of 7–10. No tufts of elongate setae at base of propodus. Opposable margin of dactyl with enlarged tubercles on basal half. Ratio of palm length to dactyl length averaging 1.5. Dorsomedian longitudinal ridges of dactyl and opposable propodus strongly developed. No dorsolateral impression at base of propodus. Ventral surface of chelae palm covered with tubercles. Carpus with two large, frequently basely conjoined, tubercles on mesial margin just distal of midpoint, normally super tended by two rows of tubercles on dorsal surface, lateral disposed row up to three in number, mesial disposed row up to five. Ventral surface of carpus with tubercle on mid-distal articular rim and frequently with two tubercles forming row from mid-distal articular rim to proximal mesial carpus margin. Mesial ramus of uropod with distomedian spine usually not reaching caudal margin, not extending beyond. First pleopods of form I male contiguous at base, with convexity near midlength of cephalic surface; terminal elements consisting of a tapering, distally pointed central projection, with an apical notch, and equal in length to mesial process. Mesial process conically shaped at base and tapering to distal point. Both processes recurved at slightly more than 90°. A corneous area between the central projection and mesial process in area normally associated with the presence of a caudal process. Hooks on ischium of third pereopods only, not opposed by tubercle on coxa. Female with asymmetrical annulus ventralis formed by two hardened caudal parts, one curved in a weak C-shape, the other a straight, rounded segment with a flange projecting under the C-shaped portion forming a fossa. Cephalic half of annulus ventralis comprised of a leathery membrane. Postannular sclerite an asymmetrical rhomboid shape, displaying a caudally off center

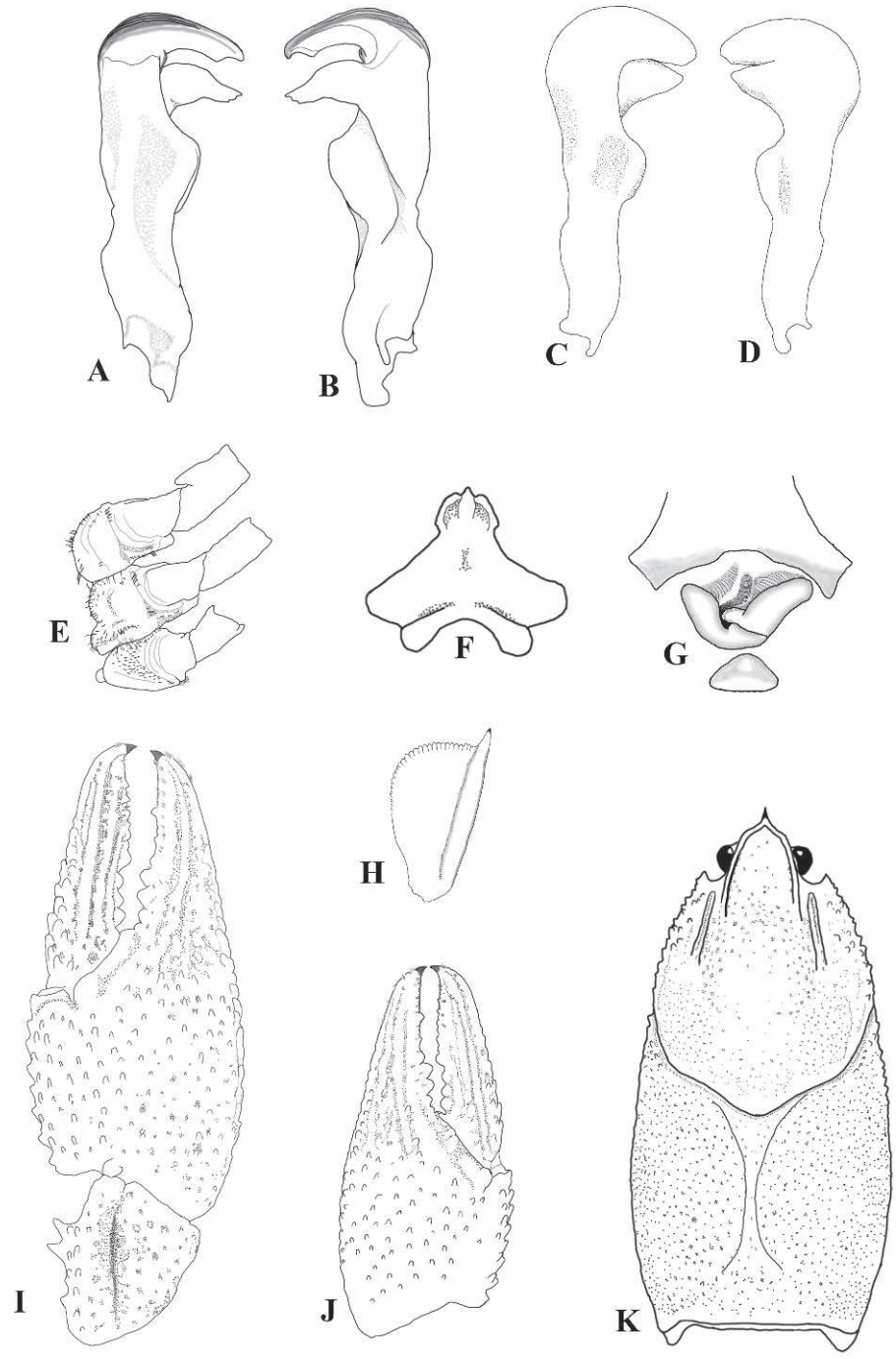

Fig. 1. *Cambarus* (*Tubericambarus*) *stockeri*; A, B, E, F, H–K, holotype male, form I (OSUMC 7704); C, D, morphotype male, form II (OSUMC 7706); G, allotype female (OSUMC 7705). A, C, lateral aspect of gonopod (first pleopod); B, D, mesial aspect of gonopod; E, ventral aspect of right third, fourth, and fifth pereopods; F, epistome; G, caudal aspect of annulus ventralis; H, dorsal aspect of antennal scale; I, dorsal aspect of distal podomeres of right cheliped; J, ventral aspect of distal podomeres of right cheliped; K, dorsal aspect of carapace.

Table 1.—Measurements (mm) of *C.* (*T.*) *stockeri*.

Character	Holotype	Allotype	Morphotype
Carapace			
Height	18.0	17.8	13.8
Width	19.0	18.6	14.3
Length	36.1	36.2	29.1
Areola			
Length	15.1	14.6	11.8
Rostrum			
Width at base	5.6	5.0	4.0
Length	6.6	6.3	5.4
Postorbital ridge			
Width	7.8	7.6	6.4
Chelae – right			
Length of lateral margin of chelae	27.0	27.3	18.2
Length of mesial margin of palm	9.2	10.0	6.9
Width of palm	12.3	12.8	8.7
Length of dactyl	16.7	16.0	10.4
Abdomen			
Length	35.9	34.1	27.9
Width	15.2	15.8	11.6
Gonopod			
Length	7.7	N/A	6.0
Antennal scale			
Length	4.0	4.3	3.5
Width	2.1	2.2	2.1

angle, slight sulcus in center and slight knob at cephalic end.

Holotypic male, Form I.—Body subovate (Fig. 1K), tubular in cross section, not laterally compressed. Abdomen narrower than cephalothorax (15.2 and 18.9 mm, respectively); maximum width of carapace slightly greater than depth at caudodorsal margin of cervical groove (18.9 and 18.1 mm, respectively). Areola very narrow (3 mm) with one punctuation in narrowest part; length comprising 41.8% of total length of carapace. Rostrum decurved throughout length with convergent, elevated raised margins. Acumen not distinctly delimited basally, anterior tip slightly upturned, not reaching to base of ultimate podomere of antennular peduncle; dorsal surface of rostrum concave with very small punctuations mostly on basal half. Subrostral ridge strong. Postorbital ridge well developed, grooved dorsolaterally, and ending cephalically without spine or corneous tubercle. Suborbital angle acute; branchiostegal spine absent. Cervical spine absent. Hepatic and branchiostegal regions with small tubercles. Remainder of carapace punctate dorsally and laterally. Abdomen nearly equal in length to carapace, pleura short, subtruncate, rounded caudoventrally. Cephalic section of telson with two spines in caudolateral corners. Proximal podomere of uropod with well-defined distal spine on mesial lobe; mesial ramus of uropod with median rib ending distally as distomedian spine not overreaching margin of ramus; laterodistal spine of ramus also present.

Cephalomedian lobe of epistome (Fig. 1F) short and square-shaped with lateral raised margins, ridge running from midpoint to distal margin forming a pointed projection, lacking setae; main body with shallow fovea; epistomal zygoma strongly arched. Ventral surface of antennal peduncle proximal podomere without acute spine at base of distal third. Antennal peduncle without spines; antennal scale (Fig. 1H) 1.9 times as long as wide, broadest distally, mesial border rounded; distal spine strong, not reaching distal extremity of antennular peduncle. Ischium of third maxilliped with two rows of equal length long, flexible setae; lateral margin with 20 teeth, numbers 1, 5, and 9 from distal end much larger than all others.

Length of right chela (Fig. 1I) 74.9% that of carapace; width 34.1% of chela length; palm length 25.4% of chela length; dactyl length 1.8 times palm length. Dorsal surface of palm studded with tubercles, mesialmost row composed of nine; ventral surface tuberculate (Fig. 1J); three tubercles on articular rim opposite base of dactyl, one mesial and two lateral; lateral surface of palm and fixed finger costate. Both fingers of chela with well-defined submedian dorsal ridges; proximal half of opposable margin of fixed finger with row of five tubercles (third and fourth from base enlarged), gap

between fifth and sixth tubercle, then another gap and a seventh corneous tubercle displaced below the denticles, denticles ending before sixth tubercle. Opposable margin of dactyl with row of four equal-sized tubercles along proximal half; followed by six small tubercles decreasing in size and increasing in spacing distally, single row of minute denticles extending distally from tubercle five; mesial surface of dactyl with numerous tubercles basally giving way to setiferous punctuations distally.

Carpus of cheliped with distinct dorsal furrow; dorsomesial surface with two rows of four (upper) and three (lower) tubercles; dorsolateral surface with setose punctuations; mesial surface with two large spiniform, conjoined, tubercles and three tubercles proximally; ventral surface with one tubercle on distal articular rim and two additional tubercles in line from articular rim tubercle to mesial conjoined tubercles. Merus with 10 premarginal tubercles dorsally followed proximally by row of nine tubercles on dorsal ridge, ventrolateral row of eight spiniform tubercles, and ventromesial row of 15 tubercles. Ventral ridge of ischium with four small spiniform tubercles. Ischium of third pereopod (Fig. 1E) with simple hook extending proximally over basioischial articulation, not opposed by tubercles on basis. Coxa of fourth pereopod (Fig. 1E) with setiferous, vertically disposed caudomesial boss; that of fifth pereopod (Fig. 1E) lacking boss, its ventral membrane setiferous.

First pleopods contiguous at base, reaching coxae of third pereopods; central projection (Fig. 1A, B) long, tapering, with subapical notch, angled slightly greater than 90° to axis of shaft, as long as mesial process; mesial process conical at base and tapered apically, directed caudolaterally, bent slightly greater than 90° to axis of shaft, terminating in three small points; corneous area at caudal base of mesial process and central projection. Distal margin of proximal segment of lateral ramus of right uropod having 16 spines distally, large movable spine at lateral edge, median spine of mesial uropod ramus small, not overhanging distal margin.

Allotypic female.—Other than secondary sexual characters, differing from holotype in following respects: areola length 40.2% of total length of carapace; right chela 75.4% of carapace length; opposable margin of dactyl with nine tubercles, opposable margin of propodus with eight; carpus with group of six tubercles on mesial surface below two conjoined tubercles. Merus with nine premarginal tubercles, ventrolateral row of 12 spiniform tubercles, and ventromesial row of 11.

Annulus ventralis (Fig. 1G) as described in Diagnosis.

Morphotypic male, Form II.—Differing from holotype in following respects: areola length 40.6% of carapace length; rostrum equally punctate throughout; antennal scale 1.7 times as long as wide; right chela 6.26% of carapace length; palm length 23.9% of chela length; chela width 29.9% chela length; dactyl length 1.5 times palm length; opposable margin of right fixed finger with eight tubercles; palm of right chela with two well-formed rows of tubercles on mesial margin, both rows numbering eight; opposable margin of dactyl with seven tubercles; merus with numerous dorsal tubercles throughout length, not forming distinct row, ventrolateral and ventromesial rows of 11 spineform tubercles; central projection of first pleopod (Fig. 1C, D) non-corneous and blunt, slightly longer than mesial process. Left lateral cervical groove with two very small tubercles, right with six. Hook on ischium of third pereopod weakly developed. Distal margin of proximal segment of lateral ramus of right uropod having 21 spines distally.

Type locality.—Holotype, morphotype and allotype dug from burrows on south shore flood plain of Ramsey Branch

(Blackburn Branch), a tributary of Coahulla Creek, Conasauga River basin, just upstream Hunt Road SE bridge crossing, Bradley County, Tennessee (35.04936°N, −84.86681°W). The area is a grassy field on the south side and secondary growth woods on the north.

Disposition of types.—The holotype, allotype and morphotype are in the collection of the Ohio State University Museum of Biological Diversity Crustacean Collection (OSUMC 7704, 7705, and 7706, respectively), Columbus, Ohio. Paratypes are housed at the National Museum of Natural History, Smithsonian Institution (USNM 1146549, 1146550), Washington, D.C. and Illinois Natural History Survey Crustacean Collection (INHS 11646, 11647).

Range and specimens examined.—This species is found only in Bradley County, Tennessee and Murray and Whitfield Counties, Georgia in the middle reaches of the Tennessee and Conasauga River basins. A total of 76 specimens have been examined.

TENNESSEE: BRADLEY COUNTY: OSUMC 6732—hillside seep/stream to unnamed tributary of Mill Creek adjacent TN Rt 74 at recently clearcut area, 1.8 Km SSE of Felker (35.016100°N, −84.790970°W), Roger F. Thoma (RFT) & David I. Withers (DIW), 1M-I, 2F, 2F juv, 21 Apr 2007; OSUMC 6768—hillside seep or rivulet to Mill Creek of Conasauga River adjacent TN Rt 74, 1.8 Km SSE of Felker (35.015963°N, −84.791803°W), RFT & Glen Rhorbach (GR), 2M-I, 1F, 16 Oct 2007; OSUMC 6769—cow pasture adjacent unnamed tributary of Mill Creek, 2.1 Km SSE of Felker (35.015295°N, −84.786226°W), RFT & GR, 1F, 16 Oct 2007; OSUMC 6780—small hillside ravine 150 m downhill from TN Rt 74, tributary to unnamed tributary of Mill Creek, 1.5 Km SE of Felker, 6.0 Km WNW of Conasauga (35.018924°N, −84.792729°W), RFT & GR, 1M-I, 1F, 1M juv, 18 Oct 2007; OSUMC 6976—Ramsey Branch (Blackburn Branch) of Coahulla Creek, Conasauga River basin, just upstream Hunt Rd SE bridge crossing, (35.049364°N, −84.866811°W), RFT & DIW, 2M-I, 1M-II, 2F, 1M juv, 6F juv, 29 Apr 2008; OSUMC 6977—power line right-of-way and ditch tributary to ditch of Paps Branch of South Chestnut Creek, N of intersection with Old River Rd adjacent Kinser Rd SE (35.132332°N, −84.781556°W), RFT & DIW, 3M juv, 7F juv, 29 Apr 2008; OSUMC 7075—unnamed tributary of Allen Branch at Lebanon Baptist Church on Lebanon Baptist Church Rd (35.050643°N, −84.953215°W), RFT & DIW, 9M juv, 7F juv, 30 Mar 2009; OSUMC 7228—Ramsey Branch (Blackburn Branch) of Coahulla Creek, Conasauga River basin, just upstream Hunt Rd SE bridge crossing (35.049364°N, −84.866811°W), RFT, 1M-II, 3F, 25 Sep 2009; OSUMC 7229—Ramsey Branch (Blackburn Branch) of Coahulla Creek, Conasauga River basin, just upstream Hunt Rd SE bridge crossing (35.049364°N, −84.866811°W), RFT & DIW, 2M-II, 2F, 30 Mar 2009; GEORGIA: MURRAY COUNTY: OSUMC 7721—unnamed tributary of Holly Creek at park in Chatsworth bounded by 4th Ave, 5th Ave, Peachtree St, and Walnut St, G. Whitney Stocker & Cully Stocker, 1 molted chela, 22 Jul 2006; WHITFIELD COUNTY: OSUMC 6787—wet field and wetland at gas line crossing N of GA Rt 76/52 W, 6.6 Km E of Dalton, 11.7 Km W of Chatsworth (34.781334°N, −84.898805°W), RFT & GR, 1M-I, 1F, 2 YOY, 18 Oct 2007.

Conservation status.—*Cambarus* (*T.*) *stockeri* is narrowly distributed and currently found only in undisturbed or minimally disturbed environments. Its current known range is approximately 610 Km^2. It is best classified as ''Vulnerable'' following Taylor et al. 2007, and ''Near Threatened'' using IUCN criteria (IUCN 2001).

Color notes.—All adult specimens observed have been a concolorous brown. A

slight reddish tint can be seen on the rostral margins and postorbital ridges. Tubercles are similar in color to the general body color. The tips of chelae fingers can be orange in larger adults.

Variation.—No geographic variation has been identified in this species. Minor variations occur in the tuberculation of pereopod I. Other than external sexual organs there does not appear to be significant sexual dimorphism in this species.

Size.—The largest individual observed was a female, total carapace length 47.9 mm. Mature form I males ($n = 4$) averaged 35.4 mm (39.1–30.7), form II males ($n = 5$) 30.3 mm (33.1–27.3), and females ($n = 4$) 37.3 mm (47.9–26.7) carapace length.

Life history.—Collections have been made in March, April, July, September, and October only. First form males have been observed in April and October, second form males in March, April, and September, and females in all months sampled. No ovigerous females were observed. Young-of-year were found in March and juveniles were recorded in March, April, and October. The food habits of *C.* (*T.*) *stockeri* are unknown. In the lab, captive-held specimens have consumed both plant and animal material such as earthworms, mealworms, carrots, and maple leaves.

Crayfish associates.—*Cambarus* (*T.*) *stockeri* was collected with *C.* (*D.*) *cymatilis*, *C.* (*D.*) *striatus*, Hay 1902, and *C.* (*L.*) *acanthura,* Hobbs, 1981.

Relationships.—This species is tentatively assigned to the subgenus *Tubericambarus*. In general body and chelae outline, it best comports with members of that subgenus. It also shares a corneous area at the lateral base of the mesial process and central projection with the subgenus. The species is unique within the genus *Cambarus* in the tuberculation of the chelae. No other species' chelae are as extensively covered with tubercles, both dorsal and ventrally. This trait is shared with many members of the genus *Procambarus* and is herein considered a plesiomorphic character state. Hobbs (1969) and Ortmann (1905a) proposed character states they believed present in the ancestral stock of the *Cambaridae*. They both discussed general carapace shape, areola width and length, rostrum structure, coloration, chelae shape, ischial hooks, coxal boss, and gonopod structure and both considered *Procambarus* to be closest in general body form to that ancestral stock. Hobbs and Ortmann both concluded the ancestor of North America's eastern crayfish stock was a lotic species possessing those character states observed in such species as seen today and (implied by Ortmann) that character states seen in burrowing species are derived. Hobbs further elucidated his concept of this ancestor, which he designated the adorconectoid stock, by detailing nine individual character states. In relation to the species herein described character states #5 and #8 are of most import. Hobbs (1969:119) theorized the adorconectoid stock possessed a chela with "…scattered squamous tubercles on the mesial and upper mesial portion of the palm and fingers …" (#5) and the gonopod possessed "… a prominent caudal knob bearing a small corneous caudal process …" (#8). *Cambarus stockeri* possesses characters that appear related to these hypothesized ancestral states. It is more parsimonious to conclude that these characters are a remnant of the ancestral adorconectoid stock than to assume they are derived. If these character states are accepted as plesiomorphic, then *C. stockeri* represents one of the more primitive species in the genus *Cambarus*.

It may be that this species will eventually be found to warrant its own subgenus but that decision should be reserved until genetic data are available for most of the species in the genus *Cambarus*.

Comparisons.—Within the subgenus, *Cambarus* (*T.*) *stockeri* can be distin-

guished from *C.* (*T.*) *polychromatus* Thoma et al. 2005, *C.* (*T.*) *thomai* Jezerinac, 1993 and *C.* (*T.*) *acanthura* (and all other members of the genus *Cambarus*) by its chelae tuberculation.

Etymology.—It is my distinct pleasure to name this species after my fellow Ray Jezerinac protégé, Mr. G. Whitney Stocker of Denison University. Whitney has contributed considerably to my understanding of North American crayfish taxonomy, ecology and distribution. In addition, it is a pleasure to lampoon Whitney by naming such a plesiomorphic species after my good friend. It is suggested that the common name for this species be "cocoa crayfish" in recognition of the coloration of adult specimens. A color picture can be seen at http://web.me.com/cambarus1/Cocoacrayfish/Cocoa_crayfish.html. (Accessed on 20 November 2011)

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Literature Cited

Erichson, W. F. 1846. Uebersicht der Arten der Gattung *Astacus*.—Archiv für Naturgeschichte (Berlin) 12:86–103.

Hay, W. P. 1902. Observations on the crustacean fauna of Nickajack Cave, Tennessee, and vicinity.—Proceedings of the United States National Museum 25(1292):417–439.

Hobbs, H. H., Jr. 1969. On the distribution and phylogeny of the crayfish genus *Cambarus*. *In* P. C. Holt, R. L. Hoffman and C. W. Hart, Jr, eds., The distributional history of the biota of the southern Appalachians, Part I: Invertebrates.—Virginia Polytechnic Institute, Research Division Monograph 1:93–178.

———. 1970. New crayfishes of the genus *Cambarus* from Tennessee and Georgia (Decapoda, Astacidae).—Proceedings of the Biological Society of Washington 83(23):241–259.

———. 1981. The crayfishes of Georgia.—Smithsonian Contributions to Zoology 318:1–549.

IUCN. 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK,

Jezerinac, R. F. 1993. A new subgenus and new species of crayfish (Decapoda: Cambaridae) of the genus *Cambarus* with an amended description of the subgenus *Lacunicambarus*.—Proceedings of the Biological Society of Washington 106:532–544.

Ortmann, A. E. 1905a. The mutual affinities of the species of the genus *Cambarus*, and their dispersal over the United States.—Proceedings of the American Philosophical Society 44(180):91–136.

———. 1905b. *Procambarus*, a new subgenus of the genus *Cambarus*.—Annals of the Carnegie Museum 3(3):435–442.

Taylor, C. A., G. A. Schuster, J. E. Cooper, R. J. DiStefano, A. G. Eversole, P. Hamr, H. H. Hobbs, III, H. W. Robison, C. E. Skelton, & R. F. Thoma. 2007. A reassessment of the conservation status of crayfishes of the United States and Canada after 10+ years of increased awareness.—Fisheries 32(8):372–389.

Thoma, R. F., R. F. Jezerinac, & T. P. Simon. 2005. *Cambarus* (*Tubericambarus*) *polychromatus* (Decapoda: Cambaridae), a new species of crayfish from the United States.—Proceedings of the Biological Society of Washington 118(2):326–336.

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