

A Field-Guide to the Crayfishes of Obed Wild and Scenic River

By Roger F. Thoma



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Introduction: The Obed National Wild and Scenic River National Park, located on the Cumberland Plateau of Tennessee, has thirteen species of crayfish living within or near its borders. These thirteen species come from two genera in the family Cambaridae, a solely North American crayfish family. There are currently seven families of crayfish worldwide.

The two Obed genera are highly specious (approximately 100 species each) and widespread. They are *Cambarus* and *Orconectes*. In total there are approximately 360 species of crayfish in the United States and Canada and approximately 80 species are known to occur in Tennessee.

In the Obed area crayfish can be found in any surface water area and most areas where the water table is close to the surface. Three of the species found in the Obed area are burrowers that spend almost all of their lives in burrows and are rarely found out in open water. Crayfish display three basic life strategies; living in open water and hiding under objects such as woody debris

and rocks, living in short burrows dug into stream banks or under large rocks, and burrowing vertically into ground water that is found near the surface. Technical terminology for these life styles is tertiary, secondary, and primary burrowers respectively.

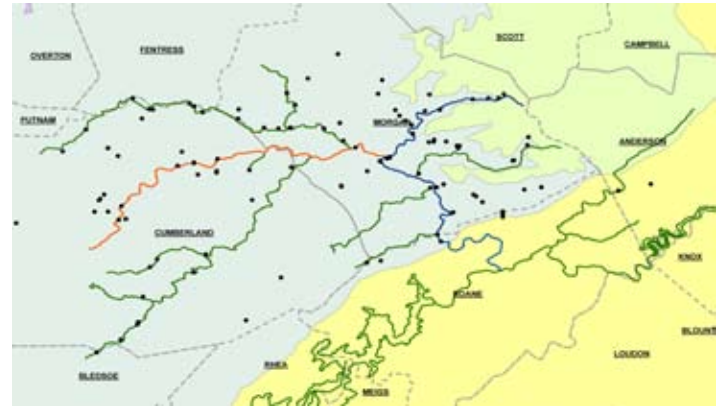
The generalized pattern of reproduction in North American crayfish is normally to mate in late fall or early spring, laying of eggs from early spring to early summer and dispersal of young in mid summer. Crayfish mating is referred to as amplexus. Female crayfish carry a sperm plug with them in their annulus ventralis until they lay their eggs. The eggs are consequently carried by the female on her pleopods as are the young until they are old enough to disperse.

The life span of crayfish can vary based on the type of habitat a species occupies. Species that live in warmer waters seem to live for about three to four years. Those that live in colder waters such as springs, burrows, and caves can live from six to twenty plus years. Much work needs to be done with crayfish life histories before

a solid understanding of the crayfish's role in our ecosystems can be fully understood. It is generally understood that crayfish form an important factor in aquatic ecosystems processing large portions of a systems energy and biomass as well as altering and creating habitat. Over 260 animal species are known to feed on crayfish. Crayfish are known to feed at every level of the food chain.

Special note: All line drawings used in this document are derived from Hobbs, Jr. 1989, Taylor and Schuster 2004 or self drawn.

Maps: The maps provided in this field guide are focused on the Obed Emory River area. The map on this page displays the drainage basin's streams, collection sites, and the three ecoregions in the area. Blue represents the Southwestern Appalachians, green the Central Appalachians, and yellow the Central Appalachian Ridge and Valleys Ecoregions. Streams are either green, blue for the Emory River mainstem, or red for the Obed River mainstem. Crayfish collection sites are



denoted with black dots. Each county is labeled.

Figures: In each species account is a line drawing illustration derived from Hobbs, Jr. 1989. For the genera *Cambarus* and *Orconectes* from left to right are figured a dorsal view of the carapace, inner view first form male gonopod, outer view first form male gonopod, outer view second form male gonopod, annulus ventralis of female, and dorsal view of chelae 1.

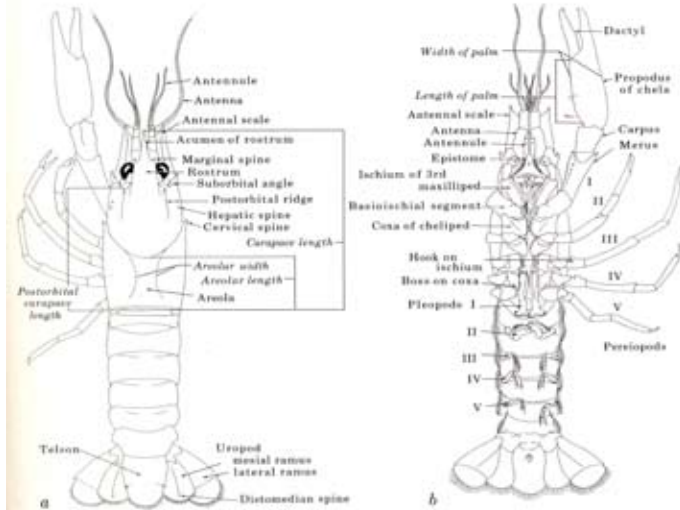


FIGURE 3.—Generalized crayfish: a, dorsal view; b, ventral view.

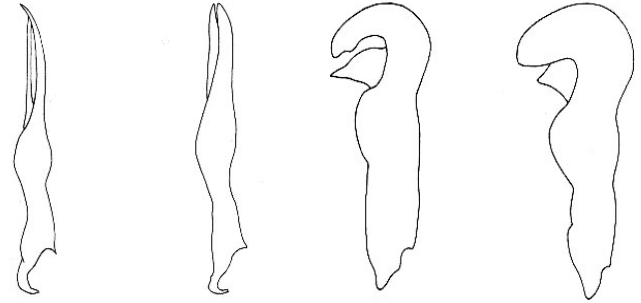
How to identify crayfish: The figure above gives a generalized outline of the body structure of a North American crayfish. The most important body parts for the identification of Obed crayfish on this figure are the rostrum (between the eyes), cervical spine (on the side of the body), areola and its width (dorsal mid body), and the chelae's propodus, dactyl and palm.

The rostrum will either have or not have marginal (lateral) spines, the body will either have or not have cervical spines, and the width of the areola will be wide or narrow. Not figured is the tuberculation of the dorsal chelae palm. Palmer tubercles can be in rows or generally scattered about. There can be several rows or only one row of tubercles and some rows can be complete (run the length of the palm) while others are incomplete. Also not illustrated are the tubercles on the inner margins of the chelae fingers. Of special use in the Obed area is the presence of denticles on the inner margins of the chelae fingers. Denticles are very small spine like structures that look like tiny teeth. A group of three species have these small denticles running the full length of the fingers with the denticles appearing between the larger tubercles. In the other species the denticles do not run past the midpoint of the finger and are found near the tips or distal ends.

Crayfish in North America go through reproductive seasons or cycles. Associated with reproduction, male crayfish display a special reproductive form referred to

as “first form”. When not in reproductive form a male is called second form. Associated with each species account is a line drawing showing the shape of the first form and second form male gonopod. One must learn to distinguish between the two possible forms to be able to distinguish any two species in question. The first form male gonopod is always more delicately sculptured and part of the tip will be a darker brown color and is described as corneous (consisting of a horny substance). The figures to the right show a first form male (left) and a second form male (right) gonopod for the genera *Orconectes* (left) and *Cambarus* (right). The gonopod location is illustrated in the generalized crayfish drawing. They are labeled as Pleopods I. Female crayfish lack gonopods and between Pereiopods V (fifth pair of legs) is found the annulus ventralis. This structure is illustrated in the individual species accounts.

When examining the chelae structure of a crayfish all characters are observed from the dorsal surface. Numerous tubercles can be observed on the mesial sur-



face below the movable finger (the dactyl). This area is called the palm and the tubercles are called palmer tubercles. Rows of tubercles are numbered from the mesial margin inward as first row, second row, etc. Some species do not have their tubercles lined up in rows but scattered randomly across the surface, though on the inner edge of the palm tubercles can appear to form a row.

The chelae have “fingers”. The fingers are formed by the dactyl (the movable finger) and an extension of the propodus. On the opposable margins (the pinching surface) of the fingers are also found tubercles. Some

of these are larger than those surrounding. The location of these enlarged tubercles on the fingers can be diagnostic in the identification of a species. As discussed previously, some species have denticles (small spine like teeth) that extend the length of the opposable finger margins while some have them half way or less down the fingers.

The areola is an area of the body positioned between the gill cambers and is located on the dorsal surface of the thorax. Life history habits are expressed in the state of the areola. The width of the areola (space between the suture lines) can aid in crayfish species identification. Species in low oxygen waters will have narrow areolas while those that inhabit high oxygen waters will have wide areolas.

The mandible, the last pair of appendages located at the mouth, can be an aid in identification. The rusty crayfish, found at one site in the basin, has a unique mandible that lacks the normal toothed margin and has a blade like edge to it that identifies the species. All

other species in the basin have mandibles with teeth extending the total length of the mandible edge.

Obed Emory River basin crayfish key

1a) Rostrum with three spines at tip, 2 lateral (marginal) and one middle, carapace with cervical spines on sides (fig. 1a) 2

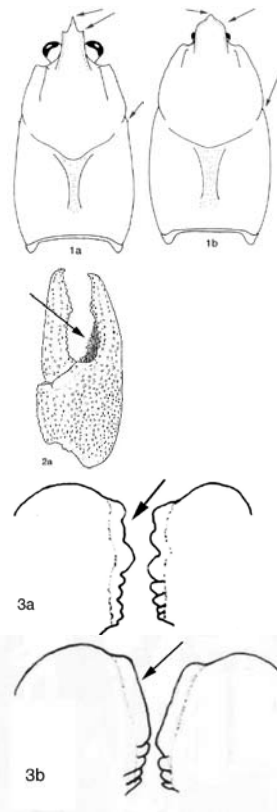
1b) Rostrum without lateral spines, one spine at tip, no cervical spines (fig. 1b) 4

2a) Chelae with noticeable tuft of hairs at base of lateral finger (fig. 2a)
 **Tanback crayfish (pg. 24)**

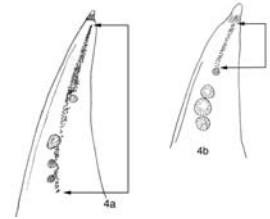
2b) No tuft of hairs at base of chelae's lateral finger 3

3a) Mandible with teeth on all of its edge..... **Bigclaw crayfish (pg. 32)**

3b) Mandible with blade like margin on distal edge..... **Rusty crayfish (pg. 34)**

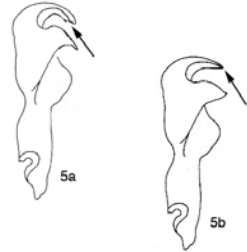


4a) Small tooth like denticles on inner margins of chelae fingers extending length of finger and found between tubercles near base of fingers 5



4b) Small tooth like denticles on inner margins of chelae fingers extending half way or less length of inner fingers 7

5a) Central projection of firstform male gonopod with subapical notch 6



5b) Central projection of firstform male gonopod without subapical notch
..... **Hairyfoot crayfish (pg. 18)**

6a) Central projection of firstform male gonopod approximately as long as messial process (fig. 5a) **Obed River crayfish (pg. 20)**



6b) Central projection of firstform male gonopod approximately half as long as messial process (fig. 6a)..... **Emory River crayfish (pg. 22)**

7a) Areola closed, no space between edges of gill chambers (fig. 7a)..... 8

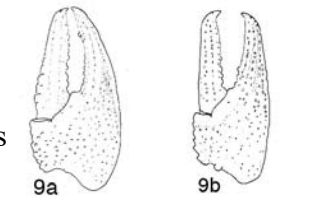
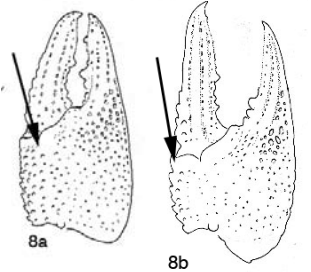
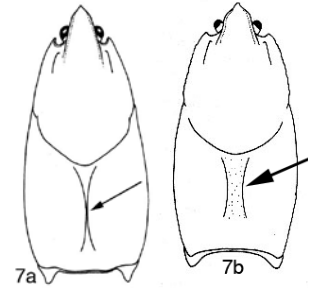
7b) Areola open, space for one or more rows of punctations between edges of gill chambers (fig. 7b) 9

8a) Palm of chelae with two distinct rows of tubercles, color in life red (fig. 8b)
..... **Valley flame crayfish (pg. 26)**

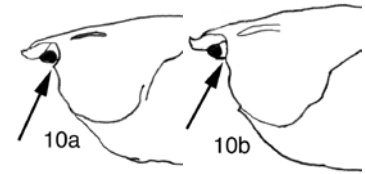
8b) Palm of chelae with many tubercles covering inner, dorsal, half and not forming distinct rows, color in life mainly browns (fig. 8a) **Thornytail crayfish (pg. 10)**

9a) Chelae of mature individuals triangular shaped, usually with two rows of easily seen tubercles on inner margin, not forming a fussed ridge at base (fig. 9a)..... 10

9b) Chelae of mature individuals more rectangular in shape, usually one row of tubercles on inner palm, tubercles forming a fussed ridge like structure at base (fig. 9b)..... 11

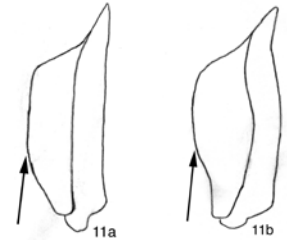


10a) Suborbital angle acute, areola wide with three or more rows of punctations in narrowest part (fig. 10a)..... **Triangleclaw crayfish (pg. 28)**



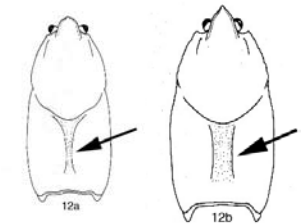
10b) Suborbital angle obsolete, areola narrow with one or two rows of punctations in narrowest part (fig. 10b)..... **Ambiguous crayfish (pg. 30)**

11a) Eyes small, inner edge of antennal scale straight at mid point (fig. 11a)
..... **Mountain midget crayfish (pg. 14)**



11b) Eyes not small, inner edge of antennal scale curved (fig. 11b)..... 12

12a) Coloration very bright in life having abundant reds and blues, areola narrow, usually with two rows of punctations, central projection of gonopod equal in length to mesial process (fig. 12a)..... **Upland burrowing crayfish (pg. 12)**



12b) Coloration brown or greent in life, areola broad, usually with six or more rows of punctations, central projection of gonopod distinctly shorter than mesial process (fig. 12b) **Boxclaw crayfish (pg. 16)**

Thornytail crayfish

Cambarus (Tubericambarus) acanthura

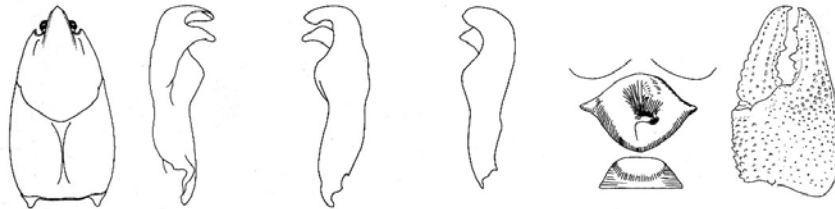
Identification: Key characters are an obliterated areola that forms a line down the back, numerous tubercles on the chelae palm that do not form distinct rows, and two small median spines at the end of the tail that project beyond the margins of the tail.

The thornytail crayfish is unique in the Obed River area. No other species in the basin has two small spines overhanging the distal margin of the tail. Also, no other species has numerous tubercles that do not form distinct rows covering the palm of the chelae. The upland burrowing and ambiguous crayfish can have very narrow areolas that can in some individuals be obliterated but both have only one distinct row and occasionally a second less developed row of tubercles on the inner edge of the chelae palm.



Color: The color of the thornytail crayfish is dominated by browns, yellows, and greens. The color of the chelae is varied. The tips of the “fingers” are red or reddish orange along with two tubercles at the base of the movable “finger”. The edges of the rostrum are red or yellowish orange. Tubercles on the chelae are usually light cream. The head and body are vermiculated with browns, yellows, and greens. Coloration can vary with age and time since molting.

Photo by Zac Loughman.



87. *Cambarus (Lacunicambarus) acanthura*

Distribution: The thornytail crayfish is found in northwest Georgia, northeast Alabama, and southeast Tennessee in the Tennessee, Coosa, Black Warrior, and Chattahoochee River basins. The population discovered in the Emory River basin is the furthest north ever recorded. It appears to be confined to the low gradient, low relief areas of the basin. Specimens have only been collected in the Emory River upstream of the Obed River and the Crooked Creek areas but it is likely it will be found all the way to the confluence with the Tennessee River.



Ecology/Life History: The thornytail crayfish mates and lays eggs in the spring. The species burrows exclusively in wetland areas around streams, ditches, and wooded wetlands and is rarely found outside its burrow except in spring. The best populations seem to be from areas of ditched wetlands though this is likely an artifact of the ease of collecting. Food preference is unknown but may be similar to the closely related little brown mudbug which waits at the mouth of its burrow and attacks small invertebrates that pass by..

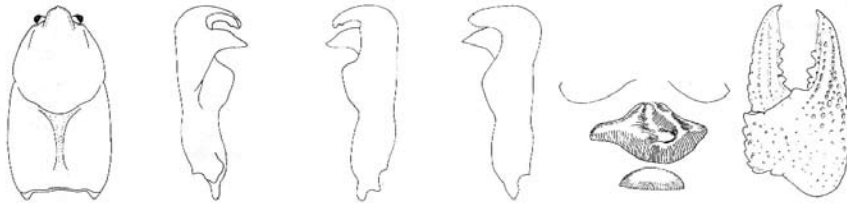


Upland burrowing crayfish

Cambarus (Jugicambarus) dubius

Identification: Key characters are a ridge like row of tubercles on inner edge of chelae palm, denticles extending less than half way down “fingers” of chelae, no lateral spines on rostrum, narrow areola, length of central projection of the firstform male gonopod usually equal to or near equal to mesial process, life colors vibrant blues and reds.

The upland burrowing crayfish is similar to the boxclaw crayfish and mountain midget crayfish. The upland burrowing crayfish has small eyes. Boxclaw and mountain midget crayfish both have wide areolas. Other species in the basin either have lateral spines at the cervical groove and/or rostral margins, denticles that extend the length of the chelae “fingers”, or more than one well developed row of tubercles on the chelae palm.



78. *Cambarus (Jugicambarus) dubius*



Color: The color of the upland burrowing crayfish is dramatic. The specimen pictured here is a red body blue leg color morph. Numerous color variations of this species can be found within its range. Some populations are mostly blue with some reds, or black with orange or red, some are all reddish orange, while some are solid blue, and many are variations of the above color themes. Coloration within a population can vary with age and time since molting.

Photo by Zac Loughman.

Distribution: The upland burrowing crayfish is a widely distributed species in the Appalachian Mountains. It is found from western Pennsylvania south through West Virginia, southwest Virginia, eastern Kentucky, eastern Tennessee, and northwestern North Carolina. The species shows no special association with drainages as it is known to travel overland during wet spring nights. Within the Obed/Emory basin it is found throughout the area where suitable habitat can be found. Much of the basin is dominated by sand stone which limits suitable springs and seeps.



Ecology/Life History: The upland burrowing crayfish mates in spring and fall. Egg production occurs in the spring and early summer. This species burrows into springs and seeps on hill sides and mountain tops. The best populations are from areas of extensive forest cover though like the picture above, at the type locality, healthy populations can be found in fields. Food preference appears to be vegetation and invertebrate animals. Numerous burrows have been observed with leaf litter, mosses and other plants stored in them.



Mountain midget crayfish

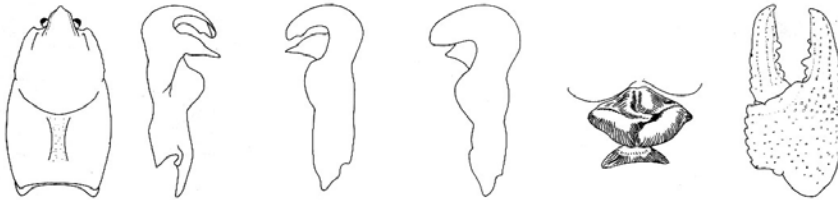
Cambarus (Jugicambarus) parvoculus

Identification: Key characters are ridge like row of tubercles on inner edge of chelae palm, denticles extending less than half way down “fingers” of chelae, no lateral spines on rostrum, wide areola, length of central projection of the firstform male gonopod equal to mesial process, antennal scale straight edged on inner margin.

The mountain midget crayfish is similar to the boxclaw crayfish and upland burrowing crayfish. The boxclaw and upland burrowing crayfish have larger eyes and rounded antennal scale margins. Other species in the basin either have lateral spines at the cervical groove, denticles that extend the length of the chelae “fingers”, or more than one well developed row of tubercles on the chelae palm.



Color: The color of the mountain midget crayfish is usually brown. The specimen pictured here is a blue color phase individual. Normally, the body, chelae, and abdomen are a solid brown. The legs are always some shade of blue. Tubercles on the chelae fingers are lighter colored than the background and are usually a yellowish or cream color. Older, un-molted individuals can be very dark to black due to staining by organic matter.



70. *Cambarus (Jugicambarus) parvoculus*

Distribution: The mountain midget crayfish is a widely distributed species on the Cumberland Plateau and can be found in southeastern Kentucky in the Cumberland basin, eastern Tennessee in the Tennessee and Cumberland River basins, and the northern corners of Georgia and Alabama in the Sand Mountain area of the Tennessee basin. Within the Obed/Emory basin it is found throughout the area.



Ecology/Life History: The mountain midget crayfish appears to mate from spring to fall. Egg production occurs in the spring. This species lives in small sized streams and springs with rocky substrates where they burrow under aquatic moss covered rocks and into rocky banks. The best populations are from streams with an extensive forest cover, especially those dominated by hemlock and rhododendron. Food preferences as well as life span are unknown.

Boxclaw crayfish

Cambarus (Jugicambarus) distans

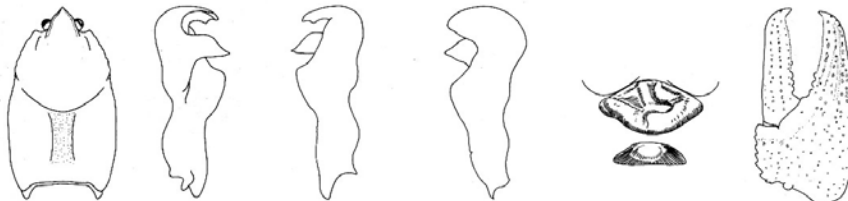
Identification: Key characters are a ridge like row of tubercles on inner edge of chelae palm, denticles extending less than half way down “fingers” of chelae, no lateral spines on rostrum, wide areola, length of central projection of the firstform male gonopod less than equal to mesial process.

The boxclaw crayfish is similar to the mountain midget crayfish and upland burrowing crayfish. The mountain midget crayfish has smaller eyes and the upland burrowing crayfish is usually very colorful with intense reds and blues. Other species in the basin either have lateral spines at the cervical groove, denticles that extend the length of the chelae “fingers”, or more than one well developed row of tubercles on the chelae palm.



Color: The color of the boxclaw crayfish is usually brown. The body and abdomen are a solid brown or brown-green. The chelae are brown but can have an orange tint. The species can be light in color. The legs are always brownish to cream colored and never blue. Tubercles on the chelae fingers are lighter colored than the background and are usually a yellowish or cream color. Older, individuals can be very dark to black due to staining by organic matter.

Photo by Chris Lukhaup.



68. *Cambarus (Jugicambarus) distans*

Distribution: The boxclaw crayfish is a widely distributed species and can be found in southeastern Kentucky in the Cumberland and Kentucky River basins, eastern Tennessee in the Tennessee and Cumberland River basins, and the northern corners of Georgia and Alabama in the Sand Mountain area of the Tennessee basin. Within the Obed/Emory basin it is found throughout the area.



Ecology/Life History: Very little is known about this specie's life history. Reproduction may take place from spring to fall. Egg production has never been observed. Boxclaw crayfish live in small sized streams with rocky substrates where they burrow under rocks and into the banks. The best populations are from streams with extensive forest cover. Food preferences as well as life span are unknown. They do not appear to require as cold of water as the mountain midget crayfish.

Hairyfoot crayfish

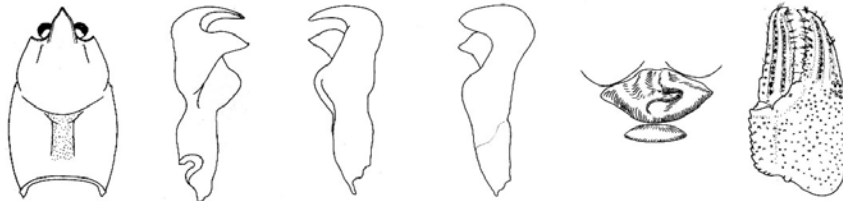
Cambarus (Jugicambarus) crinipes

Identification: Key characters are denticles extending length of chelae “fingers”, no lateral spines on rostrum, one row of tubercles on the palm, wide areola, length of central projection of the firstform male gonopod equal to mesial process and lacking a subapical notch.

The Hairyfoot crayfish looks like the Obed River and Emory River crayfishes. The only sure way to reliably tell this species from the other two is to examine the firstform male gonopod. Obed River crayfish have a subapical notch on the central projection and Emory River crayfish have a central projection half the length to the mesial process. Other species in the basin have lateral spines on the rostrum or a rostrum that is not acuminate but sharply angled near the end, have two distinct rows of tubercles on the inner edge of the chelae’s palm, or do not have denticles extending the length of the chelae “fingers”.



Color: The color of the hairyfoot crayfish is rather drab. The body, legs, chelae, and abdomen are usually a mottled brown, brownish green, or brownish orange. Shading can be very dark and the species is rarely light in color. Recently molted individuals may have orange or red finger tips. Tubercles on the chelae fingers are lighter colored than the background and are usually a yellowish or cream color. Older, un-molted individuals can be very dark to black due to staining by organic matter.



73. *Cambarus (Jugicambarus) crinipes*

Distribution: The hairyfoot crayfish is widely distributed in Tennessee and can be found in the Obey, Emory, and Big South Fork Cumberland River basins in Cumberland, Fentress, Morgan, Overton, Putnam, and Scott Counties of Tennessee. Within the Obed/Emory basin it is confined to Clear Creek.



Ecology/Life History: Very little is known about this specie's life history. It is known that reproduction takes place in the fall and possibly spring. Egg production is low as the eggs are large and few in number. Hairyfoot crayfish live in small and mid sized streams with rocky substrates where they hide under rocks. In high gradient areas, where flows are strong, they are found both at the stream edges and midstream where they burrow under rocks. In low gradient streams they can be found in the open stream and under rocks.

Obed River crayfish

Cambarus (Jugicambarus) species A

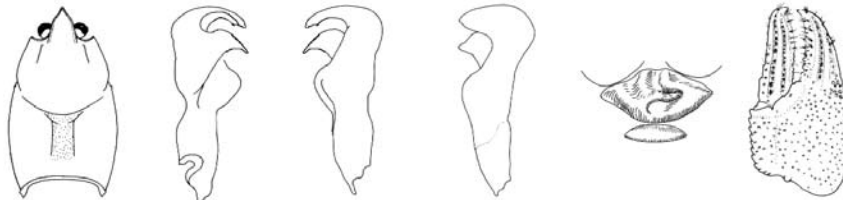
Identification: Key characters are denticles extending length of chelae “fingers”, no lateral spines on rostrum, one row of tubercles on the palm, wide areola, a subapical notch on the central projection of the firstform male gonopod, and a strongly deflected mesial process.

The Obed River crayfish looks like the Emory River crayfish and hairyfoot crayfish. The only sure way to tell this species from the other two is to examine the firstform male gonopod. Obed River crayfish have a subapical notch on the central projection, hairyfoot crayfish do not, and Emory River crayfish have a central projection shorter than the mesial. Other species in the basin have lateral spines on the rostrum, two distinct rows of tubercles on the inner edge of the chelae’s palm, or denticles extending part way down the chelae “fingers”.



Color: The color of the Obed River crayfish is also rather drab. The body, legs, chelae, and abdomen are usually a mottled brown, brownish green, or olive green. Shading can be very dark to moderate dark. It is rarely light in color. Recently molted individuals will have orange or red finger tips. Tubercles on the chelae fingers are lighter colored and are usually a yellowish color. Older individuals can be very dark to black due to staining by organic matter.

Photo by Zac Loughman.



73. *Cambarus (Jugicambarus) species A*

Emory River crayfish

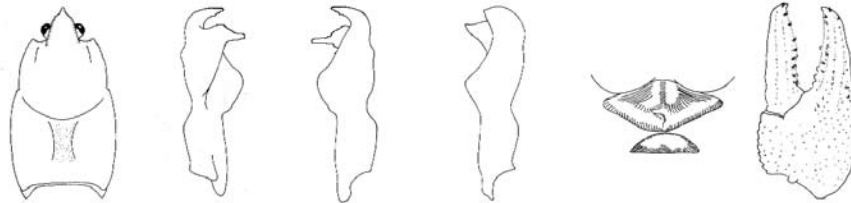
Cambarus (Jugicambarus) species B

Identification: Key characters are denticles extending length of chelae “fingers”, no lateral spines on rostrum, one row of tubercles on the palm, wide areola, central projection of the firstform male gonopod half the length of mesial process and with a subapical notch.

The Emory River crayfish also looks like the hairyfoot crayfish and Obed River crayfish. The only sure way to tell this species from the other two is to examine the firstform male gonopod. Obed River and hairyfoot crayfish have a central projection equal in length to the mesial process. Other species in the basin either have lateral spines on the rostrum, two distinct rows of tubercles on the inner edge of the chelae’s palm, or denticles extending only part way down the chelae “fingers”.



Color: The color of the Emory River crayfish is rather drab. The body, legs, chelae, and abdomen are a mottled brown, brownish green, or olive green. Shading can be dark to moderate dark. Shading is rarely light in color. Recently molted individuals may have orange or red finger tips. Tubercles on the chelae fingers are lighter colored than the background and are a yellowish or cream color. Older, individuals can be very dark to black from staining by organic matter. *Photo by Zac Loughman.*



67. *Cambarus (Jugicambarus) species B*

Tanback crayfish

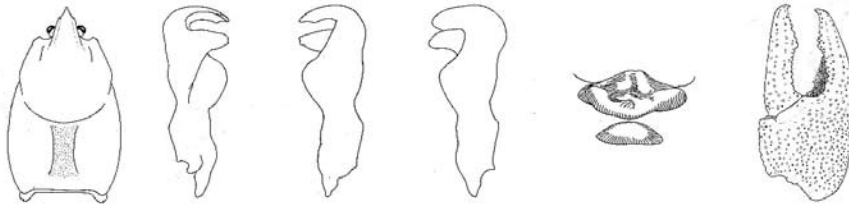
Cambarus (Hiaticambarus) girardianus

Identification: Key characters are a distinct tuft of hairs at base of immovable “finger”, small spines on carapace sides at cervical groove and lateral edges of rostrum, wide areola, and widely gaping chelae “fingers”.

The Tanback crayfish is similar in general appearance to the bigclaw and rusty crayfish, two species in the Obed/Emory basin that are from a different genus. All three species prefer larger streams and rivers and are adapted to that type of environment. The tanback crayfish is the only species in the basin that has a distinct tuft of hairs at the base of the immovable “finger” of the chelae. In addition, male tanback crayfish have a gonopod with two elements recurved at a 90° angle instead of pointing in line with the main shaft.



Color: The color of the tanback crayfish is shades of brown and green. Two dark brown saddles run across the back, one at the cervical groove and one at the posterior margin. The rostral margins are reddish brown and tubercles on the chelae “fingers” are yellow. Some large individuals take on a metallic blue sheen on the chelae. Color patterns on the abdomen create a scalloped appearance. A few blue phase individuals have been observed.



60. *Cambarus (Hiaticambarus) girardianus*

Distribution: The tanback crayfish is widely distributed in the Tennessee River and its tributaries from northeast Mississippi to Knoxville Tennessee. In the Obed area the best populations are found in the larger river portions of the Emory River mainstem downstream of the Obed River confluence. Populations have also been recorded from the Little Emory River, Daddys Creek, and upper Obed River. A good deal of variation is seen in the physical appearance and habitat preferences of this species within its wide range.



Ecology/Life History: In the Obed Emory River system the tanback crayfish prefers the larger water bodies of the mainstem where it lives under the larger flat rocks in the vicinity of riffles and rapids. It is not found directly in the rapids and riffles but at the head and foot of such areas where it burrows under rocks. The food of this species is unknown. Mating appears to occur in the spring and fall with egg production in spring. The species' life span may be three to four years according to H. H. Hobbs Jr.

Valley flame crayfish

Cambarus (Depressicambarus) deweesae

Identification: Key characters are an obliterated areola, suborbital angle obsolete, two rows of tubercles on chelae palm, no lateral spines on rostrum or cervical groove, central projection of firstform male gonopod without subapical notch and shorter than mesial process.

The valley flame crayfish is closely related to and physically similar to the triangleclaw and ambiguous crayfish. All three can have two rows of palmer tubercles. The triangleclaw crayfish has a wide, open areola and the ambiguous crayfish has a narrow areola that is usually narrowly open though some individuals have shown closed obliterated areolas. Valley flame crayfish can be distinguished from thornytail crayfish by the absence of overhanging spines on the tail and only two well organized rows of tubercles on the chelae palm.



46. *Cambarus (Depressicambarus) deweesae*



Color: The color of the valley flame crayfish is rather straight forward. All body parts and appendages are some shade of red. Tubercles and the margins of joints are usually a lighter red or orange. In Kentucky, some populations have been recorded that have an overall blue body and appendages with red tubercles, joint margins, and rostrum and postorbital ridges. This color morph has not been observed in the small Tennessee populations.

Distribution: The valley flame crayfish is found only in the Ridge and Valley Province of the lower Emory River drainage basin in the Little Emory River area. Currently there are only a few sites from which this species has been collected in Tennessee. Twelve localities from four different areas of Kentucky have been reported by Taylor and Schuster. It is likely that this species is much more abundant than presently known. One population near Oak Ridge numbered in the hundreds of burrows in less than a one acre area.



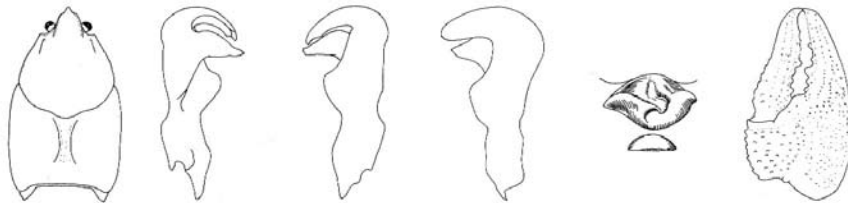
Ecology/Life History: This species is a primary burrower and has never been observed outside its burrow in standing water. It has been seen above ground on rainy spring nights moving about. Burrows are located in wetland like areas associated with springs or seeps such as pictured above. The burrows are simple with one or two entrances, a single large chamber about one foot deep, and may have smaller side chambers or tunnels. Food preferences and life span are unknown. One gravid female has been observed in spring.

Triangleclaw crayfish

Cambarus (Depressicambarus) sphenoides

Identification: Key characteristics are open areola, two rows of tubercles on chelae palm, no lateral spines on rostrum or cervical groove, suborbital angle acute.

This is one of the three Obed area crayfish species with triangular shaped chelae. All three species have two rows of tubercles on the chelae palm and no lateral spines on the rostrum or cervical groove. Within this group, the triangleclaw crayfish is the only one with an acute suborbital angle. It also has the widest areola. The valley flame and ambiguous crayfish both have very narrow or obliterated areola. Other crayfish species in the basin have only one row of palmer tubercles, a tuft of hair at the base of the outer chelae finger, or lateral spines on the end of the rostrum.



41. *Cambarus (Depressicambarus) sphenoides*



Color: The triangleclaw crayfish is almost always some shade of brown, green, or greenish brown. The tips of the chelae fingers are frequently orange to red. Tubercles on the chelae are a lighter brown or cream color. The abdomen is usually darker colored than the body and some times has a greenish hue. Younger individuals may be mottled on the head and body and can have a banded pattern to the abdomen with a pair of dark dorsal bands running the length of the tail.

Distribution: The triangleclaw crayfish is found throughout the Southwestern Appalachian ecoregion (blue colored area of map) of the Obed Emory River basin. It does not appear to inhabit the Ridge and Valley area (yellow area) or the Central Appalachian ecoregion areas (green area). Outside of the immediate area it is found on the Cumberland Plateau of Kentucky and Tennessee in the Kentucky, Cumberland, and Tennessee River basins.



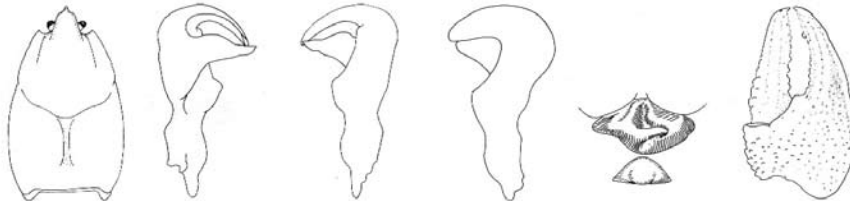
Ecology/Life History: The triangleclaw crayfish displays two basic life styles. One is to burrow into stream banks (especially those of clay) in small to medium sized streams. The other is to live in mid stream burrowing under rocks. In such streams water temperatures must remain cool to cold such as would be found in a spring fed stream. The species is tolerant of mild environmental disturbance. Mating occurs in the spring and fall and egg production has been observed in spring. Food preferences are unknown along with life span.

Ambiguous crayfish

Cambarus (Depressicambarus) striatus

Identification: Key characteristics are an obsolete suborbital angle, a narrow areola (not normally obliterated), two rows of palmer tubercles, no cervical or rostrum lateral spines.

As implied by its common name, this species is highly variable. There are few populations in the Obed area so variation is not a problem in the basin. Within the basin this is the only species with a narrow areola that is not completely closed, two easily seen rows of tubercles on the chelae palm, and no lateral spines on the rostrum. The thornytail crayfish differs from this species but with its spines that overhang the tail's margin and large number of tubercles on the chelae palm. The triangleclaw crayfish has a wider areola and acute suborbital angle and the valley flame crayfish has an obliterated areola.



48. *Cambarus (Depressicambarus) striatus*



Color: The ambiguous crayfish is a uniform brown to brownish green in adults. Young individuals (like the triangle crayfish) can display two bark brown to black-brown stripes on the abdomen. The chelae tips will be reddish to orange and the tubercles light orange to cream. Some can have a mottled appearance. The legs will be a light brown, light green or cream color. Rostral margins are usually a lighter color than the body and may be orange, red, or light brown.

Photo G.W. Stocker.

Distribution: The ambiguous crayfish is found in the lower elevations of the Southwestern Appalachians Ecoregion on the banks of the Emory and Obed Rivers and Clear Creek. There are only four collections sites for this species in the basin but it is likely that it is much more common. It can be a difficult species to collect because of its excellent digging abilities and is likely under represented. Further collecting in the basin will result in more records for the ambiguous crayfish and it will likely be found through out the Southwestern Appalachian Ecoregion.



Ecology/Life History: The ambiguous crayfish is almost always found in a burrow. Its burrows are found on the edges of streams and rivers usually where some ground water is seeping into the stream. In other parts of its range it has been reported in open stream environments from under rocks and logs or burrowing in wetland habitats. Females with eggs have been collected in August and October. Firstform males have been reported for all months except June and August. Food and life span are unknown.

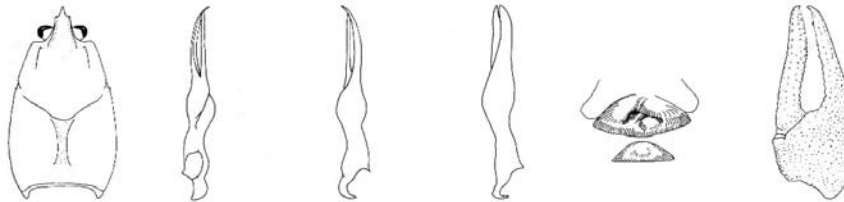


Bigclaw crayfish

Orconectes (Procericambarus) placidus

Identification: Key characters are two lateral spines at distal end of rostrum, cervical spines on side of carapace just posterior to cervical groove, mandible with teeth throughout length.

There are two species of *Orconectes* in the Obed Emory River basin, both of which are introduced invasive species. Both species have lateral spines on the rostrum and cervical groove. One other species in the basin, the tanback crayfish, can display such spines but this species has a tuft of hairs at the base of its outside chelae finger. The bigclaw crayfish can be distinguished from the rusty crayfish by examining the mandible (the inner most mouth part). The bigclaw crayfish has teeth on all of the mandible's edge while the rusty crayfish has a blade like edge on the distal half and thus lacks teeth there.



177. *Orconectes (Procericambarus) placidus*



Color: Background coloration is some shade of brown or green. There are two dark brown to black saddles, at the cervical groove and the back of the carapace. The chelae have orange or red tips with a black band just behind. Chelae tubercles and spines on the body and appendages are light tan or cream. The legs are a lighter color of the carapace background color. The abdomen is patterned with rows of dark markings and reddish bands at each segment's posterior edge. *Photo by G.W. Stocker.*

Distribution: Currently the bigclaw crayfish is confined to the lower gradient waters of the upper Obed River. The species is not native to the basin. In 1974 collections (made by Dr. D.H. Stansbury) only Obed River crayfish were recorded in the upper Obed. This work found that all Obed River crayfish had been replaced by bigclaw crayfish in upper Obed mainstem waters. It is not known if this species will continue to expand its range in the basin. In its native range it is found in the lower and middle Cumberland and Tennessee River basins north and west of the Obed River.



Ecology/Life History: In its native range the bigclaw crayfish is found in all sizes of streams. It seems to avoid high gradient waters. In the Obed, it currently occupies low gradient streams showing signs of nutrient enrichment where it lives amongst and under rocks. How far the species will expand its range in the basin is unknown. It is possible that 80 to 90 percent of the basin could be invaded by bigclaw crayfish which could result in the extinction of Emory and Obed River crayfishes. The bigclaw likely arrived via bait bucket.

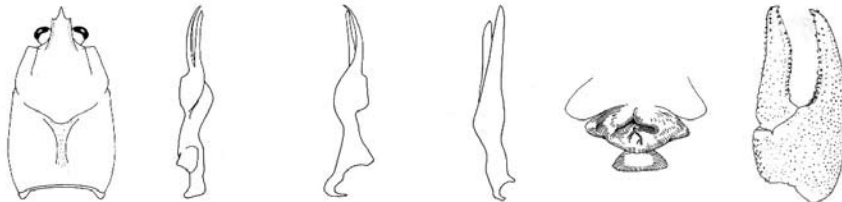


Rusty crayfish

Orconectes (Procericambarus) rusticus

Identification: Key characters are two lateral spines at distal end of rostrum, cervical spines on side of carapace just posterior to cervical groove, mandible with blade like edge on distal end.

This is another introduced invasive species in the Obed Emory basin. The rusty crayfish also has lateral spines on the rostrum and cervical groove. One other species in the basin, the tanback crayfish, can display such spines but the tanback has a tuft of hairs at the base of its outside chelae finger. The rusty crayfish can be distinguished from the bigclaw crayfish by examining the mandible (the inner most mouth part). The bigclaw crayfish has teeth on all of the mandible's edge and the rusty crayfish has a blade like edge on the distal half and thus lacks teeth there.



174. *Orconectes (Procericambarus) rusticus*



Color: Rusty crayfish have chelae coloration similar to bigclaw crayfish with an orange or red tip and an adjacent black band and light colored tubercles. The body lacks the cervical saddle band but frequently has the band at the posterior carapace edge. It also has lateral rusty colored blotches on the posterior carapace. Background coloration is brown, green, or rusty red. The legs are normally bluish or green. Some populations have strong bluish tints to their overall body coloration.

Distribution: Only one specimen of the rusty crayfish has been collected in the Obed Emory River basin from Laurel Branch at the Oakdale City Park. It is not known if this specimen represents an established population. Other adjacent collecting sites in the Emory River mainstem failed to yield rusty crayfish. It is likely that a population exist somewhere in the Laurel Branch basin possibly in one of the local ponds. The rusty crayfish has been widely introduced in North America and has proven to be an aggressive invader. If it becomes established it will spread widely in the basin.



Ecology/Life History: The rusty crayfish prefers lower gradient, nutrient enriched streams and lakes and ponds. The species has dramatic negative impacts on aquatic vegetation and has been known to eliminate plant communities. Such ecological changes invariably have negative effects on the other members of the ecosystem, especially fish. Rusty crayfish are known to eliminate native crayfish populations. They appear to consume aquatic plants as well as insects and other benthic organisms. They reproduce prolifically.



Helpful Crayfish Literature

The Crayfishes of Kentucky. C.A. Taylor and G.A. Schuster. 2004. Published by the Illinois Natural History Survey, Special Publication number 28. This book is still available from the Illinois Natural History Survey for \$20.00. It contains a great deal of information on many of the crayfish species found in the Obed River area.

The Crayfishes of Georgia. H.H. Hobbs Jr. 1981. Published by Smithsonian Institution Press, Smithsonian Contributions to Zoology number 318. This book is no longer available but may be found at University and College libraries. It contains extensive, detailed information on some of the Obed species and many Tennessee species.

The Crayfishes of West Virginia. R.F. Jezerinac, G.W. Stocker, & D.C. Tarter. 1995. Published by the Ohio Biological Survey, Bulletin of the Ohio Biological Survey New Series Vol. 10 number 1. This book is still available from the Ohio Biological Survey for about \$10. It contains a great deal of morphometric information.

An Illustrated Checklist of the American Crayfishes. H.H. Hobbs Jr. 1989. Published by Smithsonian Institution Press, Smithsonian Contributions to Zoology number 480. This book is no longer available but may be found at University and College libraries. It contains some information on habitat and distribution with line drawings of every species known from North and South America. It has most Tennessee species listed in it that were described prior to 1990.

Conservation status of crayfishes of the United States and Canada. C.A. Taylor et al. 1996. Published by the American Fisheries Society in Fisheries, Volume 21, number 4. It may be found at University and College libraries. The paper contains information on all species north of Mexico including their general distribution and conservation status (or rarity) and discusses those things that threaten their existence. It has been revised and will be published again in Fisheries in 2007.