What’s a Crawdad?

This looks like a great place to catch a crawdad.

What will we do with it if we catch one?

Well that’s one thing we don’t need to worry about.

You don’t know what one is either, huh?
Agenda

- Information
- Classification/Distribution
- Biology and Conservation
- Invasive species impacts
- Morphology
- Identification
Information

- H.H. Hobbs, Jr., 1972 Biota of Freshwater Ecosystems: Identification Manual No. 9. Crayfishes (Astacidae) of North and Middle America. For the Environmental Protection Agency, Project #18050 ELD.


- Online resources – NCWRC website & Dr. Jim Fetzner – Carnegie MNH

- Original descriptions
Horton H. Hobbs, Jr.
1914 - 1994

- 200+ publications

- Descriptions
  - 168 Crayfishes (~46%)
    - 29 genera and subgenera
  - 104 Ostracods
  - 8 Shrimps
  - 6 Crabs
  - And….1 Hush puppy recipe

- “Oh Hobbs. He writes faster than I can read”
Classification

Phylum Arthropoda
Subphylum Crustacea
Class Malacostraca
Order Decapoda: shrimps, crabs, lobsters
Superfamily Astacoidea – N. Hemisphere
   Family Astacidae
   **Family Cambaridae**
Superfamily Parastacoidea – S. Hemisphere
   Family Parastacidae
<table>
<thead>
<tr>
<th>Genera of North America</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Astacidae</strong></td>
</tr>
<tr>
<td>- <em>Pacifasticus</em> (7)</td>
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<tr>
<td><strong>Cambaridae</strong></td>
</tr>
<tr>
<td>- <em>Barbicambarus</em> (2)</td>
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<tr>
<td>- <em>Bouchardina</em> (1)</td>
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<tr>
<td>- <em>Cambarellus</em> (8)</td>
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<tr>
<td>- <em>Cambarus</em> (98)</td>
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<tr>
<td>- <em>Distocambarus</em> (5)</td>
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<tr>
<td>- <em>Fallicambarus</em> (16)</td>
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<td>- <em>Faxonella</em> (4)</td>
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<td>- <em>Hobbseus</em> (7)</td>
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<tr>
<td>- <em>Orconectes</em> (90)</td>
</tr>
<tr>
<td>- <em>Procambarus</em> (125)</td>
</tr>
<tr>
<td>- <em>Troglocambarus</em> (1)</td>
</tr>
</tbody>
</table>
Genera of North America

(From Hobbs III, 1991)
NC Taxa

49+ taxa, 4 genera

- 44 Native (17 type localities)
- 5 Introduced

- *Cambarus* (31)
- *Fallicambarus* (1)
- *Orconectes* (8)
- *Procambarus* (9)
Biology

Life Cycle

- Egg
- Immature (direct development)
- Adult Female
- Adult Male
  - Form I
  - Form II
Molting
Regeneration and ID issues
Female vs. Male

Orconectes ozarkae (Ozark Crayfish)

Annulus ventralis

Gonopods

MDC

Orconectes ozarkae (Ozark Crayfish)
Female

Gonopores

Annulus ventralis
Male Orconectes sp.

Male Cambarus sp.

Gonopods
Male I vs. Male II

Form I
- Reproductively active
- Corneous
- Longer and more definition
- Featherlike

Form II
- Reproductively inactive
- Reddish or orange tip
- Blunt
- Hard
Female vs. Male

*Orconectes ozarkae* (Ozark Crayfish)
Reproduction

Cambarus batchi
(Bluegrass Crayfish)

Photos courtesy of MDC
Sperm plug

*Orconectes quadrucnus* (St. Francis River Crayfish)
Glair Glands

Female *Orconectes* sp.
Ovigerous
“In Berry”
Development

Orconectes luteus (Golden Crayfish) hatchlings
Hatchlings
Biology

Diet

- Typically considered omnivores and scavengers
- Carnivores
- Considerable variation likely
**Biology**

**Predators**

- Fish – 81 species
- Birds – 77 species
- Reptiles – 40 species
- Amphibians – 18 species
- Mammals – 18 species

![Smallmouth Bass & Orconectes ozarkae](MDC)
Biology

Longevity

- Sexual maturity $\geq 1$ year
- Life span $\approx 5$ years
- Exceptions! Cave dwelling species $> 20$ years?
Biology

Habitat

- Water = Crayfish habitat
  - Streams and rivers
  - Lakes and ponds
  - Wetlands/marshes
  - Ditches
  - Underground burrows
  - Caves

- Habitat Partitioning
  - Species
  - Age
Biology

Habitat - Burrows
Conservation

Taylor et al. 2007

- 363 taxa
  - 2 (<1%) – Possibly extinct
  - 66 (18%) – Endangered
  - 52 (14%) – Threatened
  - 54 (15%) – Vulnerable
  - 189 (52%) – Stable

- Federally listed species - 4
Conservation

Threats

- Restricted range
- Habitat loss and fragmentation
- Introduced species
- Disease
Collection

- Surface waters
  - Seines
  - Traps
  - Dip nets
  - Electrofishing
Collection

- Burrowers
- Excavation
- Traps
- Hook and Line
- Night Surveys
Preservation of specimens

- 70% Ethanol
  - Best for long-term storage
  - Specimens remain flexible

- 95% Ethanol
  - Higher likelihood of future DNA extraction
  - Specimens become stiff and fragile

- 40% Isopropanol
  - Ok, but tends to make specimens stiff and fragile

- Formalin?
Morphology

The Basics

- Compound eyes on stalks
- 10 pr. of appendages (non-feeding)
- 2 pr. of antennae
- Two body regions
  - Cephalothorax
  - Abdomen
Morphology

Dorsal view of generalized male crayfish illustrating structures and measurements referred to in keys.

(From Hobbs, 1976)
Morphology

**Areola width**

Obliterated (Linear)  Narrow  Wide

From Hobbs, 1972
Morphology

Suborbital angle

Obsolete

Acute

From Hobbs, 1972
Morphology

Appendages of the Head

- 1 pair of mandibles
  - Chewing
- 2 pair of maxillae
  - Grasp food
  - Baling water
- 3 pair of maxillipeds
  - Feeding
  - Cleaning
  - Baling water

(From Hobbs, 1972)
Morphology

Cephalothorax

- Five pair of walking legs
  - 1\textsuperscript{st} three pair are chelate
  - 1\textsuperscript{st} pair = cheliped

- Each leg with seven segments
  - Coxa, basis, ischium, merus, carpus, propodopus, and dactyl

(From Hobbs, 1972)
Morphology

Abdomen

- Pleopods (swimmerets)
  - 1st 5 segments
    - Males – 1st two are modified
    - Females – no modification

- 6th segment with:
  - Telson (median)
  - Uropods (lateral)

(From Hobbs, 1972)
Morphology

Ischial hooks

(From Hobbs, 1972)
Morphology

Chelae

- Robustness (e.g. slender vs heavy)
- Dactyl notch
- Tubercles on palm
  - Rows, shape, number
- Overall shape of chelae
  - Subtriangular, quadrate, etc.
- Setae
- Ridges
Morphology

Chelae

(From Hobbs, 1972)
Morphology

Gonopods

(From Hobbs, 1972)
How do I view this dang Mudbug?

(From Cooper, 2004)