

# Amphipod - *Echinogammarus ischnus*

*Echinogammarus ischnus*, a crustacean of Ponto-Caspian origin, has recently become established in much of the Great Lakes region. Since its 1995 introduction into North American waters, *E. ischnus* has become the dominant amphipod in many benthic communities.

## Taxonomy

<b>Phylum</b>	▪ Arthropoda
<b>Class</b>	▪ Crustacea
<b>Order</b>	▪ Amphipoda
<b>Family</b>	▪ Gammaridae

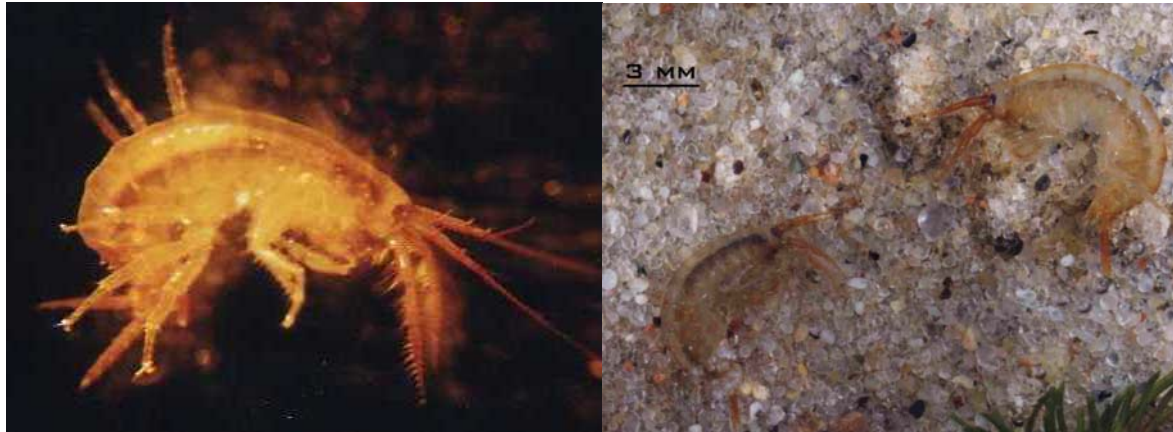
In the European literature, *E. ischnus* has been described under various scientific names and has been a subject of numerous taxonomic revisions. Synonyms include *Gammarus tenellus*, *Gammarus ischnus*, *Gammarus sowinskyi*, *Chaetogammarus tenellus* var. *behningi* morpha *sowinskyi*, and *Chaetogammarus ischnus*.

## General Biology

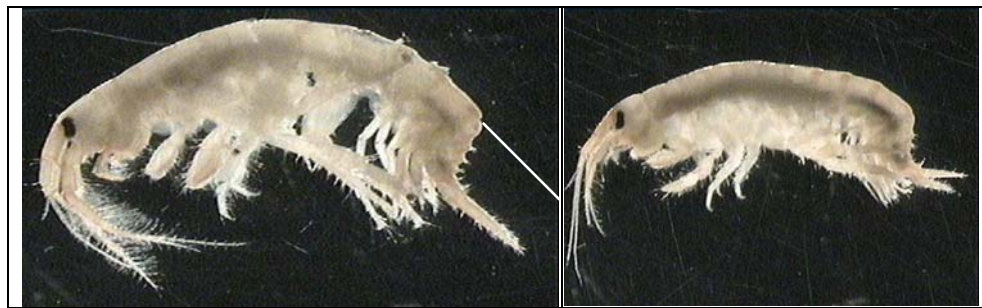
- Morphology**
- Bodies are laterally compressed (e.g., flattened from side to side), curled, and semi-transparent (Fig. 1)
  - Males and females have a maximum body length, respectively, of 11 mm and 8 mm in North America and 15 mm and 13 mm in Europe.
  - Body lacks dorsal teeth
  - Body consists of head, thorax, and abdomen
    - Dominant features on head are two pairs of antennae, one pair of eyes, and mouthparts
      - First pair of antennae with moderate setae
      - Males with second pair of antennae having dense, fine, curling setae (Fig. 2)
      - Head has small triangular-shaped rostrum
      - Moderately large, reniform (i.e., kidney-shaped) eyes
    - Thorax consists of seven segments
      - Thoracic section contains seven pairs of walking legs
      - First two pairs of walking legs are modified to assist with grasping of food
      - First four pairs of walking legs extend downwards and forwards
      - Last three pairs of walking legs extend downwards and backwards
    - Abdomen consists of six segments
      - Abdominal section is divided into two parts, each containing three segments
      - First set of abdominal segments contains three pairs of brush-like limbs called pleopods
      - Second set of abdominal segments contain three pairs of shorter and immobile, rod-like limbs called uropods

**Behavior**

- Agile and capable of moving across solid surfaces
- Able to swim actively through water, including against currents



**Fig. 1** *Echinogammarus ischnus*.<sup>1</sup>



**Fig. 2** Male (left) and female (right) *E. ischnus*.<sup>2</sup>

**Identification**

**Distinguishing Characteristics**

- As indicated in the following key, three characters distinguish *E. ischnus* from all other amphipods in the Laurentian Great Lakes:
  - Presence of an accessory flagellum on antenna I
  - Uropod III with inner ramus less than half the length of the outer ramus
  - Basipodite of pereopod V distally narrowed, without a postero-dorsal projection

**Key to Separating *E. ischnus* from other Amphipoda in the Laurentian Great Lakes<sup>3</sup>**

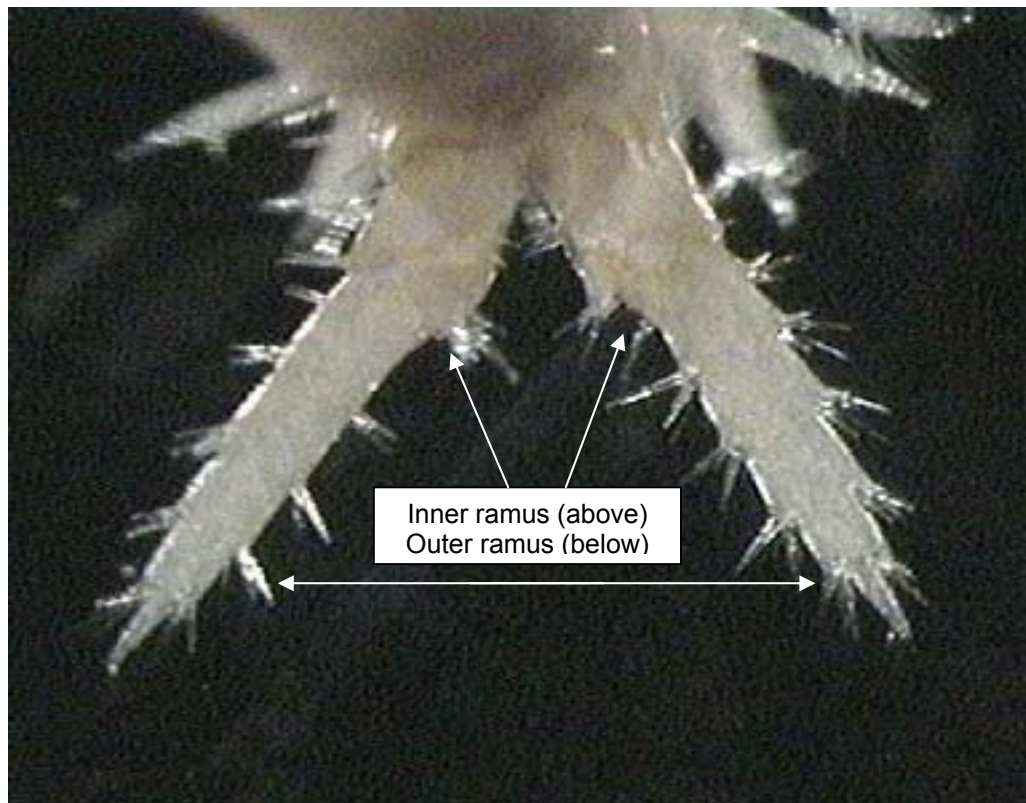
- 1a. Accessory flagellum of antenna I present .....GAMMARIDAE...**2**  
 Accessory flagellum of antenna I well-developed, at least two-jointed; body laterally compressed; sternal gills absent; telson variously cleft.
- 1b. Accessory flagellum of antenna I absent.....**5**
- 2a. Uropod III with inner ramus less than half the length of the outer ramus .....**3**

<sup>1</sup> <http://ww2.mcgill.ca/Redpath/ricciardi/echinogammarus.html>

<sup>2</sup> Igor Grigorovich (University of Windsor) and Colin van Overdijk (University of Windsor)

<sup>3</sup> Igor Grigorovich (University of Windsor)

- 2b.** Uropod III with inner ramus more than half the length of the outer ramus .....**4**
- 3a.** Basipodite of pereopod V distally narrowed, without a postero-dorsal projection .....*E. ischnus*  
Antennae II pereopods in male with numerous curled setae; uropod III with minute, scale-like inner ramus (Fig. 3); telson cleft nearly to base, with characteristic lobes that less than 1.5 times as long as wide, each lobe armed with 2-4 subbasal-lateral and 2-4 apical spines; 1<sup>st</sup> and 2<sup>nd</sup> urosome segments with four groups of 1-2 solitary spines and 1 seta; sternal gills absent.
- 3b.** Basipodite of pereopod V posterior margin convex and serrated (may not be apparent) ....*Crangonyx*  
Accessory flagellum of antenna I of one distinct segment and one terminal, node-like joint; telson cleft less than half way to base, each lobe with 3-5 apical spines; eyes may be degenerated or absent; urosome dorsally without spines; sternal gills present.
- 4a.** Basipodite of pereopod V distally non-widened, posterior margin nearly strait or convex proximally; interantennal lobe of head broad, often with sharp upper angle .....*Gammarus*  
Urosome dorsally without spines; sternal gills present; outer ramus of uropod III two-segmented.
- 4b.** Basipodite of pereopod V posterior margin convex; sternal gills present .....PONTOPOREIIDAE  
Outer ramus of uropod III one-segmented (lacking terminal segment).
- 5a.** Body laterally compressed; dorsal side of abdominal and occasionally thoracic segments with dorso-posterior projections or teeth (may not be present); antennae II without marked thickening .....  
.....TALITRIDAE ....*Hyalella azteca*
- 5b.** Body dorso-ventrally depressed, without dorso-posterior projections; coxal plates small; antennae II with marked thickening .....COROPHIIDAE ...*Corophium*



**Fig. 3** Inner and outer ramus of *Echinogammarus ischnus*.<sup>4</sup>

<sup>4</sup> Igor Grigorovich (University of Windsor)

## Life Cycle

- Juveniles**
- Newly released young resemble adults, but microscopic in size
  - As with other arthropods, develop an exoskeleton, molting several times as they increase in size
- Adults**
- Maturity reached between 55 and 65 days at temperatures of 20-21°C, 44-56 days at temperatures of 23-24°C
  - Sexual maturity obtained by 4.8 mm in length
  - Populations are predominately female
- Reproduction**
- Reproduce sexually
  - Reproduction occurs during summer, ceasing in late September
  - Presence of 2-3 size classes indicate 2-3 generations produced per year
  - Females bear up to 20 eggs depending upon total body length of female (the greater the length the greater the number of eggs produced)

## Habitat Characteristics

- Preferred Environment**
- Fresh and brackish waters
  - Closely associated with the presence of zebra mussel colonies
  - Prefer hard substrates and shallow depths
  - Most likely to become the dominant amphipod in rocky habitats with moderate current, wave washed cobble beaches, rubble armored shorelines, and breakwalls
- Temperature**
- Optimal metabolic temperatures at 20-24°C
- Salinity**
- Euryhaline

## Distribution

- Native Range**
- The least saline regions and estuaries of the Black, Azov, and Caspian Seas as well as the Caspian Sea proper
- North American Distribution**
- *E. ischnus* has been reported in the following North American locations:
    - Detroit River 1995
    - Lake Huron 1996
    - Lake Erie 1996
    - Lake Ontario 1996
    - Niagara River 1996
    - St. Lawrence River 1996
    - St. Clair River 1996
    - Lake Michigan 1999
  - It is predicted to enter the Mississippi and Hudson River basins
- Probable Means of Introduction**
- Ballast water transfers

## Diet

- Various macroinvertebrates
- Grazing on live plant tissues, detritus of plant origin, and filter-feeding

## Impacts

### Negative

- Interactions between *E. ischnus* and native gammarid species may result in displacement and possible local extinction of native species

### Positive

- *E. ischnus* is likely a food source for some fish species
- Effects of replacement of native amphipod species by *E. ischnus* are expected to be subtle and minor as they hold similar roles in the food web

## Management

### Control Measures

- There are no feasible control methods.
- Some evidence that natural parasites may exert control in eastern European populations

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## **Web Sites**

<http://www.benthos.org/meeting/nabs2000/nabstracts2000.cfm/id/486>  
North American Benthological Society

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