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BIOTA OF FRESHWATER ECOSYSTEMS

Identification Manual

2

THE GENUS ARGULUS (CRUSTACEA: BRANCHIURA) OF THE UNITED STATES

U.S. ENVIRONMENTAL PROTECTION AGENCY

Biota of Freshwater Ecosystems

Identification Manual No. 2

THE GENUS *ARGULUS* (CRUSTACEA:BRANCHIURA) OF THE UNITED STATES

by

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for the

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FOREWORD

"The genus *Argulus* (Crustacea:Branchiura) of the United States" is the second of a series of identification manuals for selected taxa of invertebrates occurring in freshwater systems. These documents prepared by the Oceanography and Limnology Program, Smithsonian Institution, for the Environmental Protection Agency will contribute toward improving the quality of the data upon which environmental decisions are based.

Additional amnuals will include, but not necessarily be limited to, freshwater representatives of the following groups: amphipod crustaceans (Gammaridae), isopod crustaceans (Asellidae), decapod crayfish crustaceans (Astacidae), leeches (Hirudinea), polychaete worms (Polychaeta), freshwater planarians (Turbellaria), aquatic dryopoid beetles (Dryopoidea) and freshwater clams (Sphaeriacea).

ABSTRACT

Twenty three species of *Argulus* are recognised as valid from the 37 reported from the United States. An illustrated key is provided to these species. Distribution and host records are also included.

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SECTION I

INTRODUCTION

Thirty seven species of *Argulus* have been described or reported from the United States since the description of *A. catostomi* by Dana and Herrick in 1837. Of the 6 genera of Branchiura which have been described from various parts of the world, the genus *Argulus* is the only one so far recorded from the United States. In the preparation of this key the present author examined 279 collections including type specimens of 31 species contained in the collections of the Smithsonian Institution. In addition to this material 56 collections solicited from various freshwater and marine biologists in the U. S. were examined. These collections and the donors will be acknowledged in a forthcoming monograph of the genus. The type specimen of *A. funduli* was sent to me by Dr. T. Wolff of the Copenhagen Museum.

From the examination of this material I was able to reduce the number of valid species to 23. A number of species had been placed in synonomy by Meehan in 1940 but Wilson resurrected 8 of these in 1944. It is my opinion that Meehan's earlier opinions regarding these synonomys were correct.

Both Meehan (1940) and Wilson (1944) published a key to the genus. They contain, however, a number of species not found in the United States.

The key presented herein is applicable to either sex. The key has been constructed for use by non-specialists. Other characters than those chosen could be used as well but these might require a more intimate knowledge of this group of parasites.

Several species included in this key have been reported only from the coastal environment. I feel confident that collections made in the freshwater drainages of these coastal areas would produce the same species and hence I have included them. *Argulus flavescens*, for example, has been collected from the Mississippi River as far north as Iowa and is common to the coastal waters of the Gulf of Mexico as well.

Discussions of life history and effects of the parasite on the host are beyond the scope of this paper. These aspects will be considered elsewhere.

Illustrations with labeled, taxonomically important structures are provided in lieu of a glossary.

COLLECTING, PRESERVATION AND IDENTIFICATION

Because individuals of *Argulus* are "loosely" associated with their hosts collection depends on rapid examination of captured fish. Individuals may be found anywhere on the body surface of the host and in the mouth and gill chamber. Furthermore, they are commonly found in freshwater and coastal plankton samples.

Material can be initially preserved in 70 percent ethyl alcohol or 10 percent formalin. Material preserved in formalin should be transferred to alcohol within a few weeks and material should remain in 70 percent alcohol for long term storage.

For microscopic examination specimens can be temporarily mounted in lactic acid. This clears the specimen sufficient for examination of appendages. Material should be examined in alcohol prior to clearing as the respiratory areas often show up better under reflected rather than transmitted light. If the respiratory areas are obscured by the legs it may be necessary to remove one side of the carapace and mount it ventral side up in lactic acid. Dilute chlorozol black can be used as a last resort to stain the borders of the respiratory areas if other methods fail. Once cleared no further dissection is necessary in order to see the characters (Fig. 3) cited in this key.

SECTION II

SPECIES LIST WITH DISTRIBUTION AND HOSTS

Argulus alosae Gould, 1841. Distribution: east coast of U. S. from Maine to Texas. Hosts: *Alosa, Clupea, Dorosoma, Tautogolabrus Lepisosteus, Opsanus, Cynoscion.*

Argulus appendiculosus Wilson, 1907. Distribution: Vermont, Michigan, Kentucky, Iowa, Wisconsin, Texas, Wyoming, South Dakota. Hosts: *Stizostedion, Ictalurus, Micropterus, Ictiobus, Catostomus, Dorosoma.*

Argulus bicolor Bere, 1936. Distribution: southeast coast of U. S. from North Carolina to Louisiana. Hosts: *Strongylura, Morone, Gobionellus, Micropogon, Scomboromorus, Dorosoma, Rhinoptera.*

Argulus borealis Wilson, 1912. Distribution: northwest coast of U. S. Hosts: *Lepidopsetta, Cymatogaster.*

Argulus catostomi Dana and Herrick, 1837. Distribution: northeast U. S. from Minnesota to Vermont and south as far as Maryland. Host: *Catostomus,* cyprinids.

Argulus chesapeakensis Cressey, 1971. Distribution: central east coast of U. S. from Maryland to North Carolina. Hosts: *Opsanus, Anguilla, Rachycentron, Paralichthys.*

Argulus diversus Wilson, 1944. Distribution: Indiana. Host: *Ameriurus.*

Argulus flavescens Wilson, 1916. Distribution: southeastern U. S. - Mississippi River System and Coastal Gulf of Mexico. Hosts: *Amia, Micropterus, Micropogon, Paralichthys, Mugil, Dasyatis.*

Argulus floridensis Meehan, 1940. Distribution: gulf coast of U. S. Host: *Mugil.*

Argulus funduli Kroyer, 1863. Distribution: east coast of U. S. from Maine to Mississippi. Hosts: *Fundulus, Lagodon, Chaetodon.*

Argulus fuscus Bere, 1936. Distribution: gulf coast of U. S. Hosts: *Orthopristis, Trachinotus.*

Argulus japonicus Thiele, 1900. Distribution: entire U. S. Host: goldfish (*Carassius*).

Argulus laticauda Smith, 1873. Distribution: northeast coast of U. S. Hosts: *Opsanus, Prionotus, Pseudopleuronectes, Anguilla, Conger,* "Sculpin".

Argulus lepidostei Kellicott, 1877. Distribution: Mississippi River System and Gulf coast of Florida. Host: *Lepisosteus.*

Argulus maculosus Wilson, 1902. Distribution: Michigan, Indiana, Missouri, Iowa, Louisiana, New York. Hosts: *Amia, Esox, Umbra.*

Argulus meehani Cressey, 1971. Distribution: Florida. Host: *Lepisosteus.*

Argulus megalops Smith, 1873. Distribution: east coast of U. S. from Mass. to Florida. Hosts: *Chilomycterus, Ogcocephalus, Synodus, Prionotus, Tautoga, Aleutera, Lophius, Paralichthys, Microgadus, Raia.*

Argulus melanostichus Wilson, 1935. Distribution: California. Host: unknown.

Argulus mississippiensis Wilson 1916. Distribution: Iowa. Host: *Lepisosteus*.

Argulus nobilis Thiele, 1904. Distribution: Mississippi, Texas. Host: *Lepisosteus*.

Argulus pugettensis Dana, 1853. Distribution: northern west coast of U. S. Hosts: *Salmo, Embiotoca, Amphistichus*.

Argulus stizostethi Kellicott, 1880. Distribution: northeast U. S from Minnesota to Maine. Hosts: *Accipenser, Alosa, Esox, Notropis, Salvelinus, Gasterosteus, Coregonus*.

Argulus versicolor Wilson, 1902. Distribution: eastern U. S. from Mass. to Texas. Hosts: *Esox, Amblophites*, "perch".

SECTION III

KEY TO THE UNITED STATES SPECIES OF *ARGULUS*

1 Smaller respiratory area entirely anterior to larger area (Figs 1D, E, and F)..... 2
Smaller respiratory area in part or entirely lateral to larger area (Figs 1A, B, and C)..... 14

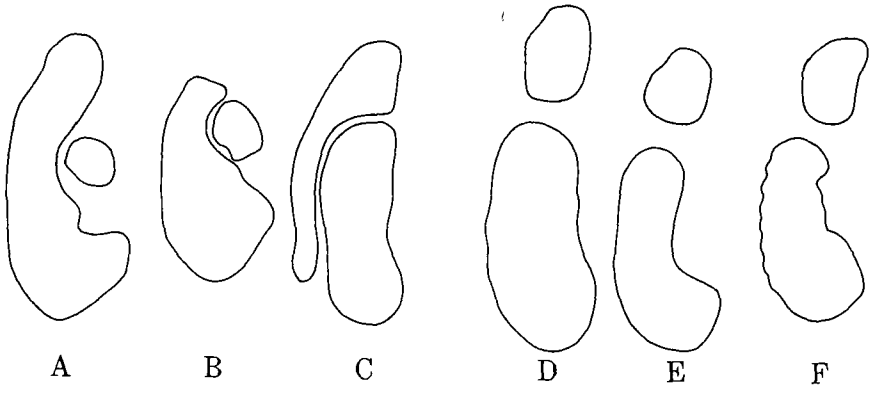

Fig. 1. Respiratory areas: A - *catostomi*; B - *nobilis*; C - *stizostethi*; D - *alosae*; E - *bicolor*; F - *megalops*

2 (1) Mouth tube with spines or scales on basal half..... 3
Mouth tube without spines or scales on basal half..... 9

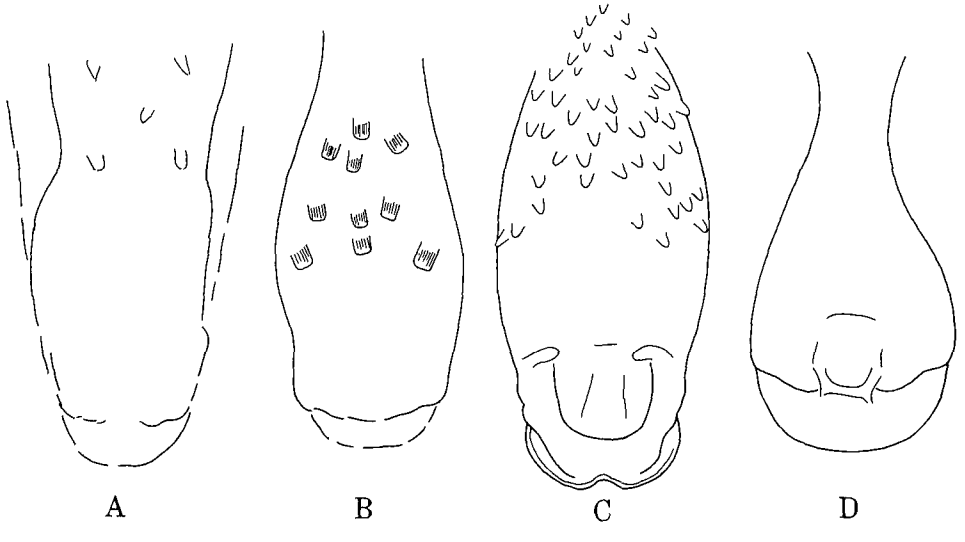

Fig. 2. Mouth tubes: A - *borealis*; B - *megalops*; C - *fuscus*; D - *japonicus*.

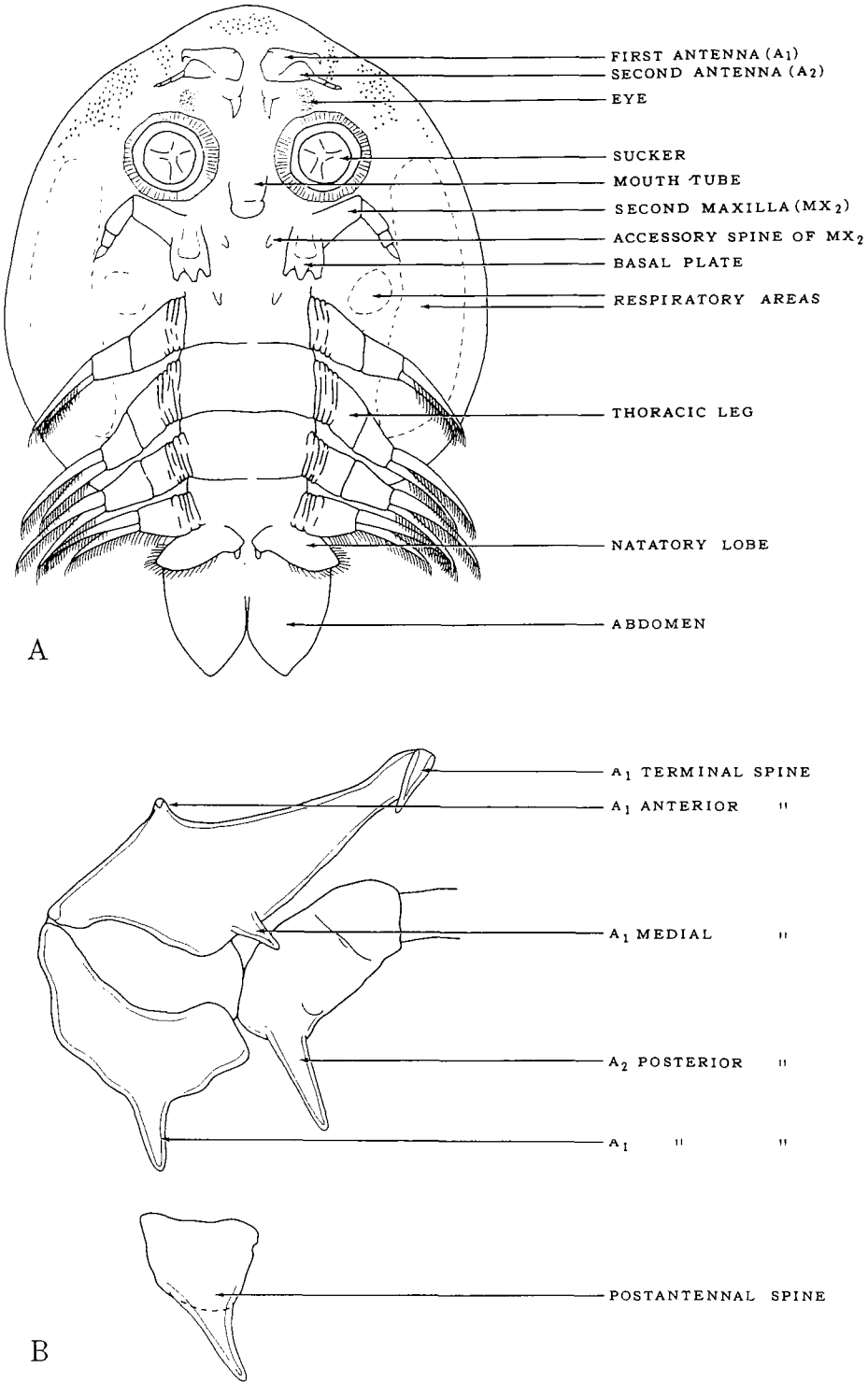

Fig. 3. A - *Argulus appendiculosus*, female with ventral structures labeled; B *Argulus borealis*, female antennal area labeled.

3 (2) Accessory spine present near base of second maxilla (Fig. 3A)..4
Accessory spine absent from near base of second maxilla..... *funduli* Kroyer

4 (3) More than 12 elements in sclerotized sucker rods.....5
Less than 12 elements in sclerotized sucker rods.....6

5 (4) Outermost spine of basal plate represented by sclerotized ridge (Fig. 6H).....*fuscus* Bere
All three spines of basal plate well-developed.....*floridensis* Meehan

6 (4) Scales present on mouth tube (Fig. 2B); posterior respiratory area with scalloped edge (Fig. 1F)..... *megalops* Smith
Spines present on mouth tube (Figs 2A, C).....7

7 (6) Antennal spines fingerlike (Figs 4A, C); 4-5 spines on base of mouth tube (Fig. 2A)..... *borealis* Wilson
Antennal spines stout (Figs 4B, E); cluster of several spines on mouth tube (Fig. 2C).....8

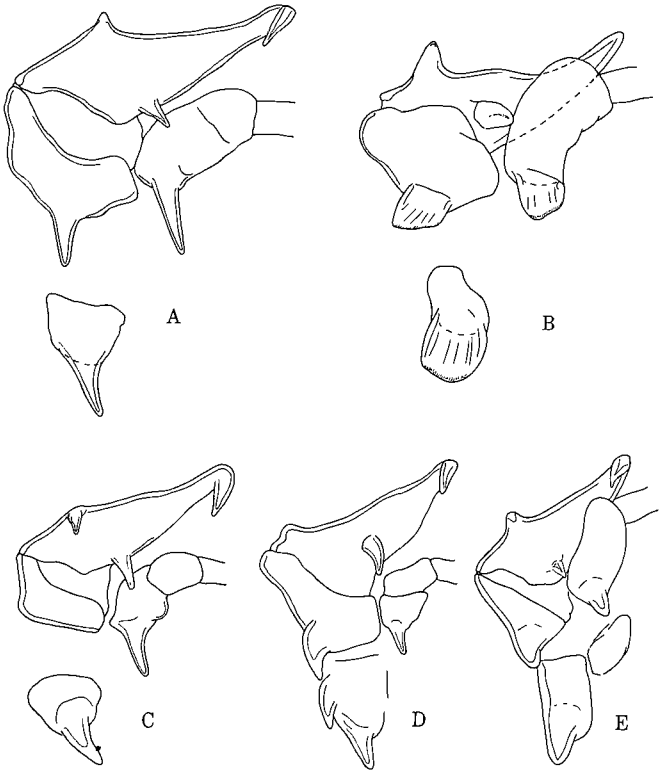

Fig. 4. Antennal area.
A- *borealis;* B- *laticauda;*
C- *lepidostei;* D- *maculosus;*
E- *alosae.*

8 (7) Posterior respiratory area bent toward mid-line in posterior half (Fig. 1E)..... *bicolor* Bere
Posterior respiratory area not bent toward mid-line in posterior half (Fig. 1D)..... *alosae* Gould

9 (2) More than 10 elements in sclerotized sucker rods..... 10
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Less than 17 elements in sucker rods (Fig. 5C)..... *pugettensis* Dana

11 (9) More than 5 elements in sucker rods (Fig. 5D).. *japonicus* Thiele
Less than 5 elements in sucker rods.....12

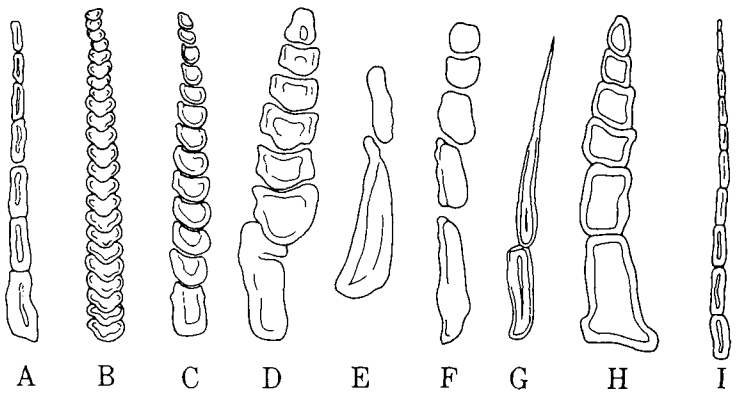

Fig. 5. Sclerotized sucker rods. A - *meehani*; B - *melanostichus*; C - *pugettensis*; D - *japonicus*; E - *maculosus*; F - *versicolor*; G - *appendiculosus*; H - *diversus*; I - *nobilis*.

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extending along outer edge of posterior respiratory area
(Fig. 1C); mouth tube with patch of spines at base
.....*stizostethi* Kellicott
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margin of larger area (Figs 1A, B); no spines or scales
at base of mouth tube 18

18 (17) Outermost spine of basal plate at least twice as wide as
either of the other two (Fig. 6G)..*catostomi* Dana & Herrick
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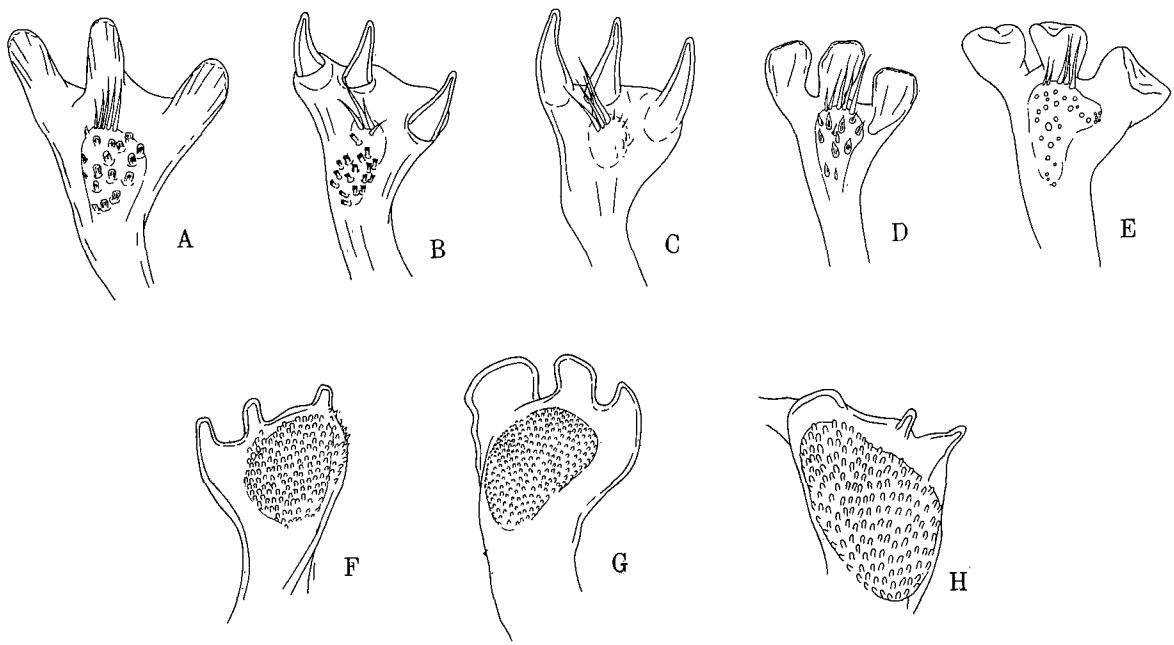

Fig. 6. Basal plates of second maxillae. A - *flavescens*; B - *lepidostei*; C - *meehani*; D - *chesapeakensis*; E - *laticauda*; F - *funduli*; G - *catostomi*; H - *fuscus*.

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Sucker rods composed of less than 10 elements (Fig. 5A).... ..... *meehani* Cressey

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16. Abstract

Twenty three species of *Argulus* are recognised as valid from the 37 reported from the United States. An illustrated key is provided to these species. Distribution and host records are also included.

17a. Descriptors *Aquatic fauna, *United States, *Fish parasite, Distribution.

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