1971

Zoogeography and host-specificity of the superfamily capsaloidea, price, 1936 (monogenea: monopisthocotylea) an evaluation of the host-parasite locality records of the superfamily, capsaloidea, price, 1936, and their utility in determinations of host-specificity and zoogeography

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72-9745

LAWLER, Adrian Russell, 1940-
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University Microfilms, A XEROX Company, Ann Arbor, Michigan

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ZOOGEOGRAPHY AND HOST-SPECIFICITY OF THE

SUPERFAMILY CAPSALOIDEA PRICE, 1936

(MONOGENEA: MONOPISTHOCOTYLEA)

An Evaluation of the Host-Parasite Locality Records of

The Superfamily Capsaloidea Price, 1936, and Their

Utility in Determinations of Host-Specificity and

Zoogeography

A Dissertation

Presented to

The Faculty of the School of Marine Science

The College of William and Mary in Virginia

In Partial Fulfillment

Of the Requirements for the Degree of

Doctor of Philosophy

---

by

Adrian Russell Lawler

1971

APPROVAL SHEET

This dissertation is submitted in partial fulfillment of

the requirements for the degree of

Doctor of Philosophy

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DEDICATION

This work is dedicated to my parents, Mr. and Mrs. Russell G. Lawler, and to my in-laws, Dr. (deceased) and Mrs. (Dr. Sibyl F. Street) Robert W. Ramsey, who contributed financial and moral support in order to ensure the furtherance of my education.

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ACKNOWLEDGMENTS

Appreciation is expressed to Dr. William J. Hargis, Jr. for the guidance, assistance, and support received throughout the course of this study, and for making his library available to me. The author wishes to express his appreciation to the members of the dissertation committee for guidance and criticism in the preparation of this manuscript. The author would also like to thank Drs. Edwin B. Joseph and John A. Musick, and Mr. John D. McEachran, Virginia Institute of Marine Science (VIMS), for assistance on part of the fish taxonomy; Dr. Joseph Loesch and Mr. John J. Norcross, VIMS, for advice on data computations; Dr. Marvin L. Wass, VIMS, for suggestions on zoogeographical problems; Dr. Reeve M. Bailey, The University of Michigan, for information on some Mediterranean fishes; Dr. James E. Böhlke, The Academy of Natural Sciences of Philadelphia, for information on some tropical fishes; Dr. James C. Chubb, The University of Liverpool, England, for information on some British fishes; Dr. Bruce B. Collette, National Center for Systematics, U. S. National Museum, for data on part of the Scombridae; Dr. Hugh H. DeWitt, University of Maine, for information on fish of the genus *Notothenia*; Dr. William N. Eschmeyer, California Academy of Sciences, for information on the Scorpaenidae; Dr. Louis Euzet, University of Montpellier, France, for information on the synonymy of *Cadenatia* and the hosts of *Calicotyle palombi*; Dr. Robert H.

Kanazawa, Division of Fishes, U. S. National Museum, for information on some American fishes; Dr. Giles W. Mead, Los Angeles County Museum of Natural History, for information on the genus Brama; Dr. William J. Richards, Tropical Atlantic Biological Laboratory, for data on the Triglidae; Drs. John R. Paxton and Frank Talbot, The Australian Museum, for information on some Australian fishes; Prof. H. Steinitz, The Hebrew University, Israel, for information on some Mediterranean fishes; Mr. A. C. Wheeler, The British Museum (Natural History), for information on some British fishes; and Mr. John B. Wentworth, Embassy of Japan, Washington, D.C., for information on the localities and present names of some Japanese cities. Thanks are also due to the following VIMS staff members: Miss Susan Barrick for assistance in obtaining literature; Mrs. Elena Burbidge for assistance in the translation of French, Italian, and Spanish literature, and for assistance in obtaining literature and in typing; Mrs. Jane Davis and Mr. Ken Thornberry for assistance on some of the tables and figures; Miss Evelyn Wells for assistance in the translation of Russian literature and in obtaining literature; Mr. David E. Zwerner for assistance in the translation of Russian literature, and for his critical review of part of the manuscript; and my wife, Sibyl, for assistance in obtaining literature and for her encouragement.

This research was supported in part by grant Nos. GA-13853, with amendments, and GA-235 under the United States Antarctic Research Program of the National Science Foundation, and No.

E-2389 from the National Institutes of Health, Dr. William J. Hargis, Jr., principal investigator in all cases.

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ABSTRACT

Original literature on the superfamily Capsaloidea Price, 1936 published prior to May 1968 was examined for parasite-host locality records in order to study the host-specificity and zoogeography of the superfamily. Complete locality records, synonyms, and references for 221 species of capsaloids belonging to 70 genera and five families and parasitizing over 260 natural hosts are given. New locality records are given for Dioncus agassizi, D. remorae, and Caballerocotyla manteri. Host-specificity tables are given for all species. The host names have been updated, and the host ranges documented. Comments are made on confused and erroneous records. The level of host-specificity is discussed for all species. Aspects of physiological specificity, biological tags, host taxonomy, relative rates of evolution, organ-specificity, and ecological specificity are discussed. Zoogeographical aspects are investigated. A list of recommendations is presented which, if followed, would ensure more meaningful parasite-host locality records in the future.

Capsaloids are shown to be presently primarily species-specific gill parasites of warm temperature Osteichthyes. At each level of host-specificity the majority of capsaloids were found to occur on the gills, with those occurring on the skin second in abundance. As the level of specificity decreases, there is a slight decrease in the percentage of capsaloids occurring on the gills, and a slight increase in the percentage occurring on the skin, an indication that gill forms are more species-specific than skin forms. More gill forms are species-specific than skin forms or capsaloids in any other organ. Capsaloids of Chondrichthyes are less gill-specific than those on Osteichthyes. The relative rates of evolution of Capsaloidea are shown to be slower than, coincident with, or faster than their hosts. The slower evolving capsaloids are those that exhibit phylogenetic specificity and parasitize more than one host. The capsaloids whose rates of evolution approximate those of their hosts are those species-specific ones which have no close relatives on the same host; if they had a close relative on the same host they would be evolving faster than the host. The occurrence of Benedeniinae on rays and Osteichthyes could indicate their evolution on ancestral jawed-fishes, if so, then they probably represent the oldest capsaloid subfamily. Their occurrence on a far larger number of host families than any other subfamily, and their cosmopolitan distribution are further indications of their antiquity. All host-specificity for species above the order-specific level may probably be attributed to ecological specificity. A majority of the capsaloid species (79.4 per cent) are endemic to a single zoogeographical zone, while 6.7 per cent are amphi-Atlantic, 1.0 per cent are amphi-Pacific, 1.4 per cent are amphi-American, and 0.5 per cent are circumpolar. Several species approach a circumtropical distribution. There is a higher affinity among zones in the Atlantic than in the other oceans. Temperature appears to be a factor in determining the distribution of capsaloids.

ZOOGEOGRAPHY AND HOST-SPECIFICITY OF THE SUPERFAMILY CAPSALOIDEA PRICE, 1936 (MONOGENEA: MONOPISTHOCOTYLEA)

CHAPTER 1

INTRODUCTION

In 1958, the Parasitology Section of the Virginia Institute of Marine Science undertook a long-range study of the host-specificity, zoogeography, and systematics of the Monogenea. Along with world-wide collections, an extensive literature review was initiated. In 1965, the author undertook the problem of host-specificity and zoogeography of the superfamily Capsaloidea Price, 1936. The capsaloids were chosen for study because of (1) the wide range of hosts parasitized, (2) the wide range of locations with respect to hosts parasitized, and (3) the author's previous experience with the superfamily.

Our present-day knowledge of monogenean parasites and their distributions remains fragmentary. The object of this study was to determine the distribution patterns of the capsaloids, there being four basic types of distribution: geographical; host; organ; and seasonal. Few seasonal records for capsaloids and their hosts exist, so this aspect was not included herein. Because the literature is scattered, and much of it out of print and difficult to obtain, no previous worker has brought all available information on a major grouping of Monogenea to bear upon his conclusions. A comprehensive survey of the literature published prior to May, 1968, concerning the parasite-host locality records of 221 species of capsaloids belonging to 70 genera and five families and found on over 260 natural hosts and 80 experimental hosts was conducted in conjunction with work on a bibliography of Monogenea (Hargis _et al_, 1969, 1970, 1971), thus the data presented herein may be considered to be quite complete to that date.

In a broad study of this sort one is faced with several difficulties because of inadequancies in the following: (1) parasite-host records, (2) identifications of parasites and hosts, (3) sampling of parasites and hosts, (4) systematics of parasites and hosts, (5) knowledge of the precise location of the parasites with respect to their hosts, (6) knowledge of the host ranges, and (7) original descriptions of new taxa. For example, the work of Yamaguti (1963) gave credit to the wrong authors for locality records, did not update scientific names of the hosts, repeated erroneous host records, and omitted host records. Erroneous data such as these have become firmly established by inclusion in widely used volumes. Except for Bychowsky (1957), previous workers on Monogenea have largely tended to be uncritical in their compilations, making new revisions concerning the parasites but completely neglecting the host identities and systematics, so that host names that have been out of date for over 100 years in many instances or are completely meaningless appear in many works. I strongly urge that parasitologists pay more attention to the hosts on which their parasites are found, because the host is the habitat of the parasite and a description of the parasite. If the correct host identity is not determined and given, how can one verify earlier findings? In this work an attempt has been made to evaluate all of these vital details. The present study has pieced together the synonymies, locality records, references, ranges, etc., of 221 species of capsaloids and over 340 species of hosts. Because it is a waste of time and effort to attempt to deduce what parasites and hosts many of the earlier workers really had, the present work accepts the identities of the hosts and parasites (except where subsequent fish or parasite synonymies have indicated otherwise) of previous workers, and makes host names current where possible.

Interest in host-specificity and its biological interpretation was emphasized recently by publication of proceedings of the "First Symposium on Host Specificity among Parasites of Vertebrates," held at the University of Neuchatel in 1957. The papers of Metcalf (1929, 1940), Kirby (1937), Baer (1948), Vanzolini and Guimaraes (1955), Bullock (1970), and Cressey and Collette (1970) are representative of the wide interest in application of parasitological studies to phylogeny and paleodistribution of hosts and parasites. Mayr (1957) noted the possible uses of parasitological clues in vertebrate systematics. "The application of knowledge of this specificity to the solution of problems on the phylogeny and past distribution of hosts was first published by von Ihering (1891)" (Arai, 1967:2161) and was subsequently termed the "Von Ihering method" by Metcalf (1929). Various workers (e.g., Baer, 1951; Hargis, 1957; Noble, 1957; Arai, 1967) have warned that this method must be used with caution because ecological factors may be as or more important than phylogenetic ones in determining the parasitocenose of a given host taxon. Parasites of fishes can also furnish information about the present-day habits and ecology of their individual hosts (Manter, 1966).

Monogenea show a strong degree of host-specificity (Baer, 1951). To date, no extensive work like the present study has been done for the Monogenea, although smaller studies have been made by such workers as Hargis (1953, 1957) and Llewellyn (1957a). Also, no prior comprehensive work concerning organ-specificity of a major group of Monogenea has been done. The present work encompasses both aspects.

Manter (1963: 45) noted three major ways to study the zoogeography of parasites: (1) "...to consider the local, precise occurrence of the parasites," (2) "...to select a particular host species (or some related species) and study all its parasites in different regions," and (3) "...to note their occurrence and that of their nearest relatives over wide areas of the globe." The present study is concerned primarily with the first two methods as mentioned above.

Although this work does not include all capsaloids described to the present date, the major trends observed for the superfamily should not significantly change in the future, because the present sample is considered representative of all described, and undescribed, Capsaloidea. However, it is likely that some details of fact or deduction may have to be changed after more is known about the superfamily. There are probably 500 or more undescribed species of capsaloids, and new species are described and emendations are made so fast that it is impossible to incorporate all the very recent literature in a work of this sort.

The major contribution of this work is its thoroughness of review of the superfamily Capsaloidea with respect to its members and their locality records, hosts, and references. The data can be used by future workers on capsaloids as a foundation for their studies without having to review an inordinate amount of literature. For the first time the following aspects are covered in one work on capsaloids: (1) distributions of hosts, (2) current names of hosts, (3) all parasite-host locality records, (4) critical evaluation of literature on capsaloids, including the errors found, (5) geographical distribution of a large group of Monogenea, (6) host-specificity of a large group of Monogenea, (7) organ-specificity of a large group of Monogenea, (8) all references to each species of capsaloid, (9) all important synonyms of each species of capsaloid, and (10) potential distributions of the capsaloids.

CHAPTER 2

MATERIALS AND METHODS

In order to determine the host-specificity and zoogeography of the superfamily Capsaloidea Price, 1936, data were obtained from the original literature published prior to May 1968. Unexamined literature (mostly very old works or certain Slavic literature) is indicated by an asterisk (*) throughout the text.

Using Yamaguti (1963) as a starting point, a set of parasite-host locality record files (Figure 1), grouped by genera, were made employing the species names he listed. Under each parasite species all references to that species and its synonyms found in Stiles and Hassall (1908), Sproston (1946), Dawes (1956), Bychowsky (1957), Yamaguti (1963), and various sections of the Index-Catalogue of Medical and Veterinary Zoology[1] were listed. References not listed in any of the previous works were found while the author was doing an extensive literature review for a comprehensive bibliography (Hargis et al, 1969, 1970, 1971) on the Monogenea. Work on this bibliography assured familiarity with the majority of the Monogenea literature.

All available literature on Monogenea was then examined

[1]Trematoda and Trematode Diseases, Parts 1-8; Supplement 15: Trematoda and Cestoda; Supplement 16, Part 3: Trematoda and Cestoda; Supplement 17, Part 3: Trematoda and Cestoda.

Figure 1. Example of the parasite-host locality record table employed.

Species: ______________________________

	Location	Host	Locality	Source
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Additional references:

Parasite synonyms:
1
2
3
4
5
6
7
8
9

(see Parasitological Literature and Appendix B) and all pertinent data on the various species of Capsaloidea and their hosts were extracted and recorded in the parasite-host locality record files. Such data consisted mainly of capsaloid specific name and author, parasite synonyms, location of parasite with respect to host, host, collection locality, author reporting the locality record, additional references to the parasite in question (other than those cited for locality records), notes on host-specificity and zoogeography, and errors found in the literature. In addition, data found in the parasitological literature concerning host synonyms, host classification, and host range were also recorded. These data are presented for each species of Capsaloidea in Tables 3 through 222.

Works on Monogenea that were examined and found lacking in references to species of Capsaloidea are given in Appendix B (author and date only are listed; for complete citations see Hargis et al, 1969, 1970, 1971). They are included because the author believes that it is important to this study to indicate what has been done; a negative report of Capsaloidea in various works decreases the number of papers to consider by future workers on Capsaloidea. All the literature pertaining to the Capsaloidea to May 1968 is given in Parasitological Literature. As titles do not always reflect contents, as much of the Monogenea literature as possible was directly examined. Although every reference on Monogenea was not examined, it is thought that the present report contains all the host-locality records for the Capsaloidea to May

1968. It is estimated that a majority of the truly relevant papers were studied. Possible host-locality records that may have been published in unexamined literature, but not cited by any of the subsequent workers, are, unfortunately, lacking.

In compiling the data for Tables 3 through 222, certain steps were followed in order to present the most appropriate data. Species names are based on Yamaguti (1963), except for subsequent emendations, synonymies, and descriptions. Generic compositions are generally those given by Yamaguti (1963). However, new taxa and new emendations in some cases necessitated following other authors' works; in all instances the author followed is listed in parentheses after the generic name in Table 1. Publication dates for literature examined were changed to agree with those given on the original papers or in the Index-Catalogue of Medical and Veterinary Zoology. Where the parasite-host data were scattered throughout a paper, the page numbers are given which refer to all of the data utilized. When locality records are contained in unexamined literature, reference is made to other works, whose authors apparently had access to the original literature, as, for example, Stossich (1898)* In Palombi (1949). Records which represent separate localities or hosts are listed separately. When an abstract appeared before a paper (e.g., Williams, 1964, before Williams, 1965), the paper, and not the abstract, was the one cited for locality records. The original report only is cited. If subsequent authors cited the same host and locality from the same collection as was previously reported in the literature, they were not cited. Where the collection locality was vague, I have added such additional geographical information as is possible. General references, as Sproston (1946), Dawes (1956), Bychowsky (1957), and Yamaguti (1963), were used to help establish the lists of parasite synonymies. Synonymies presented in previous works have been accepted unless there was a more recent significant revision. No attempt has been made to establish new synonymies. The host-locality records of each parasite have been adjusted to fit the latest synonymies accepted. Additional references to species, listed in chronological order after each species, include those papers that refer to a particular species by its present scientific name or one of its synonyms and do not report locality records. Those papers which refer to generic names only have not been included in this report. Price (1935, 1936) was not listed because his dissertation appeared in subsequently published works which were utilized. Although many errors were found in the literature, only those pertaining to the parasite-host data are discussed, appearing as footnotes to Tables 3 through 222. As Yamaguti (1963) is the latest large work on Monogenea, special attention was given to correcting his erroneous host records and omissions (footnotes to Tables 3-222).

The last, and most difficult, step followed in order to ensure meaningful data for Tables 3 through 222 concerned host identities. The host names and authors employed follow Bailey (1970) or an appropriate authority who either worked in the approximate localities the fish were found or was an authority on a particular fish taxon, and the names employed are thusly current (Tables 234 and 253). The ichthyological works examined are given in the literature cited under Ichthyological Literature. Various ichthyological specialists were consulted in order to verify or correct some data, and to update some of the host scientific names. Although the host names have been made current, there is no way to ascertain whether the original host identifications were correct. Unfortunately, some of the host names could not be verified because insufficient information was found in the ichthyological literature available, hence the host name as employed by the worker on the capsaloid in question was used in order to avoid further confusion (Table 253). Norman (1966) was used to clarify some of the confusion concerning some synonyms of various genera. If the parasitological worker neglected to include the author of the host, I added the appropriate author citation. If the host name presented herein is different from that originally given by a worker on the Capsaloidea, then the name used by the original author is given in brackets under the current host name in Tables 3 through 222. The various host names previously employed by parasitologists are also listed under the correct host names in Table 234. Various errors, and comments concerning host synonyms, identifications, etc., appear as footnotes to Tables 3 through 222.

After all parasite and host data were verified, host-specificity tables, similar to that employed by Hargis (1957), were made for the major taxonomic groupings of the superfamily Capsaloidea (Tables 223-233). Additional information, derived from the previous tables, is presented in Tables 234 through 242 and Tables 244 through 249. Terms used to describe the various types of host-specificity are those of Hargis (1957), and Sprent (1969).

A set of host-parasite cards (Figure 2), containing (a) information on current host name and author, (b) authority followed to ensure correctness of host scientific name, (c) host synonyms contained in the parasitological literature, (d) host classification, and (e) capsaloid parasites reported from the hosts and their location with respect to the hosts, was made after all parasite and host data were verified. Data from these cards are presented in Tables 234 and 253.

Using The Times Atlas of the World (1967), all collection localities were found and added to distribution maps for the Capsaloidea (Figures 6-17). In addition, the latitude of each collection locality was extracted for inclusion in Figure 18 (see Appendix D). For some of the collection localities, listed as general rather than specific in the original literature, latitudinal positions are approximations based on study of the previous atlas (Appendix D).

After all the information on the parasites was processed, various ichthyological works (see Ichthyological Literature) were used to ascertain the correct name and author of the host, host family, host synonyms, host range, and important host habits. These data were recorded on host distribution cards and are presented in Tables 253 through 257. In Table 253 the general

Figure 2. Example of the host-parasite card employed.

Front:

(Host scientific name and author)

Name OK (Authority followed)

SYNS. in capsaloid literature

Class

Subclass

Order

Suborder

Superfamily

Family

NOTES:

Back:

LOCATION	PARASITE	Parasite subf.

distribution of the host is given first, followed by specific locality records. The specific distributions are included in order to add conflicting or complementary data to the general distribution, and thus, in many instances, do not include all the distributional information given by the authors cited. The distributions of some hosts are little known, or much confused. For these I have included as much information as possible. Tables 254 through 257 were derived from data contained in Table 253.

It was difficult to ascertain whether some authors were reporting host-parasite locality records of their own or records from the previous work of others. Consequently a few reports of the same host-parasite locality record may be duplicated. Since a duplicated record is better than no record, I have included all records about which there was any doubt of originality.

The overall parasite taxonomic scheme employed is essentially that of Yamaguti (1963), with emendations or additions of Bychowsky & Nagibina (1967), Euzet & Trilles (1962), Dillon & Hargis (1965), Dollfus & Euzet (1964 (1965)), Price (1960, 1963b), Yamaguti (1965, 1966), and Young (1967a, 1967b) (Table 1).

Unless otherwise noted, the taxonomic scheme employed for the fish hosts is based on Berg (1947) (Table 2).

Percentage computations were rounded off to the nearest tenth.

The symbols used in Tables 223 through 236, and 238 through 242, for the locations of the parasites with respect to their hosts are as follows:

A=Anus

BC=Buccal cavity (includes tongue, mouth, inner side of gill plates, mouth cavity, gill chamber, gill cavity, throat, "post-boca," branchial cavity, skin of mouth, under opercules)

C=Cloaca

CO=Coelom

CP=On parasitic copepod on gills

G=Gills

NC=Nasal cavity (includes nares, olfactory organs, nasal filaments, nasal glands, nasal capsule, nasal sacs, nasal fossae, nasal chamber, nasal sinuses, nostrils, nasal passages, nasal mucus glands)

O=Oviducts

OP=Opercules (included because no indication was given as to whether the parasite was on the inside (=BC) or the outside (=S) parts of the opercules)

R=Rectum

RA=Rectal ampulla

RG=Rectal gland (=appendicular gland of rectum)

S=Skin (includes body, fin, epidermis, "ectoparasite," external)

SI=Spiral intestine

ST=Stomach

U=Uterus

?=No mention

Table 1. Taxonomic scheme of Capsaloidea Price, 1936 employed.

Primarily after Yamaguti (1963), with emendations and/or additions of Bychowsky & Nagibina (1967), Euzet & Trilles (1962), Dillon & Hargis (1965), Dollfus & Euzet (1964(1965)), Price (1960, 1963b), Yamaguti (1965, 1966), and Young (1967a, 1967b) incorporated. The authors in parentheses after the generic names indicate the authorities followed for the generic diagnoses.

Capsaloidea Price, 1936

Capsalidae Baird, 1853

Capsalinae Johnston, 1929

Capsala Bosc, 1811 (Price, 1960: 240)

Caballerocotyla Price, 1960 (Price, 1960: 240-241)

Capsaloides Price, 1938 (Price, 1960: 243-244)

Tricotyla Guiart, 1938 (Price, 1960: 242-243)

Tristoma Cuvier, 1817 (Price, 1960: 243)

Tristomella Guiart, 1938 (Price, 1960: 241)

Benedeniinae Johnston, 1931

Benedenia Diesing, 1858 (Yamaguti, 1963: 122)

Allobenedenia Yamaguti, 1963 (Yamaguti, 1963: 123)

Ancyrocotyle Parona & Monticelli, 1903 (Yamaguti, 1963: 124)

Benedeniella (Johnston, 1929) Yamaguti, 1963 (Yamaguti, 1963: 124)

Dioncopseudobenedenia Yamaguti, 1965 (Yamaguti, 1965: 58)

Entobdella Blainville in Lamarck, 1818 (Yamaguti, 1963: 125)

Lagenivaginopseudobenedenia Yamaguti, 1966 (Yamaguti, 1966: 425)

Metabenedeniella Yamaguti, 1958 (Yamaguti, 1963: 127)

Table 1 continued

Neobenedenia Yamaguti, 1963 (Yamaguti, 1963:128)

Neobenedeniella Yamaguti, 1963 (Yamaguti, 1963:129)

Oligoncobenedenia Yamaguti, 1965 (Yamaguti, 1965:60)

Pseudallobenedenia Yamaguti, 1966 (Yamaguti, 1966:423)

Pseudoentobdella Yamaguti, 1963 (Yamaguti, 1963:130)

Encotyllabinae Monticelli, 1892

Encotyllabe Diesing, 1850 (Yamaguti, 1963:131)

Nitzschiinae Johnston, 1931

Nitzschia Baer, 1826 (Yamaguti, 1963:132)

Pseudonitzschiinae Yamaguti, 1965

Pseudonitzschia Yamaguti, 1965 (Yamaguti, 1965:61)

Trochopodinae (Price, 1936) Sproston, 1946

Trochopus Diesing, 1850 (Yamaguti, 1963:133)

Allomegalocotyla Yamaguti, 1963 (Yamaguti, 1963:135)

Macrophyllida Johnston, 1929 (Yamaguti, 1963:136)

Megalocotyle Folda, 1928 (Yamaguti, 1963:136)

Megalocotyloides Bychowsky & Nagibina, 1967 (Bychowsky & Nagibina, 1967:525)

Pseudobenedenia Johnston, 1931 (Dollfus & Euzet, 1964 (1965):855)

Pseudomegalocotyla Yamaguti, 1963 (Yamaguti, 1963:137)

Sprostonia Bychowsky, 1957 (Yamaguti, 1963:138)

Sprostoniella Bychowsky & Nagibina, 1967 (Bychowsky & Nagibina, 1967:523)

Trochopella Euzet & Trilles, 1962 (Euzet & Trilles, 1962:220)

Table 1 continued

Trilobiodiscus Bychowsky & Nagibina, 1967 (Bychowsky & Nagibina, 1967:526)

Dioncidae Bychowsky, 1957

Dioncus Goto, 1900 (Yamaguti, 1963:139)

Loimoidae Bychowsky, 1957

Loimos MacCallum, 1917 (Yamaguti, 1963:140)

Loimopapillosum Hargis, 1955 (Yamaguti, 1963:141)

Loimosina Manter, 1944 (Yamaguti, 1963:141)

Microbothriidae Price, 1936

Microbothriinae Price, 1938

Microbothrium Olsson, 1869 (Yamaguti, 1963:143)

Leptobothrium Gallien, 1937 (Yamaguti, 1963:145)

Leptocotyle (Monticelli, 1905) Gallien, 1937 (Yamaguti, 1963:145)

Leptomicrobothrium Dillon & Hargis, 1965 (Dillon & Hargis, 1965:245)

Pseudoleptobothrium Young, 1967 (Young, 1967a:1014)

Anoplocotylinae Yamaguti, 1963

Anoplocotyle Palombi, 1943 (Yamaguti, 1963:146)

Pseudomicrobothrium Yamaguti, 1958 (Yamaguti, 1963:147)

Asthenocotylinae Yamaguti, 1963

Asthenocotyle Robinson, 1961 (Yamaguti, 1963:148)

Enoplocotylinae Tagliani, 1912

Enoplocotyle Tagliani, 1909 (Yamaguti, 1963:148)

Pseudocotylinae Monticelli, 1903

Pseudocotyle Beneden & Hesse, 1865 (Yamaguti, 1963:149)

Table 1 continued

Dermophthiriinae Price, 1963

Dermophthirius MacCallum, 1926 (Price, 1963b: 217)

Neodermophthirius Price, 1963 (Price, 1963b: 217)

Monocotylidae Taschenberg, 1879

Monocotylinae Gamble, 1896

Monocotyle Taschenberg, 1878 (Young, 1967b: 386-387)

Anoplocotyloides Young, 1967 (Young, 1967b: 394-395)

Dasybatotrema Price, 1936 (Young, 1967b: 397)

Decacotyle Young, 1967 (Young, 1967b: 398)

Diploheterocotyla Yamaguti, 1965 (Yamaguti, 1965: 62)

Heterocotyle Scott, 1904 (Young, 1967b: 399)

Horricauda Tripathi, 1959 (Young, 1967b: 402-403)

Neoheterocotyle Hargis, 1955 (Yamaguti, 1963: 155)

Papillicotyle Young, 1967 (Young, 1967b: 405)

Spinuris Doran, 1953 (Young, 1967b: 407-408)

Troglocephalus Young, 1967 (Young, 1967b: 409)

Tympanocirrus Tripathi, 1959 (Yamaguti, 1963: 156)

Calicotylinae Monticelli, 1903

Calicotyle Diesing, 1850 (Yamaguti, 1963: 157)

Dictyocotyle Nybelin, 1941 (Yamaguti, 1963: 158)

Gymnocalicotyle (Nybelin, 1941) Yamaguti, 1963 (Yamaguti, 1963: 159)

Dendromonocotylinae Hargis, 1955

Dendromonocotyle Hargis, 1955 (Young, 1967b: 412)

Clemacotyle Young, 1967 (Young, 1967b: 416)

Table 1 continued

Merizocotylinae Johnston & Tiegs, 1922

Merizocotyle Cerfontaine, 1894 (Yamaguti, 1963:161)

Cathariotrema Johnston & Tiegs, 1922 (Yamaguti, 1963: 162)

Empruthotrema Johnston & Tiegs, 1922 (Yamaguti, 1963: 162)

Thaumatocotyle Scott, 1904 (Yamaguti, 1963:162)

Table 2. Taxonomic scheme of fish hosts of Capsaloidea employed. After Berg (1947).

Class IX. Elasmobranchii

- Subclass Selachii
  - Order 42. Lamniformes
    - Suborder Lamnoidei
      - Family 97. Lamnidae
    - Suborder Scyliorhinoidei
      - Family 98. Scyliorhinidae
      - Family 99. Carcharhinidae
      - Family 100. Sphyrnidae
  - Order 43. Squaliformes
    - Suborder Squaloidei
      - Family 102. Squalidae
    - Suborder Squatinoidei
      - Family 103. Squatinidae
  - Order 44. Pristiophoriformes
      - Family 104. Pristiophoridae
  - Order 45. Rajiformes
    - Suborder Rhinobatoidei
      - Family 105. Rhinobatidae
      - Family 106. Pristidae
      - Family 107. Platyrhinidae
    - Suborder Rajioidei
      - Family 108. Rajidae

Table 2 continued

Suborder Trygonoidei

Family 109. Trygonidae

Family 112. Myliobatidae

Class X. Holocephali

Subclass Chimaerae

Order 48. Chimaeriformes

Family 125. Chimaeridae

Class XII. Teleostomi

Subclass Actinopterygii

Order 72. Acipenseriformes

Family 179. Acipenseridae

Order 79. Clupeiformes

Suborder Salmonoidei

Family 219. Salmonidae

Order 87. Cypriniformes

Suborder Cyprinoidei

Family 286. Cyprinidae

Suborder Siluroidei

Superfamily Siluroidae

Family 291. Ariidae

Order 88. Anguilliformes

Suborder Anguilloidei

Family 326. Muraenidae

Family 333. Congridae

Table 2 continued

Order 92. Gadiformes

Suborder Gadoidei

Family 356. Gadidae

Order 101. Beryciformes

Family 399. Holocentridae

Order 103. Mugiliformes

Suborder Mugiloidei

Family 407. Mugilidae

Order 107. Perciformes

Suborder Percoidei

Superfamily Percoidae

Family 415. Serranidae

Family 417. Theraponidae

Family 429. Latilidae

Family 433. Pomatomidae

Family 435. Rachycentridae

Family 436. Carangidae

Family 440. Bramidae

Family 441. Coryphaenidae

Family 445. Lutianidae

Family 446. Nemipteridae

Family 447. Lobotidae

Family 449. Pomadasyidae

Family 450. Sciaenidae

Family 451. Lethrinidae

Table 2 continued

Family 452. Sparidae

Family 455. Psettidae

Family 461. Girellidae

Family 462. Ephippidae

Family 464. Scatophagidae

Family 465. Chaetodontidae

Family 471. Hoplegnathidae

Superfamily Embiotocoidae

Family 474. Embiotocidae

Superfamily Pomacentroidae

Family 475. Pomacentridae

Superfamily Labroidae

Family 476. Labridae

Family 478. Scaridae

Superfamily Cirrhitoidae

Family 482. Haplodactylidae

Family 483. Cheilodactylidae

Family 484. Latridae

Superfamily Notothenioidae

Family 505. Nototheniidae

Suborder Blennioidei

Family 518. Pholidae

Suborder Acanthuroidei

Family 536. Acanthuridae

Table 2 continued

Suborder Scombroidei

Superfamily Scombroidae

Family 539. Scombridae

Superfamily Xiphioidae

Family 542. Histiophoridae

Family 544. Xiphiidae

Suborder Gobioidei

Superfamily Gobioidae

Family 555. Gobiidae

Suborder Cottoidei

Superfamily Scorpaenoidae

Family 558. Scorpaenidae

Family 559. Triglidae

Superfamily Cottoidae

Family 570. Cottidae

Order 108. Dactylopteriformes

Family 578. Dactylopteridae

Order 110. Pleuronectiformes

Suborder Pleuronectoidei

Superfamily Pleuronectoidae

Family 582. Bothidae

Family 583. Pleuronectidae

Superfamily Soleoidae

Family 584. Soleidae

Table 2 continued

Order 114. Echeneiformes

Family 590. Echeneidae

Order 115. Tetraodontiformes

Suborder Balistoidei

Family 595. Balistidae

Suborder Ostracioidei

Family 596. Ostraciidae

Suborder Tetraodontoidei

Family 597. Tetraodontidae

Family 598. Diodontidae

Suborder Moloidei

Family 599. Molidae

CHAPTER 3

RECOMMENDATIONS WHICH WOULD ENSURE MORE MEANINGFUL PARASITE-HOST LOCALITY RECORDS

Throughout this study, I have repeatedly encountered inadequate and confusing parasite-host locality records. Numerous omissions and shortcomings of data were found throughout the literature on monogenetic trematodes, some of which are as follows:

(1) Many authors failed to cite the location of the parasite with respect to the host. Some authors said "on," while others made no mention whatsoever of the parasite's location. Examples are T. Scott (1902), Johnston (1934a), Baylis (1939), Hutton (1964), and Llewellyn and Euzet (1964).

(2) Many authors failed to identify the host to species. Some examples are A. Scott (1904), Canavan (1934), and Hammen and Lum (1962).

(3) Some authors, in redescribing Monogenea from museum collections, reported hosts other than those originally cited, and gave no explanation as to how they got them. An example is Price (1938a).

(4) Some authors cited a general collection locality instead of a specific collection locality. Examples are McMahon (1963), and Williams (1965). Others, like Gallien (1937a), said that certain parasites were found on a cruise, without mentioning the specific collection locality.

(5) Many workers omitted the date of collection, thereby depriving future workers of information on seasonality.

(6) Some authors cited several collection localities and listed the parasites found without any reference as to which parasite was found at which locality. Stafford (1904) is an example. Some authors listed the collection locality on a different page from the rest of the data concerning new parasite-host locality records. Froissant (1930) is an example.

(7) Many authors cited parasite-host locality records without mentioning that they had been previously reported, thereby making it more difficult to ascertain which was the original report.

(8) Several authors cited the locality at which the host was examined, and not where the fish was collected. Examples are MacCallum (1917), and Linton (1940).

(9) Some authors gave credit for parasite-host locality records to authors who had just repeated the original record. Ronald's (1960:255) citation of Winter (1955) is an example. Sproston (1946) is an example.

(10) Most authors did not include negative records for Capsaloidea when the appropriate potential hosts were examined, thereby depriving future workers of information on seasonality, distribution, and host-specificity.

A study of almost all of the original literature on the superfamily Capsaloidea Price, 1936 has revealed the above problems.

In order to ensure complete parasite-host locality records for future workers, it is recommended that the following be done:

(1a) Record the location of the parasite with respect to its host, and, if the parasite is found in more than one location, record the number of parasites recovered from each location.

(1b) Give a table of all known parasite-host locality records when a species is redescribed (similar to the table employed in the present work).

(2a) Identify the host to species; include the describer's name and the source to which you referred for the host identification so that synonymies are easier to work out.

(2b) Note the habitat and range of the host, as the host is the microenvironment of the parasite and thus an important part of the parasite-host couplet. The distribution of a host represents the potential range of its parasites.

(2c) In order to ensure an unquestioned identity of the host, an example of the host of a new species of Monogenea, or an example of the host of a new host record, should be submitted to a museum for identification and storage, and for possible future reference. Böhlke (personal communication), in commenting on the problem of host identity, said "Only when voucher specimens of hosts as well as parasites are preserved in permanent collections will host names in parasite papers have any significance." Fish are the most numerous vertebrate group, making up about 43% of all species of vertebrates (Lagler, Bardach, and Miller, 1962:1 & 2). Incorrect identification of fish hosts by parasitologists are apparently quite frequent, but the deposition of host specimens in museums could alleviate the problem.

(3a) In redescribing museum material, if an additional host is encountered, the author should note all collection data for the additional host and indicate whether the new host material is from the original collection or another collection.

(3b) Give the following for the new species when type material of one species is split into the original species plus a new species: type or museum slide number(s), original collector, date of collection, collection locality, location with respect to host, and host.

(4) Present the specific collection locality and its latitude and longitude.

(5) Give the collection date.

(6) Record sufficient data for each species of monogenetic trematode so that, taken alone, all the necessary parasite-host locality data is included for each species.

(7) When repeating previously reported parasite-host locality records, note them as such.

(8) Give the collection locality of the host, not where the host was examined.

(9) In order to avoid confusion in the literature only the original parasite-host locality records should be cited, and

not those review references by various workers concerning previous works. Such references are not valid locality records.

(10) Include a list of the parasites not found, but known to parasitize the host in question.

CHAPTER 4

RESULTS

PARASITE-HOST LOCALITY RECORDS

The parasite-host locality records and additional data for 221 species of capsaloids are presented in the following tables. This section represents the basic data upon which the following discussions are based. The tables are presented in the same order as indicated in Table 1.

Table 3. Capsala martinierei Bosc, 1811[1].

Location	Host	Locality	Source
1. Body	Mola mola (Linnaeus) ["poisson de genre des diodons de Linné"]	Between Nootka Island, British Columbia and Monterey Bay, California	La Martiniere (1787)*, In Winter (1955:16-17)
2. Skin, lateral part of body	M. mola (L.)	39°56'10" N; 34° W (west of Flores Island, Azores)	Guiart (1938:8)
3. No mention	"	English Channel	Guiart (1938:10)
4. Surface of body	"	Naples, Italy	Baer & Euzet[2] (1961:306)
5. Skin	"	Plymouth, England	Kearn (1963c:449)
6. Body surface	"	Fermeuse, Long Pond, and Conception Bay--Newfoundland	Threlfall (1967:170,171)

Synonyms: Phylline diodontis Oken, 1815
Tristoma maculatum Rudolphi, 1819
Capsala maculata (Rudolphi, 1819) Nordmann in Lamarck, 1840

Additional references: La Martiniere (1797*), Bosc (1811), Oken (1815*), Rudolphi (1819*), Nitzsch (1826*), Baer (1827), Blainville (1828*), Eichwald (1829*), Diesing (1835*, 1836a, 1850), Nordmann (1840), Leuckart (1842), Dujardin (1845*), Moquin-Tandon (1846*), Beneden & Hesse (1864), Linstow (1878), Taschenberg (1878a), Braun (1890a), Saint-Remy (1891c, 1891d, 1892c), Monticelli (1892a), Goto (1894), Setti (1898, 1899a, 1899b), Pratt (1900), Odhner (1905*), Stiles & Hassall (1908), MacCallum (1927b), Johnston (1929), Price (1937b, 1938c, 1939, 1960, 1962a,[3] 1962b), Meserve

Table 3 continued

(1938), Dollfus (1946), Sproston (1946), Palombi (1949), Chauhan (1951, 1954), Brinkmann (1952b, 1956b), Perez-Vigueras (1955), Winter (1955), Dawes (1956), Bychowsky (1957), Rossignol & Repelin (1962), Stunkard (1962), Kearn (1963d), Llewellyn (1963, 1965), Yamaguti (1963)[4], Halton & Jennings (1965), Smyth (1966).

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[1]This species has been confused with both Tricotyla molae (Table 25) and Tricotyla cutanea (Table 26). Price (1962b: 444) said, "The only definite records of its occurrence appear to be those of La Martiniere (1787)--collection off the coast of California; two by Guiart (1938)--one from Azores and the other from Roscoff; and the one reported herein from off the coast of Cuba." Its characteristics are apparently also confused as Price (1962a: 750) changed his mind and said that the Cuban specimen was Tristoma cutaneum (=Tricotyla cutanea). Price's (1962b: 444) reference to Roscoff as a locality reported by Guiart is incorrect, Guiart (1938:10) said English Channel. Only a close examination of the specimens of Baer & Euzet (1961), Kearn (1963c), and Threlfall (1967) can reveal whether they are in fact C. martinierei.

[2]A locality record? Baer & Euzet (1961:306) presented a photograph of a C. martinierei from Naples, with no mention as to whether it represented a new locality record.

[3]See Table 26, footnote 10.

[4]Yamaguti (1963:116) listed Diodon sp. as a host. It should probably be listed as Mola mola.

Table 4. Capsala squali (Blanchard, 1847) Johnston, 1929[1].

Location	Host	Locality	Source
1. Gills	Squalus sp. ["d'un Squale"]	New Zealand (Coll. by Verreaux)	Blanchard (1847: 328)

Synonyms: Tristoma squali Blanchard, 1847
Tristomum blanchardii Diesing, 1850

Additional references: Diesing (1850), Beneden & Hesse (1864), Linstow (1878), Taschenberg (1878b), Örley (1885), Braun (1890a), Saint-Remy (1891c, 1892c), Monticelli (1892a), Goto (1894), Setti (1898, 1899a, 1899b), Stiles & Hassall (1908), Johnston (1929), Guiart (1938), Price (1938c, 1939, 1960), Sproston (1946), Chauhan (1951), Winter (1955), Bychowsky (1957), Robinson (1961), Yamaguti (1963), and Cuvier*(year unknown)[2]; Stunkard (1962).

[1]This species is inadequately described and may not belong in the genus Capsala (Price, 1960: 240).

[2]"Cuvier: Regne anim. nouv. edit. Zoophyt. Tab. XXXVI. 3.3.a." (Diesing, 1850: 430).

Table 5. *Capsala* sp. of Koratha & Martin, 1960[1].

Location	Host	Locality	Source
1. No mention	*Sarda chiliensis* (Cuvier) [*Sarda lineolata*][2]	California	Koratha & Martin (1960:14)

[1] As this species came from the same host as *Caballerocotyla gregalis* (Table 11), it could be a synonym of *C. gregalis*, but a definite determination cannot be made until the species are compared.

[2] "*Sarda lineolata* (Girard, 1858) = *Sarda chiliensis lineolata* (Girard, 1858) or = *S. chiliensis* (Cuvier, 1831)" (Collette, personal communication).

Table 6. Caballerocotyla biparasitica (Goto, 1894) Price, 1960.

Location	Host	Locality	Source
1. Carapace of copepod, probably of genus Parapetalus, on gills	Thunnus albacares (Bonnaterre) [Thynnus albacora][1]	Misaki, Japan	Goto (1894: 253)
2. Carapace of copepod, Elytrophora sp., on gills	T. albacares (Bonnaterre) [Neothunnus macropterus (Temminck & Schlegel)][2]	Christmas Island, Line Islands, Pacific Ocean 02°14' N; 159°59'W	Iversen & Hoven (1958: 132)

Synonyms: Tristomum biparasiticum Goto, 1894
Capsala biparasitica (Goto, 1894) Johnston, 1929
Tristomella biparasitica (Goto, 1894) Guiart, 1938

Additional references: Goto (1895, 1900), Saint-Remy (1898), Setti (1898, 1899a, 1899b), Monticelli (1899a), Stiles & Hassall (1908), Tagliani (1912), Dollfus (1922), Johnston (1929), Guiart (1938), Price (1938c, 1939, 1951, 1960), Yamaguti (1943a, 1963), Sproston (1946), Chauhan (1951), Brinkmann (1952b), Winter (1955), Stunkard (1962), Wagner & Carter (1967).

[1] Thynnus albacora is a synonym of Thunnus albacares (Bonnaterre) (Gibbs & Collette, 1967:102).

[2] Neothunnus macropterus (Temminck & Schlegel) is a synonym of Thunnus albacares (Bonnaterre) (Gibbs & Collette, 1967:102).

Table 7. *Caballerocotyla albsmithi* Dollfus, 1962.

Location	Host	Locality	Source
1. Gills	*Thunnus thynnus orientalis* (T. & S.) [*Thunnus saliens* Jordan & Evermann][2]	California[1]	Dollfus (1962:526)

Additional references: Wagner & Carter (1967), Mamaev (1968).

[1] "The fish were collected on 26 June 1961 near Guadalupe Island, Baja California..." (Wagner & Carter, 1967:279). They contacted the collector and obtained the collection locality.

[2] "*Thunnus saliens* Jordan & Evermann, 1926 = *Thunnus thynnus orientalis* (Temminck and Schlegel, 1844). Name based on California specimens and usually used for eastern North Pacific population of the subspecies" (Collette, personal communication).

Table 8. <u>Caballerocotyla caballeroi</u> (Winter, 1955) Price, 1960.

Location	Host	Locality	Source
1. Gills	*Sarda orientalis* (Temminck & Schlegel)	Acapulco, Guerrero, Pacific Ocean, Mexico	Winter (1955:13)

Synonym: *Capsala caballeroi* Winter, 1955

Additional references: Price (1960, 1963a), Stunkard (1962), Yamaguti (1963), Wagner & Carter (1967).

Table 9. Caballerocotyla foliacea (Goto, 1894) Price, 1960.

Location	Host	Locality	Source
1. Gills	Undetermined species of fish (Japanese name= hazara)[1]	Misaki, Japan	Goto (1894:249)

Synonyms: Tristomum foliaceum Goto, 1894
Capsala foliacea (Goto, 1894) Johnston, 1929

Additional references: Saint-Remy (1898), Setti (1898, 1899a, 1899b), Monticelli (1899a), Stiles & Hassall (1908), Tagliani (1912), Johnston (1929), Price (1938c, 1939, 1951, 1960), Yamaguti (1943a, 1963), Sproston (1946), Palombi (1949), Chauhan (1951), Brinkmann (1952b), Winter (1955), Bychowsky (1957), Stunkard (1962), Wagner & Carter (1967).

[1] Okada (1955) did not list a fish with this Japanese name.

Table 10. Caballerocotyla gouri (Chauhan, 1951) Price, 1960.

Location	Host	Locality	Source
1. Operculum	Euthynnus affinis (Cantor) [Thynnus thunnina C. V.][1]	From Arabian Sea of Indian Ocean at Bombay, India	Chauhan (1951: 45, 49)

Synonym: Capsala gouri Chauhan, 1951

Additional references: Chauhan (1953, 1954), Winter (1955), Price (1960), Dollfus (1962), Stunkard (1962), Yamaguti (1963), Wagner & Carter (1967).

[1] "If the Thunnus thunnina reference is to an Indian Ocean species, it must be Euthynnus affinis (Cantor) of which E. yaito Kishinouye is a synonym" (Collette, personal communication).

Table 11. Caballerocotyla gregalis Wagner & Carter, 1967.

Location	Host	Locality	Source
1. Gills	Sarda chiliensis (Cuvier) [Sarda lineolata (Girard)][1]	Newport Beach, California	Wagner & Carter (1967:277)

Possible synonym: ? Capsala sp. of Koratha and Martin, 1960[2]

[1] "Sarda lineolata (Girard, 1858) = Sarda chiliensis lineolata (Girard, 1858) or = S. chiliensis (Cuvier, 1831). Name based on Californian specimens and usually used for the California-Mexico population of this eastern Pacific species, leaving the nominal subspecies along the coast of South America" (Collette, personal communication).

[2] Koratha & Martin (1960:14) reported a Capsala sp. from Sarda lineolata from California. Their parasite came from the same host as C. gregalis, and their "Capsala sp." could be a synonym of C. gregalis, but a definite determination cannot be made until the specimens are compared.

Table 12. Caballerocotyla katsuwoni (Ishii, 1936) Price, 1960.

Location	Host	Locality	Source
1. Gill	Euthynnus pelamis (Linnaeus) [Katsuwonus vagans][1]	Japan (no specific locality given)	Ishii (1936: 782)

Synonyms: Tristoma katsuwonum Ishii, 1936
Capsala katsuwona (Ishii, 1936) Price, 1938

Additional references: Ishii & Sawada (1938a, 1938b), Price (1938c, 1939, 1951, 1960, 1963a), Yamaguti (1943a, 1963), Sproston (1946), Chauhan (1951), Winter (1955), Stunkard (1962), Wagner & Carter (1967).

[1] Katsuwonus vagans (Lesson, 1828) is a synonym of Euthynnus pelamis (Linnaeus) (Collette, personal communication).

Table 13. Caballerocotyla klawei Stunkard, 1962.

Location	Host	Locality	Source
1. Nasal capsule	Thunnus albacares (Bonnaterre) [Neothunnus macropterus][1]	18°24'N, 104°38'W (Pacific)	Stunkard (1962:883)
2. No mention	T. albacares (Bonn.) [Neothunnus albacores][2]	Atlantic Ocean Off the coast of Africa	Price In Stunkard (1962:889)[3]
3. Nasal sacs	T. albacares (Bonn.) [Neothunnus albacora][4]	Eastern South Atlantic going from Gulf of Guinea to Angola	Rossignol & Repelin (1962:177)

Synonym: Tristoma sp. of Rossignol & Repelin, 1962[5]

Additional reference: Wagner & Carter (1967).

[1] Neothunnus macropterus is a synonym of Thunnus albacares (Bonnaterre) (Gibbs & Collette, 1967:102.)

[2] "Neothunnus albacores = Thunnus albacares (Bonnaterre, 1788). Yellow fin tuna. Worldwide in tropical and subtropical seas. Name based on Madeiran specimens and used sporadically for eastern and western Atlantic populations of the species" (Collette, personal communication).

[3] "He replied that he was studying specimens from Neothunnus albacores, taken in the Atlantic Ocean off the coast of Africa... ...whole mounts, and sections of the material of N. macropterus taken in the Pacific Ocean, were sent to him. Price reported that all the worms belong to a single species in the genus Caballerocotyla and that in as far as he was informed, had not been described or named" (Stunkard, 1962:889).

Table 13 continued

[4] *Neothunnus albacora* is a synonym of *Thunnus albacares* (Bonnaterre) (Gibbs & Collette, 1967:103).

[5] Bane (1969:165 and 167) considered their specimens to be *Caballerocotyla klawei*.

Table 14. Caballerocotyla magronum (Ishii, 1936) Price, 1960.

Location	Host	Locality	Source
1. Gill	Thunnus thynnus orientalis (Temminck & Schlegel) [Thunnus orientalis][1]	Japan (no specific locality given)	Ishii (1936: 781)

Synonyms: Tristoma magronum Ishii, 1936
Capsala magrona (Ishii, 1936) Price, 1938

Additional references: Ishii & Sawada (1938a, 1938b), Price (1938c, 1939, 1951, 1960, 1963a), Yamaguti (1943a, 1963), Sproston (1946), Chauhan (1951), Winter (1955), Stunkard (1962), Wagner & Carter (1967), Mamaev (1968).

[1] "Thunnus orientalis (Temminck and Schlegel, 1844) = Thunnus thynnus orientalis (Temminck and Schlegel, 1844). Pacific bluefin tuna. Name based on a Japanese specimen and usually used for the western North Pacific population of the subspecies" (Collette, personal communication).

Table 15. Caballerocotyla manteri (Price, 1951) Price, 1960.

Location	Host	Locality	Source
1. Gills	*Euthynnus alletteratus* (Rafinesque)	Tortugas, Florida	Price (1951: 24)
2. Gills	"	Offshore from Quinby, Virginia (Coll. by Hargis)	Zwerner & Lawler (unpublished data)

Synonym: *Capsala manteri* Price, 1951

Additional references: Winter (1955), Price (1960), Stunkard (1962), Yamaguti (1963), Wagner & Carter (1967), Mamaev (1968).

Table 16. *Caballerocotyla manteri affinis* Mamaev, 1968.

Location	Host	Locality	Source
1. Gills	*Euthynnus affinis* (Cantor)	South China Sea (p. 5)	Mamaev (1968:12)
2. Gills	*Auxis thazard* (Lacépède)	South China Sea (p. 5)	Mamaev (1968:12)

Table 17. *Caballerocotyla notosinense* Mamaev, 1968.

Location	Host	Locality	Source
1. Gills	*Euthynnus affinis* (Cantor)	South China Sea (p. 5)	Mamaev (1968:11)

Table 18. *Caballerocotyla paucispinosa* Mamaev, 1968.

Location	Host	Locality	Source
1. Gills[1]	*Thunnus thynnus orientalis* (Temminck & Schlegel) [*Thunnus thynnus*][2]	South China Sea (p. 5)	Mamaev (1968:9)
2. Gills[1]	*Euthynnus affinis* (Cantor)	South China Sea (p. 5)	Mamaev (1968:9)

[1] Mamaev (1968:9) also listed "stomach" as a location. However, on another page (Mamaev, 1968:6) all he listed was "gills." Apparently the "stomach" listing was an error.

[2] *Thunnus thynnus* of the Pacific equals *Thunnus thynnus orientalis* (Temminck & Schlegel) (Gibbs & Collette, 1967:117).

Table 19. Caballerocotyla pelamydis (Taschenberg, 1878) Price, 1960.

Location	Host	Locality	Source
1. Gills	Sarda sarda (Bloch) [Pelamys sarda][1]	Naples, Italy	Taschenberg (1878b: 569)
2. Gills	"	Trieste, Italy (Coll. by A. Valle)	Perugia & Parona (1890: 5)
3. No mention	"	Pisa, Italy	Sonsino (1890b: 173)
4. Gills (p. 1)	"	Genova, Italy	Parona & Perugia (1892: 15)
5. Gills	Sarda sarda (Bloch)	Trieste, Italy	Stossich (1898*) In Palombi (1949: 274)
6. Gills	" [Pelamys sarda]	Trieste & Genova, Italy	Setti (1899a: 3-4)
7. No mention	"	Portoferrajo, Elba, Italy	Parona (1902: 2)
8. No mention	No mention	Black Sea	Bychowsky (1957: 376)[2]

Synonyms: Tristomum pelamydis Taschenberg, 1878
Capsala pelamydis (Taschenberg, 1878) Johnston, 1929
Tricotyla pelamydis (Taschenberg, 1878) Guiart, 1938

Additional references: Taschenberg (1878a, 1879a), Monticelli (1888, 1889, 1892a, 1899a), Linstow (1889b), Braun (1890a), Saint-Remy (1891c,1891d, 1892c, 1892d), Goto (1894), Parona (1894*, 1896, 1912), Setti (1898, 1899b), Stossich (1898*), Stiles & Hassall (1908), Lo Bianco (1909*), Johnston (1929),

Table 19 continued

Guiart (1938), Price (1938c, 1939, 1951, 1960, 1963a), Sproston (1946), Palombi (1949), Chauhan (1951), Winter (1955), Dawes (1956), Stunkard (1962), Yamaguti (1963), Wagner & Carter (1967).

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[1] *Pelamys sarda* is a synonym of *Sarda sarda* (Bloch) (Palombi, 1949: 274).

[2] "We observe this phenomenon in *Capsala pelamydis* (Taschenberg) from the material from the Black Sea which was transferred to our laboratory by A. V. Rechetnikova" (Bychowsky, 1957: 376).

Table 20. *Caballerocotyla* sp. of Mamaev, 1968.

Location	Host	Locality	Source
1. Gills (?)	*Thunnus thynnus orientalis* (Temminck & Schlegel) [*Thunnus thynnus*][1]	South China Sea (p. 5)	Mamaev (1968:6,14)

[1] *Thunnus thynnus* of the Pacific equals *Thunnus thynnus orientalis* (Temminck & Schlegel) (Gibbs & Collette, 1967:117).

Table 21. Capsaloides cornutus (Verrill, 1875) Price, 1938.

Location	Host	Locality	Source
1. Gills	Tetrapturus albidus Poey	Block Island, R. I.	Verrill (1875:40)
2. Gills	T. albidus Poey[1] [Tetrapturus imperator (Bloch & Schneider)][2]	Museum specimens: From Block Island; & Woods Hole, Mass.	Price (1939:89)

Synonyms: Tristoma cornutum Verrill, 1875
Capsala cornuta (Verrill, 1875) Johnston, 1929
Capsaloides cornutum (Verrill, 1875) Price, 1938

Additional references: Verrill (1885), Linstow (1889b), Saint-Remy (1891d, 1892c, 1898), Monticelli (1893a), Setti (1898, 1899b), Pratt (1900), Stiles & Hassall (1908), Johnston (1929), Price (1938c, 1960), Sproston (1946), Dollfus (1949), Brinkmann (1952b), Dawes (1956), Stunkard (1962), Yamaguti (1963).

[1] In his discussion, Price (1939:89) said "Tetrapturus albidus (=T. imperator)." It is thought that the T. imperator in the capsaloid literature refers to T. albidus.

[2] The identity of T. imperator is confused. Robins & DeSylva (1960:397) said "The name X. imperator Schneider has bothered ichthyologists for years, and was recognized as recently as 1952 (Lozano y Rey) although not for belone. According to Cuvier (1829) and Jordan and Evermann (1926:31) plate 21 in Bloch and Schneider (1801) on which Schneider's imperator was based was a poor drawing of a juvenile specimen of Xiphias gladius, copied from Duhamel (1769:fig. A2) and based on Aldrovandi (1638). Goode (1883) for some unknown reason insisted that Schneider's description of the absence of a single carina meant that it therefore had two carinae, and that it was therefore an earlier name for T. belone. LaMonte (1955:347) has discussed this name

Table 21 continued

in some detail and considers that 'the specimen can never be definitely identified.' Actually Schneider (Bloch and Schneider, 1801:xxix and 93) clearly states that his account is strictly based on Duhamel. Duhamel's account is of a swordfish despite the pelvic fins included on one of his two drawings."

Table 22. Capsaloides magnaspinosus Price, 1939.

Location	Host	Locality	Source
1. "nares"	Tetrapturus albidus Poey[1] [Tetrapturus imperator (Bloch & Schneider)]	Woods Hole, Mass. (Coll. by MacCallum, p. 91)	Price (1939:90)

Additional references: Sproston (1946), Dollfus (1949), Dawes (1956), Price (1960), Stunkard (1962), Yamaguti (1963).

[1]Although MacCallum's collection records listed the host as Tetrapturus imperator (Price, 1939:91), it is thought that he listed T. imperator for Tetrapturus albidus Poey. See also Table 21, footnote 2.

Table 23. *Capsaloides perugiai* (Setti, 1898) Price, 1938.

Location	Host	Locality	Source
1. Gills	*Tetrapturus belone* Rafinesque	Spezia, Italy	Setti (1898: 308)

Synonyms: *Tristomum perugiai* Setti, 1898
Capsala perugiai (Setti, 1898) Johnston, 1929

Additional references: Saint-Remy (1898), Monticelli (1899a), Setti (1899a, 1899b), Stiles & Hassall (1908), Parona (1912), Johnston (1929), Price (1938c, 1939, 1960), Sproston (1946), Dollfus (1949), Palombi (1949), Brinkmann (1952b), Dawes (1956), Stunkard (1962), Yamaguti (1963).

Table 24. *Capsaloides sinuatus* (Goto, 1894) Price, 1938.

Location	Host	Locality	Source
1. Inner side of gill plates	*Histiophorus* sp.[1,2]	Misaki, Japan	Goto (1894: 241)

Synonyms: *Tristomum sinuatum* Goto, 1894
Capsala sinuata (Goto, 1894) Johnston, 1929
Capsaloides sinuatum (Goto, 1894) Price, 1938

Additional references: Setti (1898, 1899b), Saint-Remy (1898), Monticelli (1899a, 1899b), Goto (1900), Stiles & Hassall (1908), Tagliani (1912), Johnston (1929), Woolcock (1936), Guiart (1938), Price (1938c, 1939, 1960), Yamaguti (1943a, 1963), Sproston (1946), Brinkmann (1952b), Dawes (1956), Stunkard (1962), Kearn (1963d).

[1] Goto (1894: 241) gave the Japanese name of "Kajiki" to this host. Okada (1955) did not list a fish with this Japanese name.

[2] If the "*Histiophorus* sp." refers to the old name *Histiophorus brevirostris*, then the host was *Makaira indica* (Cuvier) (Paxton & Talbot, personal communication); if it refers to a sailfish *Histiophorus*, then the host was *Istiophorus platypterus* (Shaw & Nodder) (Morrow & Harbo, 1969: 40-41). Goto (1894: 244) gave the same Japanese name "Kajiki" to the host for *Tristomella ovalis*. I indicated that the "*Histiophorus* sp." for *T. ovalis* (See Table 40, footnote 2) was probably *Istiophorus platypterus*. As Goto (1894: 241, 244) gave the same Japanese names to the hosts for both, and the *T. ovalis* host was probably *I. platypterus*, it is my opinion that the host for *C. sinuatus* was also probably *I. platypterus*.

Table 25. Tricotyla molae (Blanchard, 1847) Guiart, 1938[1]

Location	Host	Locality	Source
1. Gills	Mola mola (Linnaeus) [Orthragoriscus mola]	No mention[2]	Blanchard (1847: 326-327)
2. Gills	"	Palermo, Sicily, Italy (Coll. by Grohmann)	Diesing (1850: 429)
3. Gills	"	England (Coll. by Yarrell)	Diesing (1850: 429)
4. No mention	No mention[3]	In Lunds Zool. Museum (taken in Scandinavia)	Olsson (1868: 17)
5. Body surface	M. mola (L.) [Orthagoriscus mola]	Naples, Italy	Lang (1880: 29)
6. Gills (p.18)	"	Naples, Italy (from P. Mayer)	Taschenberg (1880: 17)
7. Skin	" [Mola aspera][4]	No mention	Parona & Perugia (1889: 741)
8. Skin	" [Mola rotunda][5]	Beach Haven, N. J.	Leidy (1890: 281-282)[6]
9. Skin	" [Orthagoriscus mola]	Island of Groix, France (Coll. by Bonnier)	Monticelli (1890a: 418)
10. No mention	"	Trieste, Italy (Coll. by Valle)	Parona & Perugia (1890a: 5)
11. No mention	"	Naples, Italy	Sonsino (1890b: 173)[7]
12. No mention	No mention[3]	Norway[8]	Lönnberg (1891)* In Brinkmann (1952b: 15)

Table 25 continued

Location	Host	Locality	Source
13. No mention	No mention[3]	Roscoff, France	Saint-Remy (1891b:1072)
14. Gills (p.1(86))	M. mola (L.) [Orthagoriscus mola]	Pegli, Italy	Parona & Perugia (1892: 15 (100))
15. No mention	No mention[3]	Roscoff, France (p.2) (Coll. by Hecht)	Saint-Remy (1892d:4)
16. Gills	M. mola (L.) [Orthagoriscus mola]	In collection of Zool. Mus. of Un. of Palermo, Italy (p.167)	Monticelli (1893a:169)
17. Skin	"	Naples, Italy	Monticelli (1893a:169)
18. Skin & Gills	M. mola (L.)	Trieste, Italy (see Addendum at end of Table)	Stossich (1898)* In Palombi (1949:272)
19. Skin & Gills	"	Venezia, Italy	Stossich* (?) In Palombi (1949:272)
20. "on"	"	Woods Hole, Mass.	Linton (1898:510)
21. Skin	"	Off No Man's Land, Mass.	Linton (1900:281)[9]
22. Skin	"	Woods Hole, Mass.	Linton (1901:466)[10]
23. No mention	" [Orthagoriscus mola]	Near Mallaig, west coast of Scotland	T. Scott (1901:144)
24. No mention	"	Firth of Forth, Scotland	T. Scott (1901:144)

Table 25 continued

Location	Host	Locality	Source
25. Skin	M. mola (L.) [Orthagoriscus mola]	Naples, Italy	Maclaren (1903: 262)
26. Skin	M. mola (L.)	Maritime Provinces, Canada[11]	Stafford (1904: 481, 482)
27. No mention	" [Orthagoriscus mola]	Berry Head, Devon, England	Elwes (1909)* In Ind. Cat. Med. Vet. Zoo., Trem. & Trem. Dis., Pt. 8:1641.[12]
28. Gills	"	Achill, Ireland	Southern (1912: 17)[13]
29. Skin	M. mola (L.)	New York Aquarium	MacCallum (1921: 222-223)
30. No mention	"	Ireland	Baylis (1928: 333)[14]
31. Surface of body	" [Orthagoriscus mola L]	French waters (p. 43)	Froissant (1930: 66)
32. Skin	" [Orthagoriscus mola Bloch]	Salcombe, Devon, England	Robinson (1934: 346)
33. Skin	M. mola (L.)	Woods Hole, Mass.	Linton (1940: 9)
34. Skin	"	Seahouses, Northumberland, England	Crofton (1941: 209)
35. Skin & Gills	"	Naples, Italy (Coll. by Ariola)	Palombi (1949: 272)

Synonyms: Tristoma coccineum of Rudolphi, 1819; Bremser, 1824; Diesing, 1836[15]

Table 25 continued

Syn. (cont.): Phylline coccinea (Cuvier, 1817) Schweigger, 1820[15]
Tristoma molae Blanchard, 1847
Tristomum rudolphianum Diesing, 1850[15]
Capsala sanguinea Diesing, 1850[15]
Capsala rudolphiana (Diesing, 1850) Johnston, 1865[15]
Tristomum aculeatum Couch in Yarrell, 1868[15]
Tristomum rudolphianum of Leidy, 1890[6]
Tristomum rudolphianum Diesing, 1850 of Linton, 1898, 1900
Capsala molae (Blanchard, 1847) Johnston, 1929
Tricotyla cutanea var. mediterranea or microcotylea of Guiart, 1938[16]
Capsala martinierei of Palombi, 1949[17]

Additional references: Cuvier (1817*), Rudolphi (1819*), Schweigger (1820*), Bremser (1824a*, 1824b*), Nitzsch (1826*), Blainville (1828*), Diesing (1836a), Kroyer (1838-40*, 1952-53*), Nordmann (1840), Dujardin (1845*), Beneden & Hesse (1864), Johnston (1865*), Cobbold (1866*), Beneden (1871), Taschenberg (1878b, 1879a, 1879c*), Braun (1883a*, 1889b, 1892*, 1890a), Fischer (1883*), Looss (1885*, 1894*), Niemiec (1885*), Poirier (1885*), Hoyle (1888*), Jackson (1888*)[18], Monticelli (1888, 1892a, 1892b, 1893b*, 1899a, 1899b), Rolleston (1888*), Linstow (1889a, 1889b, 1893), Goto (1891, 1894, 1900), Saint-Remy (1891c, 1892a, 1892c, 1898), Sonsino (1891), Stossich (1891*, 1896), Haswell (1892*, 1893), Knoch (1894*), Parona (1894*, 1896, 1912), Stiles & Hassall (1894*, 1908), Kathariner (1895), Saint-Loup (1895), Bettendorf (1897), Perrier (1897*), Brandes (1898*), Cerfontaine (1898), Setti (1898, 1899a, 1899b), Pratt (1900), Benham (1901), Heath (1902), Maclaren (1904), T. Scott (1905, 1911b), Stafford (1907), Tagliani (1912), Sumner, Osburn & Cole (1913), Nicoll (1915), Faust (1918b*), Fuhrmann (1928), Johnston (1929, 1937), Little (1929a), Sprehn (1933), Perez-Vigueras (1935), Price (1938c, 1939, 1960, 1962a), Guiart (1938), Brinkmann (1940, 1952b[19]), Dollfus (1946), Sproston (1946), Dartevelle (1950), Chauhan (1951), Winter (1955), Dawes (1956), Bychowsky (1957), Baer & Euzet (1961), Yamaguti (1963); and Malard* (year unknown)[20]; Stunkard (1962).

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[1]This species has been confused with Capsala martinierei (Table 3) and Tricotyla cutanea (Table 26); we may never know the true identities of the specimens of some of the past workers.

[2]Blanchard (1847:327) said, "...individus conserves dans l'alcool ...collection helminthologique du Muséum de Paris."

Table 25 continued

[3]Although the host was not mentioned, it is presumed to have been Mola mola (L.).

[4]Mola aspera Bp. is a synonym of Mola mola (Linnaeus) (D'Ancona, 1931 In Joubin, 1929-38: 408).

[5]Mola rotunda is a synonym of Mola mola (Linnaeus) (Bailey, personal communication).

[6]Price (1962a: 748) considered this to be T. molae.

[7]Sonsino (1891: 265) is a repeat of Sonsino (1890b: 173). Both papers refer to bottle #638, containing specimens collected at Naples. All references to Pisa for this specific report should be deleted from the records.

[8]Brinkmann (1952b: 15) said, "In 1890 R. COLLETT, professor of zoology in Oslo, handed a collection of cestodes and trematodes from the University Zoological Museum, to Lönnberg for scientific treatment."

[9]Linton (1900: 281) said many external parasites, "probably Tristomum rudolphianum, had been removed by the capturing party and were not seen by me."

[10]Three different collections listed.

[11]Stafford (1904: 481) listed three collection localities (St. Andrews, N. B.; Causo, N. S.; Malpeque, P. E. I.) but failed to mention which one represented the collection locality for this species. For this reason, I have cited the locality as "Maritime Provinces, Canada."

[12]No other references to this work were found in the literature.

[13]Specimens in the Irish National Museum, collected by A. G. More. Southern (1912) apparently did not collect any himself.

[14]Baylis (1928: 333) listed the parasite as "Tristoma molae (Rudolphi, 1819)."

Table 25 continued

[15]Price (1962a:748) made Tristomum rudolphianum Diesing, 1850 a synonym of Tricotyla molae. These had previously been listed as synonyms of T. rudolphianum Diesing, 1850.

[16]A synonym of T. molae (Price, 1962a:750).

[17]See Table 26, footnote 10.

[18]Listed as a reference by Stiles & Hassall (1908:377). I was unable to find the complete citation for this work.

[19]See Table 26, footnote 8.

[20]Listed by Monticelli (1893a:169). I was unable to find this work by Malard.

Addendum: Stossich (1896:191) said this capsaloid was collected by Valle from the gills and skin of Orthagoriscus mola (= Mola mola) at Trieste in 1896 (p. 189). It is unknown whether this collection represents the same one referred to by Palombi (1949:272).

Table 26. Tricotyla cutanea Guiart, 1938[1].

Location	Host	Locality	Source
1. Body (p.78)	Mola mola (Linnaeus) [Orthagoriscus mola]	Coast of Brittany; North Sea	Beneden & Hesse (1864: 77)[2,3]
2. Gills (p.18)	"	Naples, Italy (from P. Mayer)	Taschenberg (1880: 17)[4]
3. Lateral parts of skin[5]	M. mola (L.)	48°00'08" N, 17°28'01" W	Guiart (1938: 14)[6]
4. Skin of cheeks[5]	"	43°23' N, 7°36'15" E	Guiart (1938: 15)
5. Skin	"	United States (Atlantic & Pacific coasts)	Price (1939: 333)[7]
6. ?	"	Bergen, Norway (Coll. by Sars ?)	Brinkmann (1952b: 57)[7,8]
7. ?	"	Bergen, Norway (Coll. by ?)	Brinkmann (1952b: 57)
8. Skin	"	Oslofjord, Norway (Coll. by Esmark)	Brinkmann (1952b: 57)
9. ?	"	Glesvaer, Norway (Coll. by Bjerkan)	Brinkmann (1952b: 57)
10. ?	"	Bergen, Norway (Coll. by Bjerkan)	Brinkmann (1952b: 57)
11. ?	"	Alta, Norway (Coll. by ?)	Brinkmann (1952b: 57)
12. Skin	"	Solsvik, Norway (Coll. by Brinkmann, Sr.)	Brinkmann (1952b: 57)
13. Skin	"	Bergen (Sandviken), Norway (Coll. by Grieg)	Brinkmann (1952b: 57)

Table 26 continued

Location	Host	Locality	Source
14. Skin of head & anterior part of body	*M. mola* (L.)	Bulandet (Fedøy), Norway (Coll. by Grieg ?)	Brinkmann (1952b:57)
15. Skin	"	Holmengrå, Norway (Coll. by Grieg)	Brinkmann (1952b:57)
16. Skin	"	Tittelsnes (Sunnhordl.), Norway (Coll. by Grieg)	Brinkmann (1952b:57)
17. Skin	"	Kalvåg (Bremang.), Norway (Coll. by Grieg)	Brinkmann (1952b:57)
18. Skin	"	Herdla, Norway	Brinkmann (1952b:57)
19. Skin	"	Lista, Norway (Coll. by Eidem)	Brinkmann (1952b:57)
20. Skin	"	Langesund, Norway (Coll. by Rødal)	Brinkmann (1952b:57)
21. Skin	"	Glesvaer, Norway (Coll. by Willgohs)	Brinkmann (1952b:57)
22. Skin	"	Matanzas, Cuba	Perez-Vigueras (1955:31)[9]
23. Skin	"	Herdla Fiord, Norway (Coll. by Yonge)	Dawes (1956:138)[7]

Synonyms: *Tristoma molae* of Beneden & Hesse, 1863[3]
Tristomum molae of Taschenberg, 1880, in part[4]
Tricotyla cutaneum Guiart, 1938
Tricotyla cutanea var. *atlantica* or *macrocotylea* of Guiart, 1938
Capsala martinierei Bosc, 1811 of Price, 1939[7]

Table 26 continued

Syn. (cont.): Capsala cutanea (Guiart, 1938) Sproston, 1946
Capsala martinieri Bosc, 1811 of Brinkmann, 1952[7]
Capsala martinierei Bosc, 1811 of Perez-Vigueras, 1955[9]
Capsala martinierei Bosc, 1811 of Dawes, 1956[7]
Capsala martinierei Bosc, 1811 of Price, 1959, 1962[10]

Additional references: Sproston (1946), Chauhan (1951), Winter (1955), Brinkmann (1956b), Price (1960, 1962a, 1962b), Yamaguti (1963); Stunkard (1962), Cheng (1964).

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[1] This species has been confused with Capsala martinierei (Table 3) and Tricotyla molae (Table 25); we may never know the true identities of the specimens of some of the past workers.

[2] Guiart (1938:13) listed the specimens of Beneden & Hesse (1863) as a synonym of T. cutanea.

[3] See Table 76, footnote 1.

[4] Guiart (1938:13) considered part of the Tristomum molae of Taschenberg, 1880, as a synonym of T. cutanea.

[5] Sproston (1946:298) erroneously said "gills."

[6] Guiart (1938:13) listed "1915. Tristomum cephala Nicoll, p. 350 et 370 (nec Risso 1826)," as a synonym of Tricotyla cutaneum. Guiart (1938:14) said, "Par contre nous n'admettons pas l'identification faite par Nicoll des Tristomes de la peau du Môle avec le Tristomum cephala décrit par Risso en 1826; nous désignerons donc ces Tristomes sous le nom nouveau de Tricotyla cutaneum nom. nov." An examination of Nicoll (1915) revealed that Guiart (1938) apparently made an error. Nicoll (1915:350), in his "List of the trematode parasites found in British marine fishes, arranged systematically," did list Tristomum cephala Risso and gave the authorities for this determination as Risso (1826b*) and Saint-Remy (1898). Nicoll (1915:370), in his "List of trematode parasites recorded from British marine fishes outside British waters and hitherto not recorded from the British area; arranged according to hosts," did list "Tristomum cephala Risso" from the skin of Mola mola. However, Nicoll (1915:362), in his "List of trematode parasites recorded from British marine fishes in British waters, arranged according to their hosts," did

Table 26 continued

not personally find T. cephala on Mola mola, nor had anyone else up to that date, in British waters. Nicoll (1915:350,370) merely cited previous works. Thus Guiart's (1938:13) reference to T. cephala Nicoll, 1915 (nec Risso, 1826) is apparently an error.

[7] Price (1962b:442) considered Capsala martinierei of Price, 1939, to be a synonym of T. cutanea. Price (1962b:442) said, "Of these all but one specimen corresponded to the form which the writer (Price, loc. cit. [1939]), Sproston (1946), Dawes (1946, 1947), Palombi (1949), Brinkmann (1952) and others have regarded as C. martinierei but actually belonged to the species which Guiart (loc. cit. [1938]) named Tricotyla cutaneum."

[8] Some of the host-locality records of Brinkmann (1952b:57) might in reality belong under Tricotyla molae, as Brinkmann (1952b:55) considered C. molae to be a synonym of C. martinierei. Price (1962b:442) probably did not take this into consideration when he said Brinkmann's specimens were referable to Tricotyla cutanea. Only an examination of all the specimens mentioned by Brinkmann (1952b:57) can determine their correct identities.

[9] After saying that the specimen of Perez-Vigueras (1955) was C. martinierei (Price, 1962b:442), Price (1962a:750) changed his mind and said it was T. cutanea.

[10] Price (1962a:750) said, "Assuming the constancy of these characters, the species described by Price (1959), and Dawes (1947) are T. cutaneum, whereas that of Palombi (1949) is T. molae and not Capsala martinierei as stated."

Table 27. *Tricotyla thynni* Guiart, 1938[1].

Location	Host	Locality	Source
1. Gills	*Thunnus alalunga* (Bonnaterre) [*Thynnus alalonga*]	47°12' N, 10°29'45" W	Guiart (1938:16)

Synonym: *Capsala thynni* (Guiart, 1938) Sproston, 1946

Additional references: Dollfus (1940, 1952), Sproston (1946)[2], Chauhan (1951), Winter (1955), Dawes (1956), Price (1960), Yamaguti (1963)[2]; Stunkard (1962).

[1] Price (1960:243) regarded this as a *species inquirendum*, the description being so inadequate that he thought it impossible to determine its generic status. Guiart (1938) suspected that *Tricotyla thynni* might be the same as *Tristoma levinsenii* which, according to Price (1960), would imply that the pharynx was not constricted, and would exclude it from *Tricotyla*.

[2] Sproston (1946:302,542) erroneously listed "*Thynnus albacora*" as a host; however, she also listed the correct host "*Germo alalunga*" (p. 525). Yamaguti (1963:119) repeated the erroneous host.

Table 28. Tristoma coccineum Cuvier, 1817[1]

Location	Host	Locality	Source
1. Gills	Xiphias gladius Linnaeus	No mention	Cuvier (1817)* In Diesing (1850: 429)
2. Gills	"	Mediterranean Sea	Diesing (1836b: 314)
3. Gills	"	Genova, Italy (Market)	Blanchard (1847: 322)[2]
4. Gills	"	Palermo, Sicily, Italy	Grohmann* (?) In Diesing (1850: 431)
5. Gills	"	Coast of Belgium	Beneden (1871: 36)
6. Gills	"	Naples, Italy[3]	Taschenberg (1878b: 569)[4]
7. Gills	"	Naples, Italy	Zschokke (1887)* In Palombi (1949: 279)
8. No mention[5]	"	Trieste, Italy (Coll. by A. Valle)	Parona & Perugia (1890a: 5)
9. No mention	No mention[6]	Norway[7]	Loennberg (1891)* In Brinkmann (1952b: 15, 60)
10. Gills (p.86)	X. gladius L.	Genova, Italy	Parona & Perugia (1892: 100)
11. Gills	"	Siracuse, Sicily, Italy	Condorelli-Francaviglia (1899)* In Palombi (1949: 279)
12. Gills	"	Trieste, Italy	Stossich (1898)* In Palombi (1949: 279)

Table 28 continued

Location	Host	Locality	Source
13. Gills	*X. gladius* L.	Portoferrajo, Elba, Italy	Parona (1899:2)
14. Gills	"	Trieste, Italy	Setti (1899aa)*[8] *In* Palombi (1949:279)
15. No mention	"	Madeira, Madeira Islands	Linstow (1903b)* *In* Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 8:1642.
16. No mention	"	Naples, Italy	LoBianco (1909)* *In* Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 8:1642.
17. Gills	"	Woods Hole, Mass. (Coll. by MacCallum)	Price (1939:84)
18. Gills	"	Woods Hole, Mass.	Linton (1940:7,8)[9]
19. Gills	"	Bundefjord (Oslofjord), Norway (Coll. by Collett ?)	Brinkmann (1952b:61)
20. Ext. face of branchial lamiella & walls of bucal cavity	"	Sete, France	Euzet & Quignard (1961:321)
21. Gills	*Xiphias* sp.[10]	Region of the Madeira Islands (Atlantic Ocean)	Bychowsky (1957:14)
22. Gills	*Istiophorus platypterus* (Shaw & Nodder) [*Istiophorus americanus*][11]	Woods Hole, Mass.	Linton (1940:8)

Table 28 continued

Location	Host	Locality	Source
23. Gills	Tetrapturus belone Rafinesque	Naples, Italy & Messina, Sicily, Italy	Koelliker (1849: 21)[12]
24. Gills	"	Trieste & Genova, Italy; Carloforte, Sardinia, Italy	Setti (1899aa)*[8] In Palombi (1949: 279)
25. "on"	Mola mola (Linnaeus) [Orthagoriscus mola]	Cork Harbor, Ireland	Thompson (1847: 175)
26. Gills	" [Octagoriscus mola]	Naples, Italy & Messina, Sicily, Italy	Koelliker (1849: 21)[12]
27. Gills	M. mola (L.)	Naples, Italy	Grube (1840)* In Diesing (1850: 431)
28. Gills	" [Orthagoriscus mola]	Coast of Galway, Ireland	Baird (1853: 42)
29. No mention[13]	"	Naples, Italy (bottle 639)	Sonsino (1890b: 173)[14]
30. Gills	M. mola (L.)	Naples, Italy	Ariola In Palombi (1949: 279)
31. Gills	Prionace glauca (Linnaeus) [Carcharias glaucus]	No mention	Shipley (1898: 354)[15]
32. Gills	Sphyrna zygaena (Linnaeus)	Woods Hole, Mass. (Coll. by MacCallum)	Price (1939: 84)

Table 28 continued

Synonyms: Tristoma coccineum Cuvier, 1817, in part[16]
Tristoma coccineum Cuvier, in Risso, 1826[16]
Capsala coccinea (Cuvier, 1817) Blainville, 1828
Tristoma papillosum Diesing, 1836[16,17]
Capsala papillosum (Diesing, 1836) Nordmann, 1840[17]
Tristoma aculeatum Grube, 1840
Tristoma coccineum Cuvier, in Blanchard, 1847[16]
Tristoma papillatum of Beneden, 1858
Tristomum coccineum Cuvier, in Taschenberg, 1878a, 1878b[16]
Tristomum papillosum Diesing, in Taschenberg, 1878a, 1878b[16]
Tristomum papillosum Diesing, in Taschenberg, 1880[16]
Tristoma papillorum of Juel, 1889
Tristomum papillosum, in Loennberg, 1891[16]
Tristomum papillosum Diesing, in Saint-Remy, 1891[16]
Tristomum papillosum Diesing, in Linton, 1940[16]

Additional references: Rudolphi (1819*), Bremser (1824a*, 1824b*), Nitzsch (1826*), Risso (1826a*, 1826b*), Blainville (1828*), Cuvier (1936-49*), Diesing (1836a), Burmeister (1837*), Creplin (1837*, 1839*), Kroyer (1838-40*, 1852-53*), Nordmann (1840), Dujardin (1845*), Costa (1846*), Moquin-Tandon (1846*), Koelliker (1847*), Westwood (1851*), Beneden (1856, 1858*), Wagener (1857), Yarrell (1859*), Leuckart (1863*), Beneden & Hesse (1864), Johnston (1865*), Cobbold (1866*, 1883), Blumberg (1871*), Linstow (1878, 1889b), Taschenberg (1878a, 1878c*, 1879a, 1879b, 1880), Lang (1880), Kerbert (1881*), Braun (1883*, 1889b, 1890a, 1890c*, 1891, 1893), Ziegler (1883*), Carriere (1885*), Looss (1885*), Stossich (1885*), Parona (1887*[18], 1894*, 1896, 1902, 1912), Monticelli (1888, 1889, 1890a, 1892a, 1893a, 1893b*), Juel (1889*), Perugia & Parona (1890), Bell (1891), Brandes (1891*), Saint-Remy (1891c, 1891d, 1892c, 1892d, 1898), Sonsino (1891), Crety (1893*), Walter (1893*), Goto (1894, 1900), Saint-Loup (1895), Otto (1896*), Perrier (1897*), Linton (1898, 1900, 1901), Setti (1898, 1899a[8], 1899b), Pratt (1900, 1935), Benham (1901), T. Scott (1901, 1911b), Stafford (1904, 1907), Stiles & Hassall (1908), Tagliani (1912), Summer, Osburn & Cole (1913), Nicoll (1915), Faust (1918a*), Vlassenko (1928), Johnston (1929, 1937), Lameere (1929-30*), Froissant (1930), Sprehn (1933), Guiart (1938), Meserve (1938), Nigrelli (1938), Price (1938c, 1960*[19]), Croftin (1941), Dollfus (1946, 1949), Sproston (1946), Palombi (1949)[20,21], Chauhan (1954), Llewellyn (1954), Dawes (1956), Dogiel et al (1961), Yamaguti (1963)[19]; Stunkard (1962); Baer (1827).

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[1]This species has been badly confused with Tristoma integrum (Table 30) throughout the literature. Both are definite parasites

Table 28 continued

of Xiphias gladius. T. coccineum has also been recorded from the following: once from Istiophorus platypterus, a record that should be verified; from Tetrapturus belone from five different localities; from Mola mola several times (confusion with Tricotyla or Capsala?); and from two sharks, Prionace glauca and Sphyrna zygaena, both of which should be considered as doubtful hosts until verification.

[2] Palombi (1949:281) included Blanchard's specimens under T. integrum.

[3] From Taschenberg (1878a:176).

[4] Repeated in Taschenberg (1879a:295).

[5] Palombi (1949:279) said gills.

[6] Although the host was not mentioned, it is presumed to have been Xiphias gladius Linnaeus.

[7] See Table 30, footnote 8.

[8] Setti (1899a and 1899aa*) are identical papers. I examined Setti (1899a), which contained only a portion of the complete work presented in Setti (1899aa*).

[9] This locality record was apparently reported for the first time by Sumner, Osburn & Cole (1913:585), the parasite being listed as T. papillosum Diesing. They apparently used some unpublished notes of Linton that seem to have been subsequently published in 1940.

[10] Probably Xiphias gladius Linnaeus.

[11] Istiophorus americanus is a synonym of Istiophorus platypterus (Shaw & Nodder) (Morrow & Harbo, 1969:41).

[12] Koelliker (1849:21) said, "Ich benutzte die mir in Neapel und Messina gebotene Gelegenheit, Tristoma papillosum in beliebiger Menge von den Kiemen von Octagoriscus mola und Tetrapturus belone zu erhalten..."

Table 28 continued

[13]Palombi (1949:281) said gills.

[14]See Table 30, footnote 16.

[15]Shipley (1898:354) said that he received the specimens from Dr. Hans Gadow, who had collected them from the gills of Carcharias glaucus [=Prionace glauca]. No collection locality was given. Dr. Seitaro Goto told Shipley that the specimens were "Tristomum papillosum of Diesing" (Shipley, 1898:354).

[16]Listed as a synonym by Brinkmann (1952b:60).

[17]Listed as a synonym by Price (1939:84).

[18]Listed as a reference by Stiles & Hassall (1908:376), who gave no indication as to which 1887 work by Parona they were referring.

[19]Price (1960:243) and Yamaguti (1963:120) only listed Xiphias gladius and Sphyrna zygaena as hosts.

[20]Palombi (1949:279) listed Taschenberg as having reported this species from Mola mola. An examination of Taschenberg (1878a, 1878b, 1879a, 1880) revealed no such record. In fact, Taschenberg (1880:17) said, "...ich nie einen Parasiten von Mondfische zu eigener Untersuchung gehabt hatte."

[21]I was unable to find a record for this species at Pisa by Sonsino as reported by Palombi (1949:279). I believe Palombi's reference was to bottle 639, collected at Naples, but stored in the museum at Pisa, which Sonsino (1890b:173; 1891:265) discussed.

Table 29. *Tristoma fuhrmanni* Guiart, 1938[1].

Location	Host	Locality	Source
1. No mention	*Raja* sp.	No mention	Fuhrmann (1928:1)

Synonym: *Tristomum* sp. of Fuhrmann, 1928

Additional references: Guiart (1938), Sproston (1946), Bychowsky (1957), Price (1960), Baer & Euzet (1961), Yamaguti (1963); Stunkard (1962).

[1] Regarded as a species inquirendum by Yamaguti (1963:120). As it is the only Capsalinae reported from the genus *Raja* (Table 234), the host record should be considered suspect until verified.

Table 30. Tristoma integrum Diesing, 1850[1].

Location	Host	Locality	Source
1. Gills	*Xiphias gladius* Linnaeus	No mention	Cuvier (1817)* In Diesing (1850: 429)
2. Gills	"	Nizza, Sicily, Italy	Risso (1826a)* In Palombi (1949: 281)
3. Gills	"	Naples, Italy	Costa (1846)* In Palombi (1949: 281)
4. Gills	"	Messina, Sicily, Italy	Rüppel* (?) In Diesing (1850: 429)
5. Gills	"	Venezia, Italy	Nardo* (?) In Diesing (1850: 429)
6. Gills	"	Naples, Italy[2]	Taschenberg (1878b: 569)[3]
7. Gills	"	Naples, Italy	Lang (1880)[4] In Palombi (1949: 281)
8. Gills	"	Genova, Italy	Parona (1887)*[5] In Palombi (1949: 281)
9. No mention	"	Genova, Italy	Parona & Perugia (1890a: 5)
10. No mention[6]	" (bottle 455)	Nizza, Sicily, Italy	Sonsino (1890b: 173)
11. No mention	No mention[7]	Norway[8]	Loennberg (1891)* In Brinkmann (1952b: 15)
12. Gills	*X. gladius* L.	In coll. of Zool. Mus. of Un. of Palermo (p. 167)	Monticelli (1893a: 168)[9]

Table 30 continued

Location	Host	Locality	Source
13. Gills	*X. gladius* L.	Misaki, Japan	Goto (1894: 247)
14. Gills	"	Off Martha's Vineyard, Mass.	Linton (1898: 509)[10]
15. Gills	"	Genova, Italy	Setti (1899aa)*[11] In Palombi (1949: 281)
16. Gills	"	Woods Hole, Mass.	Linton (1900: 278)
17. Gills	"	Maritime Provinces, Canada[12]	Stafford (1904: 481, 482)[13]
18. No mention	"	Naples, Italy	LoBianco (1909)* In Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 8: 1639.
19. Gills	"	French waters (p. 43)	Froissant (1930: 69)[13]
20. Gills	"	Woods Hole, Mass. (Coll. by MacCallum)	Price (1939: 88)
21. Gills	"	Woods Hole, Mass.	Linton (1940: 8)[14]
22. Gills	"	Oslofjord, Norway (Coll. by Esmark)	Brinkmann (1952b: 63)
23. Gills	"	Iddefjord, Norway (Coll. by Collett?)	Brinkmann (1952b: 63)
24. Gills	"	Bundefjord, (Oslofjord), Norway (Coll. by Collette?)	Brinkmann (1952b: 63)
25. Gills	"	Drøbak, Norway (Coll. by Collett?)	Brinkmann (1952b: 63)

Table 30 continued

Location	Host	Locality	Source
26. Between the two rows of branchial lamiella of the same arch	X. gladius L.	Sete, France	Euzet & Quignard (1961: 321)
27. Gills	Tetrapturus belone Rafinesque	Genova, Italy	Setti (1899aa)*[11] In Palombi (1949: 281)
28. No mention[6]	" ["Tetraptorus belone"]	Sicily, Italy	Sonsino (1890b: 173)
29. No mention	Mola mola (Linnaeus) [sunfish]	Off the coast of Fife, Scotland[15]	Cobbold (1883: 404)
30. Gills	" [Orthagoriscus mola]	No mention	Malard (1889-90)* In Monticelli (1893a: 168)
31. No mention[6]	"	Naples, Italy (bottle 639)	Sonsino (1890b: 173)[16]

Synonyms: Tristoma coccineum Cuvier, 1817, in part[10]
Tristomum coccineum Cuvier, in Diesing, 1850[10]
Tristomum coccineum Cuvier, in Taschenberg, 1878[10]
Tristoma coccineum Cuvier, of Taschenberg, 1879, and subsequent authors[17]
Tristomum coccineum Cuvier, in Taschenberg, 1880[10]
Tristomum coccineum of Sonsino, 1890[18]
Tristomum coccineum of Loennberg, 1891[10]
Tristomum coccineum Cuvier, in Saint-Remy, 1891[10]
Tristomum rotundum Goto, 1894[10]
Tristomum coccineum Cuvier, in Linton, 1898, 1940[10]
Tristomum coccineum Cuvier, of Linton, 1900, 1901

Additional references[19]: Taschenberg (1878a, 1879a, 1880), Kerbert (1881*), Ziegler (1883*), Carriere (1885*), Looss (1885*), Monticelli (1888, 1892a, 1893b*), Juel (1889*), Linstow (1889b, 1903b*), Malard (1889*), Braun (1890a, 1891), Parona & Perugia

Table 30 continued

(1890b), Bell (1891), Saint-Remy (1891c, 1892c, 1898), Saint-Loup (1895), Perrier (1897*), Setti (1898, 1899a, 1899b), Goto (1900), Pratt (1900), Benham (1901), Linton (1901), T. Scott (1901), Stafford (1907), Stiles & Hassall (1908), Parona (1912), Tagliani (1912), Sumner, Osburn & Cole (1913), Nicoll (1915), Faust (1918a*), Johnston (1929), Lameere (1929-30*), Guiart (1938), Nigrelli (1938), Price (1938c, 1960[20]), Yamaguti (1943a, 1963), Sproston (1946), Palombi (1949)[21], Brinkmann (1956b), Dawes (1956), Bychowsky (1957), Kearn (1963b), Llewellyn (1963); Stunkard (1962).

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[1] This species has been confused with Tristoma coccineum (Table 28). It is a definite parasite of Xiphias gladius, and has also been recorded from Tetrapturus belone and Mola mola (confusion with Tricotyla or Capsala ?).

[2] From Taschenberg (1878a:176).

[3] Repeated in Taschenberg (1879a:295).

[4] I was unable to find any indication in Lang (1880) that he personally collected this parasite, and I could find no instance in which Xiphias gladius Linnaeus was listed as a host in the paper.

[5] See Table 28, footnote 18.

[6] Palombi (1949:281) said gills.

[7] Although the host was not mentioned, it is presumed to have been Xiphias gladius Linnaeus.

[8] Brinkmann (1952b:15) said, "In 1890 R. COLLETT, professor of zoology in Oslo, handed a collection of cestodes and trematodes from the University Zoological Museum, to Lönnberg for scientific treatment."

[9] Palombi (1949:281) listed Monticelli (1893a) under Tristoma integrum.

[10] Listed as a synonym by Brinkmann (1952b:62).

Table 30 continued

[11]See Table 28, foonote 8.

[12]Stafford (1904:481) listed three localities (St. Andrews, N. B.; Causo, N. S.; Malpeque, P. E. I.) but failed to mention which one represented the collection locality for this species. For this reason, I have listed the locality as "Maritime Provinces, Canada."

[13]This record is listed under Tristoma integrum because Price (1939:86) said that Tristoma coccineum subsequent to Taschenberg (1879a) was a synonym of Tristoma integrum.

[14]The first reference to this was by Sumner, Osburn & Cole (1913: 585) who used data from the unpublished notes of Linton.

[15]"...from a fish caught off the coast of Fife, in September, 1856" (Cobbold, 1883:404).

[16]Sonsino (1890b:173) listed bottle 639, collected at Naples, as being T. coccineum Cuvier. He (1891:265) later listed bottle 639 as being T. papillosum Diesing. Apparently he neglected (1890b: 173) to indicate that bottle 639 was T. papillosum, and corrected this omission later (1891:265). If this is so, then the reference as cited here should be transferred to T. coccineum, and Palombi's (1949:281) reference to T. integrum on Mola mola at Naples should also be changed to T. coccineum.

[17]Listed as a synonym by Price (1939:86).

[18]Listed as a synonym by Palombi (1949:280).

[19]Included herein are those references in agreement with Price's synonym (1939:86) (footnote 17).

[20]Price (1960:243) only listed Xiphias gladius as a host, as did Yamaguti (1963:120).

[21]Palombi (1949:281) listed Taschenberg as having reported this species from Mola mola. An examination of Taschenberg (1878a, 1878b, 1879a, 1880) revealed no such record. In fact, Taschenberg (1880:17) said, "...ich nie einen Parasiten von Mondfische zu eigener Untersuchung gehabt hatte."

Table 31. Tristoma levinsenii Monticelli, 1891[1].

Location	Host	Locality	Source
1. Gills	Thunnus sp.	Coll. of Zool. Mus. of Copenhagen (from Levinsen)	Monticelli (1892a:122-123)[1]

Synonym: Capsala levinseni (Monticelli, 1891) Johnston, 1929

Additional references: Braun (1891), Saint-Remy (1891c, 1891d), Goto (1894), Setti (1898, 1899b), Stiles & Hassall (1908), Johnston (1929), Guiart (1938), Price (1938c, 1939, 1960), Sproston (1946), Dawes (1956), Yamaguti (1963); Stunkard (1962).

[1]Monticelli (1891 and 1892a) are identical papers. (See Index-Catalogue of Medical and Veterinary Zoology, Authors, Part 10, p. 3380, 3381.) I examined Monticelli (1892a).

Table 32. *Tristoma uncinatum* Monticelli, 1889.

Location	Host	Locality	Source
1. No mention	No mention[1]	Coll. of Zool. Mus. of Lipsia[2]	Monticelli (1889:117)

Synonym: *Capsala uncinata* (Monticelli, 1889) Johnston, 1929

Additional references: Braun (1890a), Perugia & Parona (1890), Monticelli (1892a, 1893*[3]), Saint-Remy (1891c, 1891d, 1892c, 1892d), Linstow (1893), Goto (1894), Setti (1898, 1899b), Stiles & Hassall (1908), Tagliani (1912), Nicoll (1915), Johnston (1929), Sprehn (1933), Price (1938c, 1939, 1960), Sproston (1946), Dawes (1956), Bychowsky (1957), Ronald (1960), Yamaguti (1963).

[1] Braun (1890a:529) listed *Hippoglossus* sp. as the host. Saint-Remy (1891d:3) said *Pleuronectes* sp. was the host. Sproston (1946:526) gave *Hippoglossus hippoglossus* (L) as the host. Yamaguti (1963:121) listed "*Pleuronectes* and *Hippoglossus* sp." as hosts. It is interesting to see how the host record for this species has progressed, especially since Monticelli (1889) did not give a host name. For the purposes of this work I have listed the host as *Hippoglossus* sp.

[2] Having a label of "*Epibdella hippoglossi*, var. *Pleuronectes*" (Monticelli, 1889:117).

[3] Listed as a reference by Stiles & Hassall (1908:378). I was unable to ascertain the 1893 paper by Monticelli to which they were referring.

Table 33. *Tristomella laevis* (Verrill, 1875) Guiart, 1938.

Location	Host	Locality	Source
1. Mouth	*Tetrapturus albidus* Poey[1]	Block Island, R. I.	Verrill (1875: 40)
2. Gills	" [*Tetrapturus lessonae* Canestrini][2]	Concarneau (Finistere), France	Dollfus (1949: 317)
3. No mention	*Makaira indica* (Cuvier) [*Histrophorus brevirostris*][3]	Madras, India	Bell (1891: 534)
4. No mention	" [*Istiompax marlina* (Jordan & Hill)][4]	60 miles WSW of Cape Recife, South Africa	Pritchard (1961: 976)
5. Gills	*Xiphias gladius* Linnaeus[5]	Woods Hole, Mass.	Linton (1940: 10)
6. No mention[7]	"'Dorado', probably *Coryphaena hippurus* Linn."	Ilha Victoria, Sao Paulo, Brazil	Price (1938c: 411)

Synonyms: *Tristoma laeve* Verrill, 1875
Tristomum histiophori Bell, 1891
Tristomum laeve var. *armata* Goto, 1900
Capsala laevis (Verrill, 1875) Johnston, 1929
Tristomella laeve (Verrill, 1875) Guiart, 1938

Additional references: Verrill (1885), Linstow (1889b, 1906), Saint-Remy (1891c, 1891d, 1892c, 1898), Monticelli (1893a, 1899a, 1899b), Goto (1894, 1896, 1900), Setti (1898, 1899a, 1899b), Pratt (1900), Stiles & Hassall (1908), Johnston (1929), Guiart (1938), Price (1939, 1960[6]), Cordero (1944), Sproston (1946), Chauhan (1951, 1953, 1954), Brinkmann (1952a)[7], Winter (1955), Bychowsky (1957), Yamaguti (1963)[8]; Stunkard (1962).

Table 33 continued

[1]Verrill (1875:40) said "in mouth of bill-fish." Below this remark he said *T. cornutum* was "on gills of bill-fish (*Tetrapturus albidus*)." I presume that the "bill-fish" host for *T. laevis* was therefore *Tetrapturus albidus*.

[2]*Tetrapturus lessonae* Canestrini is a synonym of *Tetrapturus albidus* Poey (Robins & De Sylva, 1960:398).

[3]*Histiophorus brevirostris* is a synonym of *Makaira indica* (Cuvier) (Paxton & Talbot, personal communication).

[4]*Istiompax marlina* (Jordan & Hill) is a synonym of *Makaira indica* (Cuvier) (Robins & De Sylva, 1960:407).

[5]The *Xiphias gladius* record of Linton (1940) could be an error for *Tristoma coccineum* or *Tristoma integrum*.

[6]Price (1960:242) listed the hosts as "*Tetrapturus imperator*" (=*Tetrapturus albidus*), *Histiophorus* spp., and *Cybium* sp. The last two are hosts for *Tristomella ovalis* (Table 40). Their listing could be an error by Price (1960). An alternative explanation could be that somewhere, unknown to me, in the literature on *T. ovalis* part of it was made a synonym of *T. laevis*. The former is considered the more probable.

[7]Brinkmann (1952a:3) listed skin as the location on the host. Price (1938c:411) said the location was "not given."

[8]Yamaguti (1963:118) neglected to include *Histiophorus brevirostris* (= *Makaira indica*) as a host.

Table 34. Tristomella grimaldii Guiart, 1938.

Location	Host	Locality	Source
1. Skin of cheeks[1]	Mola mola (Linnaeus)	43°23'N; 7°36'15"E (Off Monaco)	Guiart (1938:11)
2. Body surface	" ["Orthragoriscus mola (Tetraodon luna)"][2]	Nizza, Sicily, Italy (Parona, 1912:12)	Risso (1826a)* In Diesing (1850:431)

Synonyms: ? Tristoma cephala Risso, 1826[3]
? Capsala cephala (Risso, 1826) Johnston, 1929[3]
Capsala grimaldii (Guiart, 1938) Sproston, 1946

Additional references: Under grimaldii: Sproston (1946), Chauhan (1951), Brinkmann (1952b)[4], Winter (1955), Dawes (1956), Price (1960, 1962a), Stunkard (1962), Yamaguti (1963).

Under cephala: Risso (1826a*, 1826b*), Diesing (1850), Krøyer (1852-53*), Linstow (1878), Taschenberg (1878b, 1880), Monticelli (1893a), Saint-Remy (1898), Setti (1898), Stiles & Hassall (1908), Parona (1912), Nicoll (1915), Johnston (1929), Sprehn (1933), Guiart (1938)[5], Price (1939, 1962a), Crofton (1941), Sproston (1946)[6], Chauhan (1951), Winter (1955), Dawes (1956), Yamaguti (1963); Stunkard (1962).

[1] "peau des joues" (Guiart, 1938:11).

[2] "It is possible that Tetraodon luna refers to Mola mola, but it may equally be the rarer species Ranzania laevis (Pennant, 1776). The latter was refered to by Lacépède as 'le Tetrodon lune', and this may have been latinized by someone later (especially if they were French). I think that possibly you should refer it doubtfully to Ranzania with a note that Mola might have been the host" (Wheeler, personal communication).

[3] Price (1962a:750) listed this as a questionable synonym of Tristomella grimaldii. He said (1962a:750) "Aside from the body having a rounded (not notched) posterior end, there is nothing in

Table 34 continued

Risso's description to separate T. cephala from any of the species from the host in question. However, Guiart has described as Tristomella grimaldii a small, obviously immature fluke from the skin of Mola mola which he thought might possibly be the same as Risso's species. While it is probable that his surmise is correct, there is nothing other than lack of a posterior notch to support this suggested relationship."

[4] Brinkmann (1952b: 55) listed this species as a synonym of Capsala martinierei.

[5] See Table 26, footnote 5.

[6] Sproston (1946: 297) listed this species as Capsala cephala (Risso, 1826) Saint-Remy, 1898. An examination of Saint-Remy (1898: 535) revealed that Saint-Remy did not place this species in Capsala.

Table 35. Tristomella interrupta (Monticelli, 1891)[1] Guiart, 1938.

Location	Host	Locality	Source
1. Gills	Thunnus thynnus thynnus (Linnaeus) [Thynnus brachypterus][2]	Naples, Italy	Monticelli (1892a: 122)[1]
2. Gills	T. t. thynnus (L.) [Thynnus thynnus]	Genova, Italy (Coll. 1890)	Parona & Perugia (1892: 87)
3. Gills (p.86)	"	Genova, Italy (Coll. 1891)	Parona & Perugia (1892: 100)

Synonyms: Tristomum interruptum Monticelli, 1891
Capsala interrupta (Monticelli, 1891) Johnston, 1929
Tristomella interruptum (Monticelli, 1891) Guiart, 1938

Additional references: Braun (1891), Saint-Remy (1891c, 1898), Goto (1894), Parona (1896[3], 1912), Setti (1898, 1899a, 1899b[4]), Monticelli (1899a), Stiles & Hassall (1908), Johnston (1929), Sprehn (1933), Guiart (1938), Price (1938c, 1939, 1960), Sproston (1946[5]), Palombi (1949[4]), Chauhan (1951), Winter (1955), Dawes (1956), Yamaguti (1963); Stunkard (1962).

[1]See Table 31, footnote 1.

[2]"Thunnus brachypterus (Cuvier, 1829). This one is complicated. Most people have thought the name was a synonym of the Atlantic bluefin tuna Thunnus thynnus thynnus (Linnaeus) and you can probably assume parasite records so apply. The material labelled as types in Paris consist of four T. thynnus and one Euthynnus alletteratus. But these are not the types because the original description was based on figures in Rondelet (1554) and Duhamel du Monceau (1769) and these are Sarda sarda (Bloch)" (Collette, personal communication).

[3]Parona (1896: 1) listed "Thynnus vulgaris" as the host, which is a synonym of Thunnus thynnus thynnus (L.) (Gibbs & Collette, 1967: 116,117).

Table 35 continued

[4]Palombi (1949:273) indicated that Setti collected this parasite. In reality Setti (1899b:117) got his specimen from Monticelli.

[5]Sproston (1946:527) erroneously listed *Katsuwonus pelamys* (L.) as a host.

Table 36. *Tristomella lintoni* (Price, 1939) Price, 1960.

Location	Host	Locality	Source
1. Gills	*Euthynnus pelamis* (Linnaeus) [*Gymnosarda pelamys*]	South of Martha's Vineyard, Mass.	Linton (1898:509)

Synonyms: *Tristomum laeve* Verrill (?) of Linton, 1898
Tristomum laeve Verrill of Linton, 1901
Capsala lintoni Price, 1939

Additional references: Linton (1901), Sumner, Osburn, and Cole (1913), Price (1939[1], 1960), Sproston (1946), Chauhan (1951), Winter (1955), Yamaguti (1963).

1 "This species is based on a single, somewhat immature specimen described by Linton (1898) as probably *Tristoma laeve* Verrill" (Price, 1939:83).

Table 37. Tristomella megacotyle (Linstow, 1906) Guiart, 1938.

Location	Host	Locality	Source
1. Surface of body	Histiophorus sp.[1]	Beruwala, Ceylon	Linstow (1906:176)

Synonyms: Tristomum megacotyle, in part, of Linstow, 1906[2]
Capsala megacotyle (Linstow, 1906) Johnston, 1929
Capsala megacephala (Linstow, 1906) Johnston, 1929
Tristomella megalocotyle of Guiart, 1938

Additional references: Stiles & Hassall (1908), Johnston (1929), Guiart (1938), Price (1938c, 1939, 1960), Sproston (1946), Chauhan (1951, 1953, 1954), Winter (1955), Yamaguti (1963)[3], Senadhira (1967).

[1] If the "Histiophorus sp." refers to the old name Histiophorus brevirostris, then the host was Makaira indica (Cuvier) (Paxton and Talbot, personal communication); if it refers to a sailfish Histiophorus, then the host was Istiophorus platypterus (Shaw & Nodder) (Morrow & Harbo, 1969:40-41). As T. megacotyle and T. ovalis were both recovered from this host by Linstow (1906), and indications are that the host for T. ovalis was I. platypterus (See Table 40, footnote 2), it would follow that the above "Histiophorus sp." was probably Istiophorus platypterus (Shaw & Nodder).

[2] See Table 40, footnote 4.

[3] Yamaguti (1963:118) erroneously indicated that this species was transferred to Caballerocotyla by Price (1960).

Table 38. *Tristomella nozawae* (Goto, 1894) Price, 1960.

Location	Host	Locality	Source
1. Fin	*Thunnus obesus* Lowe [*Thynnus sibi*][1]	Osatsube, Hokkaido, Japan	Goto (1894: 251)
2. No mention	*Thunnus thynnus thynnus* (L) [*Thunnus thynnus*][2]	North Sea	Baylis (1939: 474)[3]

Synonyms: *Tristomum nozawae* Goto, 1894
Tristomum nozawai of Saint-Remy, 1898, and Setti, 1899a, 1899b
Capsala nozawae (Goto, 1894) Johnston, 1929

Additional references: Saint-Remy (1898), Setti (1898, 1899a, 1899b), Monticelli (1899a), Stiles & Hassall (1908), Johnston (1929), Price (1938c, 1939, 1960), Yamaguti (1943a, 1963[4]), Sproston (1946[4]), Palombi (1949), Chauhan (1951), Winter (1955).

[1] *Thynnus sibi* is a synonym of *Thunnus obesus* Lowe (Gibbs & Collette, 1967: 109).

[2] The subspecies *Thunnus thynnus thynnus* occurs in the Atlantic (Gibbs & Collette, 1967: 65).

[3] "(uncertainly identified as this sp.)" (Sproston, 1946: 301).

[4] Sproston (1946: 527) erroneously listed *Katsuwonus vagans* as a host. Yamaguti (1963: 118) repeated the error.

Table 39. *Tristomella onchidiocotyle* (Setti, 1899) Guiart, 1938.

Location	Host	Locality	Source
1. Gills	*Thunnus thynnus thynnus* (Linnaeus) ["tonno"]	Portoferraio, Elba, Italy (Coll. 1898)	Setti (1899b:121)[1]
2. No mention	*T. t. thynnus* (L.) [*Thynnus thynnus*]	Elba, Italy (Coll. 1900)	Parona (1902:3)
3. Gills	" [*Thynnus thynnus* (L)]	Sete, France	Euzet (1958:211)[2]
4. Gills	*Thunnus obesus* Lowe [*Parathunnus obesus* (Lowe)][3]	Coast of Angola	Tendeiro & Valdez (1955:130-131)
5. Gills	*Euthynnus alletteratus* (Rafinesque)[4,5]	Woods Hole, Mass. (MacCallum's Coll.)	Price (1939:81)

Synonyms: *Tristomum onchidiocotyle* Setti, 1899
Capsala onchidiocotyle (Setti, 1899) Johnston, 1929
Capsala maccallumi Price, 1939

Additional references: Parona (1899, 1912), Stiles & Hassall (1908), Nicoll (1915)[6], Johnston (1929), Sprehn (1933), Guiart (1938), Price (1938c, 1960), Sproston (1946), Palombi (1949), Chauhan (1951), Winter (1955), Dawes (1956), Baer & Euzet (1961), Euzet & Quignard (1961), Kearn (1963b, 1963c), Yamaguti (1963); Stunkard (1962).

[1] Parona (1899:3) repeated this locality record in more detail. He said the parasite came from the gills of *Thynnus thynnus* collected in 1898 at Portoferraio, Elba.

[2] Apparently repeated by Baer & Euzet (1961:256).

Table 39 continued

[3] Parathunnus obesus (Lowe) is a synonym of Thunnus obesus Lowe (Gibbs & Collette, 1967:109).

[4] Originally reported as the host for Capsala maccallumi Price, 1939 (Price, 1939:81).

[5] "This species is represented by a single immature specimen collected by G. A. MacCallum, July 20, 1915, at Woods Hole, Mass., from 'Thunnus thynnus--Horse mackerel'" (Price, 1939: 81). It is not known how Price (1939:81) determined that "Thunnus thynnus" was equal to Euthynnus alletteratus (Rafinesque).

[6] Nicoll (1915:366), in his "List of trematode parasites recorded from British marine fishes outside British waters and hitherto not recorded from the British area; arranged according to hosts," listed Tristomum onchidiocotyle Setti from the skin of Thynnus pelamys (=T. vulgaris?). He erroneously listed the host and the location on the host.

Table 40. Tristomella ovalis (Goto, 1894) Price, 1960.

Location	Host	Locality	Source
1. Mouth cavity	Istiophorus platypterus (Shaw & Nodder)	Misaki, Japan	Goto (1894: 244)
	[Histiophorus orientalis][1]		
2. Mouth cavity	Histiophorus sp.[2,3]	Misaki, Japan	Goto (1894: 244)
3. Surface of body	Histiophorus sp.[2]	Beruwala, Ceylon	Linstow (1906: 176)[4]
4. Mouth cavity	Undetermined species, perhaps of Cybium[5]	Misaki, Japan	Goto (1894: 244)

Synonyms: Tristomum ovale Goto, 1894
Tristomum laeve var. inermis Goto, 1900
Tristomum megacotyle, in part, of Linstow, 1906[4]
Capsala ovale (Goto, 1894) Price, 1938

Additional references: Goto (1896, 1900), Setti (1898, 1899a), Saint-Remy (1898), Monticelli (1899a, 1899b), Benham (1901), Stiles & Hassall (1908), Tagliani (1912), Faust (1918b*), Fuhrmann (1928), Perez-Vigueras (1935), Woolcock (1936), Guiart (1938), Price (1938c, 1939, 1960), Yamaguti (1943a, 1963), Sproston (1946), Chauhan (1951, 1953, 1954), Brinkmann (1952b), Winter (1955), Stunkard (1962).

[1] Histiophorus orientalis is a synonym of Istiophorus platypterus (Shaw & Nodder) (Morrow & Harbo, 1969: 41).

[2] If the "Histiophorus sp." refers to the old name Histiophorus brevirostris, then the host was Makaira indica (Cuvier) (Paxton & Talbot, personal communication); if it refers to a sailfish Histiophorus, then the host was Istiophorus platypterus (Shaw & Nodder) (Morrow & Harbo, 1969: 40-41). As Istiophorus platypterus (Shaw & Nodder) is a recorded host, and Makaira indica (Cuvier) is not, I believe the Histiophorus sp. is probably referable to Istiophorus platypterus.

Table 40 continued

[3]Goto (1894: 244) gave the Japanese name of "Kajiki" to the host. Okada (1955) did not list a Japanese fish with this name.

[4]"von Linstow (1906) described another new species of the genus Tristomum as T. megalocotyle from the surface of the body of a Sword fish, Histiophorus sp. from Ceylon. His specimens are now (Chauhan, 1952) regarded as to have consisted of Capsala megacotyle and Capsala ovalis" (Chauhan, 1953: 31).

[5]Goto (1894: 244) gave the Japanese name of "Oki-ma-zawara" to the host. Okada (1955) did not list a Japanese fish with this name.

Table 41. *Tristomella poeyi* (Perez-Vigueras, 1935) Price, 1960.

Location	Host	Locality	Source
1. Skin	*Makaira nigricans* Lacépède [*Makaira ampla* (Poey)][1]	Havana, Cuba	Perez-Vigueras (1935: 43)
2. Skin-second dorsal fin & isthmus	"	Washington Island, Line Islands, Pacific Ocean (04° 48'N, 160°37'W)	Iversen & Hoven (1958: 131)
3. No mention	"	Hawaii	Pritchard (1961: 977)
4. No mention	*Makaira indica* (Cuvier) [*Istiompax marlina* (Jordan & Hill)][2]	Hawaii	Pritchard (1961: 977)

Synonyms: *Tristomum poeyi* Perez-Vigueras, 1935
Capsala poeyi (Perez-Vigueras, 1935) Price, 1938

Additional references: Perez-Vigueras (1936, 1955), Price (1938c, 1939, 1960), Sproston (1946), Chauhan (1951), Manter (1954), Koratha (1955a), Winter (1955), Stunkard (1962), Yamaguti (1963).

[1] *Makaira ampla* (Poey) is a synonym of *Makaira nigricans* Lacépède (Robins & De Sylva, 1960: 407).

[2] *Istiompax marlina* (Jordan & Hill) is a synonym of *Makaira indica* (Cuvier) (Robins & De Sylva, 1960: 407).

Table 42. Tristomella pricei (Hidalgo-Escalante, 1959) Price, 1960.

Location	Host	Locality	Source
1. Skin-ventral region	Tetrapturus audax (Phillipi) [Makaira mitzukurii[1] (Jordan & Snyder)]	Mazatlan, Sinaloa, Mexico	Hidalgo-Escalante (1959: 216)
2. Skin of beak	Makaira indica (Cuvier) [Makaira marlina[2] Jordan & Evermann]	Pacific Ocean Off Caracoles Point, Panama	Price (1960: 238)
3. No mention	M. indica (Cuv.) [Istiompax marlina[3] (Jordan & Hill)]	60 miles WSW of Cape Recife, South Africa	Pritchard (1961: 976)
4. No mention	Istiophorus platypterus (Shaw & Nodder) [Istiophorus greyii[4] Jordan & Hill]	Panama Bay	Pritchard (1961: 977)

Synonym: Capsala pricei Hidalgo-Escalante, 1959

Additional references: Stunkard (1962), Yamaguti (1963).

[1]Makaira mitzukurii (Jordan & Snyder) is a synonym of Tetrapturus audax (Phillipi) (Robins & De Sylva, 1960: 385).

[2]Makaira marlina Jordan & Evermann is a synonym of Makaira indica (Cuvier) (Robins & De Sylva, 1960: 407).

[3]Istiompax marlina (Jordan & Hill) is a synonym of Makaira indica (Cuvier) (Robins & De Sylva, 1960: 407). "...black marlin, M. indica (=Istiompax marlina or M. marlina of the most recent authors)" (Robins & De Sylva, 1960: 407).

Table 42 continued

[4] *Istiophorus greyi* Jordan & Evermann is a synonym of *Istiophorus platypterus* (Shaw & Nodder) (Morrow & Harbo, 1969: 41).

Table 43. Benedenia sciaenae (Beneden, 1856) Odhner, 1905.

Location	Host	Locality	Source
1. Skin	Argyrosomus regium (Asso) [Sciaena aquila][1]	Ostende, Belgium	Beneden (1856:502)[2]
2. Surface of body	" [Sciaena aquila Lacep.]	French waters (p. 43)	Froissant (1930:68)
3. Skin	Sciaena umbra Linnaeus [Sciaena umbra Cuv.]	Viareggio, Italy	Sonsino (1891:263)
4. No mention	"	Pisa, Italy	Sonsino (1891:263)
5. Skin	Sciaena umbra L.	In Coll. of Zool. Mus. Univ. Palermo (p. 167)	Monticelli (1893a:168)
6. Skin	Umbrina cirrosa (Linnaeus) [Umbrina cirrhosa Linnaeus]	Pisa, Italy	Sonsino (1891:262-263)
7. Skin	" [Umbrina cirrhosa]	Pisa, Italy (Coll. by Prof. Richiardi)	Monticelli (1893a:168)

Synonyms: Epibdella n. sp. of van Beneden, 1852[2]
Epibdella sciaenae Beneden, 1856[2]
Benedenia elegans Diesing, 1858
Tristomum sciaenae (Beneden, 1856) Taschenberg, 1878
Phylline sciaenae (Beneden, 1856) Sonsino, 1891
Epibdella (Phylline) sciaena (Beneden, 1856) Parona, 1896
Epibdella (Benedenia) sciaenae (Beneden, 1856) Monticelli, 1902
Benedenia (Benedenia) sciaenae (Beneden, 1856) Johnston, 1929

Table 43 continued

Additional references: Beneden (1852b[2], 1858*, 1871), Diesing (1858a, 1859), Beneden & Hesse (1864), Linstow (1878, 1889a, 1889b, 1893, 1903a), Taschenberg (1878b), Fraipont (1880), Monticelli (1888, 1890a, 1892a, 1893b*, 1902, 1905), Braun (1890a), Saint-Remy (1891c, 1892b, 1892c), Goto (1894, 1900), Stiles & Hassall (1894*, 1908), Parona & Perugia (1895), Parona (1896, 1912), Odhner (1905*), Massa (1906), Cohn (1916), MacCallum (1927b), Folda (1928), Johnston (1929), Ishii & Sawada (1938b), Meserve (1938), Price (1939), Sproston (1946), Palombi (1947), 1949), Bravo-Hollis (1952), Chauhan (1954), Dawes (1956), Lamothe-Argumedo (1963), Yamaguti (1963); Taschenberg (1879a).

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[1] *Sciaena aquila* is a synonym of *Argyrosomus regium* (Asso) (Wheeler, 1969: 342).

[2] Beneden (1852b: 100) noted that a new species of *Epibdella* was found on the skin of *Sciaena aquila* at Ostende (p. 98). This new species was described by him in 1856 (Beneden, 1856).

Table 44. Benedenia derzhavini (Layman, 1930) Meserve, 1938.

Location	Host	Locality	Source
1. Gills	Sebastes schlegelii Hilgendorf [Sebastodes schlegelii]	Japanese Sea	Layman (1930: 90)
2. Gill chamber	" [Sebastodes schlegeli (Hilg.)]	Region of Vladivostok (Sea of Japan), U.S.S.R.	Bychowsky (1957: 69)
3. Gills	Sebastes alutus (Gilbert) [Sebastodes alutus (Gilbert)]	Bering Sea	Mamaev (1965: 168-169)
4. Gills	Sebastes introniger (Gilbert) [Sebastodes introniger (Gilbert)]	Bering Sea	Mamaev (1965: 168-169)
5. No mention	No mention	South Sakhalin & South Kuril Islands, U.S.S.R.	Bychowsky (1959: 197)

Synonym: Epibdella derzhavini Layman, 1930

Additional references: Yamaguti (1934, 1943a, 1963), Guberlet (1936), Meserve (1938), Price (1939), Sproston (1946), Euzet (1958), Baer & Euzet (1961), Dogiel et al (1961), Kearn (1963b), Lamothe-Argumedo (1963).

Table 45. Benedenia epinepheli (Yamaguti, 1937) Meserve, 1938.

Location	Host	Locality	Source
1. Gills	Epinephelus akaara (Temminck & Schlegel)	Tarumi, Inland Sea, Japan	Yamaguti (1937:15,16)

Synonym: Epibdella (Epibdella) epinepheli Yamaguti, 1937

Additional references: Meserve (1938), Price (1939), Yamaguti (1939, 1943a, 1963), Sproston (1946), Bravo-Hollis (1952), Baer & Euzet (1961), Lamothe-Argumedo (1963).

Table 46. Benedenia hendorffi (Linstow, 1889) Odhner, 1905.

Location	Host	Locality	Source
1. Skin	Coryphaena hippurus Linnaeus	Caleta Buena, Chile (19°55'S; 70°09'W)	Linstow (1889a:163)
2. Skin	"undetermined species of fish"	Spokane, Washington (Coll. by Dr. Wehr)	Price (1938c:410)

Synonyms: Phylline hendorffii Linstow, 1889
Epibdella hendorfii (Linstow, 1889) Braun, 1890
Epibdella hendorffii (Linstow, 1889) Monticelli, 1891[1]
Phylline endorfii Linstow of Parona & Perugia, 1895
Epibdella (Phylline) hendorffii (Linstow, 1889) Heath, 1902
Epibdella (Benedenia) hendorffii (Linstow, 1889) Monticelli, 1902
Benedenia hendorffii (Linstow, 1889) Stiles & Hassall, 1908
Benedenia (Parabenedenia) hendorffi (Linstow, 1889) Johnston, 1929

Additional references: Linstow (1889b, 1893, 1903a, 1904), Braun (1890a), Parona & Perugia (1890c, 1895), Monticelli (1890a, 1892a[1], 1892b, 1892c*, 1893b*, 1902), Saint-Remy (1891c, 1892c, 1892d), Goto (1894), Perrier (1897*), Heath (1902), Odhner (1905*), Lühe (1906), Stiles & Hassall (1908), Cohn (1916), MacCallum (1927b), Vlassenko (1928), Johnston (1929), Meserve (1938)[2], Price (1939), Cordero (1944), Sproston (1946), Bravo-Hollis (1952), Brinkmann (1952a), Winter (1955), Pratt & McCauley (1961)[3], Lamothe-Argumedo (1963), Yamaguti (1963), Kearn (1964).

[1]See Table 31, footnote 1.

[2]Meserve (1938:35) listed "B. hendorffii (von Linstow, 1889) on Sciaena aquila," the host being in error.

Table 46 continued

[3] Pratt & McCauley (1961:5) said, "It has also been reported from Europe (Linstow, 1889), Chile (Price, 1939a), and California (Heath, 1902)." They made several errors here. First, Linstow (1889a:163) did not report it from Europe, but Chile. Price (1939 :67) did not find it in Chile; he merely reported Linstow's (1889a) work. Heath (1902) discussed this species, but gave no locality record for this species for California. Apparently Pratt & McCauley (1961) did not examine the original literature.

Table 47. *Benedenia jaliscana* Bravo-Hollis, 1952.

Location	Host	Locality	Source
1. Gills	*Epinephelus labriformis* (Jenyns)	Puerto Vallarta, Jalisco, Mexico	Bravo-Hollis (1952:501)
2. Gills	*Epinephelus analogus* Gill	Zihuatanejo, Gro., Mexico	Lamothe-Argumedo (1963:38)

Additional references: Winter (1955), Yamaguti (1963).

Table 48. *Benedenia leucanthemum* Euzet & Maillard, 1967.

Location	Host	Locality	Source
1. Gills	*Dasyatis marmorata* (Steindachner)[1]	Goree, Senegal	Euzet & Maillard (1967:1450)

[1]Cadenat (1950:295) listed this species as "*Dasyatis marmorata* (*pastinaca* var. *marmorata*) Steindachner."

Table 49. Benedenia madai (Ishii & Sawada, 1938) Price, 1939[1].

Location	Host	Locality	Source
1. Gill	Chrysophrys major Schlegel [Pagrosomus major]	Japan (no specific locality given)	Ishii & Sawada (1938b: 240)

Synonym: Epibdella madai Ishii & Sawada, 1938

Additional references: Price (1939, Yamaguti (1943a, 1963), Sproston (1946), Lamothe-Argumedo (1963).

[1]Yamaguti (1963:123) listed it as "B. madai (Ishii & Sawada,1938) Sproston, 1948," which is an error. Price (1939: 65) said "B. madai (Ishii & Sawada, 1938) n. comb."

Table 50. Benedenia micracantha Euzet & Maillard, 1967.

Location	Host	Locality	Source
1. Skin	Dasyatis marmorata[1] (Steindachner)	Goree, Senegal	Euzet & Maillard (1967:1443)

[1] See Table 48, footnote 1.

Table 51. Benedenia monticellii (Parona & Perugia, 1895) Johnston, 1929.

Location	Host	Locality	Source
1. Gills	Liza auratus (Risso) [Mugil auratus][1]	Trieste, Italy	Parona & Perugia (1895: 2, 3)
2. Gills	Liza ramada (Risso) [Mugil capito Cuvier][2]	Lago Fusaro, Italy	Palombi (1947: 1)
3. Gills	Gobius (Macrogobius) paganellus Linnaeus[3] [Bathygobius paganellus (L)]	Gulf of Naples, Italy	Reichenbach-Klinke (1957: 115, 116)

Synonyms: Phylline monticellii Parona & Perugia, 1895
Epibdella (Phylline) monticelli (Parona & Perugia, 1895) Parona, 1896
Epibdella monticelli (Parona & Perugia, 1895) Saint-Remy, 1898
Epibdella (Benedenia) monticelli (Parona & Perugia, 1895) Monticelli, 1902
Benedenia (Parabenedenia) monticelli (Parona & Perugia, 1895) Johnston, 1929

Additional references: Parona (1896, 1912), Saint-Remy (1898), Stossich (1898*), Monticelli (1902), Linstow (1903a), Stiles & Hassall (1908), MacCallum (1927b), Johnston (1929), Meserve (1938), Price (1939), Sproston (1946), Palombi (1949), Dawes (1956), Bychowsky (1957), Lamothe-Argumedo (1963), Yamaguti (1963), Reichenbach-Klinke (1966).

[1] Mugil auratus is a synonym of Liza auratus (Risso) (Wheeler, 1969: 467).

[2] Mugil capito is a synonym of Liza ramada (Risso) (Wheeler, 1969: 465).

[3] The parasite on the gobiid should be reexamined to ascertain if it is, in fact, B. monticellii.

Table 52. Benedenia ovata (Goto, 1894) Johnston, 1929.

Location	Host	Locality	Source
1. Gills	Caprodon schlegeli (Günther) [Anthias schlegelli][1]	Misaki, Japan	Goto (1894: 237)

Synonyms: Epibdella ovata Goto, 1894
Epibdella (Phylline) ovata (Goto, 1894) Parona & Perugia, 1895
Epibdella (Benedenia) ovata (Goto, 1894) Monticelli, 1902
Tristoma ovata (Goto, 1894) Heath, 1902
Benedenia (Parabenedenia) ovata (Goto, 1894) Johnston, 1929

Additional references: Parona & Perugia (1895), Saint-Remy (1898), Monticelli (1899a, 1902), Heath (1902), Linstow (1903a), Stiles & Hassall (1908), Tagliani (1912), MacCallum (1927b), Folda (1928), Johnston (1929, 1931, 1937), Yamaguti (1934, 1943a, 1963), Guberlet (1936), Meserve (1938), Price (1939), Sproston (1946), Bychowsky (1957), Baer & Euzet (1961), Kearn (1963b), Lamothe-Argumedo (1963).

[1] Goto (1894: 237) gave the Japanese name of "akasagi" to the host. Katayama (1960: 135) listed Caprodon schlegeli (Günther) with the Japanese name of "Akaisagi." It is presumed that Anthias schlegelli is a synonym of Caprodon schlegeli (Günther).

Table 53. *Benedenia pagrosomi* (Ishii & Sawada, 1938) Price, 1939.

Location	Host	Locality	Source
1. Gill	*Chrysophrys major*[1] Schlegel [*Pagrosomus major*]	Japan (no specific locality given)	Ishii & Sawada (1938a: 234)

Synonym: *Epibdella pagrosomi* Ishii & Sawada, 1938

Additional references: Ishii & Sawada (1938b), Price (1939), Yamaguti (1943a, 1963), Sproston (1946), Bravo-Hollis (1952), Lamothe-Argumedo (1963).

[1] The Index-Catalogue of Medical and Veterinary Zoology, Trematoda and Trematode Diseases, Part 1, p. 111, listed *Pagrosomus unicolor* as the host, which is an error. *Pagrosomus unicolor* is the host for *Benedenia sekii* (Yamaguti, 1943a: 2).

Table 54. Benedenia sebastodis (Yamaguti, 1934) Meserve, 1938.

Location	Host	Locality	Source
1. Gills	Sebastes inermis Cuvier [Sebastodes inermis]	Ise Bay, Japan	Yamaguti (1934:262,264)

Synonym: Epibdella sebastodis Yamaguti, 1934

Additional references: Meserve (1938), Price (1939), Yamaguti (1943a, 1963), Sproston (1946), Bravo-Hollis (1952), Bychowsky (1957), Baer & Euzet (1961), Lamothe-Argumedo (1963).

Table 55. Benedenia sekii (Yamaguti, 1937) Meserve, 1938.

Location	Host	Locality	Source
1. Skin	Chrysophrys unicolor Quoy & Gaimard [Pagrosomus unicolor (Quoy & Gaimard)]	Otyo, Hiroshima Prefecture, Inland Sea, Japan	Yamaguti (1937:13,15)

Synonym: Epibdella (Epibdella) sekii Yamaguti, 1937

Additional references: Meserve (1938), Price (1939), Yamaguti (1943a, 1963), Sproston (1946), Lamothe-Argumedo (1963).

Table 56. Benedenia seriolae (Yamaguti, 1934) Meserve, 1938[1].

Location	Host	Locality	Source
1. Skin	Seriola aureovittata Temminck & Schlegel	Inland Sea, Japan	Yamaguti (1934: 259, 262)
2. Skin	Seriola quinqueradiata Temminck & Schlegel	Mie Prefecture fish culture farms (Kuki Fish. Assoc.)	Kubota & Takakuwa (1963:111)
3. Skin	S. quinqueradiata T & S ["yellow tail"][2]	"fish-culture farms in Shizuoka Prefecture"	Kasahara (1967:103)

Synonym: Epibdella seriolae Yamaguti, 1934

Additional references: Yamaguti (1937, 1943a, 1963[3]), Meserve (1938), Price (1938c, 1939), Sproston (1946), Bravo-Hollis (1952), Lamothe-Argumedo (1963).

[1]Yamaguti (1963:123) erroneously listed it as "B. seriolae (Yamaguti, 1934) Price, 1939." Price (1939) has nothing in his paper on this species. An examination of the literature revealed that Meserve (1938:35) said "B. seriolae (Yamaguti, 1934) n. comb. on Sebastodes aureovittata" and that Price (1938c:410) said "B. hendroffii resembles in many respects a species described by Yamaguti (1934) as Epibdella seriolae (= B. seriolae (Yamaguti), n. comb.) from Japan." As Meserve (1938) was issued "March, 1938" and Price (1938c) was issued "March 31, 1938," I have taken Meserve (1938) to be the first emender, as above.

[2]Okada (1955:165) listed the name of "yellow tail" for Seriola quinqueradiata Temminck & Schlegel.

[3]Yamaguti (1963:123) listed Seriola quinqueradiata as a host for this species in Japan. An examination of the above cited works revealed no mention whatsoever of this species as a host prior to 1963. It is possible that Yamaguti (1963) listed this species as a new host, but it is difficult to determine his intention since he did not designate it as such.

Table 57. Benedenia synagris Yamaguti, 1953.

Location	Host	Locality	Source
1. Gills	Synagris sp.[1]	Macassar, Celebes	Yamaguti (1953:237)

Additional references: Lamothe-Argumedo (1963), Yamaguti (1963).

[1]Norman (1966:282) gave Synagris Günther as a synonym of genus Nemipterus Swainson, family Nemipteridae. However, he listed ? Synagris Walbaum as a questionable synonym of Dentex Cuvier of family Sparidae (p. 302). Herre (1953:446-452) has listings of Synagris as being mostly synonyms of members of family Nemipteridae; Munro (1955:141) also has Synagris as synonyms of members of family Nemipteridae. Although Yamaguti (1953) gave no information concerning the family of the host, it is assumed that his "Synagris sp." was a member of the family Nemipteridae, and probably a member of the genus Nemipterus Swainson. However, in order to avoid further confusion, I have listed the host as Yamaguti (1953) did.

Table 58. Benedenia sp. of Porter, 1954.

Location	Host	Locality	Source
1. Gills	Dasyatis pastinaca (Linnaeus) [Dasybatis pastinacea]	Aquarium, Zool. Soc. London	Porter (1954: 315)

Table 59. Benedenia sp. of Randall, 1961.

Location	Host	Locality	Source
1. Epidermis	Acanthurus sandvicensis (Streets) [Acanthurus triostegus sandvicensis]	Hawaii	Randall (1961: 220, 221)

Table 60. Benedenia sp. of Hutton, 1964.

Location	Host	Locality	Source
1. No mention	Thalassoma bifasciatum (Bloch)	Coffin Patch Reef, Key West, Florida	Hutton (1964: 440)

Table 61. Allobenedenia convoluta (Yamaguti, 1937) Yamaguti, 1963.

Location	Host	Locality	Source
1. Gills	Epinephelus akaara (Temminck & Schlegel)	Inland Sea, Japan	Yamaguti (1937:18)

Synonyms: Epibdella (Benedenia) convoluta Yamaguti, 1937
Entobdella convoluta (Yamaguti, 1937) Meserve, 1938
Benedenia convoluta (Yamaguti, 1937) Price, 1939

Additional references: Meserve (1938), Yamaguti (1939, 1943a, 1963), Price (1939), Menzies (1946), Sproston (1946), Brinkmann (1952a), Bravo-Hollis (1958), Kearn (1962a), Lamothe-Argumedo (1963).

Table 62. Allobenedenia ishikawae (Goto, 1894) Yamaguti, 1963.

Location	Host	Locality	Source
1. Gills	"Lethrinus sp.?" [probably Lethrinus haematopterus (Temminck & Schlegel)][1]	Hagi, Japan	Goto (1894: 235)

Synonyms: Epibdella ishikawae Goto, 1894
Epibdella (Phylline) ishikawe (Goto, 1894) Parona & Perugia, 1895
Epibdella (Benedenia) ishikawae (Goto, 1894) Monticelli, 1902
Benedenia ishikawae (Goto, 1894) Odhner, 1905
Benedenia (Parabenedenia) ishikawae (Goto, 1894) Johnston, 1929

Additional references: Parona & Perugia (1895), Saint-Remy (1898), Monticelli (1899a, 1902), Linstow (1903a), Odhner (1905*), Stiles & Hassall (1908), Tagliani (1912), MacCallum (1927b), Johnston (1929), Yamaguti (1934, 1943a, 1963), Guberlet (1936), Ishii & Sawada (1938a), Meserve (1938), Price (1939), Sproston (1946), Lamothe-Argumedo (1963).

[1] Goto (1894: 235) gave the Japanese name of "Kuchibi-dai" for the host. Okada (1955: 240) listed the Japanese name of "Kuchibidai" for Lethrinus haematopterus (Temminck & Schlegel). This was probably the host Goto (1894) had, but an examination of this fish for A. ishikawae is necessary for final proof.

Table 63. *Ancyrocotyle vallei* (Parona & Perugia, 1895) Parona & Monticelli, 1903.

Location	Host	Locality	Source
1. Gills	*Naucrates ductor* (Linnaeus)	Trieste[1], Italy	Parona & Perugia (1895: 4)

Synonym: *Placunella vallei* Parona & Perugia, 1895

Additional references: Parona (1896, 1912), Stossich (1898*), Saint-Remy (1898), Looss (1902), Parona & Monticelli (1902, 1903), Massa (1903, 1906), Stiles & Hassall (1908), Tagliani (1912), Price (1934, 1939), Meserve (1938), Palombi (1942b, 1949), Sproston (1946), Dawes (1956), Bychowsky (1957), Yamaguti (1963).

[1] It is not known why Parona & Monticelli (1903:117), in referring to the collection of this parasite by Parona & Perugia (1895), said that it was found at Genova--when Parona & Perugia (1895: 4) said Trieste, December 1894.

Table 64. Ancyrocotyle bartschi Price, 1934[1].

Location	Host	Locality	Source
1. Gills	Naucrates ductor (Linnaeus)	19°30'30"N 65°14'00"W (Puerto Rico Deep)	Price (1934: 2)

Additional references: Meserve (1938), Price (1939), Palombi (1942b, 1949), Sproston (1946), Koratha (1955a), Dawes (1956), Bychowsky (1957), Baer & Euzet (1961), Yamaguti (1963).

[1] Palombi (1949: 257) considered this species to be a synonym of Ancyrocotyle vallei (Parona & Perugia, 1895).

Table 65. Benedeniella macrocolpa (Lühe, 1906) Johnston, 1929.

Location	Host	Locality	Source
1. Skin	Rhinoptera javanica Müller & Henle	Kalpitiya and Dutch Bay, Ceylon	Lühe (1906:97)

Synonyms: Epibdella (Benedenia) macrocolpa Lühe, 1906
Benedenia (Benedeniella) macrocolpa (Lühe, 1906) Johnston, 1929
Benedenia macrocolpa (Lühe, 1906) Meserve, 1938

Additional references: Tagliani (1912), MacCallum (1927b), Johnston (1929), Yamaguti (1937, 1963), Meserve (1938), Price (1939), Sproston (1946), Chauhan (1951[1], 1953, 1954), Hargis (1955c), Bychowsky (1957), Kearn (1962a), Lamothe-Argumedo (1963), McMahon (1963), Senadhira (1967).

[1]Chauhan (1951:53) listed "Epibdella (Benedenia sensu Montic.) macrocolpa Linstow, 1906 " as a synonym and on p. 54 he cited Linstow (1906:163-188) as a reference. I could find no reference to this species in Linstow (1906). Chauhan (1951) undoubtedly made an error, and cited Linstow (1906) instead of Lühe (1906).

Table 66. *Benedeniella posterocolpa* (Hargis, 1955) Yamaguti, 1963.

Location	Host	Locality	Source
1. Skin (ventral surface)	*Rhinoptera bonasus* (Mitchill) [*Rhinoptera quadriloba* (LeSueur)][1]	Tampa Bay, Florida	Hargis (1955c: 220)
2. Skin (ventral surface)	*R. bonasus* (Mitchill)	Chesapeake Bay	McMahon (1963: 154)

Synonym: *Benedenia posterocolpa* Hargis, 1955

Additional references: Hargis (1957), Lamothe-Argumedo (1963), Kearn (1963d), Yamaguti (1963).

[1]*Raja quadriloba* Le Sueur is listed by Bigelow and Schroeder (1953b: 475) as a synonym of *Rhinoptera bonasus* (Mitchill), so this host record should be changed to *Rhinoptera bonasus* (Mitchill).

Table 67. *Dioncopseudobenedenia kala* Yamaguti, 1965.

Location	Host	Locality	Source
1. Gills	*Naso unicornis* (Forskål)	Hawaii	Yamaguti (1965: 56)

Table 68. Entobdella hippoglossi (Müller, 1776) Johnston, 1865.

Location	Host	Locality	Source
1. Body surface	Hippoglossus hippoglossus (Linnaeus) [Hippoglossus gigas][1]	"Anglia"	Baster (1759)* In Diesing (1850: 427)
2. No mention	No mention[2]	Norway or Denmark[3]	Müller (1776)* In Brinkmann (1952b: 12)
3. No mention	H. hippoglossus (L.) [Hippoglossus vulgaris][4]	West Greenland	Frabricius (1780)* In Ditlevsen (1917: 1146)
4. Skin	" ["Pleuronectes"]	No mention	Oken (1815)* In Diesing (1836a: 13)
5. No mention	No mention[2]	Norway[5]	Christie (1839)* In Brinkmann (1952b: 20)
6. No mention	No mention[2]	No mention	Leuckart (1842: 11-12)
7. Body surface	H. hippoglossus (L.) [Hippoglossus gigas]	"Dania"	Kroyer (1843-45)* In Diesing (1850: 427)
8. No mention	" ["Pleuronectes hippoglossus"]	Norway[6]	Rathke (1843)* In Brinkmann (1952b: 14)
9. No mention	" [Pleuronectes hippoglosse]	Denmark; Ireland[7]	Moquin-Tandon (1846)* In Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 6: 1227.

Table 68 continued

Location	Host	Locality	Source
10. Body surface	H. hippoglossus (L.) [Hippoglossus gigas]	"Hibernia"	Thompson (year unknown)* In Diesing (1850: 427)[8]
11. Skin, ventral	" [Pleuronectes hippoglossus]	Ostende, Belgium (p.98)	Beneden (1852b:100)
12. Body surface	" [Hippoglossus gigas]	"Anglia" (see Addendum at end of table)	Johnston (1838) In Diesing (1850: 427)
13. Body surface	" [Hippoglossus maximus][9]	"Storeggen et extra Bergas in Norvegia"	Olsson (1868: 15)
14. No mention	" [Hippoglossus vulgaris]	Greenland[7]	Lütken (1875:182)* In Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 6: 1227.
15. Skin	"	North Sea (Coll. by Dr. Pansch)	Möbius (1874: 258)[10]
16. Skin	" [Hippoglossi maximi]	Skagerrack	Olsson (1876: 7)
17. No mention	No mention[2]	No mention[11]	Braun (1890b:597)
18. No mention	No mention[2]	Coast of Finmark (Coll. by Jägerskiöld)	Schött (1896)* In Brinkmann (1952b:16)
19. No mention	H. hippoglossus (L.) [Hippoglossus vulgaris]	West-Greenland	VanHoffen (1897)* In Ditlevsen (1917: 1146)

Table 68 continued

Location	Host	Locality	Source
20. Body	H. hippoglossus (L.) [Hippoglossus vulgaris Flem.]	71°14' N; 32°46' E	Linstow (1901: 280)
21. Body	"	71°30' N; 33°30' E	Linstow (1901: 280)
22. Body	"	69°32' N; 35°10' E	Linstow (1901: 280)
23. Body	"	European Polar Sea	Linstow (1901: 280)
24. Skin	H. hippoglossus (L) [Halibut]	Aberdeen, Scotland (fish market)	T. Scott (1901: 142)
25. Skin	H. hippoglossus (L.)	Maritime Provinces, Canada[12]	Stafford (1904: 481, 482)
26. Skin	" [Hippoglossus vulgaris]	Aberdeen, Scotland	Nicoll (1915: 360)
27. Skin	H. hippoglossus (L.)	Le Have Island, Nova Scotia	Cooper (1921: 6)
28. Surface of body	" [Pleuronectes hipp. L.]	French waters (p. 43)	Froissant (1930: 67)
29. Skin	H. hippoglossus (L.)	From Museum spec. (Woods Hole, Mass.; Swans Island, Me.; Alaska[13]; Nova Scotia; Greenland)	Price (1939: 71)
30. Skin	"	Woods Hole, Mass.	Linton (1940: 6)[14]

Table 68 continued

Location	Host	Locality	Source
31. Skin	H. hippoglossus (L) [Hippoglossus vulgaris]	Bjørnefjord, Norway (Coll. by T. Lyche)	Brinkmann (1952b: 64)[15]
32. Skin of head	"	Andenes, Norway (Coll. by Brinkmann)	Brinkmann (1952b: 64)
33. Skin	"	Manger, Norway (Coll. by Sars)	Brinkmann (1952b: 64)
34. ?	"	Bergen, Norway (Coll. by ?)	Brinkmann (1952b: 64)
35. ?	"	Bergen, Norway (Coll. by Nansen)	Brinkmann (1952b: 64)
36. ?	"	Bergen, Norway (Coll. by Friele)	Brinkmann (1952b: 64)
37. ?	"	S. Varanger, Norway (Coll. by ?)	Brinkmann (1952b: 64)
38. ?	"	Tromsø, Norway (Coll. by ?)	Brinkmann (1952b: 64)
39. ?	"	Kristiansund, Norway (Coll. by Collett)	Brinkmann (1952b: 64)
40. Skin	"	Tr. heimsfj., Norway (Coll. by Dons)	Brinkmann (1952b: 64)
41. Skin	H. hippoglossus (L.)	Barents Sea	Polyanskii (1955: 40)
42. No mention	"	Iceland (Coll. by ?)	Brinkmann (1956a: 10)
43. No mention	"	Iceland (Coll. by Steincke)	Brinkmann (1956a: 10)

Table 68 continued

Location	Host	Locality	Source
44. No mention	H. hippoglossus (L.)	Iceland (? Coll. by Steincke)	Brinkmann (1956a:10)
45. No mention	"	Seyoisfjorour, Iceland (Coll. by Jensen)	Brinkmann (1956a:10)
46. No mention	"	Onundarfjorour, Iceland (Coll. by Saemundsson)	Brinkmann (1956a:10)
47. No mention	"	Faxafloi, Iceland (Coll. by Saemundsson)	Brinkmann (1956a:10)
48. No mention	"	Rejkjarfjorour, Iceland (Coll. by Saemundsson)	Brinkmann (1956a:10)
49. Gill cavity	"	Region of the Lofoten Islands (Norwegian Sea)	Bychowsky (1957:380)
50. Skin	"	Gulf of St. Lawrence	Ronald (1957:747)
51. Skin	"	South West Point; Anticosti Island; Brion Island, Magdalen Islands, P.Q.	Ronald (1960:244)
52. Skin	"	56°30'N, 7°45' W	Williams (1960:707,713)
53. Skin	"	56°30'N, 9°0' W	Williams (1960:707,713)
54. Skin	"	Between Shetland Islands & Norwegian coast	Kearn (1962a:104)
55. Skin	"	England	Halton & Jennings (1965:257)

Table 68 continued

Location	Host	Locality	Source
56. Skin	H. hippoglossus (L.)	England	Halton (1967a: 46)
57. Skin	"	England[16]	Halton (1967b: 117)
58. No mention	Hippoglossus stenolepis Schmidt	Canadian Pacific coast	Margolis (1952)* In Ronald (1960: 244)
59. Gills	" [Hipp. hippo. stenolepis Schmidt]	Bering Sea	Mamaev (1965: 168-169)
60. Gills	Atheresthes stomias (Jordan & Gilbert) [Atherestes stomias Jordan & Gilbert]	Bering Sea	Mamaev (1965: 168-169)
61. Skin	Scophthalmus maximus (Linnaeus) [Rhombus maximus]	North Sea (Coll. by Dr. Pansch)	Möbius (1874: 258)[10]
62. No mention	" [Rhombus maximus L.]	French waters (p.43)	Froissant (1930: 68)
63. Gills	"a member of the Gadidae"[17]	Labrador	Canavan (1934: 120)

Synonyms: Tertia pediculorum species Baster, 1759
Hirudo hippoglossi Müller, 1776
Phylline hippoglossi (Müller, 1776) Oken, 1815
Epibdella hippoglossi (Müller, 1776) Blainville, 1828
Epibdella sp. of Kroyer, 1843-45
Tristoma hamatum Rathke, 1843
Epibdella sp. of Beneden, 1852
Nitzschia hippoglossi (Müller, 1776) Taschenberg, 1878

Table 68 continued

Synonyms (cont.): Phyllonella hippoglossi (Müller, 1776) Goto, 1900
Epibdella (Phylline) hippoglossi (Müller, 1776) Monticelli, 1902
Entobdella (Entobdella) hippoglossi (Müller, 1776) Johnston, 1929
Epibdella bumpusii of Canavan, 1934

Additional references: Müller (1780*, 1784*[18], 1788*[18]), Herbst (1787*), Gmelin (1790*), Bruguiere (1791*), Bosc (1802*), Blainville (1818*, 1827*, 1828*), Fabricius (1824*), Baer (1827), Diesing (1836a, 1850, 1858a, 1859), Koelliker (1849), Beneden (1852a*, 1853, 1856, 1858*, 1871), Baird (1853), Paulson (1862), Beneden & Hesse (1864), Johnston (1865*), Möbius (1875*), Linstow (1878, 1889a, 1893, 1903a), Taschenberg (1878b, 1879b), Vogt (1878), Wright (1879), Krabbe (1881*), Monticelli (1888, 1890a, 1892b, 1899a, 1902, 1905, 1908), Braun (1889b, 1890a), Cunningham (1890*), Parona & Perugia (1890b, 1895), Saint-Remy (1891c, 1892c, 1892d, 1898), Goto (1894, 1896, 1900), Gamble (1896), Parona (1896), Perrier (1897*), Heath (1902), Odhner (1905*), T. Scott (1905, 1911b), Massa (1906), A. Scott (1906), Stafford (1907), Stiles & Hassall (1908), Tagliani (1912), Sumner, Osburn & Cole (1913), Cohn (1916), Ditlevsen (1917), Saemundsson (1926*), MacCallum (1927b), Folda (1928), Isaichikov (1928*), Johnston (1929, 1937), Sprehn (1933), Guberlet (1936), Meserve (1938)[19], Sproston (1946), Brinkmann (1952a, 1956b), Winter (1955), Dawes (1956), Baer & Euzet (1961), Caballero & Bravo-Hollis (1962), Kearn (1963d, 1964), Yamaguti (1963)[19], Smyth (1966), and Nordmann*(year unknown)[20]; Taschenberg (1879a), Cheng (1964).

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[1] Hippoglossus gigas is a synonym of Hippoglossus hippoglossus (Linnaeus) (Norman, 1934: 291-292).

[2] Although the author did not mention the host, it is presumed to have been Hippoglossus hippoglossus (Linnaeus).

[3] Brinkmann (1952b: 12) said, "Neither in 'ZOOLOGIAE DANICAE PRODROMUS' nor in 'ZOOLOGICA DANICA,' does Müller mention where the hosts of the trematodes described had been taken. Accordingly we cannot decide whether they had been collected in Danish or in Norwegian waters."

[4] Hippoglossus vulgaris is a synonym of Hippoglossus hippoglossus (Linnaeus) (Norman, 1934: 291-292).

Table 68 continued

[5]Brinkmann (1952b: 20) said, "This list enumerates natural history specimens collected by him and presented to the Bergen Museum." Some of Christie's (1839) specimens were labeled as follows: "Lever-Igler av pleuronetis hippoglossus," "Queite-Luus, hirudo hippoglossi," and "Hirudo hippoglossi"; "These finds all concern Entobdella hippoglossi (Müller, 1776) Johnston, 1856" (Brinkmann, 1952b: 20).

[6]Brinkmann (1952b: 13) said, "He went to the Oslofjord, the Namsenfjord, and the towns of Trondheim, Kristiansund and Molde."

[7]A repeat of previous records? I could find no other reference to this as a locality record.

[8]"W. Thompson: in Annal. and Mag. of Nat. Hist. VII. 482" (Diesing, 1850: 427).

[9]Hippoglossus maximus is a synonym of Hippoglossus hippoglossus (Linnaeus) (Norman, 1934: 291-292).

[10]The Index-Catalogue of Medical and Veterinary Zoology, Authors, Part 10, p. 3346 indicated that Möbius (1875*) was an extract of Möbius (1874). The Index-Catalogue, Trematoda and Trematode Diseases, Part 4, p. 652, indicated that Möbius (1875*) reported E. hippoglossi from two hosts from "Greenland." If Möbius (1875*) is an extract of Möbius (1874) then an error concerning the locality has occurred, because Möbius (1874: 258) said, "In der Nordsee sammelte Herr Dr. Pansch Epibdella Hippoglossi Müller von der Haut von Hippoglossus vulgaris und Rhombus maximus..."

[11]Braun (1890b: 597) noted that his Epibdella (referring to E. hippoglossi) "...war nicht gut genung konservirt...," so I assume he collected some.

[12]Stafford (1904: 481) gave three collection localities: St. Andrews, B. C.; Causo, N. S.; and Malpeque, P. E. I. However, when he listed his parasites he neglected to mention the locality at which each parasite was found, so I have listed the locality as "Maritime Provinces, Canada."

[13]The host for the Alaskan specimens was probably Hippoglossus stenolepis Schmidt.

Table 68 continued

[14]This was apparently reported for the first time by Sumner, Osburn & Cole (1913:584), who apparently used some unpublished notes of Linton that appear to have been subsequently published in 1940.

[15]Brinkmann (1952b:65) found heavy infestations of this parasite on Hippoglossus vulgaris in the Trondheim Aquarium.

[16]A repeat of Halton (1967a)?

[17]The record for "a member of the Gadidae" by Canavan (1934) should be considered suspect.

[18]The works of Müller (1784* and 1788*) are almost identical, according to the Index-Catalogue of Medical and Veterinary Zoology, Authors, Part 10, p. 3457.

[19]Meserve (1938:39) erroneously listed "Spheroides annulatus" as a host; Yamaguti (1963:126) repeated this error.

[20]Listed in Stiles & Hassall (1908:338).

Addendum: Johnston (1838:434) reported Entobdella hippoglossi "on" Hippoglossus vulgaris (= Hippoglossus hippoglossus) from Berwick Bay (England).

Table 69. Entobdella apiocolpos Euzet & Maillard, 1967.

Location	Host	Locality	Source
1. Skin	Taeniura grabata (Geoffroy Saint-Hilarie)	Goree, Senegal	Euzet & Maillard (1967:1437)
2. Skin	Zanobatus schoenleini (Müller & Henle)	"	Euzet & Maillard (1967:1437)

Table 70. Entobdella brattstroemi Brinkmann, 1952.

Location	Host	Locality	Source
1. Skin	Paralichthys adspersus (Steindachner)	41°47'18" S; 73°20'55" W (Golfo de Ancud, N of Isla Abtao, Chile)	Brinkmann (1952a:6)

Additional references: Winter (1955), Caballero & Bravo-Hollis (1962), Yamaguti (1963).

Table 71. Entobdella bumpusii (Linton, 1900) Johnston, 1929.

Location	Host	Locality	Source
1. Skin	Dasyatis centroura (Mitchill)	Woods Hole, Mass.	Linton (1900: 267,275,286)
2. Skin & Gills[1]	" [Pastinachus centrourus (Mitchill)]	Woods Hole, Mass. & Labrador[1] (from Museum coll.)	Price (1939:73)
3. Skin-ventral	"	Woods Hole, Mass.	Linton (1940:5,6)
4. No mention	D. centroura (Mitchill)	Woods Hole, Mass.	Llewellyn & Euzet (1964:342)
5. Skin	"Dasyatis"[2]	? [3]	Laurie (1961:67)
6. "an ectoparasite"	"sting ray"	Marine Biol. Lab. (Woods Hole, Mass.)[4]	Hammen & Lum (1962:2419)
7. No mention	No mention	No mention	Lyons (1966: 70,92)[5]

Synonyms: Epibdella bumpusii Linton, 1900
Epibdella (Phylline) bumpusii (Linton, 1900) Monticelli, 1902
Phylline bumpusii (Linton, 1900) Linstow, 1903
Phyllonella bumpusii (Linton, 1900) MacCallum, 1927
Entobdella (Parepibdella) bumpusii (Linton, 1900) Johnston, 1929

Additional references: Pratt (1900, 1935), Linton (1901, 1908), Heath (1902), Monticelli (1902), Linstow (1903a), Stiles & Hassall (1908), Tagliani (1912), Sumner, Osburn & Cole (1913), MacCallum (1927b), Johnston (1929, 1937), Guberlet (1936), Nigrelli (1937), Meserve (1938)[6], Sproston (1946), Brinkmann (1952a), Bychowsky (1957), Ronald (1957), Robinson (1961), Kearn (1963d, 1964), Yamaguti (1963), Hammen (1964)[7], Euzet & Maillard (1967).

Table 71 continued

[1] I believe Price (1939: 73) was confused. I do not know where he got "gills"; the "Canada (Labrador)" record cannot be found in the literature so apparently Price forgot he had just made E. bumpusii of Canavan (1934) from Labrador a synonym of E. hippoglossi and cited Labrador as a locality record for E. bumpusii. The Woods Hole locality apparently refers to Linton (1900), so this whole citation should be removed from the locality records of this species. (Price, 1939: 73, only used one specimen in his redescription.)

[2] Laurie (1961: 67) found the parasite "...attached to the skin of Dasyatis." As Dasyatis centroura was the only member of the genus listed as a host (Laurie, 1961: 64), it is thought to have been the host.

[3] Laurie (1961) gave no collection locality; however, as he acknowledged "...members of the Marine Biological Laboratory Supply Department..." for assistance in obtaining host material (Laurie, 1961: 70) it is thought that the collections were made in the Woods Hole region.

[4] Collected by Dr. J. W. Campbell of the Marine Biological Laboratory (Hammen & Lum, 1962: 2419).

[5] Lyons (1966: 70, 92) worked on attachment sclerites of this species. However, she did not mention location, host, or locality.

[6] Meserve (1938: 39) erroneously listed the host as "Lasyatis centrura."

[7] Hammen (1964: 49, Table 2) listed E. bumpusii and noted that the reference was to Hammen and Osborne (1959) who actually made no reference to the species. An examination of several papers by Hammen revealed that the correct reference was Hammen & Lum (1962).

Table 72. *Entobdella corona* Hargis, 1955.

Location	Host	Locality	Source
1. Skin, ventral surface, rarely gills	*Dasyatis americana* Hildebrand & Schroeder	Alligator Harbor, Fla.	Hargis (1955c: 223)
2. "	*Dasyatis sabina* (Lesueur)	"	Hargis (1955c: 223)
3. No mention	"	Tampa Bay, Florida	Hutton (1964: 440)
4. Skin, ventral surface, rarely gills	*Dasyatis sayi* (Lesueur)	Alligator Harbor, Fla.	Hargis (1955c: 223)

Additional references: Hargis (1957, 1959), Robinson (1961), Caballero & Bravo-Hollis (1962), Yamaguti (1963), Llewellyn & Euzet (1964).

Table 73. *Entobdella curvunca* Ronald, 1957.

Location	Host	Locality	Source
1. Skin	*Hippoglossus hippoglossus* (Linnaeus)	La Tabatiere, north shore of the Gulf of St. Lawrence; Anticosti Island; Brion Island, Magdalen Islands, P. Q.	Ronald (1957: 750)

Additional references: Ronald (1960), Yamaguti (1963).

Table 74. *Entobdella diadema* (Monticelli, 1902)Johnston, 1929.

Location	Host	Locality	Source
1. Skin	*Dasyatis violacea* (Bonaparte) [*Trygon violacea*]	Gulf of Naples, Italy	Monticelli (1902:137)
2. No mention	"	Naples, Italy (Coll. by Brinkmann's father)	Brinkmann (1952a:8)[1]
3. No mention	*D. violacea* (Bonaparte)	Aquarium of Zool. Station at Naples, Italy	Llewellyn & Euzet (1964:337)
4. Skin-ventral	*Dasyatis pastinaca* (Linnaeus)	English Channel	Llewellyn & Euzet (1964:337)
5. Skin	*Dasyatis marmorata*[2] (Steindachner)	Goree, Senegal	Euzet & Maillard (1967:1436)
6. No mention	*Myliobatis aquila* (Linnaeus)	Aquarium of Zool. Station at Naples, Italy	Llewellyn & Euzet (1964:337)
7. No mention	No mention	No mention	Lyons (1966: 70,83,92)[3]

Synonyms: *Epibdella (Phylline) diadema* Monticelli, 1902
Phylline diadema (Monticelli, 1902) Linstow, 1903
Phyllonella diadema (Monticelli, 1902) MacCallum, 1927
Entobdella (Entobdella) diadema (Monticelli, 1902) Johnston, 1929

Additional references: Monticelli (1905), Linstow (1903a), Stiles & Hassall (1908), Parona (1912), MacCallum (1927b), Johnston (1929), Meserve (1938)[4], Price (1939), Sproston (1946), Palombi (1949), Dawes (1956), Bychowsky (1957), Robinson (1961), Kearn (1962a, 1963b, 1963d, 1964, 1965), Llewellyn (1963), Llewellyn & Euzet (1963), Yamaguti (1963)[4], Dollfus & Euzet (1964(1965)), Paling (1966a), Smyth (1966).

Table 74 continued

[1]Brinkmann (1952a: 7,8) considered *E. diadema* to be a synonym of *E. bumpusii*.

[2]See Table 48, footnote 1.

[3]Lyons (1966: 70, 83,92) did work on the chemical nature of attachment sclerites of this species. However, she failed to note location, host, or locality.

[4]Meserve (1938: 39) erroneously listed "*Solea vulgaris*" as the host; Yamaguti (1963: 126) repeated this error.

Table 75. Entobdella guberleti Caballero & Bravo-Hollis, 1962.

Location	Host	Locality	Source
1. Gills	Urolophus halleri Cooper [Urobatis halleri (Cooper)]	Guaymas, Sonora, Golfo de California, Mexico	Caballero & Bravo-Hollis (1962: 63)

Table 76. Entobdella soleae (Beneden & Hesse, 1863)[1] Johnston, 1929.

Location	Host	Locality	Source
1. Skin	Solea solea (Linnaeus) [Solea vulgaris][2]	Coast of Brittany	Beneden & Hesse (1864: 70)[1]
2. No mention	No mention[3]	Roscoff, France (p.306)	Vogt (1878: 306)
3. No mention	S. solea (L.) [Solea vulgaris]	British waters	Cunningham (1890: 93-96)* In Sproston (1946: 325)
4. Skin-ventral	"	Wimereux (Pas-de-Calais), France (p.417)	Monticelli (1890a: 419)
5. No mention	No mention[3]	Naples (?), Italy	Monticelli (1829a: 126)[4]
6. No mention	No mention[3]	Roscoff, France	Saint-Remy (1891b: 1072)
7. Ventral surface	S. solea (L.) ["sole"]	Roscoff, France (p. 2)	Saint-Remy (1892d: 12)[5]
8. "white side"	" [Solea vulgaris]	Offshore between Lancashire & Isle-of-Man	A. Scott (1901b: 344)
9. Skin-ventral	" ["common sole"]	Irish Sea	A. Scott (1904: 115)[6, 7]
10. Skin	" [Solea vulgaris]	Firth of Clyde, Scotland	T. Scott (1901: 142)
11. Back-dorsal surface	"	England[8]	Linstow (1903a: 354)

Table 76 continued

Location	Host	Locality	Source
12. Skin-ventral	*S. solea* (L.) [*Solea vulgaris*]	2 miles E of Clare Island, Ireland	Southern (1912:16-17)
13. Skin	" [*Solea vulgaris* Quensel]	West coast of Ireland off Galway Bay area	Little (1929a:25,26)
14. "white-side"	"	Off the coast of Galway, Ireland	Little (1929c:324)
15. No mention	*S. solea* (L.) ["Common sole"]	Cardigan Bay, Wales	Little (1929c:324)
16. Surface of body	" [*Solea vulgaris*]	French waters (p. 43)	Froissant (1930:68)
17. Skin	"	Plymouth, England	Plymouth Marine Fauna (1931)* In Sproston (1946:326)
18. Skin	"	Plymouth, England	Baylis & Jones (1933:629)
19. No mention	*S. solea* (L.)	South Devon, England	Baylis (1939:476)
20. Skin-ventral	"	Roscoff, France	Sproston (1946:326)
21. Skin	"	Plymouth, England	Sproston (1946:326)
22. Ventral surface	"	Whitstable, England (p.481)	Maghraby & Perkins (1956:486)
23. Skin	"	Plymouth, England	Llewellyn (1957b:244)

Table 76 continued

Location	Host	Locality	Source
24. Skin-ventral	*S. solea* (L.)	Plymouth, England	Kearn (1963a: 253)
25. Skin	"	Plymouth, England	Kearn (1963b: 435)
26. Skin	"	Plymouth, England	Kearn (1964: 327)
27. Skin	"	Plymouth, England	Kearn (1967b: 585)
28. Skin	"	In tank of Marine Biol. Assoc. at Plymouth, England	Lyons (1966: 66)
29. Skin-ventral	*Pegusa lascaris* (Risso) [*Solea lascaris*][9]	Roscoff, France	Sproston (1946: 326-327)[10]
30. Skin	*Raja montagui* Fowler[11]	Plymouth, England	Kearn (1967b: 585)

Synonyms: *Phyllonella soleae* Beneden & Hesse, 1863[1]
Tristoma soleae (Beneden & Hesse, 1863) Taschenberg, 1878
Epibdella soleae (Beneden & Hesse, 1863) Monticelli, 1890
Epibdella (*Phylline*) *soleae* (Beneden & Hesse, 1863) Monticelli, 1902
Epibdella producta Linstow, 1903
Phylline soleae (Beneden & Hesse, 1863) Linstow, 1903
Phyllonella producta (Linstow, 1903) MacCallum, 1927
Entobdella (*Entobdella*) *soleae* (Beneden & Hesse, 1863) Johnston, 1929
Entobdella producta (Linstow, 1903) Meserve, 1938

Table 76 continued

Additional references: Beneden (1871), Lorenz (1878), Taschenberg (1878b, 1879b), Lang (1880), Monticelli (1888, 1892b, 1902), Linstow (1889b), Braun (1890a), Saint-Remy (1891c, 1892a, 1892c), Goto (1894, 1900), Parona (1896), Perrier (1897*), Pratt (1900), Benham (1901), Odhner (1905*, 1906*), T. Scott (1905, 1911b), Stiles & Hassall (1908), Tagliani (1912), Henry (1913*), Nicoll (1915), MacCallum (1927b), Johnston (1929), Sprehn (1933), Meserve (1938), Price (1939), Brinkmann (1952a), Euzet (1957b, 1958), Llewellyn (1957a, 1963, 1965), Coupland (1960), Baer & Euzet (1961), Robinson (1961), Kearn (1962a, 1962b, 1963c, 1963e, 1965, 1967a, 1968), Yamaguti (1963)[12], Llewellyn & Euzet (1964), Dollfus & Euzet (1964(1965)), Halton & Jennings (1965), Reichenbach-Klinke (1966), Smyth (1966), Euzet & Maillard (1967); Taschenberg (1879a).

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[1]The papers of Beneden & Hesse (1863*, 1864) contain similar information on the species they discussed. I examined Beneden & Hesse (1864).

[2]Solea vulgaris is a synonym of Solea solea (Linnaeus) (Wheeler, 1969:554).

[3]Although no reference to the host was found, it is presumed that the host was Solea solea (Linnaeus).

[4]This could be a repeat of Monticelli (1890a). Monticelli (1892a:126) said "..mie personali ricerche sul E. soleae a fresco..." No locality was given so Naples is questioned.

[5]A repeat of Saint-Remy (1891b) ?

[6]A repeat of A. Scott (1901b:344) ?

[7]Nicoll (1915:360) listed E. soleae from the skin of Solea vulgaris from Liverpool and attributed the record to A. Scott (1904).

[8]Dr. Shipley of Cambridge gave Linstow the opportunity to work on this species. As Linstow (1903a:352) gave no locality, I presume the locality was England.

Table 76 continued

[9] Solea lascaris is a synonym of Pegusa lascaris (Risso) (Wheeler, 1969:553).

[10] Sproston (1946:326-327) found that 2 of 9 Solea lascaris had a few E. soleae on the underside.

[11] This record should probably be considered accidental. Kearn (1967b:585) said, "Many hundreds of adult specimens of Entobdella soleae were collected and all of them came from the skin of a single host species, the common sole (Solea solea), with the exception of two specimens, each found on a ray (Raia montagui). These rays were brought up from the sea bottom in a tightly packed trawl containing soles infected with E. soleae and it is possible that the parasites transferred themselves from the soles to the rays."

[12] Yamaguti (1963:126) neglected to list Solea lascaris (=Pegusa lascaris (Risso)) as a host.

Table 77. Entobdella squamula (Heath, 1902) Johnston, 1929.

Location	Host	Locality	Source
1. Skin, rarely gill cavity	Paralichthys californicus (Ayres)	Monterey Bay, California	Heath (1902: 109)
2. No mention	"	Alaska to California	Guberlet ((1936)1937: 458)[1]
3. No mention	"	California	Koratha & Martin (1960: 14)
4. Skin, rarely gill cavity	Sebastes spp. [Sebastodes spp.]	Monterey Bay, California	Heath (1902: 109)[2]
5. No mention	Sebastes [Sebastodes]	Alaska to California	Guberlet ((1936)1937: 458)[1, 2]
6. No mention	Hippoglossus stenolepis Schmidt [Hyppoglossus hyppoglosus][3, 4]	Alaska to California	Guberlet ((1936)1937: 458)
7. Skin	" [Hippoglossus hippoglossus][4, 5]	Puget Sound, Washington area	Bonham (1937: 66)
8. Skin	Hippoglossina macrops Steindachner	40°31'30"S, 72°48'15"W, (Seno Reloncavi, Piedra Azul, Chile)	Brinkmann (1952a: 10)
9. No mention	"undetermined fish"	"presumably from the Gulf of Mexico"	Price (1939: 72)

Table 77 continued

Synonyms: Epibdella squamula Heath, 1902
Phylline squamula (Heath, 1902) Linstow, 1903
Epibdella (Phylline) squamula (Heath, 1902) Monticelli, 1905
Phyllonella squamula (Heath, 1902) MacCallum, 1927
Entobdella (Entobdella) squamula (Heath, 1902) Johnston, 1929
Epibdella squamata Heath, 1902 of Guberlet, (1936) 1937 (lapsus)
Entobdella squamata (Heath, 1902) of Halton & Jennings, 1965 (lapsus)

Additional references: Linstow (1903a), Monticelli (1905), Odhner (1905*), Massa (1906), Stiles & Hassall (1908), Tagliani (1912), MacCallum (1927b), Folda (1928), Johnston (1929, 1930a, 1931, 1937), Bresslau (1932), Guberlet (1936), Meserve (1938), Sproston (1946), Manter (1954), Koratha (1955a), Winter (1955), Bychowsky (1957), Ronald (1957, 1960), Baer & Euzet (1961), Pratt & McCauley (1961), Caballero & Bravo-Hollis (1962), Kearn (1962a, 1963a, 1963b, 1963d, 1964), Yamaguti (1963)[6], Halton & Jennings (1965), Euzet & Maillard (1967), and Meisenheimer* (year unknown)[7].

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[1]A repeat of Heath's (1902) records?

[2]An error for Megalocotyle marginata (Table 130)?

[3]Guberlet ((1936)1937: 458) said, "Una especie de tremátode de gran tamaño Epibdella squamata Heath ha sido tomada de Hyppoglossus hyppoglossus (Linn.) de Paralichthys californicus y de Sebastodes. Su distribucion a lo largo de la costa es desde Alaska hasta California y sin duda, puede ser encontrado a lo largo de la costa mexicana, si una búsqueda cuidadosa fuera hecha." The records for Paralichthys and Sebastodes might be repeats of Heath (1902). Since Heath (1902) made no reference to Hippoglossus as a host, I presume that this reference by Guberlet ((1936)1937: 458), at least, can be considered a host record.

[4]The correct scientific name of the Pacific halibut is Hippoglossus stenolepis Schmidt (Bailey, 1970).

Table 77 continued

[5]Bonham (1937:66) said, "Ectoparasitic trematodes of the family Tristomidae Taschenberg showing close agreement with Heath's description of Epibdella squamula were obtained in the Puget Sound region as early as 1918 by Professors Trevor Kincaid, and E. Victor Smith, from the skin of fish identified as Hippoglossus hippoglossus (Linnaeus). The parasite is commonly found upon the Pacific halibut throughout the entire range of this fish."

[6]Yamaguti (1963:126) neglected to list Hippoglossus stenolepis Schmidt as a host.

[7]Cited by Bresslau (1932:1114). I was unable to locate this work, or find any other mention of it in the capsaloid literature.

Table 78. Entobdella steingroeveri (Cohn, 1916) Johnston, 1929.

Location	Host	Locality	Source
1. No mention	Undetermined fish	German South West Africa	Cohn (1916: 460)

Synonyms: Epibdella steingroeveri Cohn, 1916
Phyllonella steingroeveri (Cohn, 1916) MacCallum, 1927
Entobdella (Entobdella) steingroeveri (Cohn, 1916) Johnston, 1929

Additional references: MacCallum (1927b), Johnston (1929), Yamaguti (1934, 1963), Guberlet (1936), Meserve (1938), Price (1939), Sproston (1946), Brinkmann (1952a), Dawes (1956), Kearn (1964).

Table 79. Lagenivaginopseudobenedenia etelis Yamaguti, 1966.

Location	Host	Locality	Source
1. Gills	Etelis carbunculus Cuvier & Valenciennes	Hawaii	Yamaguti (1966: 423)

Table 80. Metabenedeniella hoplognathi (Yamaguti, 1942) Yamaguti, 1958.

Location	Host	Locality	Source
1. Gills	Oplegnathus punctatus (Temminck & Schlegel)	Tokusima (=Tokushima), Japan	Yamaguti (1942:121)
	[Hoplognathus punctatus (T & S)]		
2. Gills	Oplegnathus fasciatus (Temminck & Schlegel)	Suma Municipal Aquarium, Japan	Yamaguti (1958:56)
	[Hoplognathus fasciata]		
3. Gills	Epinephelus septemfasciatus (Thunberg)	Suma Municipal Aquarium, Japan	Yamaguti (1958:56)

Synonym: Epibdella (Benedenia) hoplognathi Yamaguti, 1942

Additional references: Yamaguti (1943a, 1963[1]).

[1]Yamaguti (1963:127) neglected to list Oplegnathus punctatus as a host.

Table 81. Neobenedenia melleni (MacCallum, 1927) Yamaguti, 1963.

Location	Host	Locality	Source
	NATURAL HOSTS		
1. No mention[1]	Epinephelus striatus (Bloch) (Serranidae)	Bimini, B.W.I.	Nigrelli (1947: 25)
2. "	Lutjanus apodus (Walbaum) [Lutianus apodus] (Lutianidae)	"	Nigrelli (1947: 25)
3. "	Chaetodon capistratus Linnaeus (Chaetodontidae)	"	Nigrelli (1947: 25)
4. "	Chaetodon ocellatus Bloch (Chaetodontidae)	"	Nigrelli (1947: 25)
5. "	Chaetodon striatus Linnaeus (Chaetodontidae)	"	Nigrelli (1947: 25)
6. "	Holacanthus ciliaris (Linnaeus) (Chaetodontidae)	"	Nigrelli (1947: 25)
7. "	Holacanthus tricolor (Bloch) (Chaetodontidae)	"	Nigrelli (1947: 25)
8. "	Pomacanthus paru (Bloch) [Pomacanthus arcuatus (Linnaeus)][2] (Chaetodontidae)	"	Nigrelli (1947: 25)

Table 81 continued

Location	Host	Locality	Source
	NATURAL HOSTS		
9. No mention	Pomacanthus paru (Bloch)	Bimini, B.W.I.	Nigrelli (1947: 25)
	(Chaetodontidae)		
	HOSTS IN CONFINEMENT		
ARIIDAE			
1. Eyes	Arius felis (Linnaeus)	N.Y. Aquarium	Nigrelli (1937: 189, 190)
	[Galeichthys milberti][3]		
HOLOCENTRIDAE			
2. Skin & Eyes	Holocentrus ascensionis (Osbeck)	N.Y. Aquarium	Nigrelli & Breder (1934: 264)
3. "	"	"	Nigrelli (1940: 530)
SERRANIDAE			
4. Skin & Eyes	Centropristis striata (Linnaeus)	N.Y. Aquarium	Jahn & Kuhn (1932: 102)
	[Centropristus striatus (L.)]		
5. "	"	"	Nigrelli & Breder (1934: 262)
	[Centropristes striatus (L.)]		
6. "	Cephalopholis fulva (Linnaeus)	"	Nigrelli & Breder (1934: 264)
	[C. fulvus (L.)]		
7. "	"	"	Nigrelli (1940: 530)
8. "	Dermatolepis inermis (Valenciennes)	"	Nigrelli (1940: 530)
	[Dermatolepis marmoratus Osburn & Mowbray][4]		

Table 81 continued

Location	Host	Locality	Source
9. Skin & Eyes	*Dermatolepis punctatus* Gill	N.Y. Aquarium	Jahn & Kuhn (1932:102)
10. "	"	"	Nigrelli & Breder (1934:262)
11. "	*Epinephelus adscensionis* (Osbeck)	"	Jahn & Kuhn (1932:102)
12. "	"	"	Nigrelli & Breder (1934:262)
13. "	"	"	Nigrelli (1940:530)
14. "	*Epinephelus guttatus* (Linnaeus)	"	Jahn & Kuhn (1932:102)
15. "	"	"	Nigrelli & Breder (1934:262)
16. "	*Epinephelus itajara* (Lichtenstein)	"	Jahn & Kuhn (1932:102)
	[*Promicrops itaiara* (Lichtenstein)]		
17. "	"	"	Nigrelli & Breder (1934:262)
18. "	*Epinephelus morio* (Valenciennes)	"	Jahn & Kuhn (1932:102)
	[*E. morio* (C. & V.)]		
19. "	"	"	Nigrelli & Breder (1934:262)
20. "	*Epinephelus striatus* (Bloch)	"	Jahn & Kuhn (1932:102)

Table 81 continued

Location	Host	Locality	Source
21. Skin & Eyes	*Epinephelus striatus* (Bloch)	N.Y. Aquarium	Nigrelli & Breder (1934:262)
22. "	*Morone saxatilis* (Walbaum) [*Roccus lineatus* Bloch][5]	"	Nigrelli & Breder (1934:264)
23. "	*Mycteroperca interstitialis* (Poey)	"	Nigrelli (1940:530)
24. "	*Paralabrax maculatofasciatus* (Steindachner)	"	Jahn & Kuhn (1932:102)
25. "	*Paranthias furcifer* (Valenciennes) [*P. furcifer* (C. & V.)]	"	Nigrelli & Breder (1934:264)
26. "	*Petrometopon cruentatum* (Lacépède) [*P. cruentatus* (Lac.)]	"	Nigrelli & Breder (1934:264)
THERAPONIDAE			
27. No mention[1]	*Therapon jarbua* (Forskål)	"	Nigrelli (1937:189)
LATILIDAE			
28. Skin & Eyes	*Malacanthus plumieri* (Bloch) [*M. plumeri* (Bloch)]	"	Jahn & Kuhn (1932:103)
POMATOMIDAE			
29. Skin & Eyes	*Pomatomus saltatrix* (Linnaeus)	"	Jahn & Kuhn (1932:102)
30. "	"	"	Nigrelli & Breder (1934:262)

Table 81 continued

Location	Host	Locality	Source
CARANGIDAE			
31. Skin & Eyes	Caranx fusus (Geoffroy-St. Hilaire)	N.Y. Aquarium	Jahn & Kuhn (1932:102)
	[Caranx crysos (Mitchill)][6]		
32. "	"	"	Nigrelli & Breder (1934:261)
33. "	Caranx hippos (Linnaeus)	"	Jahn & Kuhn (1932:102)
34. "	"	"	Nigrelli & Breder (1934:261)
35. "	Naucrates ductor (Linnaeus)	"	Jahn & Kuhn (1932:102)
36. "	"	"	Nigrelli & Breder (1934:261)
37. "	Trachinotus carolinus (Linnaeus)	"	Jahn & Kuhn (1932:102)
38. "	"	"	Nigrelli & Breder (1934:261)
39. "	"	"	Nigrelli (1935c:439)
40. "	"	"	Nigrelli (1937:185)
41. Skin	Trachinotus falcatus (Linnaeus)	"	Nigrelli (1937:185)
42. "	"	"	Nigrelli (1943:216)

Table 81 continued

Location	Host	Locality	Source
43. Skin & Eyes	Trachinotus goodei Jordan & Evermann	N.Y. Aquarium	Jahn & Kuhn (1932: 102)
	[Trachinotus glaucus (Bloch)][7]		
44. No mention[1]	T. goodei Jordan & Evermann	Outside tank at Bimini, B.WI., having access to fresh sea water	Nigrelli (1947: 25)
45. Skin & Eyes	Vomer setapinnis (Mitchill)	N.Y. Aquarium	Jahn & Kuhn (1932: 102)
46. "	"	"	Nigrelli & Breder (1934: 261)
47. "	"	"	Nigrelli (1940: 530)
LUTIANIDAE			
48. Skin & Eyes	Lutjanus analis (Cuvier)	N.Y. Aquarium	Jahn & Kuhn (1932: 102)
	[Lutianus analis (C. & V.)]		
49. "	"	"	Nigrelli (1940: 530)
50. "	Lutjanus apodus (Walbaum)	"	Jahn & Kuhn (1932: 102)
	[Lutianus apodus (W.)]		
51. "	"	"	Nigrelli & Breder (1934: 262)
52. "	"	"	Nigrelli (1940: 530)
53. "	Lutjanus griseus (Linnaeus)	"	Nigrelli & Breder (1934: 264)
	[Lutianus griseus (L.)]		

Table 81 continued

Location	Host	Locality	Source
54. Skin & Eyes	Lutjanus griseus (Linnaeus) [Lutianus griseus (L.)]	N.Y. Aquarium	Nigrelli (1940:530)
55. "	Lutjanus jocu (Bloch & Schneider) [Lutianus jocu (B. & S.)]	"	Jahn & Kuhn (1932:102)
56. "	"	"	Nigrelli & Breder (1934:262)
57. "	"	"	Nigrelli (1940:530)
58. "	Lutjanus synagris (Linnaeus) [Lutianus synagris (L.)]	"	Jahn & Kuhn (1932:102)
59. "	"	"	Nigrelli (1940:530)
60. "	Lutjanus viridis (Valenciennes) [Evoplites viridis (Val.)][8]	"	Nigrelli & Breder (1934:264)
61. "	Ocyurus chrysurus (Bloch)	"	Nigrelli (1940:530)
LOBOTIDAE			
62. Skin & Eyes	Lobotes surinamensis (Bloch)	"	Nigrelli (1940:530)
POMADASYIDAE			
63. Skin & Eyes	Anisotremus surinamensis (Bloch)	"	Jahn & Kuhn (1932:102)
64. "	"	"	Nigrelli & Breder (1934:262)

Table 81 continued

Location	Host	Locality	Source
65. Skin & Eyes	Anisotremus virginicus (Linnaeus)	N.Y. Aquarium	Jahn & Kuhn (1932:102)
66. "	"	"	Nigrelli & Breder (1934:263)
67. "	"	"	Nigrelli (1940:530)
68. "	Haemulon album Cuvier [H. album C. & V.]	"	Jahn & Kuhn (1932:102)
69. "	Haemulon flavolineatum (Desmarest)	"	Nigrelli & Breder (1934:265)
70. "	"	"	Nigrelli (1940:530)
71. "	Haemulon macrostomum Günther	"	Nigrelli (1940:530)
72. "	Haemulon plumieri (Lacépède)	"	Nigrelli (1940:530)
73. "	Haemulon sciurus (Shaw)	"	Nigrelli (1940:530)
SCIAENIDAE			
74. Skin & Eyes	Menticirrhus saxatilis (Bloch & Schneider)	"	Jahn & Kuhn (1932:102)
75. "	Micropogon undulatus (Linnaeus)	"	Jahn & Kuhn (1932:102)
76. "	"	"	Nigrelli & Breder (1934:263)
77. "	Pogonias cromis (Linnaeus)	"	Nigrelli (1940:531)

Table 81 continued

Location	Host	Locality	Source
SPARIDAE			
78. Skin & Eyes	Archosargus rhomboidalis (Linnaeus)	N.Y. Aquarium	Nigrelli (1940:531)
	[Salema rhomboidalis (L.)][9]		
PSETTIDAE			
79. No mention[1]	Monodactylus argenteus (Linnaeus)	"	Nigrelli (1937:189)
	[Psettis argentus][10]		
EPHIPPIDAE			
80. Eyes	Chaetodipterus faber (Broussonet)	"	MacCallum (1927b:291,300)
81. Skin & Eyes	"	"	Jahn & Kuhn (1932:102)
82. "	"	"	Nigrelli & Breder (1934:263)
83. "	"	"	Nigrelli (1940:531)
84. "	Platax sp.	"	Nigrelli (1940:531)
SCATOPHAGIDAE			
85. No mention[1]	Scatophagus argus (Linnaeus)	"	Nigrelli (1937:189)
CHAETODONTIDAE			
86. Skin & Eyes	Chaetodon capistratus Linnaeus	"	Nigrelli & Breder (1934:265)
87. "	"	"	Nigrelli (1940:531)
88. "	Chaetodon collaris Bloch	"	Nigrelli (1940:531)

Table 81 continued

Location	Host	Locality	Source
89. Skin & Eyes	Chaetodon ocellatus Bloch	N.Y. Aquarium	Jahn & Kuhn (1932:102)
90. "	"	"	Nigrelli & Breder (1934:263)
91. "	"	"	Nigrelli (1940:531)
92. No mention[1]	"	Outside tank at Bimini, BWI., having access to fresh sea water	Nigrelli (1947:25)
93. No mention[1]	Chaetodon striatus Linnaeus	"	Nigrelli (1947:25)
94. Skin & Eyes	Heniochus acuminatus (Linnaeus)	N.Y. Aquarium	Nigrelli (1940:531)
95. Eyes	Holacanthus bermudensis Goode	"	MacCallum (1927b:291,300)
	[Angelichthys isabelita][11]		
96. Skin & Eyes	" [Angelichthys isabelita Jordan & Ritter]	"	Jahn & Kuhn (1932:102)
97. "	"	"	Nigrelli & Breder (1934:263)
98. "	"	"	Nigrelli (1940:531)
99. "	Holacanthus ciliaris (Linnaeus)	"	Jahn & Kuhn (1932:102)
	[Angelichthys ciliaris (L.)][12]		

Table 81 continued

Location	Host	Locality	Source
100. Skin & Eyes	*Holacanthus ciliaris* (Linnaeus)	N.Y. Aquarium	Nigrelli & Breder (1934: 263)
	[*Angelichthys ciliaris* (L.)]		
101. "	"	"	Nigrelli (1940: 531)
102. No mention[1]	*H. ciliaris* (L.)	Outside tank at Bimini, B.W.I., having access to fresh sea water	Nigrelli (1947: 25)
103. Skin & Eyes	Hybrid between *H. ciliaris* & *H. bermudensis*	N.Y. Aquarium	Jahn & Kuhn (1932: 102)
	[*Angelichthys townsendi* Nichols & Mowbray][13]		
104. "	"	"	Nigrelli & Breder (1934: 263)
105. "	"	"	Nigrelli (1940: 531)
106. Eyes	*Pomacanthus paru* (Bloch)	"	MacCallum (1927b: 291, 300)
	[*Pomacanthus arcuatus* (Linnaeus)][2]		
107. Skin & Eyes	" [*P. arcuatus* (L.)]	"	Jahn & Kuhn (1932: 102)
108. "	" [*P. arcuatus* (L.)]	"	Nigrelli & Breder (1934: 263)
109. "	" [*P. arcuatus* (L.)]	"	Nigrelli (1940: 531)

Table 81 continued

Location	Host	Locality	Source
110. No mention[1]	Pomacanthus paru (Bloch) [Pomacanthus arcuatus]	Outside tank at Bimini, B.W.I., having access to fresh sea water	Nigrelli (1947: 25)
111. Skin & Eyes	Pomacanthus paru (Bloch)	N.Y. Aquarium	Jahn & Kuhn (1932:102)
112. "	"	"	Nigrelli & Breder (1934: 263)
113. No mention[1]	"	Outside tank at Bimini, B.W.I., having access to fresh sea water	Nigrelli (1947: 25)
LABRIDAE			
114. Skin & Eyes	Bodianus rufus (Linnaeus) [B. rufa (L.)]	N.Y. Aquarium	Nigrelli & Breder (1934: 265)
115. "	"	"	Nigrelli (1940: 531)
116. "	Diastodon speciosus Bowdich [Trechocopus scrofa (C.& V.)][14]	"	Nigrelli (1940: 531)
117. "	Lachnolaimus maximus (Walbaum)	"	Jahn & Kuhn (1932:102)
118. "	"	"	Nigrelli & Breder (1934: 263)
119. "	"	"	Nigrelli (1940: 531)
120. "	Tautoga onitis (Linnaeus)	"	Jahn & Kuhn (1932:102)
121. "	"	"	Nigrelli & Breder (1934: 263)

Table 81 continued

Location	Host	Locality	Source
122. Skin & Eyes	Thalassoma pavo (Linnaeus) [Julis pavo (C. & V.)][15]	N.Y. Aquarium	Nigrelli (1940:531)
123. No mention[1]	European wrasses	"	Nigrelli (1937:189)
ACANTHURIDAE			
124. Skin & Eyes	Acanthurus chirurgus (Bloch) [Acanthurus hepatus (L.)][16]	"	Jahn & Kuhn (1932:102)
125. "	"	"	Nigrelli & Breder (1934:263)
126. "	"	"	Nigrelli (1940:531)
127. "	Acanthurus coeruleus Bloch & Schneider [A. caeruleus B. & S.]	"	Jahn & Kuhn (1932:102)
128. "	"	"	Nigrelli & Breder (1934:263)
TRIGLIDAE			
129. Skin & Eyes	Prionotus evolans (Linnaeus)	"	Jahn & Kuhn (1932:103)
BALISTIDAE			
130. Skin & Eyes	Aluterus schoepfi (Walbaum) [Ceratacanthus schoepfi (Walbaum)]	"	Jahn & Kuhn (1932:103)
131. "	" [Ceratacanthus schoepfii (W.)]	"	Nigrelli & Breder (1934:264)

Table 81 continued

Location	Host	Locality	Source
132. No mention[1]	Aluterus scriptus (Osbeck) [Alutera scripta]	Outside tank at Bimini, B.W.I., having access to fresh sea water	Nigrelli (1947:25)
133. Skin & Eyes	Balistes capriscus Gmelin [Balistes carolinensis Gmelin]	N.Y. Aquarium	Nigrelli (1940:531)
134. "	Balistes vetula Linnaeus	"	Jahn & Kuhn (1932:102)
135. "	"	"	Nigrelli (1940:531)
136. "	Canthidermis sufflamen (Mitchill) [Canthidermis sabaco (Poey)][17]	"	Nigrelli & Breder (1934:265)
137. "	" [Canthidermis sabaco Poey]	"	Nigrelli (1940:531)
138. "	Melichthys niger (Bloch) [Melichthys bispinosus Gilbert][18]	"	Jahn & Kuhn (1932:102)
139. No mention[1]	Melichthys niger (Bloch) [Melichthys piceus][19]	Outside tank at Bimini, B.W.I., having access to fresh sea water	Nigrelli (1947:25)
140. Skin & Eyes	Monacanthus hispidus (Linnaeus) [Stephanolepis hispidus (L.)]	N.Y. Aquarium	Jahn & Kuhn (1932:103)
141. "	"	"	Nigrelli & Breder (1934:264)

Table 81 continued

Location	Host	Locality	Source
OSTRACIIDAE			
142. Skin & Eyes	*Lactophrys quadricornis* (Linnaeus) and/or *L. polygonia* (Poey)	N.Y. Aquarium	Jahn & Kuhn (1932:103)
	[*Lactophrys tricornis* (L.)][20]		
143. "	*Lactophrys trigonus* (Linnaeus)	"	Jahn & Kuhn (1932:103)
144. "	*Lactophrys triqueter* (Linnaeus)	"	Jahn & Kuhn (1932:103)
TETRODONTIDAE			
145. Eyes	*Sphoeroides annulatus* (Jenyns)	"	MacCallum (1927b:291,300)
	[*Spheroides annulatus*]		
146. Skin & Eyes	"	"	Jahn & Kuhn (1932:103)
	[*Spheroides annulatus* (Jenyns)]		
147. "	*Sphoeroides maculatus* (Bloch & Schneider)	"	Jahn & Kuhn (1932:103)
	[*Spheroides maculatus* (B. & S.)]		
DIODONTIDAE			
148. Skin & Eyes	*Diodon hystrix* Linnaeus	"	Jahn & Kuhn (1932:103)

Synonyms: *Epibdella melleni* MacCallum, 1927
Benedenia (Parabenedenia) melleni (MacCallum, 1927) Johnston, 1929

Additional references: Johnston (1929), Jahn & Kuhn (1930), Nigrelli (1932, 1935a, 1935b, 1939), Breder (1933), Nigrelli & Breder (1933), Alvey (1936), Guberlet (1936), Bychowsky (1937, 1957), Jahn (1937), Stunkard (1937, 1957a), Meserve

Table 81 continued

(1938), Mizelle (1938), Paul (1938), Price (1939), Merriman (1941), Remley (1942), Sproston (1946), Gallien & Le Calvez (1947), Hyman (1951), Brinkmann (1952a, 1952b), Ivanov (1952), Euzet (1955, 1957a, 1957b, 1958), Frankland (1955), Hargis (1955a, 1957), Koratha (1955a), Winter (1955), Bauer (1956, 1959), Dawes (1956), Llewellyn (1957a, 1957b, 1963), Tripathi (1959), Baer & Euzet (1961), Dogiel et al (1961), Randall (1961), Kearn (1963a, 1963b, 1963d, 1967b), Lamothe-Argumedo (1963), Yamaguti (1963)[21], Freeman (1964), Cheng (1964), Sindermann (1966), Williams (1967); Baer (1951), Rogers (1962).

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[1]The location of the parasite with respect to the host is presumed to have been the skin.

[2]Pomacanthus arcuatus (L.) has been changed to Pomacanthus paru (Bloch), and the former P. aureus has been changed to P. arcuatus (L.) (Bailey, 1970:78).

[3]Galeichthys milberti is a synonym of Arius felis (Linnaeus) (Kanazawa, personal communication).

[4]Dermatolepis marmoratus Osburn & Mowbray is a synonym of Dermatolepis inermis (Valenciennes) (Kanazawa, personal communication; Böhlke, personal communication).

[5]Roccus lineatus Bloch is a synonym of Roccus saxatilis (Walbaum) (Bigelow & Schroeder, 1953a:389). Roccus saxatilis (Walbaum) is now a synonym of Morone saxatilis (Walbaum); the genus Morone was removed from the family Serranidae and put into a new family Percichthyidae (Bailey, 1970:74).

[6]Caranx chrysos is a synonym of Caranx fuscus (Geoffroy-St. Hilaire) (Randall, 1968:109).

[7]Trachinotus glaucus (Bloch) is a synonym of Trachinotus goodei Jordan & Evermann (Böhlke & Chaplin, 1968:339).

[8]Evoplites viridis (Valenciennes) is a synonym of Lutjanus viridis (Valenciennes) (Kanazawa, personal communication).

[9]Salema rhomboidalis (Linnaeus) is a synonym of Archosargus rhomboidalis (Linnaeus) (Kanazawa, personal communication; Böhlke, personal communication).

Table 81 continued

[10]*Psettis argentus* is a synonym of *Monodactylus argenteus* (Linnaeus) (Kanazawa, personal communication).

[11]*Angelichthys isabelita* is a synonym of *Holacanthus bermudensis* Goode (Kanazawa, personal communication).

[12]*Angelichthys ciliaris* (Linnaeus) is a synonym of *Holacanthus ciliaris* (Linnaeus) (Kanazawa, personal communication).

[13]"*A. townsendi* Nichols & Mowbray is a hybrid between *H. bermudensis* and *H. ciliaris*" (Kanazawa, personal communication).

[14]*Trechocopus scrofa* (C. & V.) is a synonym of *Diastodon speciosus* Bowdich (Kanazawa, personal communication).

[15]*Julis pavo* (C. & V.) = *Thalassoma pavo* (Linnaeus) (Wheeler, personal communication; Bailey, personal communication).

[16]*Acanthurus hepatus* (Linnaeus) is a synonym of *Acanthurus chirurgus* (Bloch). "Many recent authors have applied the name *Acanthurus hepatus* to the species *Acanthurus chirurgus*" (Randall, 1956:225). "*Acanthurus hepatus* (=*chirurgus*)" (Randall, 1961:221).

[17]*Canthidermis sabaco* (Poey) is a synonym of *Canthidermis sufflamen* (Mitchill). "*Canthidermis sobaco* is placed in synonymy of *C. sufflamen*..." (Moore, 1967:699).

[18]*Melichthys bispinosus* Gilbert is a synonym of *Melichthys niger* (Bloch) (Kanazawa, personal communication; Böhlke, personal communication).

[19]*Melichthys piceus* is a synonym of *Melichthys niger* (Bloch) (Randall, 1968:261; Kanazawa, personal communication).

[20]*Lactophrys tricornis* (Linnaeus) is a synonym of *Lactophrys quadricornis* (Linnaeus) (Musick, personal communication). Tyler (1965) split this species in two, making the original *L. quadricornis* plus *L. polygonia* (Poey). Since the identification of the original hosts cannot be verified, it has to be listed as "*L. quadricornis* and/or *L. polygonia*."

Table 81 continued

[21] Yamaguti (1963:128) neglected to list the natural hosts given by Nigrelli (1947).

Table 82. Neobenedenia adenea (Meserve, 1938) Yamaguti, 1963.

Location	Host	Locality	Source
1. Gills	Mycteroperca sp.	Socorro Island, Mexico	Meserve (1938: 36, 38)
2. Gills	Mycteroperca pardalis (Gilbert) [Mycteroperca pardalis Gilbert]	La Paz, Baja California, Mexico	Bravo-Hollis (1958: 196)
3. Gills	Scarops perrico (Jordan & Gilbert) [Scarus perrico (Jordan & Gilbert)]	"	Bravo-Hollis (1958: 196)

Synonyms: Benedenia adenea Meserve, 1938
Benedenia anadenea Meserve, 1938

Additional references: Price (1939), Manter (1940), Sproston (1946), Hargis (1955a), Winter (1955), Baer & Euzet (1961), Lamothe-Argumedo (1963), Yamaguti (1963).

Table 83. Neobenedenia girellae (Hargis, 1955) Yamaguti, 1963.

Location	Host	Locality	Source
1. Skin	Girella nigricans (Ayres)	La Jolla, California	Hargis (1955a: 48)
2. Gills	Mycteroperca pardalis (Gilbert) [Mycteroperca pardalis Gilbert]	La Paz, Baja California, Mexico	Bravo-Hollis (1958: 201)
3. Gills	Scarops perrico (Jordan & Gilbert) [Scarus perrico (Jordan & Gilbert)]	Bahia de Banderas, Nayarit, Mexico	Lamothe-Argumedo (1963: 26)

Synonym: Benedenia girellae Hargis, 1955

Additional reference: Yamaguti (1963).

Table 84. <u>Neobenedenia isabellae</u> (Meserve, 1938) Yamaguti, 1963.

Location	Host	Locality	Source
1. Gills	"unidentified, spotted, grouper-like fish"	Isabel Island, Mexico	Meserve (1938: 35)
2. Gills	<u>Mycteroperca olfax</u> (Jenyns)	Isla Isabela, Nayarit, Mexico	Lamothe-Argumedo (1963: 31-32)

Synonym: <u>Benedenia isabellae</u> Meserve, 1938

Additional references: Price (1939), Manter (1940), Sproston (1946), Hargis (1955a), Winter (1955), Baer & Euzet (1961), Yamaguti (1963).

Table 85. Neobenedenia muelleri (Meserve, 1938) Yamaguti, 1963.

Location	Host	Locality	Source
1. Gills	Cratinus agassizii Steindachner	Tagus Cove, Albemarle Island, Galapagos Islands	Meserve (1938: 40)

Synonyms: Entobdella muelleri Meserve, 1938
Benedenia muelleri (Meserve, 1938) Price, 1939

Additional references: Price (1939), Manter (1940), Sproston (1946), Brinkmann (1952a), Hargis (1955a), Winter (1955), Baer & Euzet (1961), Lamothe-Argumedo (1963), Yamaguti (1963).

Table 86. Neobenedeniella congeri (Yamaguti, 1958) Yamaguti 1963.

Location	Host	Locality	Source
1. Gills	Astroconger myriaster (Brevoort) [Conger myriaster Brevoort]	Inland Sea, Japan	Yamaguti (1958: 54)

Synonym: Benedeniella congeri Yamaguti, 1958

Additional reference: Yamaguti (1963).

Table 87. Oligoncobenedenia nasonis Yamaguti, 1965.

Location	Host	Locality	Source
1. Gills	Naso hexacanthus (Bleeker)	Hawaii	Yamaguti (1965:58)

Table 88. Pseudallobenedenia apharei Yamaguti, 1966.

Location	Host	Locality	Source
1. Gills	Aphareus rutilans (Cuvier & Valenciennes)	Hawaii	Yamaguti (1966: 419)

Table 89. Pseudallobenedenia opakapaka Yamaguti, 1966.

Location	Host	Locality	Source
1. Gills	Pristipomoides microlepis (Bleeker)	Hawaii	Yamaguti (1966: 422)

Table 90. *Pseudoentobdella pacifica* (Guberlet, 1936) Yamaguti, 1963.

Location	Host	Locality	Source
1. Buccal cavity	*Myliobatis californica* Gill [*M. californicus*]	Elkhorn Slough, Monterey Bay, California	Guberlet (1936: 954, 958, 961)[1]
2. Body[2]	"	Coast of California	Guberlet ((1936)1937: 458, 463)[3]
3. No mention	"	California (no specific locality given)	Koratha & Martin (1960: 14)

Synonyms: *Epibdella pacifica* Guberlet, 1936
Benedenia pacifica (Guberlet, 1936) Price, 1939

Additional references: MacGinitie (1935), Price (1939), Sproston (1946), Winter (1955), Bychowsky (1957), Baer & Euzet (1961), Kearn (1962a), Lamothe-Argumedo (1963), Yamaguti (1963).

[1]MacGinitie (1935: 679) gave the original reference to this species as "*Epibdella* ...Guberlet, sp. nov." He collected the specimens and gave them to Guberlet to describe.

[2]It is not known why Guberlet (1936: 961) would say this parasite was obtained "from the buccal cavity of the sting ray," when Guberlet ((1936)1937: 463) said "Fig. 5.--*Epibdella pacifica*, n. cp. parasito en el cuerpo de *Myliobatus californicus*."

[3]Probably a repeat of Guberlet (1936).

Table 91. *Pseudoentobdella pugetensis* (Robinson, 1961) Yamaguti, 1963.

Location	Host	Locality	Source
1. Gills	*Atheresthes stomias* (Jordan & Gilbert)	Salmon Banks, Puget Sound, Washington	Robinson (1961: 248)

Synonym: *Entobdella pugetensis* Robinson, 1961

Additional references: Caballero & Bravo-Hollis (1962), Yamaguti (1963).

Table 92. Encotyllabe nordmanni Diesing, 1850.

Location	Host	Locality	Source
1. "in fauce" (jaws/ throat)	Brama brama Bonnaterre [Brama mediterranea][1]	No mention[2]	Diesing (1850: 428)
2. Buccal cavity	Chromis chromis (Linnaeus) [Heliastes chromis L.]	French waters (p. 43)	Froissant (1930: 64)

Synonyms: Tristomi sp. of Nordmann
Tristoma excavatum Nordmann in Diesing, 1850
Tristoma nordmanni (Diesing, 1850) Taschenberg, 1878
Plectanocotyle nordmanni (Diesing, 1850) Braun, 1890

Additional references: Krøyer (1838-40*), Diesing (1858a, 1858b*), Beneden & Hesse (1864), Linstow (1878), Taschenberg (1878b), Braun (1890a), Monticelli (1892a, 1907), Saint-Remy (1891d, 1892c), Perrier (1897*), Pratt (1900), Benham (1901)[3], Stiles & Hassall (1908), Parona (1912), Nicoll (1915), Fuhrmann (1928), Sprehn (1933), Yamaguti (1934, 1963), Meserve (1938), Price (1939), Perez-Vigueras (1940), Sproston (1946), Palombi (1949), Dawes (1956), Bychowsky (1957), Tripathi (1959), Noble (1966), Lebedev (1967); Cheng (1964).

[1] Brama mediterranea is a synonym of Brama brama Bonnaterre (Mead, personal communication).

[2] No locality was given originally (Diesing, 1850 1858a); Braun (1890a: 547) said Mediterranean Sea (?); Monticelli (1907: 11) said Mediterranean; authors since have cited the locality as Mediterranean--which may be correct, but I found no definite locality reference.

[3] Benham (1901: 50) said "nostril of bream."

Table 93. *Encotyllabe caranxi* Lebedev, 1967.

Location	Host	Locality	Source
1. Gills	*Caranx lutescens* (Richardson)[1]	Great Australian Bight and Tasman Sea	Lebedev (1967:530)

[1]Kanazawa (personal communication) indicated that the current name was *Caranx lutescens* (Richardson). Paxton (personal communication) mentioned a *Usacaranx lutescens*, which "was described by Richardson in 1843 as *Scomber lutescens*." If *Caranx lutescens* (Richardson) = *Usacaranx lutescens* (Richardson), then there is a possibility that the host was misidentified by Lebedev (1967) because Paxton (personal communication) noted "The species [*Usacaranx lutescens*] occurs in New Zealand, but is unknown from the waters of Australia."

Table 94. *Encotyllabe chironemi* Robinson, 1961.

Location	Host	Locality	Source
1. Gills	*Cheilodactylus spectabilis* (Hutton) [*Chironemus spectabilis* (Hutton)][1]	Cook Strait, New Zealand	Robinson (1961:247)

Additional references: Yamaguti (1963), Noble (1966), Lebedev (1967).

[1]*Chironemus spectabilis* (Hutton) is a synonym of *Cheilodactylus spectabilis* (Hutton) (Paxton & Talbot, personal communication).

Table 95. Encotyllabe embiotocae Noble, 1966.

Location	Host	Locality	Source
1. Tongue	Cymatogaster aggregata Gibbons	Goleta Beach, California	Noble (1966:145)
2. Tongue	Amphistichus argenteus Agassiz	Goleta Beach, California	Noble (1966:145)

Additional reference: Lebedev (1967).

Table 96. Encotyllabe latridis Lebedev, 1967.[1]

Location	Host	Locality	Source
1. Gills	Latridopsis forsteri (Castelnau) [Latris forsteri]	Tasman Sea	Lebedev (1967:532)

[1] Lebedev (1967) indicated that this species had two tandem testes. This testicular arrangement does not agree with Yamaguti's (1963:131) description of the genus "Testes two, juxtaposed, pre-equatorial." This species should be restudied in order to ascertain if its characteristics are close enough to Encotyllabe to warrant its inclusion in the genus (with appropriate emendation to the genus) or if it should be place in another genus, possible new.

Table 97. *Encotyllabe lintoni* Monticelli, 1909.

Location	Host	Locality	Source
1. Gills	*Calamus calamus* (Valenciennes)	Flatts, Bermuda	Linton (1907: 85,103)

Synonym: *Encotyllabe* sp. of Linton, 1907

Additional references: Monticelli (1909), Yamaguti (1934, 1963), Price (1937a, 1939), Meserve (1938), Perez-Vigueras (1940), Sproston (1946), Koratha (1955b), Tripathi (1959), Robinson (1961), Noble (1966), Lebedev (1967).

Table 98. *Encotyllabe lutiani* Tripathi, 1959.

Location	Host	Locality	Source
1. No mention	*Lutjanus johni* (Bloch) [*Lutjanus johnii*]	Madras (Bay of Bengal), India	Tripathi (1959: 71)

Additional references: Yamaguti (1963), Noble (1966), Lebedev (1967).

Table 99. Encotyllabe masu Ishii & Sawada, 1938 [1].

Location	Host	Locality	Source
1. Gill	Oncorhynchus masu (Brevoort) [Oncorhynchus masou]	Japan (no specific locality given)	Ishii & Sawada (1938b: 241)

Additional references: Price (1939), Perez-Vigueras (1940), Yamaguti (1943a, 1963), Sproston (1946), Bychowsky (1957), Tripathi (1959), Robinson (1961), Noble (1966), Lebedev (1967).

[1]Yamaguti (1943a: 2) listed this as a synonym of Encotyllabe spari, but he later (1963: 131) listed it as a distinct species. Studies need to be made to ascertain if it is a synonym of E. spari, and if Oncorhynchus masu was an accidental host, a belief of Bychowsky (1957: 262).

Table 100. Encotyllabe monticellii Perez-Vigueras, 1940.

Location	Host	Locality	Source
1. "post-boca"	Calamus bajonado (Bloch & Schneider)	La Chorrera (north of Havana, Cuba)	Perez-Vigueras (1940: 224)

Additional references: Manter (1954), Koratha (1955a), Perez-Vigueras (1955), Yamaguti (1963), Noble (1966), Lebedev (1967).

Table 101. *Encotyllabe pagelli* Beneden & Hesse, 1863[1].

Location	Host	Locality	Source
1. Buccal cavity	*Pagellus bogaraveo* (Brünnich)	Coast of Brittany	Beneden & Hesse (1864: 80)[1]
	[*Pagellus centrodontus*][2]		
2. Gills	" [*Sparus centrodontus* De La Roche]	West coast of Ireland off Galway Bay area	Little (1929a: 25,26)

Synonym: *Tristomum pagelli* (Beneden & Hesse, 1863) Taschenberg, 1878

Additional references: Taschenberg (1878b), Cunningham (1887*), Monticelli (1888, 1892a, 1907), Linstow (1889b), Braun (1890a), Saint-Remy (1891d, 1892c), Saint-Loup (1895), Gamble (1896), Perrier (1897*), Stiles & Hassall (1908), Nicoll (1915), MacCallum (1917), Froissant (1930), Sprehn (1933), Yamaguti (1934, 1963), Meserve (1938), Price (1939), Perez-Vigueras (1940), Sproston (1946), Dawes (1956), Tripathi (1959), Noble (1966), Lebedev (1967).

[1] See Table 76, footnote 1.

[2] *Pagellus centrodontus* is a synonym of *Pagellus bogaraveo* (Brünnich) (Wheeler, 1969: 354).

Table 102. *Encotyllabe pagrosomi* MacCallum, 1917.

Location	Host	Locality	Source
1. Mouth and throat	*Chrysophrys auratus* (Bloch & Schneider) [*Pagrosomus auratus*]	Australian waters[1]	MacCallum (1917:50)
2. Gills	*Caulolatilus* sp.[2]	James Island, Galapagos Isl.	Meserve (1938:41)
3. Gills	*Pomadasys macracanthus* (Günther)	Mazatlan, Sinaloa, Mexico	Bravo-Hollis (1958:211)

Additional references: Yamaguti (1934, 1963), Price (1937a, 1939), Manter (1940), Perez-Vigueras (1940), Sproston (1946), Winter (1955), Bychowsky (1957), Tripathi (1959), Baer & Euzet (1961), Robinson (1961), Noble (1966), Lebedev (1967), Young (1967b).

[1]Price (1937a:25) said it was collected April 12, 1916, at Sydney, Australia.

[2]Sproston (1946:519) listed the host as "*Caulolatilus princeps* (Jenyns)" -- with no explanation as to whence this information was derived or how she knew it was *Caulolatilus princeps*.

Table 103. Encotyllabe paronae Monticelli, 1907.

Location	Host	Locality	Source
1. No mention[1]	Thalassoma pavo (Linnaeus) [Crenilabrus pavo][2]	Genova, Italy	Parona & Perugia (1890a: 6)

Synonym: Encotyllabe n. sp. ? of Parona & Perugia, 1890

Additional references: Braun (1890a), Saint-Remy (1891d, 1892c), Parona (1896, 1912), Monticelli (1907), Stiles & Hassall (1908), Yamaguti (1934, 1963), Meserve (1938), Price (1939), Perez-Vigueras (1940), Sproston (1946), Palombi (1949), Dawes (1956), Tripathi (1959), Noble (1966), Lebedev (1967).

[1] Monticelli (1907:13) and Palombi (1949: 262) both said "branchie?"

[2] Crenilabrus pavo is a synonym of Thalassoma pavo (L.) (Bailey, personal communication; Steinitz, personal communication). Palombi (1949: 262) said that Crenilabrus pavo Cuv. was a synonym of Symphodus tinca (L.) However, Wheeler (personal communication) and Bailey (personal communication) both noted that Symphodus tinca (L.) = Crenilabrus tinca (L.).

Table 104. *Encotyllabe pricei* Koratha, 1955.

Location	Host	Locality	Source
1. Gills	*Scorpaena plumieri* Bloch	Port Aransas, Texas	Koratha (1955a: 244)

Additional references: Koratha (1955b), Robinson (1961), Yamaguti (1963), Noble (1966), Lebedev (1967).

Table 105. *Encotyllabe spari* Yamaguti, 1934.

Location	Host	Locality	Source
1. Gills	*Sparus macrocephalus* (Basilevsky)	Inland Sea, Japan	Yamaguti (1934: 265)
2. Gills	*Diagramma pictum* (Thunberg) [*Plectorhynchus pictus* (Thunberg)][1]	"	Yamaguti (1934: 265)
3. Gills	*Epinephelus akaara* (Temminck & Schlegel)	"	Yamaguti (1934: 265)

Additional references: Ishii & Sawada (1938b), Price (1937a, 1939), Meserve (1938), Perez-Vigueras (1940), Sproston (1946), Bychowsky (1957), Tripathi (1959), Baer & Euzet (1961), Robinson (1961), Yamaguti[2] (1963), Noble (1966), Lebedev (1967).

[1] *Plectorhynchus pictus* (Thunberg) is a synonym of *Diagramma pictum* (Thunberg) (Paxton and Talbot, personal communication).

[2] See Table 99, footnote 1.

Table 106. *Encotyllabe vallei* Monticelli, 1907.

Location	Host	Locality	Source
1. No mention[1]	*Sparus aurata* Linnaeus [*Chrysophrys aurata*]	Trieste, Italy (Coll. by A. Valle)	Monticelli (1907:14)
2. Gills	"*Dentex* sp.?"	No mention[2]	Palombi (1949:261)

Additional references: Monticelli (1909), Parona (1912), Yamaguti (1934, 1963[3]), Meserve (1938), Price (1939), Perez-Vigueras (1940), Sproston (1946), Dawes (1956), Tripathi (1959), Noble (1966), Lebedev (1967).

[1]Monticelli (1907:14) gave no location with respect to the host. It is unknown whence Palombi (1949:260) obtained the information "Sulle branchie e nella cavita boccale."

[2]From Helminthological Collection of Central Italy.

[3]Yamaguti (1963:132) neglected to list "*Dentex* sp.?" as a host.

Table 107. Nitzschia sturionis (Abildgaard, 1794) Kroyer, 1852[1].

Location	Host	Locality	Source
1. No mention[2]	Acipenser sturio Linnaeus	Danish waters[3]	Abildgaard (1794)* In Brinkmann (1952b:50)
2. Gills	"	Europe	Nitzsch (1826)* In Sproston (1946:312)
3. Gill slits	" ["störs"][4,5]	No mention (East Prussia)[4]	Baer (1827:673)
4. Gills	A. sturio L.	No mention	Leuckart* (?) In Diesing (1850:426)
5. Gills	" ["Accipenser acutirostris Purnell"][5]	Scotland[6]	Blanchard (1847:329)
6. No mention	A. sturio L.	Denmark	Kroyer (1852-53)* In Sproston (1946:312)
7. Jaws	"	Coll. of M. Siebold	Baird (1853:42)
8. Gills & skin of mouth, particularly the opercules	No mention[7]	Coast of Brittany[8]	Beneden & Hesse (1864:68)[9]
9. Gills	A. sturio L.	Öresund (Denmark) (Mus. Ludense)	Olsson (1868:17)
10. Gill cavity	" ["störe"][5]	From Kraepelin & Brunn in Hamburg	Braun (1889a:433)
11. No mention	A. sturio L. (p. 527)	North Sea	Braun (1890a:494)[10]
12. Gill cavity	" [Sturgeon][5]	No mention	Braun (1890b:597)[11]

Table 107 continued

Location	Host	Locality	Source
13. Branchial cavity & opercules	A. sturio L.	No mention[12]	Monticelli (1908:19)
14. Gills	"	Germany (p. 1)	Lühe (1909:5)
15. No mention	"	French waters (p. 43)	Froissant (1930:56)
16. Gills	"	Leningrad, U.S.S.R.	Markevich (1934)* In Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 6:1084.
17. Gills (p.262)	"	Volga River, U.S.S.R. (p.262)	Ivanov & Murygin (1937:267)
18. Gills	"	Oslofjord, Norway (Coll. by Esmark)	Brinkmann (1952b:50)
19. Gills	"	Bergen, Norway (Coll. by ?)	Brinkmann (1952b:50)
20. Gills	"	Herøysund (Sundhordl.), Norway (Coll. by Bjerkan)	Brinkmann (1952b:50)
21. Gills	Acipenser güldenstädti Brandt	No mention[13]	Creplin (1846)* In Diesing (1850:426)[14]
22. Lower lip of mouth cavity	"	Zool. Mus. of Un. of Königsberg (Coll. by Vanhöffen)	Muehling (1898:17)
23. Gills	"	Volga River, U.S.S.R.	Skorikov (1903)* In Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 6:1083.

Table 107 continued

Location	Host	Locality	Source
24. Gills (p.262)	A. güldenstädti Brandt	Volga River, U.S.S.R. (p.262)	Ivanov & Murygin (1937: 267)
25. Gills	Acipenser nudiventris Lovetzky	Aral Sea	Dogiel & Lutta (1937)* In Bauer (1959: 8)[15]
26. Gills	" [Aral sturgeon][16]	Aral Sea	Osmanov (1959: 206)
27. No mention	A. nudiventris Lovetsky	Syr-Darya River, U.S.S.R.	Kolesnikova (1963)* In Ind.-Cat. Vet. Zool., Supp. 16, Pt. 3: 74.
28. No mention	Acipenser stellatus Pallas	To Aral Sea from Caspian	Dogiel & Lutta (1937)* In Bauer (1959: 8)
29. Gills (p.262)	"	Volga River, U.S.S.R. (p.262)	Ivanov & Murygin (1937: 268)
30. Gills	A. stellatus Pallas [Aral sturgeon][16]	Aral Sea	Osmanov (1959: 206)
31. Buccal cavity	Huso huso (Linnaeus).	Island of Sara (Caspian Sea)	Bychowsky (1957: 23)[17]
32. No mention	"	Black Sea (near Batumi)	Kurashvili (1960: 255)
33. Gills	"	Ural River, U.S.S.R.	Agapova (1966: 246-247)
34. ?	Abramis sapa (Pallas)[18] ["белоглазка"]	Kura River, U.S.S.R.	Mikailov (1963: 153)
35. ?	Aspius aspius (Linnaeus)[18] ["жерех"]	Kura River, U.S.S.R.	Mikailov (1963: 153)

Table 107 continued

Location		Host	Locality	Source
36.	?	Barbus barbus (Linnaeus)[18] ["усач"]	Kura River, U.S.S.R.	Mikailov (1963:153)
37.	?	Chalcalburnus chalcoides (Güldenstädt)[18] ["шамая"]	Kura River, U.S.S.R.	Mikailov (1963:153)
38.	?	Rutilus rutilus caspicus (Jakoelew)[18] ["вобла"]	Kura River, U.S.S.R.	Mikailov (1963:153)
39.	No mention	No mention	No mention	Bychowsky (1937:1355)[19]

Synonyms: Hirudo sturionis Abildgaard, 1794
Tristoma elongatum Nitzsch, 1826
Nitzschia elegans Baer, 1826
Tristoma sturionis (Abildgaard, 1794) of Cuvier, 1829, and Blainville, 1828
Capsala elongata (Nitzsch, 1826) Nordmann, 1840
Tristoma elegans (Baer, 1826) of Beneden & Hesse, 1863[9]
Nitzschia elongata (Nitzsch, 1826) Johnston, 1865
Phylline sturionis (Abildgaard, 1794) Monticelli, 1908
Hitxschia sturionis of Mikailov, 1963, p. 153 (lapsus)

Additional references: Abildgaard (1797*), Oken (1815*), Baer (1826*), Audouin (1828*), Blainville (1828*), Cuvier (1829*, 1849*), Nordmann (1832, 1840), Diesing (1835*, 1836a, 1850, 1858a), Dujardin (1845*), Moquin-Tandon (1846*), Koelliker (1849), Beneden (1858*, 1871), Johnston (1865*), Olsson (1869a*), Linstow (1878, 1889b, 1893, 1903b*), Taschenberg (1878b, 1879b), Braun (1889b, 1889c*, 1892*), Monticelli (1892a, 1904), Saint-Remy (1891c, 1892c, 1892d), Goto (1894), Stiles & Hassall (1894*, 1908), Kathariner (1895), Saint-Loup (1895), Gamble (1896), Parona (1896), Perrier (1897*), Pratt (1900, 1916, 1935), Benham (1901), Hofer (1904*), Wolf (1908*), Wegener (1910), Tagliani (1912), Nicoll (1915), Ward (1918), MacCallum (1921, 1927b), Isaichikov (1925),

Table 107 continued

Bittner & Sprehn (1928*), Fuhrmann (1928), Vlassenko (1928), Johnston (1929), Sprehn (1930, 1933), Ivanov & Murygin (1936*), Lutta (1937*,1940*,1941*), Dogiel & Bychowsky (1938*)[20], Guiart (1938), Dogiel (1939*), Price (1939), Bykhovskaya-Pavlovskaya & Bychowsky (1940), Sproston (1946)[21], Markevich (1951), Akhmerov (1952), Dubinin (1952), Petrushevskii (1954), Shulman (1954*), Polyanski (1955), Dawes (1956), Agapova (1957), Euzet (1958), Bauer (1959), Mikailov (1959*)[20], Roman (1960*), Baer & Euzet (1961), Dogiel et al (1961), Bykhovskaya-Pavlovskaya et al (1962), Kearn (1963a, 1963b, 1963d), Llewellyn (1963), Markov, Trusov & Reshetnikova (1963), Yamaguti (1963), Reichenbach-Klinke (1966), Sindermann (1966), Smyth (1966); Taschenberg (1879a), Bychowsky, Gussev, & Dubinina (1964).

[1]A few host-locality records for this species may have been omitted because of unavailable Russian literature. Agapova (1966:92) said it had been recorded from the gills and mouth cavity of sturgeons from the Black Sea, Taganrogskiy Bay of the Sea of Azov, the Caspian Sea, the lower reaches of the Volga River, the lower reaches of the Ural River, the Aral Sea, and the lower reaches of the Syr-Daria River.

Because several acipenserid hybrids exist (Table 253), one must be extremely careful in making host identifications for this parasite.

[2]Diesing (1850:426) said gills.

[3]Brinkmann (1952b:50) said, "The worm was collected from the common sturgeon, most likely in Danish waters."

[4]Wegener (1910:250) said that Baer (1827) found it in East Prussia on "Kiemenspalten" of Acipenser sturio Linnaeus. I could find no locality given in Baer (1827).

[5]"As the sturgeon was Scottish I have no doubt that it was A. sturio, of which A. latirostris Parnell is a synonym; this also goes for any western European sturgeon" (Wheeler, personal communication).

[6]Blanchard (1847:329) got the specimens from the Museum at Oxford from Dr. Melleville.

[7]Although the host was not mentioned, it is presumed to have been Acipenser sturio Linnaeus.

Table 107 continued

[8] Beneden & Hesse (1864:68) studied the living worm.

[9] See Table 76, footnote 1.

[10] "Ich habe...Eier gefunden...im Juli bei Nitzschia elongata N. von Stören der Nordsee" (Braun, 1890a:494).

[11] Probably a repeat of Braun (1890a).

[12] Monticelli (1908) gave no locality. I presume his locality was in the Mediterranean, probably at Naples.

[13] Sproston (1946:312) gave the locality as Europe.

[14] "Creplin: in Wiedemann's Arch. 1846. 149" (Diesing, 1850:426).

[15] Also mentioned in Sindermann (1966:27).

[16] Osmanov (1959:206) said it was on sturgeon. On page 203 he mentioned that, among other fish, 43 Acipenser nudiventris and 3 Acipenser stellatus, were examined. Thus both could be hosts. Berg (1948 (1962):63) said that A. nudiventris "...is the only representative of the sturgeon family in the Aral Sea."

[17] Based on work in 1932 (Bychowsky, 1957:194).

[18] The Index-Catalogue of Medical and Veterinary Zoology, Suppl. 17, Pt. 3:102, listed these five cyprinids as hosts for Nitzschia sturionis. These data were apparently derived from the table on page 153 of Mikailov (1963), where "усач" [=Barbus barbus (Linnaeus)], "вобла" [=Rutilus rutilus caspicus (Jakoelew)], "жерех" [=Aspius aspius (Linnaeus)], "белоглазка" [=Abramis sapa (Pallas)], and "шамая" [=Chalcalburnus chalcoides (Güldenstädt)] were listed as hosts opposite both "Hitxschia [sic] sturionis" and "Diplozoon sp. sp." However, Mikailov (1963:148) said that Nitzschia sturionis was encountered on all sturgeons except "севрюга" [=Acipenser stellatus Pallas] and that "Diplozoon sp. sp." was found on the gills of "6" species of fish. The interpretation of the table on page 153 (Mikailov, 1963) would lead one to believe that "Diplozoon sp. sp." was found on only five species of fish, as are listed by the Index-Catalogue of Medical and Veterinary Zoology, Suppl. 17, Pt. 3:49. As Nitzschia sturionis has been previously reported only from Acipenseridae, and Mikailov (1963:148)

Table 107 continued

said that it was found on sturgeons, I believe that an error has occurred in the table on page 153, there having been a pairing of the wrong hosts with the parasites. Thus, Mikailov's (1963) hosts for N. sturionis should be corrected to "белуга" [=Huso huso (Linnaeus)], "осётр" [=Acipenser baeri Brandt], and "шип" [=Acipenser nudiventris Lovetzky], and the last 6 hosts opposite "Hitzschia [sic] sturionis" and "Diplozoon sp. sp.," all cyprinids, would be hosts for "Diplozoon sp. sp." Thus, "лещ" [=Abramis brama (Linnaeus)] should be added to the list of hosts for "Diplozoon sp. sp." in the Index-Catalogue of Medical and Veterinary Zoology, Suppl. 17, Pt. 3: 49. Finally Acipenser baeri Brandt, which is found in the rivers of Siberia from the Ob' to the Kolyma, occasionally in the Pechora, and in the gulfs of the Ob', Taz, Yenisei, and Khatanga (Berg, 1948 (1962): 85), should be noted as a new host for Nitzschia sturionis.

[19] Larval study. *The same record as mentioned in* Bychowsky (1957)?

[20] Cited by Markov, Trusov & Reshetnikova (1963: 116) as reporting N. sturionis on Acipenser stellatus Pallas from the Caspian Sea. Possibly a repeat of Dogiel & Lutta (1937*).

[21] Sproston (1946: 312) said that Wegener (1910) found this parasite in East Prussia. This is not so. Wegener (1910: 250) said "Ich selbst habe den Parasiten nie gefunden..."

Table 108. Nitzschia monticellii Price, 1939.

Location	Host	Locality	Source
1. Branchial cavity and opercules	Acipenser sturio Linnaeus	Naples? Mediterranean?[1]	Monticelli (1908:19)

Synonym: "forma giovane" of Nitzschia elongata of Monticelli, 1908

Additional references: Price (1939), Sproston (1946), Dawes (1956), Brinkmann (1952b), Yamaguti (1963), Cheng (1964).

[1]Monticelli (1908) gave no locality.

Table 109. Nitzschia quadritestes Pratt & Hermann, 1962.

Location	Host	Locality	Source
1. Gills and mouth	Acipenser transmontanus Richardson	"off mouth of Columbia River in Pacific Ocean and upstream to vicinity of Ranier, Oregon"	Pratt & Hermann (1962: 291)
2. Gills and mouth	Acipenser medirostris[1] Ayres	"	Pratt & Hermann (1962: 291)

[1]"rarely" (Pratt & Hermann, 1962: 291).

Table 110. *Nitzschia superba* MacCallum, 1921.

Location	Host	Locality	Source
1. Gills	*Acipenser oxyrhynchus* Mitchill[1]	Off coast of New England[2]	Verrill (1875:40)
2. Gills	*Acipenser brevirostrum* Lesueur	New York Aquarium, from Atlantic coast	MacCallum (1921:189)
3. Gills	*Acipenser* sp. [*Acipenser sturio* Linnaeus][3,4]	Delaware River, at Philadelphia, Penn.	Leidy (1887:24)[5]
4. Under opercules & on gills	*Acipenser* sp. [*Acipenser sturio* Linnaeus][3]	Woods Hole, Mass.	Linton (1898:508)

Synonyms: *Nitzschia elegans* of Verrill, 1875
Nitzschia elegans of Linton, 1898
Nitzschia elongata of Linton, 1901
? *Nitzschia elegans* Baer of Leidy, 1887[6]

Additional references: Pratt (1900), Linton (1901), MacCallum (1913)[7], Sumner, Osburn & Cole (1913), Ward (1918), Price (1939)[4], Sproston (1946), Brinkmann (1952b), Dawes (1956), Bychowsky (1957), Baer & Euzet (1961), Pratt & Hermann (1962), Yamaguti (1963).

[1]As the host was collected off New England, it was undoubtedly the northern subspecies, *Acipenser oxyrhynchus oxyrhynchus* Mitchill, that was given by Vladykov & Greeley (1963:54).

[2]Price (1939:76) gave Block Island as a locality record, presumably in reference to Verrill's (1875) work. However, Verrill (1875:40) gave no specific locality. Since Verrill's expedition was off the coast of New England, I have noted the locality as such.

Table 110 continued

[3]*Acipenser sturio* Linnaeus is an East Atlantic species (Wheeler, 1969:120), thus this host is undoubtedly a misidentification. It would probably be best to list it as *Acipenser* sp.

[4]Price (1939:76) stated that Stafford (1904) gave a reference to *N. elegans* from *A. sturio*. Stafford (1904) gave no reference to either the parasite or the host. He did mention *Acipenser rubicundus* LeSueur (p. 488, 491, 492) as a host for some parasites. None of Stafford's works (1900, 1902, 1904, 1905, 1907) mentioned *N. elegans* or *A. sturio*. The erroneous record of *N. elegans* from *A. sturio* from Canada as quoted by Price (1939:76) was further compounded by Sproston (1946:313), Pratt & Herman (1962:291), and Yamaguti (1963:133), who all apparently referred to Price's work (1939) without reading the original literature by Stafford. The erroneous record for this species from Canada should be stricken from the record.

[5]"*Nitzschia elegans* Baer. Several specimens of this leech, four lines long, were taken from the gills of the same sturgeon." "...*Acipenser sturio*, of the Delaware River, at Philadelphia" (Leidy, 1887:24).

[6]As *N. sturionis* has not yet been reported from America, the *Nitzschia elegans* Baer of Leidy, 1887, is probably a synonym of *N. superba*.

[7]MacCallum (1913:408) talked about a "*Nitzschia elegans*" which could have been the *N. elegans* of Verrill, 1875, or Linton, 1898.

Table 111. Pseudonitzschia uku Yamaguti, 1965.

Location	Host	Locality	Source
1. Gills	Aprion virescens Cuvier & Valenciennes	Hawaii	Yamaguti (1965: 60)

Table 112. Trochopus tubiporus (Diesing, 1836) Beneden & Hesse, 1863.[1,2]

Location	Host	Locality	Source
1. Gills	Chelidonichthys (Chelidonichthys) lucerna (Linnaeus) [Trigla hirundo][3]	Coll. by Kollar[4]	Diesing (1836a: 4,14)
2. Gills	"	Coast of Brittany[5]	Beneden & Hesse (1864: 74,75)[2]
3. Gills	"	Trieste, Italy	Lorenz (1878: 405,412)
4. Gills	"	Trieste, Italy	Stossich (1898)* In Palombi (1949: 286)
5. No mention	C. (C.) lucerna (L.) [Trigla lucerna]	Bassin d'Arcachon, France	Cuenot (1927)* In Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 8: 1646.[6]
6. No mention	"	French waters (p. 43)	Froissant (1930: 69)

Synonyms: Tristoma tubiporum Diesing, 1836
Capsala tubipora (Diesing, 1836) Nordmann, 1840
Trochopus longipes Diesing, 1850
Tristomum (Trochopus) tubiporum of Taschenberg, 1879

Additional references: Kroyer (1838-40*), Nordmann (1840), Dujardin (1845*), Diesing (1850, 1858a), Linstow (1878, 1889b), Taschenberg(1878b, 1879a), Monticelli (1888, 1892a), Braun (1890a), Parona & Perugia (1890a), Saint-Remy (1891c, 1892b, 1892c, 1892d, 1898), Sonsino (1891)[7], Saint-Loup (1895), Perrier (1897*), Pratt (1900), A. Scott (1901b), T. Scott (1901), Parona & Monticelli (1902), Massa (1903, 1906[7]), Stiles & Hassall (1908), Parona (1912), Nicoll (1915), Sprehn (1933), Guiart (1938), Price (1939), Sproston (1946)[8], Palombi (1949), Dawes (1956), Bychowsky (1957), Yamaguti (1963)[9], Arai & Koski (1964).

Table 112 continued

[1] A study needs to be made to ascertain the identities of all the Mediterranean species of this genus. As *T. tubiporus* is found on the same host as *T. brauni*, *T. diplacanthus*, *T. gaillimhe*, *T. heteracanthus*, *T. micracanthus*, and *T. pini*, there is a possibility that one or more species might be synonyms of others.

[2] See Table 76, footnote 1.

[3] *Trigla hirundo* is a synonym of *Chelidonichthys* (*Chelidonichthys*) *lucerna* (Linnaeus) (Richards, 1968:94).

[4] Palombi (1949:286) gave Trieste as the locality for Köllar.

[5] Massa (1906:54) listed their locality as Brest.

[6] No other reference to this work was found in the literature.

[7] Massa (1906:56,57) referred *T. tubiporus* of Sonsino (1891) to *T. pini*.

[8] Sproston (1946:308) erroneously cited "A. Scott, 1901, 143" as a locality record. In reality the correct author was "T." Scott (1901), who did not give a locality record for *T. tubiporus*.

[9] Yamaguti (1963:135) erroneously listed *Cantharus lineatus* as a host.

Table 113. *Trochopus brauni* Mola, 1912.

Location	Host	Locality	Source
1. Skin	*Cottus gobio* Linnaeus[1]	Rome market (in basket with marine fish)	Mola (1912:491, 495,497)
2. Gills	*Chelidonichthys* (*Chelidonichthys*) *lucerna* (Linnaeus) [*Trigla hirundo* Bloch][2]	Cagliari, Sardinia, Italy	Mola (1928)* In Palombi (1949:295)

Synonyms: *Trochopus braunii* Mola, 1912
Trochopus braunni Mola, 1928

Additional references: Bittner & Sprehn (1928*), Sprehn (1930), Price (1939), Sproston (1946), Palombi (1949), Dawes (1956), Bychowsky (1957), Yamaguti (1963)[3], Arai & Koski (1964).

[1]Mola (1912:491, table) indicated that he found "*Trochopus braunii*" on the skin of *Cottus gobio* on not one, but two occasions: March 1906 and April 1906. Mola (1912:497) noted that the *Cottus gobio* which had this species lay in a basket with marine fish, thus the record for this host could be accidental. A transfer could have taken place.

[2]*Trigla hirundo* is a synonym of *Chelidonichthys* (*Chelidonichthys*) *lucerna* (Linneaus) (Richards, 1968:94).

[3]Yamaguti (1963:134) neglected to list *Chelidonichthys* (*Chelidonichthys*) *lucerna* (L) as a host.

Table 114. Trochopus differens Sonsino, 1891.

Location	Host	Locality	Source
1. No mention[1]	Spondyliosoma cantharus (Linnaeus)	Pisa ?	Sonsino (1891: 261)
	[Cantharus lineatus][2]		
2. Gills	"	?	Mola (1928)* In Palombi (1949: 290)
	[Spondyliosoma cantharus Gmelin]		

Synonym: Trochopus longipes of Sonsino, 1890

Additional references: Sonsino (1890a*), Braun (1891), Monticelli (1892a), Saint-Remy (1892b, 1892c), Parona & Monticelli (1902), Massa (1903, 1906), Stiles & Hassall (1908), Mola (1912)[3], Parona (1912), Price (1939), Sproston (1946), Palombi (1949)[4], Dawes (1956), Yamaguti (1963), Arai & Koski (1964).

[1]Palombi (1949: 290) said gills.

[2]Cantharus lineatus is a synonym of Spondyliosoma cantharus (Linnaeus) (Wheeler, 1969: 357).

[3]Mola (1912: 496) listed a "T. pisci"; it it not known to which species he was referring.

[4]Palombi (1949: 290, 291) referred T. longipes of Sonsino (1890a*) to both T. differens and T. heteracanthus; it should probably be under T. differens, as Massa (1906: 60) said.

Table 115. Trochopus diplacanthus Massa, 1903[1].

Location	Host	Locality	Source
1. Gills	Chelidonichthys (C.) lucerna (Linnaeus) [Trigla hirundo][2]	Genova, Italy	Parona & Perugia (1890a: 5)[3]
2. Gills	" ["Trigla hirando"]	Offshore between Lancashire and Isle-of-Man	A. Scott (1901b: 344)[1]
3. Gills	" [Trigla hirundo]	Irish Sea	A. Scott (1904: 115)[4]
4. Gills	"	Tirreno, Italy	Mola (1928)* In Palombi (1949: 293)
5. Gills	Chelidonichthys (Aspitrigla) obscurus (Bloch & Schneider) [Trigla obscura L.]	?	Mola (1928)* In Palombi (1949: 293)

Synonyms: Trochopus pini of Parona & Perugia, 1890, in part[3]
? Placunella pini of A. Scott, 1901
? Placunella pini of A. Scott, 1904

Additional references: Massa (1903, 1906), Stiles & Hassall (1908), T. Scott (1911b), Parona (1912), Sprehn (1933), Price (1939), Sproston (1946), Palombi (1949), Dawes (1956), Yamaguti (1963), Arai & Koski (1964).

[1]Massa (1903: 254) only listed "Sulla Trigla hirundo (dalla collez. Scott [Placunella pini])." He had access to Scott's collection and described this as a new species; he gave no locality. Massa (1906: 64) listed it as "Sulle branchie della Trigla hirundo: Scozia (Scott)."

Table 115 continued

[2] *Trigla hirundo* is a synonym of *Chelidonichthys* (*C.*) *lucerna* (L) (Richards, 1968: 94).

[3] Massa (1906: 56) said that part of *T. pini* of Parona collected at Genova on *Trigla hirundo* was *T. diplacanthus*, the other part being *T. micracanthus*.

[4] A repeat of Scott (1901b: 344)?

Table 116. Trochopus gaillimhe Little, 1929.

Location	Host	Locality	Source
1. Gills	Chelidonichthys (Chelidonichthys) lucerna (Linnaeus) [Trigla hirundo Day][1]	West coast of Ireland[2]	Little (1929b:107)

Additional references: Little (1929a, 1929c), Sprehn (1933), Price (1939), Brinkmann (1940), Yamaguti (1942, 1963), Sproston (1946), Dawes (1956), Arai & Koski (1964).

[1]Trigla hirundo is a synonym of Chelidonichthys (Chelidonichthys) lucerna (Linnaeus) (Richards, 1968:94).

[2]Little (1929a:25) said the locality was on the west coast of Ireland off the Galway Bay area.

Table 117. Trochopus goniistii Yamaguti, 1940.

Location	Host	Locality	Source
1. Gills	Goniistius zonatus (Cuvier & Valenciennes)	Pacific	Yamaguti (1940:46)

Additional references: Yamaguti (1942, 1943a, 1963), Sproston (1946), Bychowsky (1957), Baer & Euzet (1961), Arai & Koski (1964), Young (1967a).

Table 118. Trochopus heteracanthus Massa, 1903.

Location	Host	Locality	Source
1. Skin & Gills	Chelidonichthys (C.) lucerna (Linnaeus) [Trigla corax][1]	Gulf of Naples, Italy	Massa (1903: 252, 254)[2]
2. Skin & Gills	" [Trigla hirundo Bloch][3]	Naples, Italy	Mola (1928)* In Palombi (1949: 292)
3. Skin & Gills	"	Naples, Italy	Palombi (1949: 292)[4,5]
4. Gills	"	Gulf of Naples, Italy	Reichenbach-Klinke (1957: 115, 116)

Synonyms: Trochopus heterachanthus Massa, 1903
Trochopus heterocanthus of Mola, 1912 (lapsus)

Additional references: Massa (1906), Stiles & Hassall (1908), Lo Bianco (1909*), Mola (1912), Parona (1912), Tagliani (1912), Price (1939), Sproston (1946), Dawes (1956), Yamaguti (1963), Arai & Koski (1964), Reichenbach-Klinke (1966).

[1] Trigla corax is a synonym of Chelidonichthys (C.) lucerna (Linnaeus) (Richards, 1968: 94).

[2] Massa (1903) had access to Monticelli's collection and described this one as a new species.

[3] Trigla hirundo is a synonym of Chelidonichthys (C.) lucerna (L.) (Richards, 1968: 94).

[4] Palombi (1949: 291, 287) referred T. tubiporus of Sonsino (1891) to both T. heteracanthus and T. pini. It should probably be under T. pini, as Massa (1906: 56-57) said.

Table 118 continued

[5] Palombi (1949:291,290) referred T. longipes of Sonsino (1890a*) to both T. heteracanthus and T. differens. It should probably be under T. differens, as Massa (1906:60) said.

Table 119. Trochopus hobo Yamaguti, 1942[1].

Location	Host	Locality	Source
1. Gills	Chelidonichthys kumu (Lesson) [Chelidonichthys kumu[2] (Lesson & Garnot)]	Hamazima (=Hamajima), Japan	Yamaguti (1942:122)

Additional references: Yamaguti (1943a, 1963), Baer & Euzet (1961).

[1]Arai & Koski (1964:1009-1010) failed to include this species in their discussion of the genus.

[2]"Also kumu is usually listed as Lesson and Garnot but Garnot did not write the volume in which the species is described" (Richards, personal communication).

Table 120. Trochopus lineatus T. Scott, 1901.

Location	Host	Locality	Source
1. Gill-cavities	Chelidonichthys (Trigloporus) lastoviza (Bonnaterre) [Trigla lineata][1]	Firth of Clyde, Scotland	T. Scott (1901:143)

Additional references: Parona & Monticelli (1902), Massa (1903, 1906), T. Scott (1905, 1911b), Little (1929b), Sprehn (1933), Price (1939), Sproston (1946), Dawes (1956), Yamaguti (1963), Arai & Koski (1964).

[1]Trigla lineata is a synonym of Chelidonichthys (Trigloporus) lastoviza (Bonnaterre) (Richards, 1968:86).

Table 121. Trochopus micracanthus Massa, 1903[1].

Location	Host	Locality	Source
1. Gills	Chelidonichthys (C.) lucerna (Linnaeus) [Trigla hirundo][2]	Genova, Italy	Parona & Perugia (1890a: 5)[1]
2. Gills	"	Genova, Italy	Mola (1928)* In Palombi (1949: 293)
3. Gills	Chelidonichthys (Aspitrigla) obscurus (Bloch & Schneider) [Trigla obscura][3]	Genova, Italy	Mola (1928)* In Palombi (1949: 293)

Synonyms: Trochopus pini of Parona & Perugia, 1890, in part[1]
Trochopus micrachanthus Massa, 1903
Trochopus microcanthus of Massa, 1906 (lapsus)

Additional references: Massa (1903, 1906), Stiles & Hassall (1908), Parona (1912), Sprehn (1933), Price (1939), Sproston (1946), Palombi (1949), Dawes (1956), Yamaguti (1963), Arai & Koski (1964).

[1]Massa (1903: 255) only said "Sulla Trigla hirundo (dalla collez. Parona)." He had access to Parona's collection and described this one as a new species; he gave no mention of Parona's collection locality. Massa (1906: 63) said, "Sulle branchie della Trigla hirundo: Genova (Parona)." Massa (1906: 56) explained that part of Trochopus pini of Parona's collection at Genova from Trigla hirundo was Trochopus micracanthus, the rest being T. diplacanthus.

[2]Trigla hirundo is a synonym of Chelidonichthys (C.) lucerna (Linnaeus) (Richards, 1968: 94).

[3]Trigla obscura is a synonym of Chelidonichthys (Aspitrigla) obscurus (Bloch & Schneider) (Richards, 1968: 92).

Table 122. Trochopus oncacanthus Massa, 1906.

Location	Host	Locality	Source
1. No mention	Host unknown	Trieste, Italy (Coll. by Valle)	Massa (1906: 65)

Synonyms: Trochopus onchacanthus Massa, 1906
Trochopus onchacantus Massa, 1906, of Palombi, 1949 (lapsus)

Additional references: Stiles & Hassall (1908), Mola (1912), Parona (1912), Little (1929b), Price (1939), Sproston (1946), Palombi (1949), Dawes (1956), Yamaguti (1963), Arai & Koski (1964).

Table 123. Trochopus pini (Beneden & Hesse, 1863)[1] Massa, 1903.

Location	Host	Locality	Source
1. Body	Chelidonichthys (Aspitrigla) cuculus (Linnaeus) [Trigla pini][2]	Coast of Brittany[3]	Beneden & Hesse (1864: 72)[1]
2. No mention[4]	" [Trigla cuculus L.]	Pisa ?	Sonsino (1891: 260)
3. Skin	" [Trigla pini]	Naples, Italy	Mola (1928)* In Palombi (1949: 288)
4. No mention[4]	Chelidonichthys (C.) lucerna (Linnaeus) [Trigla hirundo Bloch][5]	Pisa ?	Sonsino (1891: 260)
5. Gills	" [Trigla hirundo]	Portoferraio, Elba, Italy	Parona (1899: 3)
6. Gills	"	Trieste, Italy (Coll. by A. Valle)	Parona (1899: 3)
7. Skin & gills	"	Naples, Italy	Parona (year ?) In Palombi (1949: 288)[6]
8. No mention	C. (C.) lucerna (L.) [Trigla corax][7]	Naples, Italy	Massa (1906: 56)[8]
9. Skin & gills	" [Trigla hirundo Bloch]	Naples & Tirreno, Italy	Mola (1928)* In Palombi (1949: 288)
10. Skin & gills	" [Trigla hirundo Bloch]	Naples, Italy	Palombi (1949: 288)[9]
11. Gills	" [Trigla corax Rond.]	No mention[10]	Euzet (1957b: 474)

Table 123 continued

Synonyms: Placunella pini Beneden & Hesse, 1863[1]
Tristomum pini (Beneden & Hesse) Taschenberg, 1878
Trochopus tubiporus of Sonsino, 1891[11]

Additional references: Taschenberg (1878b), Monticelli (1888), Linstow (1889b), Parona & Perugia (1889, 1890a[8]), Braun (1890a), Saint-Remy (1891c, 1892c), Parona (1896, 1902, 1912), Perrier (1897*), Pratt (1900), A. Scott (1901b, 1904), T. Scott (1901), Parona & Monticelli (1902), Massa (1903), Stiles & Hassall (1908), Nicoll (1915), Sprehn (1933), Price (1939), Sproston (1946)[12], Dawes (1956), Bychowsky (1957), Euzet (1958), Baer & Euzet (1961), Kearn (1963b), Yamaguti (1963), Arai & Koski (1964).

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[1]See Table 76, footnote 1.

[2]Trigla pini is a synonym of Chelidonichthys (Aspitrigla) cuculus (L.) (Richards, 1968: 90).

[3]Braun (1890a: 547) said their locality was Brest.

[4]Palombi (1949: 288) said skin.

[5]Trigla hirundo is a synonym of Chelidonichthys (C.) lucerna (L.) (Richards, 1968: 94).

[6]I was unable to verify Palombi's (1949: 288) reference to the collection of this species by Parona at Napoli.

[7]Trigla corax is a synonym of Chelidonichthys (C.) lucerna (L.) (Richards, 1968: 94).

[8]Massa (1906: 56) said that the form determined to be T. pini, collected by Parona at Genova from Trigla hirundo, can be referred to T. diplacanthus and T. micracanthus. Palombi (1949: 288) apparently forgot about this, and erroneously included the Genova collection of Parona on Trigla hirundo under T. pini. Palombi (1949: 293) correctly listed Parona's records for T. diplacanthus and T. micracanthus, however.

Table 123 continued

[9] Palombi (1949:291,287) referred *T. tubiporus* of Sonsino, 1891 to both *T. heteracanthus* and *T. pini*; but he correctly listed Sonsino (1891) only under *T. pini*. It should probably be under *T. pini*, as Massa (1906:56,57) said.

[10] Sete, France ?

[11] Massa (1906:56,57) referred *T. tubiporus* of Sonsino (1891) to *T. pini*.

[12] Sproston (1946:309) erroneously listed Sonsino (1891:260) as "1901, 200," and gave Naples instead of Pisa as the locality.

Table 124. *Trochopus plectropomi* Young, 1967.

Location	Host	Locality	Source
1. Gills	*Plectropomus maculatus* (Bloch)	Heron Island, Queensland, Australia	Young (1967a:1012)

Table 125. *Trochopus sprostoni* Arai & Koski, 1964.

Location	Host	Locality	Source
1. Gills	*Scorpaena guttata* Girard	Santa Catalina Channel, Calif.	Arai & Koski (1964:1007)

Possible synonym: Trochopodinae n. sp. of Koratha & Martin, 1963[1]

[1] Koratha & Martin (1963:27) mentioned a Trochopodinae n. sp. which was found "on" *Scorpaena guttata*, the same host from which *Trochopus sprostoni* was described. Arai & Koski (1964) did not mention whether their *T. sprostoni* was the same as the Trochopodinae n. sp. of Koratha & Martin (1963).

Table 126. *Trochopus* sp. of Reichenbach-Klinke, 1957.

Location	Host	Locality	Source
1. Gills	*Scorpaena porcus* Linnaeus	Gulf of Naples, Italy	Reichenbach-Klinke (1957:115, 116)

Table 127. *Trochopus* sp. of Kearn, 1963.

Location	Host	Locality	Source
1. Gills	*Trigla* sp.[1]	Laboratoire Arago, Banyuls sur Mer, France	Kearn (1963d: 760)

Additional reference: Smyth (1966).

[1]This *Trigla* sp. could refer to a species in any of the three genera, *Trigla*, *Lepidotrigla*, or *Chelidonichthys*, that were discussed by Richards (1968: 78).

Table 128. *Allomegalocotyla johnstoni* (Robinson, 1961) Yamaguti, 1963.

Location	Host	Locality	Source
1. Gills	*Latris lineata*[1] (Forster)	Cook Strait, New Zealand	Robinson (1961: 246)

Synonym: *Megalocotyle johnstoni* Robinson, 1961

Additional reference: Yamaguti (1963).

[1]Also cited by some authors (D. Graham, 1956: 256; Parrott, 1957: 123; 1959: 52; Scott, 1962: 206) as *Latris lineata* (Bloch & Schneider).

Table 129. *Macrophyllida antarctica* (Hughes, 1928) Johnston, 1929.

Location	Host	Locality	Source
1. Gills	*Mustelus antarcticus* (Günther)	Port Phillip Bay, Victoria, Australia	Hughes (1928: 48)

Synonym: *Macrophylla antarctica* Hughes, 1928

Additional references: Johnston (1929, 1930a), Price (1939), Sproston (1946), Bychowsky (1957), Yamaguti (1963).

Table 130. *Megalocotyle marginata* Folda, 1928.

Location	Host	Locality	Source
1. Gills	*Sebastes nebulosus* Ayres [*Sebastodes nebulosus* (Ayres)]	Friday Harbor, Wash.	Folda (1928:197)
2. Gills	"	Puget Sound, Wash.	Guberlet (1934:324)
3. Gills	*Sebastes caurinus* Richardson [*Sebastodes caurinus* (Richardson)]	Puget Sound, Wash.	Guberlet (1934:324)
4. Gills	"	Puget Sound, Wash.	Bonham (1950:99)
5. Gills	"	Friday Harbor, Wash.	Robinson (1961:244)
6. Gills	*Sebastes maliger* (Jordan & Gilbert) [*Sebastodes maliger* (J. & G.)]	Puget Sound, Wash.	Bonham (1950:99)
7. Gills	"	Friday Harbor, Wash.	Robinson (1961:244)
8. Gills	*Sebastes melanops* Girard [*Sebastodes melanops* (Girard)]	Puget Sound, Wash.	Bonham (1950:99)
9. Gills	"...on a dark gray rock fish, probably *Sebastodes melanops*."	Ketchikan, Alaska	Bonham (1950:99)
10. Gills	*Sebastes ruberrimus* (Cramer) [*Sebastodes ruberrimus* Cramer]	Ketchikan, Alaska	Bonham (1950:99)

Table 130 continued

Location	Host	Locality	Source
11. Gills	Sebastes spp. [Sebastodes spp.]	Puget Sound, Wash. & north to SE of Alaska	Guberlet ((1936) 1937: 458)[1]

Synonym: Trochopus marginata (Folda, 1928) Price, 1936

Additional references: Guberlet (1936), Woolcock (1936), Bonham (1937), Price (1939), Brinkmann (1940), Sproston (1946), Pratt & Aldrich (1953), Winter (1955), Dawes (1956), Bravo-Hollis (1958), Baer & Euzet (1961), Pratt & McCauley (1961), Kearn (1963b, 1963d), Yamaguti (1963)[2], Arai & Koski (1964), Halton & Jennings (1965).

[1]Probably a review statement.

[2]Yamaguti (1963:137) neglected to list all the hosts.

Table 131. Megalocotyle australis (Robinson, 1961) Dillon & Hargis, 1965.

Location	Host	Locality	Source
1. Gills	Helicolenus percoides Richardson & Solander [Helicolenus percoides[1] Richardson]	Cook Strait and Portobello, Otago Harbor, New Zealand	Robinson (1961: 242)
2. Gills	"	Cape Campbell, New Zealand	Dillon & Hargis (1965: 243)

Synonym: Trochopus australis Robinson, 1961

Additional reference: Yamaguti (1963).

[1]"Helicolenus percoides, authorship usually given to Richardson, but probably should be Richardson & Solander" (Eschmeyer, personal communication).

Table 132. Megalocotyle grandiloba Paperna & Kohn, 1964.

Location	Host	Locality	Source
1. Gills	Epinephelus aeneus (Geoffroy Saint-Hilaire) [Epinephalus aereus[1] Doderl.]	Israel coast of the Mediterranean Sea	Paperna & Kohn (1964: 246-247)

[1]Epinephelus aereus = Epinephelus aeneus (Geoffroy St. Hilaire) (Bailey, personal communication). "Epinephelus aereus? should probably be Epinephelus aeneus (Geoffroy St. Hilaire)" (Kanazawa, personal communication).

Table 133. Megalocotyle helicoleni Woolcock, 1936.

Location	Host	Locality	Source
1. Gills	Helicolenus percoides Richardson & Solander [Helicolenus percoides][1]	Port Phillip Bay, Victoria, Australia	Woolcock (1936:80)

Additional references: Brinkmann (1940), Sproston (1946)[2], Robinson (1961), Yamaguti (1963), Arai & Koski (1964)[3], Dillon & Hargis (1965).

[1]See Table 131, footnote 1.

[2]Sproston (1946:309) said "T. helicoleni (Woolcock, 1936) Price, 1939. ...Price, 1939a, 77: removes sp. to Trochopus, s.s., emend. Price." Price (1939) neither mentioned this species nor cited Woolcock (1936). Thus, Trochopus helicoleni (Woolcock, 1936) Price, 1939, as cited by Sproston (1946:309), is not a synonym.

[3]Arai & Koski (1964:1010) listed this species as "T. helicoleni (Woolcock, 1936)."

Table 134. Megalocotyle hexacantha (Parona & Perugia, 1889) Price, 1939.

Location	Host	Locality	Source
1. Gills	Epinephelus guaza (Linnaeus) [Serranus gigas][1]	Genova, Italy[2]	Parona & Perugia (1889: 741)
2. Gills	"	Portoferraio, Elba, Italy	Parona (1899: 3)
3. Gills	Serranus cabrilla (Linnaeus)	Naples, Italy	Mola (1928)* In Palombi (1949: 289)

Synonyms: Placunella hexacantha Parona & Perugia, 1889
Placunella exacantha of Monticelli, 1892 (lapsus)
Trochopus hexacanthus (Parona & Perugia, 1889) Massa, 1903
[Trochopus exachanthus of Massa, 1903 (lapsus)]

Additional references: Braun (1890a), Parona & Perugia (1890a), Saint-Remy (1891c, 1892c), Monticelli (1892a), Linstow (1893), Parona (1894*, 1896, 1902, 1912), Parona & Monticelli (1902), Massa (1903, 1906), Stiles & Hassall (1908), Mola (1912), Tagliani (1912), Price (1939), Sproston (1946), Palombi (1949), Dawes (1956), Yamaguti (1963), Arai & Koski (1964), Paperna & Kohn (1964).

[1] Epinephelus gigas is a synonym of Epinephelus guaza (Linnaeus) (Wheeler, 1969: 311).

[2] The Index-Catalogue of Medical and Veterinary Zoology, Trematoda and Trematode Diseases, Part 5, p. 976, erroneously listed the locality as "Inland Sea, Japan."

Table 135. Megalocotyle rhombi (Beneden & Hesse, 1863)[1] Price, 1939.

Location	Host	Locality	Source
1. Body	Scophthalmus maximus (Linnaeus) [Rhombus maximus]	Coast of Brittany (p. 4)	Beneden & Hesse (1864: 73)[1]

Synonyms: Placunella rhombi Beneden & Hesse, 1863
Tristoma rhombi (Beneden & Hesse, 1863) Taschenberg, 1878
Trochopus rhombi (Beneden & Hesse, 1863) Massa, 1903

Additional references: Beneden (1871), Taschenberg (1878b), Monticelli (1888), Linstow (1889b), Braun (1890a), Saint-Remy (1891c, 1892c), Perrier (1897*), T. Scott (1901), Parona & Monticelli (1902), Massa (1903, 1906), Stiles & Hassall (1908), Sprehn (1933), Price (1939), Sproston (1946), Dawes (1956), Bychowsky (1957), Ronald (1960)[2], Robinson (1961), Yamaguti (1963), Arai & Koski (1964).

[1]See Table 76, footnote 1.

[2]Ronald (1960: 246) said "Megalocotyle rhombi (van Beneden and Hesse, 1863) is usually regarded as a parasite of the European Turbot, Scophthalmus maximus (3, 26, 29) but the halibut too has been implicated (4). As both are benthic hosts this compatibility is understandable." Ronald's "(4)" refers to Braun (1890b: 594-598). An examination of Braun (1890b) revealed that no mention of M. rhombi was made. The only Capsaloidea mentioned were N. sturionis and E. hippoglossi (see p. 597). As Ronald discussed E. hippoglossi, it is assumed that he probably confused his data. Ronald's statement must then be disregarded, and his reference to Braun (1890b) as being a reference to M. rhombi should be noted as incorrect.

Table 136. <u>Megalocotyle</u> <u>trituba</u> Pratt & Aldrich, 1953.

Location	Host	Locality	Source
1. Gills	<u>Sebastes paucispinis</u> Ayres [<u>Sebastodes</u> <u>paucispinis</u> (Ayres)]	Newport, Lincoln County, Oregon[1]	Pratt & Aldrich (1953:535)
2. No mention	<u>Sebastes</u> <u>alutus</u> (Gilbert) [<u>Sebastodes</u> <u>alutus</u>]	Lincoln County, Oregon	Pratt & McCauley (1961:6)
3. No mention	<u>Sebastes</u> <u>diploproa</u> (Gilbert) [<u>Sebastodes</u> <u>diploproa</u>]	"	Pratt & McCauley (1961:6)
4. No mention	<u>Sebastes</u> <u>pinniger</u> (Gill) [<u>Sebastodes</u> <u>pinniger</u>]	"	Pratt & McCauley (1961:6)
5. No mention	<u>Sebastes</u> <u>ruberrimus</u> (Cramer) [<u>Sebastodes</u> <u>ruberrimus</u>]	"	Pratt & McCauley (1961:6)

Synonym: <u>Trochopus</u> <u>trituba</u> (Pratt & Aldrich, 1953) Bravo-Hollis, 1958

Additional references: Winter (1955), Bravo-Hollis (1958), Yamaguti (1963)[2], Arai & Koski (1964).

[1]The Index-Catalogue of Medical and Veterinary Zoology, Trematoda and Trematode Diseases, Part 5, p. 976, gave Puget Sound, Washington as the locality. Pratt & Aldrich (1953:535) said "offshore from Newport, Lincoln County, Oregon."

[2]Yamaguti (1963:137) neglected to list all of the hosts.

Table 137. *Megalocotyle zschokkei* (Mola, 1912) Price, 1939.

Location	Host	Locality	Source
1. Skin	*Cottus gobio* Linnaeus[1]	Rome market (in basket with marine fish)	Mola (1912:491,497)
2. Gills	*Dactylopterus volitans* (Linnaeus)	Alghero, Sardinia, Italy	Mola (1928)* In Palombi (1949:296)

Synonym: *Trochopus zschokkei* Mola, 1912

Additional references: Bittern & Sprehn (1928*), Sprehn (1930), Price (1939), Sproston (1946), Palombi (1949), Dawes (1956), Bychowsky (1957), Yamaguti (1963)[2], Arai & Koski (1964), Paperna & Kohn (1964).

[1]The record for *Cottus gobio* should probably be considered accidental, as the fish lay in a basket with marine fish in a Rome market (Mola, 1912:497). A transfer could have taken place.

[2]Yamaguti (1963:137) neglected to list *Dactylopterus volitans* (L.) as a host.

Table 138. Megalocotyloides epinepheli Bychowsky & Nagibina, 1967.

Location	Host	Locality	Source
1. Gills	Epinephelus malabaricus (Bloch & Schneider)	South China Sea by north shore of Hainan	Bychowsky & Nagibina (1967:524)

Table 139. Megalocotyloides pseudomarginatus (Bravo-Hollis, 1958) Bychowsky & Nagibina, 1967.

Location	Host	Locality	Source
1. Gills	Epinephelus labriformis (Jenyns)	Puerto Vallarta, Jalisco, Mexico	Bravo-Hollis (1953:143)
2. Gills	Epinephelus analogus Gill	"	Bravo-Hollis (1958:205, 207)
3. Gills	"	Zihuatanejo, Gro.,Mexico	Lamothe-Argumedo (1963:48)

Synonyms: Benedenia convoluta of Bravo-Hollis, 1953, nec Yamaguti, 1937
Trochopus pseudomarginatus Bravo-Hollis, 1958

Additional references: Winter (1955), Yamaguti (1963), Arai & Koski (1964), Bychowsky & Nagibina (1967).

Table 140. *Pseudobenedenia nototheniae* Johnston, 1931.

Location	Host	Locality	Source
1. Skin	*Notothenia magellanica* (Forster)	Antipodes Island, New Zealand	Johnston (1931:91)
	[*Notothenia macrocephala*][1]		
2. Skin	"	Macquarie Island, New Zealand[2]	Johnston (1931:91)
3. Skin	*Notothenia microlepidota* Hutton[3]	Antipodes Island, New Zealand	Johnston (1931:91)
	[*Notothenia colbecki* Boulenger][4]		
4. External (p. 70)	"	Auckland Islands	Johnston & Mawson (1953:65)
5. Skin	*Notothenia rossii* Richardson	Kerguelens	Dollfus & Euzet (1964 (1965):849)

Synonym: *Tristoma* sp. of Waite, 1909, 1916

Additional references: Waite (1909*, 1916*), Ainsworth (in Mawson, 1915*)[2], Johnston (1937), Price (1939), Johnston & Mawson (1943), Sproston (1946), Dawes (1956), Bychowsky (1957), Baer & Euzet (1961), Robinson (1961), Yamaguti (1963)[5], Gussev (1967b).

[1] *Notothenia macrocephala* is a synonym of *Notothenia magellanica* (Forster) (DeWitt, 1970:303).

[2] "The worms are evidently referred to by Ainsworth (in Mawson 1915, 235)" (Johnston, 1937:5).

Table 140 continued

[3]"Waite, 1916 (pp. 6, 69, 70), referred to them as gliding over the surface of this species of fish [N. *macrocephala*] and mentioned that they were similar to those infesting *Notothenia colbecki* at Antipodes Island, and identified by Professor W. B. Benham as *Tristoma* (Waite, 1909, p. 594)" (Johnston, 1937:5).

[4]*Notothenia colbecki* Boulenger is a synonym of *Notothenia microlepidota* Hutton (DeWitt, 1970:325).

[5]Yamaguti (1963:130) neglected to list *Notothenia microlepidota* as a host.

Table 141. *Pseudobenedenia noblei* (Menzies, 1946) Yamaguti, 1963[1].

Location	Host	Locality	Source
1. Gills	*Sebastes paucispinis* Ayres	Monterey Bay, Calif.	Menzies (1946: 429)
	[*Sebastodes paucispinis* (Ayres)]		

Synonym: *Benedenia noblei* Menzies, 1946

Additional references: Winter (1955), Lamothe-Argumedo (1963), Yamaguti (1963).

[1]The present author does not agree with the positioning of this species in *Pseudobenedenia* by Yamaguti (1963), but until the species can be restudied it is probably best to leave it in that genus to avoid further confusion.

Table 142. *Pseudomegalocotyla latridis* (Robinson, 1961) Yamaguti, 1963.

Location	Host	Locality	Source
1. Gills	*Latris lineata* (Forster)[1]	Cook Strait, New Zealand	Robinson (1961: 245)
	[*Latrix lineata* (F.)]		

Synonym: *Megalocotyle latridis* Robinson, 1961

Additional reference: Yamaguti (1963).

[1]See Table 128, footnote 1.

Table 143. Sprostonia squatinae (MacCallum, 1921) Bychowsky, 1957.

Location	Host	Locality	Source
1. Gills	Squatina squatina (Linnaeus)	Singapore	MacCallum (1921:153)

Synonyms: Acanthocotyle squatinae MacCallum, 1921
Trochopus squatinae (MacCallum, 1921) Price, 1937
Megalocotyle squatinae (MacCallum, 1931) Price, 1939
Megalocotyle squatinae (MacCallum, 1921) Brinkmann, 1940
Trochopus squatinae (MacCallum, 1921) of Arai & Koski, 1964

Additional references: Price (1937a, 1939), Bonham & Guberlet (1938), Brinkmann (1940), Sproston (1946), Dawes (1956), Bychowsky (1957), Yamaguti (1963), Arai & Koski (1964), Bychowsky & Nagibina (1967).

Table 144. Sprostoniella multitestis Bychowsky & Nagibina, 1967.

Location	Host	Locality	Source
1. Gills	Platax pinnatus (Linnaeus)	South China Sea, by south shore of Hainan	Bychowsky & Nagibina (1967:522)

Table 145. Trochopella candida Euzet & Trilles, 1962[1].

Location	Host	Locality	Source
1. Gills	Peristedion cataphractum Linnaeus [Peristhedion cataphractum L.]	Gulf of Lions, off coast of France, Mediterranean Sea	Euzet & Trilles (1962: 216)

[1]Trochopella, as characterized by Euzet & Trilles (1962: 220), has all the characteristics of Trochopus Diesing, 1850, as given by Yamaguti (1963: 134), and should be considered a synonym.

Table 146. Trilobiodiscus lutiani Bychowsky & Nagibina, 1967.

Location	Host	Locality	Source
1. Gills	Lutjanus argentimaculatus (Forskål) [Lutianus argentimaculatus (Forskål)]	South China Sea by south shore of Hainan	Bychowsky & Nagibina (1967: 525)

Table 147. *Dioncus agassizi* Goto, 1900.

Location	Host	Locality	Source
1. Gills	*Remora brachyptera* (Lowe)	Newport, R. I.	Goto (1900: 290)
2. Gills	*Echeneis naucrates* Linnaeus	From MacCallum's N.Y. Aquarium & Woods Hole Coll.[1]	Price (1938a: 124)
3. Gills	"	Off coast of Waltair (Bay of Bengal), India	Rao & Madhavi (1967: 490)
4. Gills	"	West Indies	Price (1938a: 124)
5. Gills	"	Buckroe Beach Pier, Chesapeake Bay, Virginia	Present study
6. Gills	*Remora remora* (Linnaeus)	Woods Hole, Mass.	Linton (1940: 5)
7. Gills	"	Indian Ocean	Bychowsky (1957: 20)

Additional references: Pratt (1900, 1909), Maclaren (1904), Monticelli (1905), Tagliani (1912), Sumner, Osburn, & Cole (1913), Johnston & Tiegs (1922), Brinkmann (1940), Sproston (1946), Hargis (1955c), Koratha (1955a, 1955b), Dawes (1956), Baer & Euzet (1961), Yamaguti (1963)[2].

[1]It is not known what species is represented by MacCallum's (1916: 21) reference to "a lot of specimens of *Dionchus* (Goto)" from "the gills of an *Echeneis naucrates*." These specimens were found on the gills of a fish, which also were infested with *Dioncus remorae*, at N.Y. Aquarium on May 16, 1915. Although Price (1938a: 124-125) used some of MacCallum's museum specimens from N.Y. Aquarium for redescriptions of both *D. agassizi* and *D. remorae*, the collection date of May 16, 1915, is not listed under *D. agassizi* (Price, 1938a: 124) but under *D. remorae* (Price, 1938a: 125). One could assume that MacCallum's specimens were thus

Table 147 continued

D. remorae. However, MacCallum's (1916: 21) reference to "Dionchus (Goto)" could refer to D. agassizi, in the writer's opinion, because it was the only species of Dioncus described up to that time. No other reference to MacCallum's specimens could be found in the literature.

[2]Yamaguti (1963: 139) neglected to list Remora remora (L.) as a host.

Table 148. Dioncus rachycentris Hargis, 1955.

Location	Host	Locality	Source
1. Gills	Rachycentron canadum (Linnaeus) [Rachycentron canadus (Linnaeus)]	Grand Isle, La. and Tampa Bay, Florida	Hargis (1955c:213)
2. Gills	"	Off Port Aransas, Texas	Koratha (1955a:244)

Synonym: Dioncus hopkinsi Koratha, 1955

Additional references: Koratha (1955b), Bychowsky (1957), Hargis (1957, 1959), Yamaguti (1963), Reichenbach-Klinke (1966).

Table 149. Dioncus remorae (MacCallum, 1916) Price, 1938.

Location	Host	Locality	Source
1. Gills	Echeneis naucrates Linnaeus[1]	New York Aquarium	MacCallum (1916:21)
2. Gills	"	West Indies	Price (1938a:125)
3. Gills	"	Alligator Harbor, Fla.	Hargis (1955c:216)
4. Gills	"	Israel Coast	Paperna & Kohn (1964:245)
5. Gills	"	Buckroe Beach Pier, Chesapeake Bay, Va.	Present study
6. Gills	Caranx hippos (Linnaeus)[2]	New York Aquarium	Price (1938a:125)

Synonyms: Acanthodiscus remorae MacCallum, 1916
Dionchotrema remorae (MacCallum, 1916) Johnston & Tiegs, 1922

Additional references: Johnston & Tiegs (1922), Brinkmann (1940), Sproston (1946), Koratha (1955a, 1955b), Bychowsky (1957), Hargis (1957, 1959), Yamaguti (1963), Rao & Madhavi (1967).

[1]See Table 147, footnote 1.

[2]MacCallum (1916:21) did not list Caranx hippos as a host, but Price (1938a:125) did. Price (1938a:125) apparently found one specimen of this parasite in MacCallum's collection (collected May 8, 1915 at N. Y. Aquarium) from Caranx hippos. Hargis (1955c:216) was in error when he stated that this host was reported by MacCallum (1916). The record for Caranx hippos by Price (1938a) should probably be considered erroneous, as Hargis (1955c:216) indicated.

Table 150. Loimos salpinggoides MacCallum, 1917.

Location	Host	Locality	Source
1. Gills	Carcharhinus obscurus (Lesueur)	Woods Hole, Mass.	MacCallum (1917:54)

Additional references: Price (1938a), Manter (1944), Chauhan & Bhalerao (1945b), Sproston (1946), Chauhan (1954), Hargis (1955c, 1959), Koratha (1955b), Calallero & Bravo-Hollis ((1961) 1962), Yamaguti (1963).

Table 151. Loimos scoliodoni (Manter, 1938) Manter, 1944.

Location	Host	Locality	Source
1. Gills	Rhizoprionodon terraenovae (Richardson) [Scoliodon terrae-novae (Richardson)][1]	Beaufort, North Carolina	Manter (1938: 295)
2. Gills	" [S. terrae-novae Richardson]	Alligator Harbor, Fla.	Hargis (1955c: 217)
3. Gills	" [S. terrae-novae]	Port Aransas, Texas	Koratha (1955a: 244)
4. Gills	Carcharhinus limbatus (Valenciennes)	Port Aransas, Texas	Koratha (1955a: 244)

Synonym: Tricotyle scoliodoni Manter, 1938

Additional references: Manter (1944), Chauhan & Bhalerao (1945a, 1945b), Sproston (1946), Chauhan (1954), Koratha (1955b), Hargis (1957, 1959), Caballero & Bravo-Hollis ((1961) 1962), Yamaguti (1963).

[1] Springer (1964: 601) transferred this species to the genus Rhizoprionodon, an action which was accepted by Bailey (1970: 66).

Table 152. Loimos secundus (Chauhan & Bhalerao, 1945) Chauhan & Bhalerao, 1945.

Location	Host	Locality	Source
1. Gills	Rhizoprionodon acutus (Rüppell) [Scoliodon sorrakowah (Cuvier)][1]	Rangoon, Burma	Chauhan & Bhalerao (1945a: 98)
2. Gills	Scoliodon sp.[2]	Puri (Bay of Bengal), India	Tripathi (1959: 73)

Synonym: Tricotyle secundus Chauhan & Bhalerao, 1945

Additional references: Chauhan & Bhalerao (1945b), Sproston (1946), Chauhan (1953, 1954), Koratha (1955b), Hargis (1959), Caballero & Bravo-Hollis ((1961)1962), Yamaguti (1963).

[1]"There is a history of confusion surrounding the trivial names sorrakowa and palasorra, both of which have been applied to S. laticaudus" (Springer, 1954: 579). "Carcharias sorrakowa can be either of two species, Rhizoprionodon acutus or R. oligolinx; it is doubtful that its exact identity will ever be known. ... Nomenclature can best be served, I think, by recognizing C. sorrakowa as a synonym of R. acutus..." (Springer, 1964: 580).

[2]Springer (1964: 559) recognized three genera, Scoliodon, Loxodon, and Rhizoprionodon, instead of the one genus Scoliodon. "The most recent studies allocate all the species included in this report to a single genus, Scoliodon,..." (Springer, 1964: 559). It is not known to which of the above three genera this "Scoliodon sp." belongs; for this reason I have listed the host as Tripathi (1959: 73) did.

Table 153. *Loimos winteri* Caballero & Bravo-Hollis, 1961.

Location	Host	Locality	Source
1. Gills	*Carcharhinus obscurus* (Lesueur) [*Carcharhinus lamiella* (Jordan & Gilbert)][1]	Miramar, Guaymas, Sonora. Golfo de California, Mexico.	Caballero & Bravo-Hollis ((1961)1962: 205)

[1]*Carcharhinus lamiella* (Jordan & Gilbert) is a synonym of *C. obscurus* (Lesueur). "*C. lamiella* of most authors is referable to *C. obscurus* although the *holotype* is a specimen of *C. remotus*" (Bailey, 1970: 65).

Table 154. *Loimopapillosum dasyatis* Hargis, 1955.

Location	Host	Locality	Source
1. Gills	*Dasyatis americana* Hildebrand & Schroeder	Alligator Harbor, Fla.	Hargis (1955c: 218)
2. Gills	*Dasyatis sayi* (Lesueur) [*D. say* (L.)]	"	Hargis (1955c: 218)
3. Gills	" [*D. say*]	Chesapeake Bay	McMahon (1963: 153)
4. Gills	*Dasyatis* sp. (either *D. sayi* or *D. americana*)	Alligator Harbor, Fla.	Hargis (1955c: 218)

Additional references: Hargis (1957), Tripathi (1959), Baer & Euzet (1961), Yamaguti (1963).

Table 155. Loimosina wilsoni Manter, 1944.

Location	Host	Locality	Source
1. Gills	Sphyrna zygaena (Linnaeus)	Montego Bay, Jamaica	Manter (1944: 87)
2. Gills	Sphyrna lewini (Griffith & Smith) [S. diplana Springer][1]	Alligator Harbor, Florida	Hargis (1955c: 217)
3. Gills	"	Goree, Senegal	Euzet & Maillard (1967:1454)
4. Gills	Sphyrna couardi Cadenat	Goree, Senegal	Euzet & Maillard (1967:1454)

Additional references: Sproston (1946), Koratha (1955a), Bychowsky (1957), Hargis (1957), Tripathi (1959), Yamaguti (1963).

[1] Sphyrna diplana Springer is a synonym of Sphyrna lewini (Griffith & Smith) (Bigelow & Schroeder, 1953a: 46).

Table 156. Microbothrium apiculatum Olsson, 1869.

Location	Host	Locality	Source
1. "dorsum"	Squalus acanthias Linnaeus [Acanthiae vulgaris]	Skagerrack	Olsson (1869b:4)
2. Skin	" [Acanthias vulgaris]	Roscoff, France	Saint-Remy (1891a:214)[1]
3. Skin	S. acanthias L.	Maritime Provinces, Canada[2]	Stafford (1904:481,482)
4. Skin of head & shoulders	"	Woods Hole, Mass.	MacCallum (1926b:332)
5. No mention	S. acanthias L.	Orkneys	Baylis (1939:479)
6. "Cloacal region"	"	Chesapeake Bay	Dillon & Hargis (1965:245)
7. Skin	"	Plymouth, England	Kearn (1965:478)
8. No mention	No mention	Cruising North Sea & East Atlantic	Gallien (1937a:13)[3]
9. Skin	Carcharhinus sp. [Carcharhinus commersonii][4]	Woods Hole, Mass.	MacCallum (1926a:162)

Synonyms: Pseudocotyle apiculatum (Olsson, 1869) Braun, 1890
Philura orata MacCallum, 1926
Dermophagus squali MacCallum, 1926

Table 156 continued

Additional references: Taschenberg (1879b), Örley (1885), Monticelli (1888, 1892a, 1893b*), Braun (1890a, 1900*(?), 1891, 1893), Saint-Remy (1891b, 1891d, 1891e, 1892a, 1892c, 1892d, 1892e), Looss (1894*), Perrier (1897*), Cerfontaine (1898), Pratt (1900), Stafford (1907), Stiles & Hassall (1908), Tagliani (1912), Nicoll (1915), Johnston & Tiegs (1922), MacCallum (1926c, 1927a), Baylis & Jones (1933), Jones (1933), Sprehn (1933), Guiart (1938), Price (1938b, 1963b), Brinkmann (1940, 1952a, 1952b), Sproston (1946), Dawes (1956), Bychowsky (1957), Yamaguti (1963), Cheng (1964).

[1]Saint-Remy gave three more references to this species at Roscoff in his papers of 1891b, 1891e, 1892d.

[2]Stafford (1904:481) gave three different collection localities: St. Andrews, N. B.; Causo, N. S.; Malpeque, P. E. I. When he listed the parasites he neglected to say which one of the three represented the collection locality for each species. I have therefore listed the locality as "Maritime Provinces, Canada."

[3]Gallien (1937a:13) said, "J'ai recueilli deux individus de M. apiculatum au cours de la croisière." Although he made no specific mention of the host, or the location on the host, I presume he meant on the skin of Squalus acanthias L.

[4]See Table 168, footnote 1.

Table 157. *Microbothrium tolloi* Brinkmann, 1952.

Location	Host	Locality	Source
1. Skin	*Mustelus mento* Cope [*Mustelus edulus* Perez][1]	Seno Reloncavi, Piedra Azul, Chile (41°31'30"S, 72°48'15"W)	Brinkmann (1952a: 4)[2]

Additional references: Brinkmann (1952b), Winter (1955), Price (1963b), Yamaguti (1963), Dillon & Hargis (1965), Young (1967a).

[1]*Mustelus edulis* Perez Canto is a synonym of *Mustelus mento* Cope (Bigelow, Schroeder & Farfante, 1948: 260).

[2]Brinkmann's (1952a) Figures 1 and 2 do not agree in testicular arrangement. Figure 1 indicates multiple testes; Figure 2 (p. 5) indicates a single testis. The text (p. 4) says "Testis median, ...," which does not agree with Figure 1 (p. 5).

Table 158. Leptobothrium pristiuri (Gallien, 1937) Gallien, 1937.

Location	Host	Locality	Source
1. Skin	Galeus melastomus Rafinesque-Schmaltz [Pristiurus melanostomus Rafinesque][1]	53°17'N, 13°08'W; 55°55'N, 7°42'W (west of south of Ireland)	Gallien (1937a:10)

Synonym: Pseudobothrium pristiuri Gallien, 1937

Additional references: Gallien (1937b), Price (1938b, 1963b), Sproston (1946), Dawes (1956), Bychowsky (1957), Baer & Euzet (1961), Yamaguti (1963), Young (1967a); Cheng (1964).

[1] Pristiurus melanostomus is a synonym of Galeus melastomus Rafinesque-Schmaltz (Wheeler, 1969:46).

Table 159. Leptocotyle minor (Monticelli, 1888) Gallien, 1937.

Location	Host	Locality	Source
1. Skin	Scyliorhinus caniculus (Linnaeus) [Scyllium]	Naples, Italy (p.5)	Monticelli (1888: 60)[1]
2. Skin of dorsal	" [Scyllium canicula]	Gulf of Naples, Italy (p.189)	Monticelli (1890b: 191)[1]
3. Skin of head	"	South of Calf of Man	A. Scott (1906: 192)
4. Skin of head	S. caniculus (L.) [common dogfish]	Aquarium at Port Erin (Isle of Man) & open sea	Johnstone (1911: 88-89)
5. Gills & mouth	" [Scyllium canicula]	West coast of Ireland off Galway Bay area	Little (1929a: 25, 26)
6. Skin	" [Scyllium canicula Cuv.]	French waters (p. 43)	Froissant (1930: 54)
7. Skin, dorsal	" [Scyllium canicula]	Plymouth, England	Baylis & Jones (1933: 629)
8. Skin, dorsal surface, & dorsal fins	"	Plymouth, England	Jones (1933: 329)
9. No mention	"	Cruise on North Sea, E. Atlantic region (p. 9)	Gallien (1937a: 14)[2]
10. On the skin or near the post. angle of the eye	S. caniculus (L.) [Scylliorhinus canicula (L.)]	Roscoff, France	Sproston (1938: 37, 51)[3]

Table 159 continued

Location	Host	Locality	Source
11. No mention	S. caniculus (L.) [Scyliorhinus caniculus]	South Devon, England	Baylis (1939: 478)
12. Skin between eye & spiracle; gills; base of claspers, within cloaca	S. caniculus (L.)	Roscoff, France	Sproston (1946: 275)[3]
13. Skin, base of pectoral & dorsal fin	S. caniculus (L.) [Scylliorhinus canicula]	Halsnøy Kloster, (Sunnhordl.) Norway	Brinkmann (1952b: 41)[4]
14. No mention	" [Scylliorhinus canicula L.]	Naples, Italy (Coll. by Brinkmann's father)	Brinkmann (1952b: 43)
15. No mention[5]	No mention[5]	Kristineberg, Sweden (from Nybelin)	Brinkmann (1952b: 44)
16. No mention[5]	No mention[5]	Skagerrack Deep (from Nybelin)	Brinkmann (1952b: 45)
17. No mention[5]	No mention[5]	Roscoff, France (from Nybelin)	Brinkmann (1952b: 45)
18. No mention[5]	S. caniculus (L.) [Scylliorhinus canicula]	Irish Sea	Brinkmann (1952b: 45)
19. Skin	"	Plymouth, England	Llewellyn (1954: 434)
20. Skin of dorsal fin	S. caniculus (L.) [Scyliorhinus canicula (L.)]	Bay of Naples, Italy	Bychowsky (1957: 38, 386)

Table 159 continued

Location	Host	Locality	Source
21. Skin	S. caniculus (L.) [Scyliorhinus canicula (L.)]	Atlantic Ocean near England	Bychowsky (1957:386)
22. Skin	S. caniculus (L.) [Scylliorhinus canicula (Cuv.)]	Gulf of Naples, Italy	Reichenbach-Klinke (1957:115,116)
23. Dorsal skin	S. caniculus (L.)	Ballyhenry Bay, Strangford Lough, Ireland	Garvin, Gilmour & Neill (1961:239-240)
24. Skin	"	Plymouth, England	Kearn (1962a:99)
25. Skin	"	Plymouth, England	Kearn (1965:473,477)
26. Skin	Scyliorhinus stellaris (Linnaeus) [Scylliorhinus catula][6]	Plymouth, England	Llewellyn (1954:434)

Synonyms: Pseudocotyle minor Monticelli, 1888
Pseudocotyle (Leptocotyle) minor (Monticelli, 1888) Monticelli, 1905
Epibdella sp. of Scott, 1906
Paracotyle caniculae Johnstone, 1911
Microbothrium caniculae (Johnston, 1911) Jones, 1933

Additional references: Braun (1890a), Monticelli (1890a, 1890b, 1892a, 1905), Parona & Perugia (1890c), Saint-Remy (1891d, 1892c), Stiles & Hassall (1908), Parona (1912), Tagliani (1912), Nicoll (1915), Johnston & Tiegs (1922), Sprehn (1933), Brinkmann (1940, 1956b), Guiart (1938), Price (1938b, 1963b), Palombi (1949), Dawes (1956), Dogiel et al (1961), Kearn (1963d, 1967b), Llewellyn (1963, 1965), Yamaguti (1963)[7], Halton & Jennings (1965), Paling (1966b), Reichenbach-Klinke (1966), Smyth (1966); Cheng (1964).

Table 159 continued

[1]The 1890 record is probably an expansion of the data for the 1888 record, and should be considered as a doubtful record.

[2]Gallien (1937a:13-14) said, talking about Leptocotyle and L. minor, "Ce genre et cette espèce ont été l'objet de multiples erreurs. J'en ai récolté, pendant la croisière, de nombreux échantillons, dont l'etude m'a permis d'eclaircir une synonymie confuse."

[3]Since Sproston (1946:275) listed different locations of the parasite with respect to the host, it is presumed the 1946 data represented a different record from the 1938 data.

[4]Brinkmann (1956b:345) may be an additional locality record, but so little information was given no definite conclusion can be reached.

[5]Although Brinkmann (1952b:44-45) gave no mention with these records of either location on host or host, it is presumed that they were collected from the skin of Scyliorhinus canicula (L.).

[6]Scylliorhinus catula (or Scyllium catulus) is a synonym of Scyliorhinus stellaris (Linnaeus) (Wheeler, 1969:44).

[7]Yamaguti (1963:145) neglected to list Scyliorhinus stellaris (L.) as a host.

Table 160. *Leptomicrobothrium longiphallus* Dillon & Hargis, 1965.

Location	Host	Locality	Source
1. Gills	*Cephaloscyllium isabella* (Bonnaterre) [*C. isabella* Bonnaterre]	Timaru and Taiaroa Heads, New Zealand	Dillon & Hargis (1965:245)

Additional reference: Young (1967a).

Table 161. *Pseudoleptobothrium aptychotremae* Young, 1967.

Location	Host	Locality	Source
1. "Dermal denticles in regions of spiracles and dorsal surface of pectoral fins."	*Aptychotrema banksi* (Müller & Henle)	Moreton Bay, Queensland, Australia	Young (1967a:1014)

Table 162. Anoplocotyle australis (Johnston, 1930) Palombi, 1943.

Location	Host	Locality	Source
1. Fin	Sparus australis (Günther)	Sidney Harbour, Australia	Johnston (1930b:108)

Synonym: Anoplodiscus australis Johnston, 1930

Additional references: Fischthal & Allison (1941), Palombi (1943b), Sproston (1946), Dawes (1956), Bychowsky (1957), Yamaguti (1963).

Table 163. Pseudomicrobothrium spari Yamaguti, 1958.

Location	Host	Locality	Source
1. Gills	Sparus macrocephalus (Basilevsky)	Sagami Bay, Japan	Yamaguti (1958:59)

Additional reference: Yamaguti (1963).

Table 164. *Asthenocotyle kaikourensis* Robinson, 1961.

Location	Host	Locatity	Source
1. Skin	*Scymnodon plunketi* (Waite)	Kaikoura, New Zealand	Robinson (1961: 237)

Additional reference: Yamaguti (1963).

Table 165. *Enoplocotyle minima* Tagliani, 1912[1].

Location	Host	Locality	Source
1. Skin	*Muraena helena* Linnaeus	Aquarium... Naples, Italy	Tagliani (1912: 281, 305)

Additional references: Tagliani *In* (Lo Bianco, 1909), Price (1938b), Brinkmann (1940), Sproston (1946), Palombi (1949), Dawes (1956), Bychowsky (1957), Baer & Euzet (1961), Yamaguti (1963).

[1]This species was first listed in 1909 (Tagliani, *In* Lo Bianco, 1909:567), but the description was given in 1912.

Table 166. Pseudocotyle squatinae Beneden & Hesse, 1865.

Location	Host	Locality	Source
1. "extérieur"	Squatina squatina (Linnaeus) ["Squatine ange."]	Ostende, Belgium	Beneden & Hesse (1865:12)
2. Skin	" [Squatina angelus][1]	Naples, Italy	Taschenberg (1879b:48)[2]
3. Ventral skin	"	Wimereux, France (p.417)	Monticelli (1890a:420)
4. No mention	"	Roscoff, France (p. 2)	Saint-Remy (1892d:21)[3]
5. Skin	S. squatina (L.) [Rhina squatina]	Plymouth, England	Nicoll (1914:497,503)
6. Skin	" [Rhina squatina L.]	West coast of Ireland off Galway Bay area	Little (1929a:25,26)
7. Ventral skin	" [Squatina angelus]	French waters (p. 43)	Froissant (1930:54)
8. No mention	No mention[4]	Plymouth, England	Plymouth Marine Fauna (1931*) In Sproston (1946:276)
9. Ventral skin	S. squatina (L.)	Roscoff, France	Sproston (1946:276)
10. Underside of pelvic fins	"	Plymouth, England	Sproston (1946:276)
11. Skin	"	Caernarvon Bay (N. Wales)	Sproston (1946:276)
12. Ventral skin	"	Plymouth, England	Kearn (1962a:99)

Table 166 continued

Location	Host	Locality	Source
13. Skin	*S. squatina* (L.)	Plymouth, England	Kearn (1965:478)

Additional references: Beneden (1871), Taschenberg (1878a, 1878b, 1879a), Fraipont (1880), Kerbert (1881*), Ziegler (1883*), Ijima (1884), Looss (1885*), Monticelli (1888, 1890b, 1892a), Braun (1889b, 1890a, 1893), Juel (1889*), Linstow (1889b), Brandes (1891), Goto (1891), Saint-Remy (1891a, 1891b, 1891d, 1891e, 1892a, 1892c), ? Parona (1894*)[5], Saint-Loup (1895), Perrier (1897*), Thoss (1897*), Cerfontaine (1898), Pratt (1900), Stiles & Hassall (1908), Parona (1912), Tagliani (1912), Nicoll (1915), Johnston & Tiegs (1922), Vlassenko (1928), Jones (1933), Sprehn (1933), Gallien (1937a), Guiart (1938), Price (1938b, 1963b), Brinkmann (1940), Palombi (1949), Dawes (1956), Llewellyn (1963), Yamaguti (1963), Smyth (1966).

[1] *Squatina angelus* is a synonym of *Squatina squatina* (Linnaeus) (Soljan, 1948:349).

[2] Also noted in Taschenberg (1879a:295).

[3] Also noted in Saint-Remy (1891b:1072; 1891e:480).

[4] Probably *Squatina squatina* (Linnaeus).

[5] Listed by Stiles & Hassall (1908:356) as a reference.

Table 167. *Pseudocotyle lepidorhini* Guiart, 1938.

Location	Host	Locality	Source
1. Caudal fin	*Centrophorus squamosus* *(Bonnaterre)* [*Centrophorus squamosus* Gmelin]	Iceland[1]	Saemundsson (1926: 477)* *In* Brinkmann (1940: 19)
Dorsal & caudal fins	" [*Centrophorus squamosus*]	"	Saemundsson (1908* and 1926*) *In* Brinkmann (1956a: 1)
2. Skin	" [*Lepidorhinus squamosus*]	47°40'10" N, 7°37' W (off Cape Finistere)	Guiart (1938: 5)
3. Caudal fin	" [*Centrophorus squamosus* Gmelin]	60°23' N, 8°55' W	Brinkmann (1940: 19)

Synonyms: Tristomid of Saemundsson, 1908, 1926[1]
Microbothrium centrophori Brinkmann, 1940
Microbothrium lepidorhini (Guiart, 1938) Brinkmann, 1952

Additional references: Sproston (1946), Brinkmann (1952a, 1952b, 1956b), Dawes (1956), Price (1963b), Yamaguti (1963).

[1]"Saemundsson (1908 & 1926) in his surveys of the Icelandic fishes, concerning the little spinacid shark *Centrophorus squamosus*, remarks that a Tristomid occurs on the dorsal and caudal fins. The 'Tristomid' in question obviously is *Microbothrium lepidorhini*, as pointed out by Brinkmann (1940)" (Brinkmann, 1956a: 1).

Table 168. Dermophthirius carcharini MacCallum, 1926.

Location	Host	Locality	Source
1. Nasal sinuses and skin of back	Carcharhinus sp. [Carcharhinus commersonii][1]	Woods Hole, Mass.	MacCallum (1926a:166-167)
2. Skin, behind dorsal fin	Carcharhinus limbatus (Valenciennes)	Barataria Pass, Grand Isle, La.	Thatcher (1959:79)
3. No mention	"	Davis Bay, Miss.[2]	Thatcher (1959:79)
4. Skin	Carcharhinus maculipinnis (Poey)	Goree, Senegal	Euzet & Maillard (1967:1471-72)
5. Skin	Negaprion brevirostris (Poey)	Goree, Senegal	Euzet & Maillard (1967:1471-72)

Additional references: MacCallum (1926c), Price (1938b, 1963b, 1964), Sproston (1946), Dawes (1956), Bychowsky (1957), Yamaguti (1963).

[1]MacCallum (1926a:166) gave the host as "Carcharhinus commersonii." Price (1938b:187), in a redescription of MacCallum's specimens, listed the host as "Carcharias commersonii (Blainville)." Bigelow, Schroeder & Farfante (1948:320) said that "...commersonii which was later stated by Blainville (in Vieillot, Faune, Franc., 1825:90) to have been based by him on the shark pictured by Lacépède, 'T. 1, pag. 169, pl. 5, fig. 1.' Unfortunately, this reference was erroneous, for pl. 5, fig. 1 pictures a skate and not a shark. However, if it was pl. 8, fig. 1, that was intended (as seems almost certain), commersonii seems to have been a member of the genus now under discussion [Carcharhinus], though neither the illustration in question nor the accompanying measurements of a 'requin' suffice for specific identification." Bigelow, Schroeder & Farfante (1948) listed the names Carcharhinus commersonii, Carcharias commersonii, or Eulamia commersonii as

Table 168 continued

synonyms for Carcharhinus leucas (Müller & Henle) [=(Valenciennes)] (p. 344, 345), Carcharhinus limbatus (Müller & Henle) [=(Valenciennes)] (p. 353), and Carcharhinus longimanus (Poey) (p. 362, 363). They identified Carcharhinus commersonii Rey as being C. obscurus (p. 388). Soljan (1948:348) gave Carcharhinus commersoni (Blainville) as a synonym of Carcharias lamia Risso. The identity of Carcharhinus commersonii (Blainville) cannot be established; however, the species can apparently be considered to have been a member of the genus Carcharhinus. I believe that the host can be best listed as "Carcharhinus sp."

[2] From the collection of Harry J. Bennett (Thatcher, 1959:79).

Table 169. Neodermophthirius harkemai Price, 1963.

Location	Host	Locality	Source
1. Gills	*Negaprion brevirostris* (Poey)	Beaufort, North Carolina	Price (1963b: 214)
2. Gills (skin?)	"	Goree, Senegal	Euzet & Maillard (1967: 1472)

Synonym: *Cadenatia polytestis* Euzet & Maillard, 1967[1]

Additional reference: Price (1964).

[1]Euzet (personal communication) considers this to be a synonym of *Neodermophthirius harkemai* Price, 1963.

Table 170. Monocotyle myliobatis Taschenberg, 1878.

Location	Host	Locality	Source
1. Gills	Myliobatis aquila (Linnaeus) [Myliobates aquila]	Aquarium of Zool. Station in Naples; fishmarket	Taschenberg (1878b:574)
2. Gills	M. aquila (L.)	Trieste, Italy	Perugia & Parona (1890:21)
3. No mention	" [Myliobatis aquila, Dumeril]	From Coll. of Museum of Pisa, Italy	Sonsino (1890b:173)
4. Gills	M. aquila (L.)	Trieste, Italy	Stossich (1898)* In Palombi (1949:242)
5. No mention	" [Leiobatus aquila L.]	French waters (p. 43)	Froissant (1930:46)
6. Gills	M. aquila (L.)	Naples, Italy (Coll. of Monticelli)	Palombi (1942a:1)

Additional references: Taschenberg (1879a), Hoyle (1888*), Linstow (1889b), Braun (1890a), Parona & Perugia (1890a), Saint-Remy (1891d, 1892c, 1892d), Cerfontaine (1894a), Goto (1894), Parona (1894*, 1896, 1912), Perrier (1897*), Pratt (1900, 1910), Benham (1901), Stiles & Hassall (1908), MacCallum (1916), Johnston & Tiegs (1922), Johnston (1934b), Price (1938a), Brinkmann (1940, 1952b), Sproston (1946), Palombi (1949), Pearse (1949), Hargis (1955b), Dawes (1956), Bychowsky (1957), Yamaguti (1963), Euzet & Maillard (1967), Young (1967b).

Table 171. Monocotyle diademalis Hargis, 1955.

Location	Host	Locality	Source
1. Gills	Dasyatis sabina (Lesueur)	Alligator Harbor, Fla.	Hargis (1955b: 3-4)
2. Gills	Dasyatis americana Hildebrand & Schroeder	Chesapeake Bay	McMahon (1963: 153)
3. Gills	Dasyatis sayi (Lesueur)	"	McMahon (1963: 153)
4. Gills	Dasyatis sp. (probably either D. sayi or D. americana)	Alligator Harbor, Fla.	Hargis (1955b: 3-4)

Synonym: Heterocotyloides diademalis (Hargis, 1955) Yamaguti, 1963

Additional references: Hargis (1957), Yamaguti (1963), Young (1967b).

Table 172. Monocotyle granulatae Young, 1967.

Location	Host	Locality	Source
1. Gills	Dasyatis granulata (Macleay)	Moreton Bay, Queensland, Australia	Young (1967b: 388-389)

Table 173. Monocotyle ijimae Goto, 1894.

Location	Host	Locality	Source
1. Mouth cavity	Dasyatis pastinaca (Linnaeus) [Trygon pastinaca]	Hiroshima (Ujina Port), Japan	Goto (1894: 232)

Synonym: Tritestis ijimae (Goto, 1894) Price, 1938

Additional references: Cerfontaine (1895, 1896, 1898), Braun (1896*), Saint-Remy (1898), Benham (1901), Stiles & Hassall (1908), Pratt (1910), Johnstone (1911), Tagliani (1912), MacCallum (1916), Johnston & Tiegs (1922), Fuhrmann (1928), Layman (1930), Sprehn (1933), Johnston (1934b), Price (1938a), Brinkmann (1940), Palombi (1942a), Yamaguti (1943a, 1963), Sproston (1946), Pearse (1949), Dawes (1956), Bychowsky (1957), Young (1967b).

Table 174. Monocotyle kuhlii Young, 1967.

Location	Host	Locality	Source
1. Gills	Dasyatis kuhlii (Müller & Henle)	Moreton Bay, Queensland, Australia	Young (1967b: 391)

Table 175. Monocotyle pricei Pearse, 1949.

Location	Host	Locality	Source
1. Gills	Archosargus probatocephalus (Walbaum)[1]	Beaufort, North Carolina	Pearse (1949: 28)
2. Gills	Dasyatis americana Hildebrand & Schroeder	Alligator Harbor, Florida	Hargis (1955b: 6)
3. Gills	Dasyatis sayi (Lesueur) [D. say]	"	Hargis (1955b: 6)
4. Gills	"	Chesapeake Bay	McMahon (1963:152)

Synonym: Heterocotyloides pricei (Pearse, 1949) Yamaguti, 1963

Additional references: Hargis (1957), Yamaguti (1963)[2], Young (1967b).

[1]The record for Archosargus probatocephalus (Walbaum) by Pearse (1949) should probably be considered accidental, as Hargis (1955b: 7) indicated.

[2]Yamaguti (1963:154) neglected to list Dasyatis sayi (Lesueur) as a host.

Table 176. *Monocotyle tritestis* Young, 1967.

Location	Host	Locality	Source
1. Gills	*Dasyatis kuhlii* (Müller & Henle)	Moreton Bay, Queensland, Australia	Young (1967b: 392)

Table 177. *Monocotyle* sp. of Layman, 1930.

Location	Host	Locality	Source
1. Gills	*Urolophoides giganteus* Lindberg [*Urolopsis giganteus* Lindberg]	Peter the Great Bay, U.S.S.R.	Layman (1930: 54, 89)
2. Gills	*Enedrias nebulosus* (Temminck & Schlegel)	"	Layman (1930: 54, 89)

Table 178. Monocotyle sp. of Euzet & Maillard, 1967.

Location	Host	Locality	Source
1. Gills	Pteromyleus bovina (Geoffroy, Saint-Hilaire)	Dakar, Senegal	Euzet & Maillard (1967:1458)

Table 179. Anoplocotyloides papillatus (Doran, 1953) Young, 1967[1].

Location	Host	Locality	Source
1. Gills	Rhinobatos productus (Ayres)	Long Beach breakwater area, Los Angeles County, California	Doran (1953:146)

Synonym: Heterocotyle papillata Doran, 1953

Additional references: Winter (1955), Yamaguti (1963), Young (1967b).

[1]It is not known whether the Monocotylidae n. sp. of Koratha & Martin (1963:27) from the olfactory cavity of Rhinobatos productus (Ayres) is, in fact, a new species, or a synonym of Anoplocotyloides papillatus or Spinuris lophosoma Doran, 1953 (Table 194), both of which have been reported from the same host.

Table 180. Dasybatotrema dasybatis (MacCallum, 1916) Price, 1938.

Location	Host	Locality	Source
1. Gills[1]	Dasyatis sp.[2] [Dasybatus pastinacus]	Woods Hole, Mass.	MacCallum (1916:9,11)
2. Gills	Dasyatis centroura (Mitchill) [Pastinachus centrourus (Mitchill)][3]	From MacCallum's Woods Hole Coll.	Price (1938a:115)
3. Skin	Dasyatis marmorata[4] (Steindachner)	Goree, Senegal	Euzet & Maillard (1967:1461)

Synonyms: Monocotyle dasybatis MacCallum, 1916
Monocotyloides dasybatis (MacCallum, 1916) Johnston, 1934

Additional references: Johnston & Tiegs (1922), Sprehn (1933), Johnston (1934b), Brinkmann (1940), Palombi (1942a), Sproston (1946), Bychowsky (1957), Tripathi (1959), Yamaguti (1963), Young (1967b).

[1]The Index-Catalogue of Medical and Veterinary Zoology, Trematoda and Trematode Diseases, Part 5, p. 1023 gave the location on the host as "nasal mucus glands," which is incorrect. MacCallum (1916:9,11) gave "gills" as the location.

[2]MacCallum (1916:6) listed the host as "Dasybatus pastinacus (Walbaum, 1793)." Price (1938a:115) gave Dasyatis pastinaca (L.) as the host. Bigelow & Schroeder (1953b) did not list any reference to a fish with Walbaum, 1793, as a synonym of any American Dasyatis sp. It could refer to Dasyatis pastinaca (Linnaeus), but this is an eastern Atlantic species (Smith, 1950: 70). I suspect that the host was misidentified, and was probably D. centroura (Mitchill). It would probably be more correct to list the host as "Dasyatis sp."

Table 180 continued

[3] Price (1938a:115-116), in redescribing MacCallum's specimens, listed this host in addition to the one originally listed by MacCallum (1916:9-11).

[4] See Table 48, footnote 1.

Table 181. *Decacotyle lymmae* Young, 1967.

Location	Host	Locality	Source
1. Gills	*Taeniura lymma* (Forskål)	Heron Island, Queensland, Australia	Young (1967b: 398)

Table 182. *Diploheterocotyla dasyatis* Yamaguti, 1965.

Location	Host	Locality	Source
1. Gills	"*Dasyatis* sp. (? *D. hawaiiensis*)"[1]	Hawaii	Yamaguti (1965: 61)

[1] A *Dasyatis hawaiiensis* Jenkins is listed by Gosline & Brock (1965: 310) for Hawaiian waters.

Table 183. Heterocotyle pastinacae Scott, 1904.

Location	Host	Locality	Source
1. Gills	Dasyatis pastinaca (Linnaeus) [Trygon pastinaca]	Dornoch Firth, Scotland	T. Scott (1904: 279)

Synonym: Monocotyle pastinacae (Scott, 1904) Brinkmann, 1940

Additional references: T. Scott (1905, 1911b), Stiles & Hassall (1908), Nicoll (1915), MacCallum (1916), Johnston & Tiegs (1922), Sprehn (1933), Price (1938a), Brinkmann (1940), Palombi (1942a), Sproston (1946), Doran (1953), Hargis (1955b), Dawes (1956), Yamaguti (1963), Young (1967b); Cheng (1964).

Table 184. *Heterocotyle americana* Hargis, 1955.

Location	Host	Locality	Source
1. Gills	*Dasyatis americana* Hildebrand & Schroeder	Alligator Harbor, Florida	Hargis (1955b: 9)

Additional references: Hargis (1957), Yamaguti (1963), Young (1967b).

Table 185. *Heterocotyle granulatae* Young, 1967.

Location	Host	Locality	Source
1. Gills	*Dasyatis granulata* (Macleay)	Moreton Bay, Queensland, Australia	Young (1967b: 401)

Table 186. *Heterocotyle minima* (MacCallum, 1916) Price, 1938.

Location	Host	Locality	Source
1. Gills	*Dasyatis* sp. [*Dasybatus pastinacus*][1]	Woods Hole, Mass.	MacCallum (1916:11, 16)
2. Gills	*Dasyatis centroura* (Mitchill) [*Pastinachus centrourus* (Mitchill)][2]	From MacCallum's Woods Hole Coll.	Price (1938a:114)
3. Gills	*Squalus acanthias* Linnaeus[2]	"	Price (1938a:114)

Synonyms: *Monocotyle dasybatis minimus* MacCallum, 1916
Trionchus dasybatis MacCallum, 1916
Monocotyle minima (MacCallum, 1916) Johnston & Tiegs, 1922
Monocotyloides minima (MacCallum, 1916) Johnston, 1934

Additional references: Johnston & Tiegs (1922), Sprehn (1933), Johnston (1934b), Brinkmann (1940), Palombi (1942a), Sproston (1946), Doran (1953), Hargis (1955b), Dawes (1956), Bychowsky (1957), Yamaguti (1963, 1965), Young (1967b).

[1]MacCallum (1916:11, 16) listed the host as "*Dasybatus pastinacus*"; Price (1938a:114) gave "*Dasyatis pastinaca* (Linnaeus)" as a host. See Table 180, footnote 2.

[2]Price (1938a:114), in redescribing MacCallum's specimens, listed these two hosts in addition to the one originally listed by MacCallum (1916:11, 16).

Table 187. Heterocotyle pseudominima Hargis, 1955.

Location	Host	Locality	Source
1. Gills	Dasyatis sp. (either D. sayi or D. americana)	Alligator Harbor, Florida	Hargis (1955b:11)

Additional references: Hargis (1957), Yamaguti (1963), Young (1967b).

Table 188. Heterocotyle robusta (Johnston & Tiegs, 1922) Price, 1938.

Location	Host	Locality	Source
1. Gills	Urolophus testaceus (Müller & Henle)	Sydney, Australia	Johnston & Tiegs (1922:117)

Synonyms: Monocotyle robusta Johnston & Tiegs, 1922
Monocotyloides robusta (Johnston & Tiegs, 1922) Johnston, 1934

Additional references: Johnston (1934b), Price (1938a), Brinkmann (1940), Palombi (1942a), Sproston (1946), Doran (1953), Dawes (1956), Yamaguti (1963), Young (1967b).

Table 189. *Horricauda rhynchobatis* Tripathi, 1959[1].

Location	Host	Locality	Source
1. No mention	*Rhynchobatus djiddensis* (Forskål)	Puri, Bay of Bengal, India	Tripathi (1959:68)

Additional references: Yamaguti (1963), Young (1967b).

[1]Young (1967b:403) spelled it *H. rhynchobatidis*.

Table 190. *Horricauda rhinobatidis* Young, 1967.

Location	Host	Locality	Source
1. Gills	*Rhinobatos typus* Bennet	Heron Island, Queensland, Australia	Young (1967b:403)

Table 191. *Neoheterocotyle inpristi* Hargis, 1955.

Location	Host	Locality	Source
1. Gills	*Pristis* sp.	Alligator Harbor, Florida	Hargis (1955c: 204)

Additional references:. Hargis (1957), Tripathi (1959), Yamaguti (1963), Young (1967b).

Table 192. *Papillicotyle octona* Young, 1967.

Location	Host	Locality	Source
1. Bases of primary gill lamellae	*Aetobatus narinari* (Euphrasen) [*Aetobatis narinari* (Euphrasen)]	Heron Island, Queensland, Australia	Young (1967b: 406)

Table 193. *Papillicotyle floridana* (Pratt, 1910) Young, 1967.

Location	Host	Locality	Source
1. Gills	*Myliobatis freminvillei* Lesueur	Gulf of Mexico[1]	Pratt (1910: 3)
2. Gills	*Aetobatus narinari* (Euphrasen)	Beaufort, North Carolina	Pearse (1949: 28)
3. Gills	"	Alligator Harbor and Tampa Bay, Florida	Hargis (1955b: 12)

Synonyms: *Monocotyle floridana* Pratt, 1910
Heterocotyle floridana (Pratt, 1910) Price, 1938
Heterocotyle aetobatis Hargis, 1955

Additional references: Tagliani (1912), Pratt (1935), Price (1938a), Brinkmann (1940), Palombi (1942a), Sproston (1946), Doran (1953), Manter (1954), Koratha (1955a), Dawes (1956), Hargis (1957), Baer & Euzet (1961), Yamaguti (1963), Young (1967b).

[1]Studied at Tortugas, Florida.

Table 194. Spinuris lophosoma Doran, 1953[1].

Location	Host	Locality	Source
1. Gills	Rhinobatos productus (Ayres)	Long Beach breakwater area, Los Angeles County, Calif.	Doran (1953:147)
2. No mention	"	California (no specific locality given)	Koratha & Martin (1960: 14)

Additional references: Winter (1955), Bychowsky (1957), Baer & Euzet (1961), Yamaguti (1963), Young (1967b).

[1] See Table 179, footnote 1.

Table 195. *Troglocephalus rhinobatidis* Young, 1967.

Location	Host	Locality	Source
1. Gills	*Rhinobatos typus* Bennet	Heron Island, Queensland, Australia	Young (1967b: 409)

Table 196. *Tympanocirrus*[1] *spirophallus* Tripathi, 1959.

Location	Host	Locality	Source
1. No mention	*Dasyatis sephen* (Forskål)	Chilka Lake and Puri (Bay of Bengal), India	Tripathi (1959: 65)

Additional references: Yamaguti (1963), Young (1967b).

[1]Young (1967b: 385) included the genus *Tympanocirrus* Tripathi, 1959 as "genus sedis incertae" in the subfamily Monocotylinae Gamble, 1896.

Table 197. Calicotyle kröyeri Diesing, 1850.

Location	Host	Locality	Source
1. "in corporis superficie" [on body surface]	Raja radiata Donovan	Kattegat (Coll. by Kroyer)	Diesing (1850:431)
2. Cloaca	" [Raia radiata Don.]	60 miles SE of the Shetland Islands	T. Scott (1902:299)
3. "on"	"	Off Aberdeen, Scotland	T. Scott (1902:299)
4. "on"	"	"in the Clyde", Scotland	T. Scott (1902:299)
5. No mention	R. radiata Donovan	Northumberland, England	Lebour (1908)* In Sproston (1946:292)
6. Cloaca	"	Swedish west coast in Skagerrak, and west of previous in North Sea	Nybelin (1941:3)
7. Abdominal cavity[1]	"	Norway (Coll. by Esmark)	Brinkmann (1952b:28)[2]
8. Cloaca	"	Herdla, Norway	Brinkmann (1952b:28)
9. Cloaca	"	Drøbak, Norway	Brinkmann (1952b:28)
10. Cloaca	"	Reykjavik, Iceland	Brinkmann (1956a:9)
11. Cloaca	"	57°02'N, 0°45'E and 60°01'N, 1°00'W	Williams (1960:707,711)[3]
12. Cloaca	" [Raia radiata]	England	Halton & Jennings (1965:257)

Table 197 continued

Location	Host	Locality	Source
13. Cloaca[4]	R. radiata Donovan	North Sea	Williams (1965:201,202)
14. Cloaca	" [Raia radiata]	England	Halton (1967a:46)
15. Cloaca	"	England	Halton (1967b:117)
16. On the skin or in the cloaca	Raja alba Lacépède [Raja marginata Lacépède][5]	Trieste, Italy (Coll. by Perugia)	Parona & Perugia (1890a:6)
17. In cloaca & on skin in vicinity of anus	"	Trieste, Italy	Stossich (1898)* In Palombi (1949:244)
18. Anus & cloaca	Raja asterias De la Roche [Raja schulzii][6]	Trieste, Italy	Wierzejski (1877:551)[7]
19. No mention	Raja asterias De la Roche [R. asterias][8]	Naples, Italy	Zschokke (1887)* In Parona (1912:13)
20. Cloaca	Raja asterias De la Roche	Sete, France	Euzet (1957a:197)
21. Rectum (p.511), rectum near anus (p.512)	Raja batis Linnaeus	Region of Strömstadt, Sweden (Kloster Island--p.512)	Hök (1856:507)
22. Cloaca	" [Raia batis L.)	Coast of Belgium	Beneden (1871:16)
23. In cloaca & on skin in vicinity of anus	R. batis L.	Trieste, Italy	Stossich (1898)* In Palombi (1949:244)

Table 197 continued

Location	Host	Locality	Source
24. Cloaca & vicinity of anus	R. batis L.	French waters (p. 43)	Froissant 1930: 48)
25. Cloaca	"	Swedish west coast in Skagerrak, and west of previous in North Sea	Nybelin (1941: 3)
26. Skin near anal opening	"	Near southern shores of England (Atlantic Ocean)	Bychowsky (1957: 59)
27. Skin near anal opening	"	From the region near western England (Atlantic Ocean)	Bychowsky (1957: 370)
28. Cloaca	"	57°40'N, 9°15'W; 57°50'N, 9°15'W; 57°25'N, 0°20'W	Williams (1960: 707, 711)
29. Cloaca	"	North Sea	Williams (1965: 201)[9]
30. Cloaca	"	North & north-west Scotland	Williams (1965: 201)[9]
31. Cloaca	Raja brachyura Lafont	Roscoff, France	Nybelin (1941: 3)
	[Raja blanda Holt & Calderwood][10]		
32. Cloaca[11]	Raja circularis Couch	Plymouth, England	Nicoll (1914: 497)
33. Cloaca	"	Plymouth, England	Plymouth Marine Fauna (1931)* In Sproston (1946: 292)

Table 197 continued

Location	Host	Locality	Source
34. "an" [on or in]	Raja clavata Linnaeus	Trieste, Italy	Wierzejski (1877: 551)
35. In cloaca & on skin in vicinity of anus	"	Trieste, Italy	Stossich (1898)* In Palombi (1949: 244)
36. Cloaca	" [Raia clavata]	Beaumaris Bay, England	A. Scott (1901a: 13)[12]
37. "on"	R. clavata L.	"in the Clyde," Scotland	T. Scott (1902: 299)
38. Cloaca	" [Raia clavata]	Irish Sea	A. Scott (1904: 115)
39. No mention	R. clavata L.	Northumberland, England	Lebour (1908)* In Sproston (1946: 292)
40. Cloaca[11]	"	Plymouth, England	Nicoll (1914: 497)
41. No mention	"	French waters (p. 43)	Froissant (1930: 52)
42. Cloaca	"	Plymouth, England	Plymouth Marine Fauna (1931)* In Sproston (1946: 292)
43. Cloaca	"	Swedish west coast in Skagerrak, and west of previous in North Sea	Nybelin (1941: 3)
44. Cloaca	"	Plymouth Aquarium	Sproston (1946: 293)[13]
45. Cloaca	"	Sete, France	Baer & Euzet (1961: 309)

Table 197 continued

Location	Host	Locality	Source
46. Cloaca	R. clavata L. [Raia clavata]	England	Halton & Jennings (1965: 257)
47. Cloaca	"	England	Halton (1967a: 46)
48. No mention	Raja fullonica Linnaeus [Raia fullonica]	Herdla, Norway (p. 482)	Ruszkowski (1934: 487)
49. Cloaca	R. fullonica L.	Swedish west coast in Skagerrak, and west of previous in North Sea	Nybelin (1941: 3)
50. Cloaca	"	53°30'-54°N, 11°40' W and/or 52°55'-53°30'N, 14° W[14]	Rees & Llewellyn (1941: 390, 392, 393)
51. Cloaca	"	Herdla, Norway	Brinkmann (1952b: 28)
52. No mention	"	57°40'N, 9°15'W	Williams (1960: 707)[3]
53. Cloaca	"	North & north-west Scotland	Williams (1965: 201)
54. Cloaca	Raja fyllae Lütken	West of Skagerrak in North Sea	Nybelin (1941: 3)
55. Cloaca	Raja microocellata Montagu [Raja microcellata]	53°30'-54°N, 11°40' W (Irish Atlantic Slope)	Rees & Llewellyn (1941: 390, 392, 393)
56. In cloaca & on skin in vicinity of anus	Raja miraletus (Linnaeus)	Trieste, Italy	Stossich (1898)* In Palombi (1949: 244)

Table 197 continued

Location	Host	Locality	Source
57. In cloaca & on skin in vicinity of anus	Raja miraletus (Linnaeus)	Messina, Sicily, Italy	Basile (1909)* In Palombi (1949: 244)
58. In cloaca & on skin in vicinity of anus	Raja montagui Fowler[8]	Naples, Italy	Zschokke (1887)* In Palombi (1949: 244)
59. Cloaca	" [Raja maculata]	Plymouth, England	Nicoll (1914: 497,503)
60. Cloaca	" [Raja maculata Montagu]	West coast of Ireland in area off Galway Bay	Little (1929a: 25,26)
61. Cloaca	R. montagui Fowler	Plymouth, England	Plymouth Marine Fauna (1931)* In Sproston (1946: 292)
62. Cloaca	" [Raja maculata]	Plymouth, England	Baylis & Jones (1933: 629)
63. No mention	R. montagui Fowler	S. Devon, England	Baylis (1939: 474)
64. Cloaca	" [Raja maculata Mont.]	Roscoff, France	Nybelin (1941: 3)
65. No mention	R. montagui Fowler[15]	Newquay, England	Rees & Llewellyn (1941: 390,393)
66. Cloaca	Raja naevus Müller & Henle	53°30'-54°N, 11°40' W and/or 52°55'-53°30'N, 14° W[14]	Rees & Llewellyn (1941: 390,392,393)
67. Cloaca	"	Plymouth, England	Llewellyn & Green (1957: 78)

Table 197 continued

Location	Host	Locality	Source
68. Cloaca	R. naevus Müller & Henle	54°0'N, 11°30'W and 61°01'N, 0°35'W	Williams (1960: 707, 711)
69. Cloaca	Raja nidarosiensis Collett [Raja nidrosiensis]	Herdla, Norway	Brinkmann (1952b: 29)
70. Cloaca	Raja oxyrinchus Linnaeus [Raja oxyrhynchus]	West of Skagerrack in North Sea	Nybelin (1941: 3)
71. No mention	R. oxyrinchus L.[15] [Raja oxyrhynchus]	54°N, 11°10'W (Irish Atlantic slope)	Rees & Llewellyn (1941: 390-393)
72. ?	"	Herdla, Norway (Coll. by Ruszkowski)	Brinkmann (1952b: 28, 31)
73. Cloaca	"	Drøbak, Norway	Brinkmann (1952b: 29)
74. Cloaca & rectum	"	Herdla, Norway	Brinkmann (1952b: 29)
75. Cloaca	"	Herdla, Norway	Brinkmann (1952b: 29)
76. Cloaca [?]	"	North Sea	Williams (1965: 201, 202)
77. Cloaca	"Raja"	Naples, Italy	Taschenberg (1879a: 295)
78. No mention	"raie"	Naples, Italy	Lo Bianco (1909)*[16] In Ind.-Cat. Med. Vet. Zool., Trem. & Trem. Dis., Pt. 2: 162.
79. No mention	Raja sp. ["skate"]	Durham, England	Baylis (1939: 474)

Table 197 continued

Location	Host	Locality	Source
80. Cloaca	*Raja* spp. ["other rays"]	Irish Sea	A. Scott (1904: 115)
81. Cloaca	*Raja* spp.	Plymouth, England	Llewellyn (1954: 434)
82. Cloaca	*Raja* spp.	Sete [?], France	Euzet & Williams (1960: 23, 22, 29)
83. No mention	*Scophthalmus maximus*[17] (Linnaeus) ["*Rhombus maximus*?"]	Norway[18]	Olsson (1868: 17)
84. No mention	No mention	No mention	Lyons (1966: 70)[19]

Synonyms: *Callicotyle kroyeri* (Diesing, 1850) Diesing, 1858
Callicotyle kroeyerii (Diesing, 1850) Beneden, 1870
Calycotyle kroyeri (Diesing, 1850) Parona, 1896
Calycotyle kroyeri (Diesing, 1850) Saint-Remy, 1898
Calliocotyle kröyeri (Wierzejski, 1877) T. Scott, 1902
Callocotyle kröyeri (Wierzejski, 1877) T. Scott, 1905
Calicotyle (*Calicotyle*) *kroyeri* (Diesing, 1850) Nybelin, 1941

Additional references: Kroyer (1852-53*), Diesing (1858a, 1858b*), Beneden & Hesse (1864), Beneden (1870*), Linstow (1878, 1889a, 1889b), Lorenz (1878), Taschenberg (1878a, 1878b, 1879b), Vogt (1878), Ziegler (1883*), Ijima (1884), Looss (1885*), Orley (1885), Cunningham (1887*), Hoyle (1888*), Monticelli (1888, 1892a), Juel (1889*), Braun (1890a, 1899), Goto (1891, 1894), Saint-Remy (1891d, 1892c, 1892d, 1898), Cerfontaine (1894a), Kathariner (1895), Parona (1896, 1912), Perrier (1897*), Pratt (1900), Benham (1901), Mordvilko (1908), Stiles & Hassall (1908), T. Scott (1905, 1911a, 1911b), Tagliani (1912), Nicoll (1915), Johnston & Tiegs (1922), Lameere (1929-30*), Pintner (1930), Bresslau (1932), Jones (1933), Sprehn (1933), Johnston (1934a), Woolcock (1936), Price (1938a), Brinkmann (1940, 1956b), Cordero (1944), Dawes (1947*, 1948, 1956), Palombi (1949), Hunter & Kille (1950),

Table 197 continued

Manter (1955b), Euzet (1957b), Llewellyn (1957a, 1959, 1963), Dawes & Griffiths (1958, 1959), Williams (1958, 1964), Dogiel *et al* (1961), Grabda, Markevich & Mikhailov (1961), Robinson (1961), Kearn (1963d), Yamaguti (1963), Smyth (1966); and Hatscheck* (year unknown)[20], and Goette* (year unknown)[20]; Cheng (1964).

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[1]Brinkmann (1952b:28) believed this location to be accidental. He examined the parasite and found it to be *Calicotyle kröyeri*.

[2]The Index-Catalogue of Medical and Veterinary Zoology, Trematoda and Trematode Diseases, Part 2, p. 162 said Brinkmann (1952b) found *Raja fyllae* and *Raja vomer* to be hosts, when in reality they were reported as negatives by Brinkmann (1952b:28).

[3]Williams (1960:706) erroneously placed his latitude lines in Figure 1. He illustrated them all too high. The 54° latitude line should go through station 1. He also left out *C. kröyeri* as a parasite of *R. fullonica* on p. 711; however, he listed it correctly on p. 707.

[4]"...occasionally...in the rectum and the rectal gland" (Williams, 1965:203). Williams (1965:203) also said that Lebour (1908*) reported this species from the cloaca, uterus, and gills of *Raja radiata*.

[5]*Raja marginata* Lacépède is a synonym of *Raja alba* Lacépède (Wheeler, 1969:92).

[6]*Raja schulzii* is a synonym of *Raja asterias* De la Roche (Bailey, personal communication).

[7]Palombi (1949:244) said that Wierzejski (1877) found it in *R. batis* at Trieste. An examination of Wierzejski (1877:551) revealed that he did not personally find it in this host, but was referring to Hök's work (1856). Braun (1899:80) also said that Wierzejski (1877) found it on *R. batis*.

[8]The correct host for Zschokke's (1887*) work was either *Raja asterias* De la Roche or *Raja montagui* Fowler. Parona (1912:13) listed the host as "*R. asterias*"; Palombi (1949:244) listed only one host for Zschokke's (1887*) work, "*Raja montagui* Fowler (=*Raja asterias* Rond.)." Which host is correct is unknown.

[9]Williams (1965:Table 1 and p. 201) presented conflicting data. He said (p. 201) "One of the four *R. batis* was infected with twelve

Table 197 continued

specimens of Dictyocotyle in the body cavity and three of Calicotyle in the cloaca; the other three yielded 24 Dictyocotyle but no Calicotyle." Table 1 indicated that 6 R. batis were infected with Calicotyle and 4 R. batis were infected with Dictyocotyle. The above quote said 1 R. batis was infected with Calicotyle and 4 R. batis had Dictyocotyle. Which is correct (Table 1 or text) is unknown.

[10]Raja blanda Holt & Calderwood is a synonym of Raja brachyura Lafont (Bailey, personal communication).

[11]Although Nicoll (1914:497) said he found C. kröyeri "in the cloaca of the three rays, Raja circularis, R. maculata and R. clavata," he listed C. kröyeri on p. 503 as being found in the "rectum" of R. circularis and R. clavata. He (p.503) listed "cloaca" as the location in R. maculata. It is unclear why Nicoll committed this confusion concerning location of the parasites.

[12]A. Scott (1901a:13) listed the parasite as "Trematode sp."

[13]Sproston (1946:292) gave Diesing (1858a:362) as a locality record, which is incorrect. Diesing (1858a:362) just repeated the findings of Kroyer and Hök. Sproston (1946:292) erroneously listed Saint-Remy (1898:540) as a record for C. kröyeri "on Rhombus maximus from N. France." I could find no indication in Saint-Remy (1898) that he personally collected this parasite on "Rhombus maximus." Olsson (1868:17) is apparently the correct work for this host record; he collected in Norway (see footnote 18).

[14]Rees & Llewellyn (1941:392, 393) gave conflicting localities for these two host species in Tables 2 and 3 (also see p. 390). Which is correct is unknown.

[15]Rees & Llewellyn (1941:392,393) did not note these two as hosts for C. kröyeri in Table 2, but they did in Table 3. Which table is correct is unknown.

[16]A repeat of Taschenberg (1879a)?

[17]"Olsson's record of its occurrence on the turbot is probably erroneous" (Dawes, 1956:126).

[18]Olsson (1868:1) said he collected at Bergen, Aalesund, and the fishing ground "Storeggen" in the summer of 1867.

Table 197 continued

[19]Lyons (1966: 70) did work on the chemical nature of attachment sclerites of this species. However, she failed to note location, host, or locality of her parasites.

[20]Cited by Bresslau (1932: 1120). I was unable to locate these works.

Addendum: Smyth (1966, Plate I, Figure A [facing p. 60]) illustrated a "*Calicotyle* sp.," but gave no host nor locality data.

Table 198. *Calicotyle affinis* Scott, 1911.

Location	Host	Locality	Source
1. Gills	*Chimaera monstrosa* *Linnaeus*	North Sea	T. Scott (1911a: 68)
	[*Chimera monstrosa* L.]		
2. Cloaca & cloacal opening	*C. monstrosa* L.	Herdla, Norway[1] (p. 482)	Ruszkowski (1934: 486)
3. Rectal ampulla	"	Herdla, Norway	Brinkmann (1940: 5, 62)
4. Rectal ampulla	"	No mention	Nybelin *In* Brinkmann (1940: 62)[2]
5. ?	"	Trondheim, Norway (Coll. by Swenander)	Brinkmann (1952b: 30)
6. Rectum	"	Trondheim, Norway (Coll. by Nybelin)	Brinkmann (1952b: 30)
7. Cloaca & rectum	"	Byfjord, Bergen, Norway	Brinkmann (1952b: 30)
8. Cloaca	"	Mangerfjord, Norway	Brinkmann (1952b: 30)
9. Cloaca & rectum	"	Herdla, Norway	Brinkmann (1952b: 30)
10. Cloaca	"	Border between Barents & Norwegian Seas	Polyanskii (1955: 39)
11. Cloaca, rectum, gills, stomach	"	54°0'N, 11°30'W and 59°30'N, 6°30'W	Williams (1960: 707, 711)
12. Cloaca	"	"Trondheim fjord," Norway	Land (1967: 110)

Table 198 continued

Location	Host	Locality	Source
13. Rectal ampulla	*Raja fullonica* Linnaeus	Herdla, Norway	Brinkmann (1940:5,62)
14. Cloaca	"	Herdla, Norway	Brinkmann (1952b:30)

Synonyms: *Calicotyle kroyeri* Diesing, 1850, in part, of Ruszkowski, 1934
Calicotyle (Calicotylides) affinis (Scott, 1911) Nybelin, 1941
Codicotyle affinis Polyanskii, 1955 (Table 22), (lapsus)

Additional references: Scott (1911b), Nicoll (1915), Sprehn (1933), Johnston (1934a), Price (1938a), Nybelin (1941), Cordero (1944), Sproston (1946), Dawes (1948, 1956), Hunter & Kille (1950), Manter (1955b), Brinkmann (1956b), Bychowsky (1957), Williams (1958, 1965), Dawes & Griffiths (1959), Euzet & Williams (1960), Baer & Euzet (1961), Dogiel *et al* (1961), Robinson (1961), Yamaguti (1963).

[1] Brinkmann (1952b:31) gave the locality as Bergen; he said "The remaining two slides showed specimens from *Chimaera monstrosa* which certainly were *C. affinis* (Bergen: 1929)."

[2] "Fil. Dr. NYBELIN informs me that he too has taken it only from the rectal ampulla of the same host" (Brinkmann, 1940:62).

Table 199. *Calicotyle australis* Johnston, 1934.

Location	Host	Locality	Source
1. "on"	*Trygonorrhina fasciata* Müller & Henle [*Trygonorhina fasciata* Müller & Henle]	Glenelg, South Australia, Australia	Johnston (1934a: 25)

Synonym: *Calicotyle* (*Calicotyle*) *australis* (Johnston, 1934) Nybelin, 1941

Additional references: Woolcock (1936), Price (1938a), Brinkmann (1940, 1952b), Nybelin (1941), Cordero (1944), Sproston (1946), Dawes (1956), Williams (1958), Euzet & Williams (1960), Robinson (1961), Yamaguti (1963).

Table 200. *Calicotyle macrocotyle* Cordero, 1944.

Location	Host	Locality	Source
1. Spiral intestine	*Sympterygia microps* (Günther) [*Raja microps*[1] Günther]	Montevideo, Uruguay	Cordero (1944: 2)

Synonym: *Calicotyle megacotyle* Cordero, 1944

Additional references: Brinkmann (1952a, 1952b), Williams (1958), Euzet & Williams (1960), Robinson (1961), Yamaguti (1963).

[1] *Raja microps* Günther is a synonym of *Sympterygia microps* (Günther) (McEachran, personal communication).

Table 201. Calicotyle mitsukurii Goto, 1894.

Location	Host	Locality	Source
1. Cloaca	Rhina sp. ? (Japanese name = Katasashi-zame)[1]	Mitsugahama (=Mitsuhama), Japan	Goto (1894: 229)

Synonyms: Calycotyle mitsukurii (Goto, 1894) Saint-Remy, 1898
Calicotyle (Calicotyle) mitsukurii (Goto, 1894) Nybelin, 1941

Additional references: Cerfontaine (1898), Saint-Remy (1898), Braun (1899), Stiles & Hassall (1908), Tagliani (1912), Johnston & Tiegs (1922), Johnston (1934a), Woolcock (1936), Price (1938a), Brinkmann (1940, 1952b), Nybelin (1941), Yamaguti (1943a, 1963), Cordero (1944), Sproston (1946), Hunter & Kille (1950), Dawes (1956), Williams (1958), Euzet & Williams (1960), Robinson (1961).

[1]Okada (1955) did not list a Japanese fish with this common name. It is impossible, therefore, to be more specific as to its most probable identity.

Table 202. Calicotyle palombi Euzet & Williams, 1960.

Location	Host	Locality	Source
1. Rectum & cloaca	Mustelus mustelus (Linnaeus)	Sete, France	Euzet & Williams (1960: 21, 29)
2. Rectum & cloaca	Mustelus canis (Mitchill)	"	Euzet & Williams (1960: 21, 29)
3. Rectum & cloaca	Centrophorus uyato (Rafinesque-Schmaltz)	"	Euzet & Williams (1960: 21)[1]

[1] Euzet & Williams (1960: 21) gave Centrophorus uyato as a host (rectum and cloaca) of a species of Calicotyle at Sete, France. However, they did not mention what species it was. As only one of the two that they discussed, Calicotyle palombi n. sp., was found in the rectum and cloaca, I assumed that the parasite in Centrophorus uyato was C. palombi. This is correct, as Euzet (personal communication) said, "C'est effectivement Calicotyle palombi qui a été récolté dans le cloaque de Centrophorus uyato. Je ne retrouve pas dans ma collection cet exemplaire qui a dû se perdre durant les échanges avec H. H. WILLIAMS. D'ailleurs il correspondrait peut-être à une infestation accidentelle car nous ne l'avons jamais depuis retrouvé chez cet hôte."

Table 203. Calicotyle ramsayi Robinson, 1961.

Location	Host	Locality	Source
1. Cloaca	Squalus lebruni[1] (Valliant)	Cook Strait, New Zealand	Robinson (1961: 241)

Additional references: Yamaguti (1963), Williams (1965).

[1] =? Squalus fernandinus Molina (Paxton & Talbot, personal communication).

Table 204. Calicotyle stossichi Braun, 1899.

Location	Host	Locality	Source
1. Appendicular gland of rectum (= rectal gland)	Mustelus mustelus (Linnaeus) [Mustelus laevis][1]	Berlin Aquarium at Rovigno, Yugoslavia	Braun (1899: 80, 81)
2. Rectal gland	M. mustelus (L.)	Sete, France	Euzet & Williams (1960: 21, 29)
3. Rectal gland	Mustelus canis (Mitchill)	"	Euzet & Williams (1960: 21, 29)

Synonym: Calicotyle (Calicotylides) stossichi (Braun, 1899) Nybelin, 1941

Additional references: Stiles & Hassall (1908), Parona (1912), Johnston & Tiegs (1922), Vatova (1928*), Johnston (1934a), Price (1938a), Brinkmann (1940, 1952b), Nybelin (1941), Cordero (1944), Sproston (1946), Dawes (1948, 1956), Palombi (1949), Williams (1958), Robinson (1961), Yamaguti (1963).

[1]"Mustelus laevis Risso, 1826 is certainly a synonym of Mustelus mustelus Linnaeus, but the nomenclature of the smooth hounds is confused and many early workers (and some today!) still are not aware of the existence of more than one European Mustelus species" (Wheeler, personal communication).

Table 205. *Dictyocotyle coeliaca* Nybelin, 1941.

Location	Host	Locality	Source
1. Coelom	*Raja radiata* Donovan	Trondheim, Norway	Nybelin (1941: 6)
2. Coelom	"	Butt of Lewis; Shetland Isles; Coral Bank, ENE of Aberdeen, Scotland	Hunter & Kille (1950: 15-16)
3. Coelom	"	Plymouth, England	Dawes & Griffiths (1958: 1033)
4. Body cavity	"	North Sea[1]	Williams (1965: 201, 204, 205)
5. Coelom	*Raja lintea* Fries	38' NW-N of Skagen	Nybelin (1941: 3)
6. Body cavity	*Raja batis* Linnaeus[2]	North Sea	Williams (1965: 201)
7. Coelom-outside stomach	*Raja clavata* Linnaeus	Brixham, England	Dawes (1948: 643)
8. Body cavity	*Raja fullonica* Linnaeus	North & north-west Scotland	Williams (1965: 201)
9. Coelom	*Raja naevus* Müller & Henle	Butt of Lewis; Shetland Isles; Coral Bank, ENE of Aberdeen, Scotland	Hunter & Kille (1950: 15-16)
10. Coelom	"	Plymouth, England	Llewellyn & Green (1957: 77-78)
11. Coelom	"	Off west coast of Ireland	Williams (1958: 465)
12. Coelom	"	56°0'N, 8°5'W; 57°40'N, 9°15'W; 57°50'N, 9°15'W	Williams (1960: 707, 711)

Table 205 continued

Location	Host	Locality	Source
13. Body cavity	Raja naevus Müller & Henle	North & north-west Scotland	Williams (1965: 201, 205)
14. Body cavity	"	Plymouth, England	Williams (1965: 201, 205)
15. Coelom-on liver	Raja sp.	Plymouth, England	Sproston (1946: 294)

Synonym: Calicotyle coeliaca (Nybelin, 1941) Dawes, 1948

Additional references: Brinkmann (1952b), Dawes (1956), Bychowsky (1957), Llewellyn (1957a, 1959, 1965), Dawes & Griffiths (1959), Euzet & Williams (1960), Robinson (1961), Yamaguti (1963)[3], Williams (1964), C. Price (1967).

[1]Between 57°21'N to 58°50'N and 00°04'E to 2°43.5'E (Williams, 1965: 204).

[2]See Table 197, footnote 9.

[3]Yamaguti (1963: 159) neglected to list all the hosts.

Table 206. *Gymnocalicotyle inermis* (Woolcock, 1936) Yamaguti, 1963[1].

Location	Host	Locality	Source
1. Oviducts	*Pristiophorus cirratus* (Latham)	Port Phillip Bay, Victoria, Australia	Woolcock (1936: 82)

Synonyms: *Calicotyle inermis* Woolcock, 1936
Calicotyle (*Gymnocalicotyle*) *inermis* (Woolcock, 1936) Nybelin, 1941

Additional references: Price (1938a), Brinkmann (1940, 1952b), Nybelin (1941), Cordero (1944), Sproston (1946), Dawes (1948, 1956), Hunter & Kille (1950), Llewellyn (1957a), Williams (1958), Euzet & Williams (1960), Robinson (1961), Yamaguti (1963).

[1]Yamaguti (1963: 159) raised this genus to generic rank.

Table 207. Dendromonocotyle octodiscus Hargis, 1955.

Location	Host	Locality	Source
1. Skin (ventral surface)	Dasyatis sayi (Lesueur) [D. say]	Alligator Harbor, Florida	Hargis (1955c: 206)
2. Skin	Dasyatis marmorata (Steindachner)[1]	Goree, Senegal	Euzet & Maillard (1967: 1464)

Additional references: Hargis (1957), Yamaguti (1963), Young (1967b).

[1] See Table 48, footnote 1.

Table 208. Dendromonocotyle kuhlii Young, 1967.

Location	Host	Locality	Source
1. Skin of body	Dasyatis kuhlii (Müller & Henle)	Moreton Bay, Queensland, Australia	Young (1967b: 413)

Table 209. Dendromonocotyle taeniurae Euzet & Maillard, 1967.

Location	Host	Locality	Source
1. Skin	Taeniura grabata (Geoffroy Saint-Hilaire)	Goree, Senegal	Euzet & Maillard (1967:1466)

Table 210. Clemacotyle australis Young, 1967.

Location	Host	Locality	Source
1. Skin of branchial cavity	Aetobatus narinari (Euphrasen) [Aetobatis narinari (Euphrasen)]	Heron Island, Queensland, Australia	Young (1967b: 416)

Table 211. *Merizocotyle diaphana* Cerfontaine, 1894.

Location	Host	Locality	Source
1. Gills	*Raja batis* Linnaeus	Ostende, Belgium	Cerfontaine (1894a: 936)
2. Gills	"	French waters (p. 43)	Froissant (1930: 48-49)

Additional references: Cerfontaine (1894b, 1895, 1896, 1898), Braun (1896*), Perrier (1897*), Saint-Remy (1898), Monticelli (1899a), Pratt (1900), Tagliani (1912), Nicoll (1915), MacCallum (1916), Johnston & Tiegs (1922), Fuhrmann (1928), Sprehn (1933), Price (1938a), Brinkmann (1940), Nybelin (1941), Kay (1942), Palombi (1943a), Sproston (1946), Dawes (1956), Baer & Euzet (1961), Yamaguti (1963), Dillon & Hargis (1965).

Table 212. *Merizocotyle amplidiscata* Dillon & Hargis, 1965.

Location	Host	Locality	Source
1. Gills	*Raja nasuta* Müller & Henle	Timaru and Akaroa, New Zealand	Dillon & Hargis (1965: 240)

Table 213. Merizocotyle minor Cerfontaine, 1898.

Location	Host	Locality	Source
1. Gills	Raja sp.[1]	Roscoff, France	Cerfontaine (1898: 330, 357, 363)
2. No mention	Raja oxyrinchus Linnaeus [Raja oxyrhynchus Linnaeus]	French waters (p. 43)	Froissant (1930: 53)

Synonym: Merizocotyle minus Cerfontaine, 1898

Additional references: Saint-Remy (1898), Tagliani (1912), MacCallum (1916), Johnston & Tiegs (1922), Price (1938a), Kay (1942), Palombi (1943a), Sproston (1946), Dawes (1956), Yamaguti (1963)[2], Dillon & Hargis (1965).

[1]Cerfontaine (1898: 330, 357) found this parasite on the gills of a Raja sp., which was known at Roscoff as "Tyre gris." He compared the host to pictures in Day, The Fishes of Great Britain and Ireland, Vol. II, and thought that the Raja in question was probably Raja oxyrhynchus (Cerfontaine, 1898: 363). I prefer to list the host as above since the original author identified the host incompletely. However, its subsequent rediscovery on this host by Froissant (1930) supports Cerfontaine's "picture book" identification.

[2]Yamaguti (1963: 161) neglected to list Raja oxyrinchus Linnaeus as a host.

Table 214. Merizocotyle pugetensis Kay, 1942.

Location	Host	Locality	Source
1. Nostrils	Raja binoculata Girard [Raja binoculata (Girard)]	Friday Harbor, Washington	Kay (1942: 258)
2. Nasal filaments	"	Friday Harbor and Point Roberts, Washington	Bonham (1950: 99)
3. Nasal filaments	"	Friday Harbor, Washington	Robinson (1961: 240)

Additional references: Sproston (1946), Winter (1955), Dawes (1956), Pratt & McCauley (1961), Yamaguti (1963), Dillon & Hargis (1965).

Table 215. Merizocotyle sp. of Palombi, 1943.

Location	Host	Locality	Source
1. Gills	Raja alba Lacépède [Raja marginata[1] Lacépède]	Trieste, Italy	Palombi (1943a: 1)

Additional references: Palombi (1949), Yamaguti (1963), Dillon & Hargis (1965).

[1] Raja marginata Lacépède is a synonym of Raja alba Lacépède (Wheeler, 1969: 92).

Table 216. Cathariotrema selachii (MacCallum, 1916) Johnston & Tiegs, 1922.

Location	Host	Locality	Source
1. Nasal glands	Sphyrna zygaena (Linnaeus) [Cestracion zygaena]	Woods Hole, Mass.	MacCallum (1916:18)
2. Nasal passages	Carcharhinus obscurus (Lesueur) [Carcharis obscurus]	"	MacCallum (1916:20)
3. Olfactory organs	Alopias vulpinus[1] (Bonnaterre)	From MacCallum's Woods Hole Coll.	Price (1938a:121)
4. Olfactory organs	Carcharhinus sp. [Carcharis commersonii (Blainville)][1,2]	"	Price (1938a:121)

Synonyms: Monocotyle selachii MacCallum, 1916
Paramonocotyle selachii (MacCallum, 1916) Johnston, 1934

Additional references: Johnston & Tiegs (1922), Johnston (1934b), Brinkmann (1940), Sproston (1946), Bychowsky (1957), Baer & Euzet (1961), Yamaguti (1963)..

[1]Price (1938a:121), in redescribing MacCallum's specimens, listed these two hosts in addition to those originally listed by MacCallum (1916:18, 20).

[2]Price (1938a:121) listed the host as "Carcharias commersonii (Blainville)." See Table 168, footnote 1.

Table 217. Empruthotrema raiae (MacCallum, 1916) Johnston & Tiegs, 1922.

Location	Host	Locality	Source
1. Nasal mucus glands	Raja erinacea Mitchill	Woods Hole, Mass.	MacCallum (1916:23)
2. Nasal mucus glands	Raja ocellata[1] Mitchill	"	MacCallum (1916:23)
3. Gills	Raja eglanteria Bosc [Raja eglanteria Lacépède]	Alligator Harbor, Florida	Hargis (1955c:209)
4. Gills	R. eglanteria Bosc	Chesapeake Bay	McMahon (1963:153)
5. Nasal chamber	Raja nasuta Müller & Henle	Portobello, Otago Harbor, New Zealand	Robinson (1961:240)

Synonym: Acanthocotyle raiae MacCallum, 1916

Additional references: Johnston & Tiegs (1922)[2], Bonham & Guberlet (1938), Price (1938a), Brinkmann (1940), Nybelin (1941), Sproston (1946), Bychowsky (1957), Hargis (1957), Yamaguti (1963), Dillon & Hargis (1965).

[1]MacCallum (1916:23) gave the host as "Raja ocellata." Price (1938a:120), in redescribing the species from MacCallum's specimens, listed "R. diaphanes Mitchill" as a host. Bigelow & Schroeder (1953b:176) considered Raja diaphanes Mitchill to be a synonym of Raja eglanteria Bosc, instead of Raja ocellata Mitchill, to which the majority of recent authors had referred it. Only an examination of specimens of R. ocellata Mitchill can disclose whether it is, in fact, a host for this monogenetic trematode. Until that time, I prefer to list the host as MacCallum (1916) did. McEachran (personal communication) thought there was a greater likelihood of the R. diaphanes Mitchill host being R. ocellata Mitchill rather than R. eglanteria Bosc because (1) in most of the past cases diaphanes has referred to ocellata, and

Table 217 continued

(2) eglanteria is only a seasonal (July-September) resident in the area where the original host was collected.

[2] Johnston & Tiegs (1922:114) said "From the gills of Raja erinacea ---"; but MacCallum (1916:23) said "...in the nasal mucus sacs or glands..."

Table 218. *Thaumatocotyle concinna* Scott, 1904[1,2].

Location	Host	Locality	Source
1. Nasal fossae	*Dasyatis pastinaca* (Linnaeus) [*Trygon pastinaca*]	Dornoch Firth, Scotland	T. Scott (1904: 279)

Additional references: T. Scott (1905, 1911b), Nicoll (1915), Johnston & Tiegs (1922), Sprehn (1933), Price (1938a), Brinkmann (1940)[2], Nybelin (1941), Sproston (1946), Hargis (1955c), Dawes (1956), Yamaguti (1963), Cheng (1964).

[1] The mention of "*A.* [*Acanthocotyle*] *concinna*" by T. Scott (1902: 301) was probably an error for *Acanthocotyle monticellii* Scott, 1902. Brinkmann (1940: 49) said, "In the same work SCOTT mentions a species *A. concinna* without in any way stating from where he has it." Brinkmann (1940: 49, footnote 1) also said, "It has proved impossible to find it in Zoological Record. Scott 1904, describes a *Thaumatocotyle concinna*. This can neither be identical with, nor a new description of *A. concinna*, as the author informs us that *T. concinna* is caught in October 1903. That is two years after he first mentions *A. concinna*."

[2] Brinkmann (1940: 78, 79, 82) said that *Merizocotyle dasybatis* MacCallum, 1916 was identical to *T. concinna*, and listed (p. 82) "*Merizocotyle dasybatis* MacCallum 1916" as a synonym of "*M.* [*Merizocotyle*] *concinna* (Scott 1904) MacCallum 1916."

Table 219. Thaumatocotyle dasybatis (MacCallum, 1916)[1] Price, 1938.

Location	Host	Locality	Source
1. Nasal mucus glands	Dasyatis sp. [Dasybatis pastinacus][2]	Woods Hole, Mass.	MacCallum (1916:13)
2. Olfactory organs & gills[3]	Dasyatis sp. [Dasyatis pastinaca[2] (Linnaeus)]	Woods Hole, Mass. (from MacCallum's collection)	Price (1938a:119)
3. Olfactory organs & gills[3]	Dasyatis centroura (Mitchill) [Pastinachus centrourus (Mitchill)][4]	"	Price (1938a:119)
4. Olfactory organs & gills[3]	Raja erinacea[4] Mitchill	"	Price (1938a:119)

Synonyms: Merizocotyle dasybatis MacCallum, 1916[1]
Pseudomerizocotyle dasybatis (MacCallum, 1916) Kay, 1942

Additional references: Johnston & Tiegs (1922), Sprehn (1933), Pratt (1935), Brinkmann (1940), Kay (1942), Sproston (1946), Hargis (1955c), Dawes (1956), Bychowsky (1957), Yamaguti (1963), Cheng (1964).

[1]See Table 218, footnote 2.

[2]MacCallum (1916:13) gave "Dasybatis pastinacus" (=Dasyatis pastinaca (Linnaeus)) as the host. Price (1938a:119) listed Dasyatis pastinaca (Linnaeus) as a host. According to Bigelow & Schroeder (1953b:344), Dasyatis pastinaca (L.) is an eastern Atlantic species. Apparently MacCallum's host was misidentified, and the incorrect host has been listed in the literature ever since (See Yamaguti, 1963:163.). It is not known with what species of western Atlantic Dasyatis MacCallum was working; however, I suspect it was D. centroura (Mitchill). It would be more correct to list the host as "Dasyatis sp."

Table 219 continued

[3]Price (1938a:119), in redescribing MacCallum's specimens, listed "gills" as an additional location of the parasite on the host. How he arrived at this is not clear.

[4]Price (1938a:119), in redescribing MacCallum's specimens, listed these two hosts in addition to the one originally listed by MacCallum (1916:13).

Table 220. Thaumatocotyle longicirrus Hargis, 1955.

Location	Host	Locality	Source
1. Skin (ventral surface)	*Dasyatis sayi* (Lesueur) [*Dasyatis say*]	Alligator Harbor, Florida	Hargis (1955c: 209)

Additional references: Hargis (1957), Yamaguti (1963).

Table 221. Thaumatocotyle pseudodasybatis Hargis, 1955.

Location	Host	Locality	Source
1. Skin (ventral surface)	*Aetobatus narinari* (Euphrasen)	Alligator Harbor, Florida	Hargis (1955c: 212)

Additional references: Hargis (1957), Baer & Euzet (1961), Yamaguti (1963).

Table 222. *Thaumatocotyle retorta* Hargis, 1955.

Location	Host	Locality	Source
1. Gills	*Dasyatis americana* Hildebrand & Schroeder	Alligator Harbor, Florida	Hargis (1955c: 210)

Additional references: Hargis (1957), Yamaguti (1963).

HOST-SPECIFICITY TABLES

Host-specificity tables for the subfamilies of Capsaloidea are presented as Tables 223 through 233. Only natural hosts are considered. Doubtful records are indicated by a plus (+). Numbers employed for the host taxa are presented in Table 2. Symbols for parasite locations on/in the hosts are explained on page 16. The most frequently parasitized location is listed first, followed by the other locations in descending order. Levels of host-specificity are indicated by the following symbols:

S = Species-specific

G = Genus-specific

F = Family-specific

O = Order-specific

L = Specific to more than one order

Table 223. Host-specificity of Capsalinae.
Symbols are explained on p. 304.

Order	Family	HOSTS \ CAPSALOIDS	CAPSALINAE	Capsala martinierei	C. squali	Capsala sp. of Koratha & Martin, 1960	Caballerocotyla biparasitica	C. albsmithi	C. caballeroi	C. foliacea	C. gouri	C. gregalis	C. katsuwoni	C. klawei	C. magronum	C. manteri	C. manteri affinis	C. notosinense	C. paucispinosa	C. [illegible]	Caballerocotyla sp. of Mamaev, 1968	Capsaloides cornutus	C. magnaspinosus	C. perugiai	C. sinuatus
42	[illegible]	Prionace glauca																							
	[illegible]	Sphyrna zygaena																							
[illegible]	[illegible]	Squalus sp.			G																				
[illegible]	[illegible]	Raja sp.																							
107	[illegible]	Coryphaena hippurus																							
	539	Auxis thazard															G								
		Cybium sp. ?																							
		Euthynnus affinis									OP						G	G	G						
		E. alletteratus														G									
		E. pelamis											G												
		Sarda chiliensis				?						G													
		S. orientalis							G																
		S. sarda																		G,?					
		Thunnus alalunga																							
		T. albacares					CP							G,?											
		T. obesus																							
		T. thynnus orientalis						G							G				G		G(?)				
		T. thynnus thynnus																							
		Thunnus sp.																							
	542	Histiophorus sp.																							BC
		Histiophorus sp.																							
		Histiophorus sp.																							
		Istiophorus platypterus																							
		Makaira indica																							
		M. nigricans																							
		Tetrapturus albidus																				G	NC		
		T. audax																							
		T. belone																						G	
	[illegible]	Xiphias gladius																							
110	[illegible]	Hippoglossus sp.																							
[illegible]	[illegible]	Mola mola		S,?																					
		No mention																		?					
		Undetermined fish								G															
Specificity			L	S	S	S	S	S	S	S	S	S	S	S	S	S	F	S	F	S	S	S	S	S	S

HOSTS \ CAPSALOIDS	Tricotyla molae	T. cutanea	T. thynni	Tristoma coccineum	T. fuhrmanni	T. integrum	T. levinsenii	T. uncinatum	Tristomella laevis	T. grimaldii	T. interrupta	T. lintoni	T. megacotyle	T. nozawae	T. onchidiocotyle	T. ovalis	T. poeyi	T. pricei
Prionace glauca				G+														
Sphyrna zygaena				G+														
Squalus sp.																		
Raja sp.					?+													
Coryphaena hippurus									?									
Auxis thazard																		
Cybium sp. ?																BC		
Euthynnus affinis																		
E. alletteratus															G			
E. pelamis												G						
Sarda chiliensis																		
S. orientalis																		
S. sarda																		
Thunnus alalunga			G															
T. albacares																		
T. obesus														S	G			
T. thynnus orientalis																		
T. thynnus thynnus											G			?	G,?			
Thunnus sp.							G											
Histiophorus sp.																		
Histiophorus sp.													S			S		
Histiophorus sp.																BC		
Istiophorus platypterus				G												BC		?
Makaira indica									?								?	S,?
M. nigricans																	S,?	
Tetrapturus albidus									G,BC									
T. audax																		S
T. belone				G		G,?												
Xiphias gladius				G,?,BC		G,?			G									
Hippoglossus sp.								?										
Mola mola	S,G,?	S,?,G		G,?		G,?				S								
No mention																		
Undetermined fish																		
Specificity	S	S	S	L	S	L	S	S	O	S	S	S	S	G	F	O	G	F

Table 224. Host-specificity of Benedeniinae: Benedenia through Dioncopseudobenedenia.

Symbols are explained on p. 304.

Order	Family	HOSTS \ CAPSALOIDS	BENEDENIINAE	Benedenia sciaenae	B. derzhavini	B. epinepheli	B. hendorffi	B. jaliscana	B. leucanthemum	B. madai	B. micracantha	B. monticellii	B. ovata	B. pagrosomi	B. sebastodis	B. sekii	B. seriolae	B. synagris	Benedenia sp. of Porter, 1954	Benedenia sp. of Randall, 1961	Benedenia sp. of Hutton, 1964	Allobenedenia convoluta	A. ishikawae	Ancyrocotyle vallei	A. bartschi	Benedeniella macrocolpa	B. posterocolpa	Dioncopseudobenedenia kala
45	109	Dasyatis marmorata							G		S																	
		D. pastinaca																	G									
	112	Rhinoptera bonasus																									S	
		R. javanica																								S		
103	407	Liza auratus										G																
		L. ramada										G																
107	415	Caprodon schlegeli											G															
		Epinephelus akaara				G																G						
		E. analogus						G																				
		E. labriformis						G																				
	436	Naucrates ductor																						G	G			
		Seriola aureovittata															S											
		S. quinqueradiata															S											
	441	Coryphaena hippurus					S																					
	446	Synagris sp.																G										
	450	Argyrosomus regium		S																								
		Sciaena umbra		S,?																								
		Umbrina cirrosa		S																								
	451	Lethrinus haematopterus																					G					
	452	Chrysophrys major								G				G														
		C. unicolor														S												
	476	Thalassoma bifasciatum																			?							
	536	Acanthurus sandvicensis																		S								
		Naso unicornis																										G
	555	Gobius (M.) paganellus										G																
	558	Sebastes alutus			G																							
		S. inermis													G													
		S. introniger			G																							
		S. schlegelii			GH																							
		No mention			?																							
		Undetermined fish					S																					
Specificity			L	F	G	S	S	G	S	S	S	L	S	S	S	S	G	S	S	S	S	S	S	S	S	S	S	S

Table 225. Host-specificity of Benedeniinae: Entobdella through Pseudoentobdella.

Symbols are explained on p. 304.

Order	Family	HOSTS \ CAPSALOIDS	Entobdella hippoglossi	E. apiocolpos	E. brattstroemi	E. bumpusii	E. corona	E. curvunca	E. diadema	E. guberleti	E. soleae	E. squamula	E. steingroeveri	Lagenivaginopseudobenedenia etelis	Metabenedeniella hoplognathi	Neobenedenia melleni	N. adenea	N. girellae	N. isabellae	N. muelleri	Neobenedeniella congeri	Oligoncobenedenia nasonis	Pseudallobenedenia apharei	P. opakapaka	Pseudoentobdella pacifica	P. pugetensis
45	107	Zanobatus schoenleinii		S																						
	108	Raja montagui									S+															
	109	Dasyatis americana					S,G																			
		D. centroura				S,G,?																				
		D. marmorata							S																	
		D. pastinaca							S																	
		D. sabina					S,G,?																			
		D. sayi					S,G																			
		D. violacea							?,S																	
		Taeniura grabata		S																						
		Urolophus halleri								G																
		"sting ray"				S																				
	112	Myliobatis aquila							?																	
		M. californica																							BC(?), S(?),?	
88	333	Astroconger myriaster																			G					
92	356	A Gadidae	G+																							
107	415	Cratinus agassizii																		G						
		Epinephelus septemfasciatus													G											
		E. striatus														?										
		Mycteroperca olfax																	G							
		M. pardalis															G	G								
		Mycteroperca sp.															G									
		"grouper-like fish"																	G							
	445	Aphareus rutilans																					G			
		Etelis carbunculus												G												
		Lutjanus apodus														?										
		Pristipomoides microlepis																						G		
	461	Girella nigricans																S								
	465	Chaetodon capistratus														?										
		C. ocellatus														?										
		C. striatus														?										
		Holacanthus ciliaris														?										
		H. tricolor														?										
		Pomacanthus paru														?										
	471	Oplegnathus fasciatus													G											
		O. punctatus													G											
	478	Scarops perrico															G	G								
	536	Naso hexacanthus																				G				
	559	Sebastes spp.										S,BC,?														
110	582	Paralichthys adspersus			S																					
		P. californicus										S,?,BC														
		Scophthalmus maximus	S,?																							
	583	Atheresthes stomias	G																							G
		Hippoglossina macrops										S														
		Hippoglossus hippoglossus	S,?,BC					S																		
		H. stenolepis	G,?									S														
	584	Pegusa lascaris									S															
		Solea solea									S,?															
		No mention							?																	
		No mention				?																				
		Undetermined fish										?														
		Undetermined fish											?													
Specificity			O	O	S	S	G	S	O	S	F	L	S	S	O	O	O	O	F	S	S	S	S	S	S	S

Table 226. Host-specificity of Encotyllabinae.

Symbols are explained on p.

Order	Family	HOSTS \ CAPSALOIDS	ENCOTYLLABINAE	Encotyllabe nordmanni	E. caranxi	E. chironemi	E. embiotocae	E. latridis	E. lintoni	E. lutiani	E. masu	E. monticellii	E. pagelli	E. pagrosomi	E. paronae	E. pricei	E. spari	E. vallei
79	219	Oncorhynchus masu									G+							
107	415	Epinephelus akaara															G	
	429	Caulolatilus sp.												G				
	436	Caranx lutescens			G													
	440	Brama brama		BC														
	445	Lutjanus johni								?								
	449	Diagramma pictum															G	
		Pomydasys macracanthus												G				
	452	Calamus bajonado										BC						
		C. calamus							G									
		Chrysophrys auratus												BC				
		Dentex sp. ?																G
		Pagellus bogaraveo											BC,G					
		Sparus aurata																?
		Sparus macrocephalus															G	
	474	Amphistichus argenteus					BC											
		Cymatogaster aggregata					BC											
	475	Chromis chromis		BC														
	476	Thalassoma pavo													?			
	483	Cheilodactylus spectabilis				G												
	484	Latridopsis forsteri						G										
	558	Scorpaena plumieri														G		
Specificity			O	O	S	S	F	S	S	S	S	S	S	O	S	S	O	F

Table 227. Host-specificity of Nitzschiinae and Pseudonitzschiinae. Symbols are explained on p.

Order	Family	HOSTS \ CAPSALOIDS	NITZSCHIINAE	*Nitzschia sturionis*	*N. monticellii*	*N. quadritestes*	*N. superba*	PSEUDONITZSCHIINAE	*Pseudonitzschia uku*
72	179	*Acipenser baeri*		?					
		A. brevirostrum					G		
		A. güldenstädti		G,BC					
		A. medirostris				G,BC			
		A. nudiventris		G,?					
		A. oxyrhynchus					G		
		A. stellatus		G,?					
		A. sturio		G,BC, ?,OP	BC, OP				
		A. transmontanus				G,BC			
		Acipenser sp.					BC,G		
		Acipenser sp.					G		
		Huso huso		G,BC, ?					
107	445	*Aprion virescens*							G
		No mention		?					
Specificity			F	F	S	G	G	S	S

Table 228. Host-specificity of Trochopodinae.

Symbols are explained on p. 304.

Order	Family	HOSTS / CAPSALOIDS	TROCHOPODINAE	Trochopus tubiporus	T. brauni	T. differens	T. diplacanthus	T. gaillimhe	T. goniistii	T. heteracanthus	T. hobo	T. lineatus	T. micracanthus	T. oncacanthus	T. pini	T. plectropomi	T. sprostoni	Trochopus sp. of Reichenbach-Klinke, 1957	Trochopus sp. of Kearn, 1963	Allomegalocotyla johnstoni	Macrophyllida antarctica	Megalocotyle marginata	M. australis	M. granulloba	M. helicoleni	M. hexacantha	M. rhombi	M. trituba	M. zschokkei	Megalocotyloides epinepheli	M. pseudomarginatus	Pseudobenedenia nototheniae	P. noblei	Pseudorregalocotyla latridis	Sprostonia squatinae	Sprostoniella multitestis	Trochopella candida	Trilobiodiscus lutiani
42	99	Mustelus antarcticus																			G																	
43	[illegible]	Squatina squatina																																		G			
107	415	Epinephelus aeneus																						G														
		E. analogus																													G							
		E. guaza																								G												
		E. labriformis																													G							
		E. malabaricus																												G								
		Plectropomus maculatus														G																						
		Serranus cabrilla																								G												
	[illegible]	Lutjanus argentimaculatus																																				G
	[illegible]	Spondyliosoma cantharus				G,?																																
	[illegible]	Platax pinnatus																																			G		
	[illegible]	Goniistius zonatus							G																													
	[illegible]	Latris lineata																		G														G				
	505	Notothenia magellanica																														S						
		N. microlepidota																														S						
		N. rossii																														S						
	558	Helicolenus percoides																					G		G													
		Scorpaena guttata															G																					
		S. porcus																G																				
		Sebastes alutus																										?										
		S. caurinus																				G																
		S. diploproa																										?										
		S. maliger																				G																
		S. melanops																				G																
		S. nebulosus																				G																
		S. paucispinis																										G					G					
		S. pinniger																										?										
		S. ruberrimus																				G						?										
		Sebastes spp.																				G																
	559	Chelidonichthys kumu									G																											
		C. (Aspitrigla) cuculus													S,?																							
		C. (A.) obscurus					G						G																									
		C. (C.) lucerna		G,?	G		G	G		G,S			G		G,S,?																							
		C. (Trigloporus) lastoviza										BC																										
		Peristedion cataphractum																																			G	
		Trigla sp.																	G																			
	[illegible]	Cottus gobio			S+																								S+									
	[illegible]	Dactylopterus volitans																											G									
110	[illegible]	Scophthalmus maximus																									S											
		Host unknown												?																								
Specificity			L	S	S	S	G	S	S	S	S	S	G	S	G	S	S	S	S	S	S	G	S	S	S	F	S	G	S	S	G	G	S	S	S	S	S	S

Table 229. Host-specificity of Dioncidae and Loimoidae. Symbols are explained on p.

Order	Family	HOSTS \ CAPSALOIDS	DIONCIDAE	Dioncus agassizi	D. rachycentris	D. remorae	LOIMOIDAE	Loimos salpinggoides	L. scoliodoni	L. secundus	L. winteri	Loimopapillosum dasyatis	Loimosina wilsoni
42	99	Carcharhinus limbatus							G				
		C. obscurus						G			G		
		Rhizoprionodon acutus								G			
		R. terraenovae							G				
		Scoliodon sp.								G			
	100	Sphyrna couardi											G
		S. lewini											G
		S. zygaena											G
45	109	Dasyatis americana										G	
		D. sayi										G	
		Dasyatis sp. (either americana or sayi)										G	
107	435	Rachycentron canadum			G								
	436	Caranx hippos				G+							
114	590	Echeneis naucrates		G		G							
		Remora brachyptera		G									
		Remora remora		G									
Specificity			L	F	S	S	L	S	F	F	S	G	G

Table 230. Host-specificity of Microbothriinae, Anoplocotylinae, Asthenocotylinae, Enoplocotylinae, Pseudocotylinae, and Dermophthiriinae.

Symbols are explained on p.

Order	Family	CAPSALOIDS / HOSTS	MICROBOTHRIINAE	Microbothrium apiculatum	M. tolloi	Leptobothrium pristiuri	Leptocotyle minor	Leptomicrobothrium longiphallus	Pseudoleptobothrium aptychotremae	ANOPLOCOTYLINAE	Anoplocotyle australis	Pseudomicrobothrium spari	ASTHENOCOTYLINAE	Asthenocotyle kaikourensis	ENOPLOCOTYLINAE	Enoplocotyle minima	PSEUDOCOTYLINAE	Pseudocotyle squatinae	P. lepidorhini	DERMOPHTHIRIINAE	Dermophthirius carcharini	Neodermophthirius harkemai
42	98	Cephaloscyllium isabella						G														
		Galeus melastomus				S																
		Scyliorhinus caniculus					S,?,EC,C															
		S. stellaris					S															
	99	Carcharhinus limbatus																			S	
		C. maculipinnis																			S,?	
		Carcharhinus sp.		S																	NC,S	
		Mustelus mento			S																	
		Negaprion brevirostris																			S	G,S(?)
43	102	Centrophorus squamosus																	S			
		Scymnodon plunketi												S								
		Squalus acanthias		S,?																		
	103	Squatina squatina																S,?				
45	104	Aptychotrema banksii							S													
88	326	Muraena helena														S						
107	452	Sparus australis									S											
		S. macrocephalus										G										
Specificity			L	L	S	S	G	S	S	G	S	S	S	S	S	S	O	S	S	F	F	S

Table 231. Host-specificity of Monocotylinae.

Symbols are explained on p. 304.

Order	Family	HOSTS \ CAPSALOIDS	Monocotylidae n. sp. of Koratha & Martin, 1963	MONOCOTYLINAE	Monocotyle myliobatis	M. diademalis	M. granulatae	M. ijimae	M. kuhlii	M. pricei	M. tritestis	Monocotyle sp. of Layman, 1930	Monocotyle sp. of Euzet & Maillard, 1967	Anoplocotyloides papillatus	Dasybatotrema dasybatis	Decacotyle lymmae	Diploheterocotyla dasyatis	Heterocotyle pastinacae	H. americana	H. granulatae	H. minima	H. pseudominima	H. robusta	Horricauda rhynchobatis	H. rhinobatidis	Neoheterocotyle inpristi	Papillicotyle octona	P. floridana	Spinuris lophosoma	Troglocephalus rhinobatidis	Tympanocirrus spirophallus
43	102	Squalus acanthias																			G										
45	105	Rhinobatos productus	NC											G															G,?		
		R. typus																							G					G	
		Rhynchobatus djiddensis																						?							
	106	Pristis sp.																								G					
	109	Dasyatis americana				G				G									G												
		D. centroura													G						G										
		D. granulata					G													G											
		D. kuhlii							G		G																				
		D. marmorata													S																
		D. pastinaca						BC										G													
		D. sabina				G																									
		D. sayi				G				C																					
		D. sephen																													?
		Dasyatis sp. (either americana or sayi)				G																G									
		Dasyatis sp. (? hawaiiensis)															G														
		Dasyatis sp.													G						G										
		Taeniura lymma														G															
		Urolophoides giganteus										G																			
		Urolophus testaceus																					G								
	112	Aetobatus narinari																									G	G			
		Myliobatis aquila			G,?																										
		M. freminvillei																										G			
		Pteromyleus bovina											G																		
107	452	Archosargus probatocephalus								G+																					
	518	Enedrias nebulosus										G																			
Specificity			S	L	S	G	S	S	S	C	S	L	S	S	G	S	S	S	S	S	L	S	S	S	S	S	S	F	S	S	S

Table 232. Host-specificity of Calicotylinae.

Symbols are explained on p.

Order	Family	CAPSALOIDS / HOSTS	CALICOTYLINAE	Calicotyle kröyeri	C. affinis	C. australis	C. macrocotyle	C. mitsukurii	C. palombi	C. ramsayi	C. stossichi	Dictyocotyle coeliaca	Gymnocalicotyle inermis
42	99	Mustelus canis							C,R		RG		
		M. mustelus							C,R		RG		
43	102	Centrophorus uyato							C,R				
		Squalus lebruni								C			
44	104	Pristiophorus cirratus											O
45	105	Rhina sp.?						C					
		Trygonorrhina fasciata				C,?							
	108	Raja alba		S,C									
		R. asterias		C,A,?									
		R. batis		C,S,R								CO	
		R. brachyura		C									
		R. circularis		C									
		R. clavata		C,?,S								CO	
		R. fullonica		C,?	C,RA							CO	
		R. fyllae		C									
		R. lintea										CO	
		R. microocellata		C									
		R. miraletus		C,S									
		R. montagui		C,?,S									
		R. naevus		C								CO	
		R. nidarosiensis		C									
		R. oxyrinchus		C,?,R									
		R. radiata		C,S,CO,R,RG,U,G,?								CO	
		Raja sp.		C									
		Raja sp.		?									
		Raja sp.										CO	
		"raie"		?									
		Raja spp.		C									
		Raja spp.		C									
		Raja spp.		C									
		Sympterygia microps					ST						
48	125	Chimaera monstrosa			C,R,RA,G,ST,?								
110	582	Scophthalmus maximus		?+									
		No mention		?									
Specificity			L	G	L	S	S	S	L	S	G	G	S

Table 233. Host-specificity of Dendromonocotylinae and Merizocotylinae.
Symbols are explained on p.

Order	Family	HOSTS \ CAPSALOIDS	DENDROMONOCOTYLINAE	*Dendromonocotyle octodiscus*	*D. kuhlii*	*D. taeniurae*	*Clemacotyle australis*	MERIZOCOTYLINAE	*Merizocotyle diaphana*	*M. amplidiscata*	*M. minor*	*M. pugetensis*	*Merizocotyle* sp. of Palombi, 1943	*Cathariotrema selachii*	*Empruthotrema raiae*	*Thaumatocotyle concinna*	*T. dasybatis*	*T. longicirrus*	*T. pseudodasybatis*	*T. retorta*
42	97	Alopias vulpinus												NC						
	99	Carcharhinus obscurus												NC						
		Carcharhinus sp.												NC						
	100	Sphyrna zygaena												NC						
45	108	Raja alba											G							
		R. batis							G											
		R. binoculata										NC								
		R. eglanteria													G					
		R. erinacea													NC		GNC			
		R. nasuta								G					NC					
		R. ocellata													NC					
		R. oxyrinchus									?									
		Raja sp.									G									
	109	Dasyatis americana																		G
		D. centroura															GNC			
		D. kuhlii			S															
		D. marmorata		S																
		D. pastinaca														NC				
		D. sayi		S														S		
		Dasyatis sp.															GNC			
		Taeniura grabata				S														
	112	Aetobatus narinari					BC												S	
Specificity			O	G	S	S	S	L	S	S	S	S	S	O	G	S	O	S	S	S

DISCUSSION

CHAPTER 5

HOST-SPECIFICITY

SPECIES-SPECIFICITY

A list of the capsaloids that are species-specific (and thus phylogenetically specific, stenohospitalic, and synhospitalic [see Glossary]) is given in Table 238. According to the literature records, 153 of 221 (69.2 per cent) are species-specific. If one discounts the records of *Dioncus remorae* on *Caranx hippos* (Table 149, footnote 2), and *Trochopus brauni* (Table 113, footnote 1) and *Megalocotyle zschokkei* (Table 137, footnote 1) on *Cottus gobio* for reasons given in footnotes in the appropriate tables, then 156 of 221 capsaloids (70.6 per cent) are species-specific (Tables 238 and 245).

If the capsaloids on the Chondrichthyes and Osteichthyes are treated separately (unidentified hosts being disregarded), then 87 of 219 (39.7 per cent) parasitize Chondrichthyes (Table 247), and 132 of 219 (60.3 per cent) parasitize Osteichthyes (Table 249). Conforming with one of Eichler's (1948) "Rules of Ectoparasitism," the largest available host group, the Teleostei, has the greatest capsaloid parasite fauna. Of those recovered from Chondrichthyes, 61 of 87 (70.1 per cent) are species-specific (Tables 238 and 247), and 91 of 132 (68.9 per cent) of those from Osteichthyes are species-specific (Tables 238 and 249).

Although comparative data from other works on capsaloids are lacking, studies on other groups are comparable. Hargis (1953) found that 79 per cent of the Monogenea studied in Westhaptom Lake were species-specific and that 89 per cent of his collection of several subfamilies of Monogenea from the northeastern Gulf of Mexico were species-specific (Hargis, 1957). Bychowsky (1957), in a review of all Monogenea, indicated that 711 of 958 (74.2 per cent) were species-specific. Price (1966) noted that 108 of 152 (71.1 per cent) monopisthocotylean Monogenea described from North America were species-specific, a percentage closely comparable to that obtained for the capsaloids in the present study.

GENUS-SPECIFICITY

A list of the capsaloids that are genus-specific (and thus phylogenetically specific, stenohospitalic, and synhospitalic [see Glossary]) is given in Table 239. From the literature records, 24 of 221 (10.9 per cent) capsaloids are genus-specific. If the records of *Calicotyle kröyeri* on *Scophthalmus maximus* (Table 197, footnote 17) and *Monocotyle pricei* on *Archosargus probatocephalus* (Table 175, footnote 1) are discounted for reasons given in footnotes in the appropriate tables, then 26 of 221 (11.8 per cent) capsaloids are genus-specific (Tables 239 and 245).

Of those that parasitize Chondrichthyes, 12 of 87 (13.8 per cent) are genus-specific (Tables 239 and 247), and 14 of 132 (10.6 per cent) reported from Osteichthyes are genus-specific (Tables 239 and 249).

Bychowsky (1957) indicated that 95 of 958 (9.9 per cent) Monogenea known at that time were genus-specific.

FAMILY-SPECIFICITY

A list of the capsaloids that are family-specific (and thus phylogenetically specific, and synhospitalic [see Glossary]) is presented in Table 240. From the literature records 14 of 221 (6.3 per cent) capsaloids are family-specific. If the records of Entobdella soleae on Raja montagui (Table 76, footnote 11) and Nitzschia sturionis on Cyprinidae (Table 107, footnote 18) are discounted for reasons given in footnotes in the appropriate tables, then 16 of 221 (7.2 per cent) are family-specific (Tables 240 and 245).

Of those reported from Chondrichthyes, 4 of 87 (4.6 per cent) are family-specific (Tables 240 and 247), and 12 of 132 (9.1 per cent) reported from Osteichthyes are family-specific (Tables 240 and 249).

Bychowsky (1957) indicated that 97 of 958 (10.1 per cent) Monogenea known then were family-specific.

ORDER-SPECIFICITY

A list of the capsaloids that are order-specific is given in

Table 241. From the literature records 15 of 221 (6.8 per cent) are order-specific. If the records of Trochopus brauni (Table 113, footnote 1) and Megalocotyle zschokkei (Table 137, footnote 1) on Cottus gobio, and Entobdella hippoglossi on a Gadidae (Table 68, footnote 17) are discounted for reasons given in footnotes in the appropriate tables, then 14 of 221 (6.3 per cent) are order-specific (Tables 241 and 245).

Of those reported from Chondrichthyes, 4 of 87 (4.6 per cent) are order-specific (Tables 241 and 247), and 10 of 132 (7.6 per cent) reported from Osteichthyes are order-specific (Tables 241 and 249).

Bychowsky (1957) indicated that 37 of 958 (3.9 per cent) Monogenea were order-specific.

SPECIFICITY TO MORE THAN ONE ORDER OF HOSTS

A list of the capsaloids that show the lowest specificity (and are thus euryhospitalic [see Glossary]) is given in Table 242. According to the literature records, 15 of 221 (6.8 per cent) capsaloids show a low level of specificity. If, due to reasons given in footnotes in appropriate tables above, the questionable records are discounted, and Dioncus remorae considered species-specific, Monocotyle pricei and Calicotyle kröyeri genus-specific, Entobdella soleae and Nitzschia sturionis family-specific, and Entobdella hippoglossi order-specific, then only 9 of 221 (4.1 per cent) capsaloids have a specificity lower than order-specificity (Tables 242 and 245).

Of those that parasitize Chondrichthyes, 6 of 87 (6.9 per cent) are specific to more than one order of hosts (Tables 242 and 247), and 5 of 132 (3.8 per cent) reported from Osteichthyes are specific to more than one order of hosts (Tables 242 and 249).

Bychowsky (1957) indicated that 18 of 958 (1.9 per cent) Monogenea known at that date were specific to more than one order of hosts.

Table 234. Systematic list of natural hosts and their capsaloid parasites.

Experimental hosts of Neobenedenia melleni are presented in Table 81. Host names used in the parasitological literature, if different, are included under the current host names. Doubtful records are indicated by a plus (+). Symbols for parasite locations on/in the hosts are explained on p. 16. The most frequently parasitized location is listed first, followed by the other locations in descending order. Symbols for the parasite subfamilies are as follows:

A = Anoplocotylinae	EN= Enoplocotylinae
AS= Asthenocotylinae	L = Loimoidae
B = Benedeniinae	M = Microbothriinae
C = Capsalinae	ME= Merizocotylinae
CA= Calicotylinae	MO= Monocotylinae
D = Dioncidae	N = Nitzschiinae
DE= Dermophthiriinae	P = Pseudonitzschiinae
DN= Dendromonocotylinae	PS= Pseudocotylinae
E = Encotyllabinae	T = Trochopodinae

Host	Caps. subf.	Capsaloid	Location
LAMINIDAE			
Alopias vulpinus (Bonnaterre)	ME	Cathariotrema selachii	NC
SCYLIORHINIDAE			
Cephaloscyllium isabella (Bonnaterre)	M	Leptomicrobothrium longiphallus	G
Galeus melastomus Rafinesque-Schmaltz Pristiurus melanostomus Rafinesque	M	Leptobothrium pristiuri	S
Scyliorhinus caniculus (Linnaeus) Scyllium Scyllium canicula	M	Leptocotyle minor	S,?,G BC,C

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Scylliorhinus canicula L.			
Scyliorhinus canicula			
Scyliorhinus caniculus (L.)			
Scyliorhinus canicula (L.)			
Scyllium canicula Cuvier			
Scyliorhinus stellaris (Linnaeus)	M	Leptocotyle minor	S
Scylliorhinus catula			
CARCHARHINIDAE			
Carcharhinus limbatus (Valenciennes)	L	Loimos scoliodoni	G
	DE	Dermophthirius carcharini	S
Carcharhinus limbatus (Müller & Henle)			
Carcharhinus maculipinnis (Poey)	DE	Dermophthirius carcharini	S, ?
Carcharhinus obscurus (Lesueur)	L	Loimos salpinggoides	G
	L	Loimos winteri	G
Carcharias obscurus (LeSueur)	ME	Cathariotrema selachii	NC
Carcharhinus lamiella (Jordan & Gilbert)			
Carcharhinus sp.	M	Microbothrium apiculatum	S
Carcharhinus commersonii			
Carcharias commersonii (Blainville)	DE	Dermophthirius carcharini	NC, S
	ME	Cathariotrema selachii	NC
Mustelus antarcticus Günther	T	Macrophyllida antarctica	G
Mustelus canis (Mitchill)	CA	Calicotyle palombi	R, C
	CA	Calicotyle stossichi	RG
Mustelus mento Cope	M	Microbothrium tolloi	S
Mustelus edulus Perez			
Mustelus mustelus (Linnaeus)	CA	Calicotyle palombi	R, C
	CA	Calicotyle stossichi	RG
Mustelus laevis			

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Negaprion brevirostris (Poey)	DE	Dermophthirius carcharini	S
	DE	Neodermophthirius harkemai	G,S (?)
Prionace glauca (Linnaeus) Carcharias glaucus	C	Tristoma coccineum+	G
Rhizoprionodon acutus (Rüppell) Scoliodon sorrakowah (Cuvier)	L	Loimos secundus	G
Rhizoprionodon terraenovae (Richardson) Scoliodon terrae-novae Richardson Scoliodon terrae-novae (Richardson)	L	Loimos scoliodoni	G
Scoliodon sp.	L	Loimos secundus	G
SPHYRNIDAE			
Sphyrna couardi Cadenat	L	Loimosina wilsoni	G
Sphyrna lewini (Griffith & Smith) Sphyrna diplana Springer	L	Loimosina wilsoni	G
Sphyrna zygaena (Linnaeus) Cestracion zygaena	C	Tristoma coccineum+	G
	L	Loimosina wilsoni	G
	ME	Cathariotrema selachii	NC
SQUALIDAE			
Centrophorus squamosus (Bonnaterre) Lepidorhinus squamosus	PS	Pseudocotyle lepidorhini	S
Centrophorus uyato (Rafinesque-Schmaltz)	CA	Calicotyle palombi	R,C

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Scymnodon plunketi (Waite)	AS	*Asthenocotyle kaikourensis*	S
Squalus acanthias Linnaeus	M	*Microbothrium apiculatum*	S,?
Acanthias vulgaris	MO	*Heterocotyle minima*	G
Acanthiae vulgaris			
Squalus lebruni (Vaillant) =? *Squalus fernandinus* Molina	CA	*Calicotyle ramsayi*	C
Squalus sp. "*Squale*"	C	*Capsala squali*	G
SQUATINIDAE			
Squatina squatina (Linnaeus)	T	*Sprostonia squatinae*	G
Squatina angelus	PS	*Pseudocotyle squatinae*	S,?
"*Squatine ange*"			
Rhina squatina			
PRISTIOPHORIDAE			
Pristiophorus cirratus (Latham)	CA	*Gymnocalicotyle inermis*	O
RHINOBATIDAE			
Aptychotrema banksii (Müller & Henle)	M	*Pseudoleptobothrium aptychotremae*	S
Rhina sp. ? ("*katasashi-zame*")	CA	*Calicotyle mitsukurii*	C
Rhinobatos productus (Ayres)	MO	*Anoplocotyloides papillatus*	G
	MO	*Spinuris lophosoma*	G
	MO	*Monocotylidae* n. sp. of Koratha & Martin, 1963	NC

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Rhinobatos typus Bennet	MO	Horricauda rhinobatidis	G
	MO	Troglocephalus rhinobatidis	G
Rhynchobatus djiddensis (Forskål)	MO	Horricauda rhynchobatis	?
Trygonorrhina fasciata Müller & Henle	CA	Calicotyle australis	"on"
Trygonorhina fasciata Müller & Henle			
PRISTIDAE			
Pristis sp.	MO	Neoheterocotyle inpristi	G
PLATYRHINIDAE			
Zanobatus schoenleinii Müller & Henle	B	Entobdella apiocolpos	S
RAJIDAE			
Raja alba Lacépède	CA	Calicotyle kröyeri	S, C
Raja marginata Lacépède	ME	Merizocotyle sp.	G
Raja asterias De la Roche	CA	Calicotyle kröyeri	C, A, ?
Raja schulzii			
Raja batis Linnaeus	CA	Calicotyle kröyeri	C, S, R
Raia batis	CA	Dictyocotyle coeliaca	CO
	ME	Merizocotyle diaphana	G
Raja binoculata Girard	ME	Merizocotyle pugetensis	NC
Raja binoculata (Girard)			
Raja brachyura Lafont	CA	Calicotyle kröyeri	C
Raja blanda Holt & Calderwood			
Raja circularis Couch	CA	Calicotyle kröyeri	C

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Raja clavata Linnaeus	CA	Calicotyle kröyeri	C,?,S
	CA	Dictyocotyle coeliaca	CO
Raja eglanteria Bosc Raja eglanteria Lacépède	ME	Empruthotrema raiae	G
Raja erinacea Mitchill	ME	Empruthotrema raiae	NC
	ME	Thaumatocotyle dasybatis	NC,G
Raja fullonica Linnaeus Raia fullonica	CA	Calicotyle affinis	C,RA
	CA	Calicotyle kröyeri	C,?
	CA	Dictyocotyle coeliaca	CO
Raja fyllae Lütken	CA	Calicotyle kröyeri	C
Raja lintea Fries	CA	Dictyocotyle coeliaca	CO
Raja microocellata Montagu Raja microcellata	CA	Calicotyle kröyeri	C
Raja miraletus (Linnaeus)	CA	Calicotyle kröyeri	C,S
Raja montagui Fowler Raja maculata Montagu Raia montagui	B	Entobdella soleae +	S
	CA	Calicotyle kröyeri	C,?,S
Raja naevus Müller & Henle	CA	Calicotyle kröyeri	C
	CA	Dictyocotyle coeliaca	CO
Raja nasuta Müller & Henle	ME	Empruthotrema raiae	NC
	ME	Merizocotyle amplidiscata	G
Raja nidarosiensis Collett Raja nidrosiensis	CA	Calicotyle kröyeri	C
Raja ocellata Mitchill Raja diaphanes Mitchill	ME	Empruthotrema raiae	NC
Raja oxyrinchus Linnaeus Raja oxyrhynchus L. Raja oxyrhyncha L.	CA	Calicotyle kröyeri	C,?,R
	ME	Merizocotyle minor	?

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Raja radiata Donovan	CA	*Calicotyle kröyeri*	C, S, CO, R, RG, U, G, ?
Raia radiata			
	CA	*Dictyocotyle coeliaca*	CO
Raja sp.	C	*Tristoma fuhrmanni* +	?
Raja sp. "Skate"	CA	*Calicotyle kröyeri*	?
Raja sp. "Skate"	CA	*Calicotyle kröyeri*	C
Raja sp.	CA	*Dictyocotyle coeliaca*	CO
Raja sp.	ME	*Merizocotyle minor*	G
Raja spp.	CA	*Calicotyle kröyeri*	C
Raja spp. "other rays"	CA	*Calicotyle kröyeri*	C
Sympterygia microps (Günther)	CA	*Calicotyle macrocotyle*	SI
Raja microps Günther			
TRYGONIDAE			
Dasyatis americana	B	*Entobdella corona*	S, G
Hildebrand & Schroeder	L	*Loimopapillosum dasyatis*	G
	MO	*Heterocotyle americana*	G
	MO	*Monocotyle diademalis*	G
	MO	*Monocotyle pricei*	G
	ME	*Thaumatocotyle retorta*	G
Dasyatis centroura (Mitchill)	B	*Entobdella bumpusii*	S, G, ?
Pastinachus centrourus	MO	*Dasybatotrema dasybatis*	G
(Mitchill)	MO	*Heterocotyle minima*	G
Dasyatis centrura	ME	*Thaumatocotyle dasybatis*	NC, G
Dasyatis granulata (Macleay)	MO	*Heterocotyle granulatae*	G
	MO	*Monocotyle granulatae*	G
Dasyatis kuhlii	MO	*Monocotyle kuhlii*	G
(Müller & Henle)	MO	*Monocotyle tritestis*	G
	DN	*Dendromonocotyle kuhlii*	S

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Dasyatis marmorata (Steindachner)	B	Benedenia leucanthemum	G
	B	Benedenia micracantha	S
	B	Entobdella diadema	S
	MO	Dasybatotrema dasybatis	S
	DN	Dendromonocotyle octodiscus	S
Dasyatis pastinaca (Linnaeus)	B	Benedenia sp. of Porter, 1954	G
Trygon pastinaca			
Dasybatis pastinacea	B	Entobdella diadema	S
	MO	Heterocotyle pastinacae	G
	MO	Monocotyle ijimae	BC
	ME	Thaumatocotyle concinna	NC
Dasyatis sabina (Lesueur)	B	Entobdella corona	S, G, ?
	MO	Monocotyle diademalis	G
Dasyatis sayi (Lesueur)	B	Entobdella corona	S, G
Dasyatis say (LeSueur)	L	Loimopapillosum dasyatis	G
	MO	Monocotyle diademalis	G
	MO	Monocotyle pricei	G
	DN	Dendromonocotyle octodiscus	S
	ME	Thaumatocotyle longicirrus	S
Dasyatis sephen (Forskål)	MO	Tympanocirrus spirophallus	?
Dasyatis violacea (Bonaparte)	B	Entobdella diadema	?, S
Trygon violacea			
Dasyatis sp. (? D. hawaiiensis)	MO	Diploheterocotyla dasyatis	G
Dasyatis sp.	MO	Dasybatotrema dasybatis	G
Dasybatis pastinacus	MO	Heterocotyle minima	G
Dasybatus pastinacus	ME	Thaumatocotyle dasybatis	NC, G
Dasyatis pastinaca (L.)			
Dasyatis sp. (either sayi or americana)	L	Loimopapillosum dasyatis	G
	MO	Heterocotyle pseudominima	G
	MO	Monocotyle diademalis	G

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Taeniura grabata (Geoffroy Saint-Hilaire)	B DN	Entobdella apicolpos Dendromonocotyle taeniurae	S S
Taeniura lymma (Forskål)	MO	Decacotyle lymmae	G
Urolophoides giganteus Lindberg Urolopsis giganteus Lindberg	MO	Monocotyle sp. of Layman, 1930	G
Urolophus halleri Cooper Urobatis halleri (Cooper)	B	Entobdella guberleti	G
Urolophus testaceus (Müller & Henle)	MO	Heterocotyle robusta	G
"Sting ray"	B	Entobdella bumpusii	S
MYLIOBATIDAE			
Aetobatus narinari (Euphrasen) Aetobatis narinari (Euphrasen)	MO MO DN ME	Papillicotyle floridana Papillicotyle octona Clemacotyle australis Thaumatocotyle pseudodasybatis	G G BC S
Myliobatis aquila (Linnaeus) Myliobates aquila Leiobatus aquila L.	B MO	Entobdella diadema Monocotyle myliobatis	? G, ?
Myliobatis californica Gill Myliobatus californicus	B	Pseudoentobdella pacifica	BC(?), S(?), ?
Myliobatis freminvillei Lesueur Aetobatus freminvillii (LeSueur)	MO	Papillicotyle floridana	G
Pteromyleus bovina (Geoffroy Saint-Hilaire)	MO	Monocotyle sp. of Euzet & Maillard, 1967	G
Rhinoptera bonasus (Mitchill) Rhinoptera quadriloba (LeSueur)	B	Benedeniella posterocolpa	S

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Rhinoptera javanica Müller & Henle	B	*Benedenia macrocolpa*	S
CHIMAERIDAE			
Chimaera monstrosa Linnaeus	CA	*Calicotyle affinis*	C, R, RA, G, ST, ?
Chimera monstrosa L.			
ACIPENSERIDAE			
Acipenser baeri Brandt	N	*Nitzschia sturionis*	?
Acipenser brevirostrum Lesueur	N	*Nitzschia superba*	G
Acipenser güldenstädti Brandt	N	*Nitzschia sturionis*	G, BC
Acipenser medirostris Ayres	N	*Nitzschia quadritestes*	G, BC
Acipenser nudiventris Lovetzky	N	*Nitzschia sturionis*	G, ?
Acipenser oxyrhynchus Mitchill	N	*Nitzschia superba*	G
Acipenser stellatus Pallas	N	*Nitzschia sturionis*	G, ?
Acipenser sturio Linnaeus	N	*Nitzschia monticellii*	BC, OP
Acipenser acutirostris Purnell	N	*Nitzschia sturionis*	G, BC, ?,OP
Acipenser transmontanus Richardson	N	*Nitzschia quadritestes*	G, BC
Acipenser sp.	N	*Nitzschia superba*	BC, G
Acipenser sturio Linnaeus			
Acipenser sp.	N	*Nitzschia superba*	G
Acipenser sturio Linnaeus			
Huso huso (Linnaeus)	N	*Nitzschia sturionis*	G, BC, ?

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
SALMONIDAE			
Oncorhynchus masu (Brevoort) Oncorhynchus masou	E	Encotyllabe masu+	G
CYPRINIDAE			
Abramis sapa (Pallas)	N	Nitzschia sturionis+	?
Aspius aspius (Linnaeus)	N	Nitzschia sturionis+	?
Barbus barbus (Linnaeus)	N	Nitzschia sturionis+	?
Chalcalburnus chalcoides (Güldenstädt)	N	Nitzschia sturionis+	?
Rutilus rutilus caspicus (Jakowlew)	N	Nitzschia sturionis+	?
MURAENIDAE			
Muraena helena Linnaeus	EN	Enoplocotyle minima	S
CONGRIDAE			
Astroconger myriaster (Brevoort) Conger myriaster	B	Neobenedeniella congeri	G
GADIDAE			
"a member of the Gadidae"	B	Entobdella hippoglossi+	G
MUGILIDAE			
Liza auratus (Risso) Mugil auratus	B	Benedenia monticellii	G
Liza ramada (Risso) Mugil capito Cuvier	B	Benedenia monticellii	G

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
SERRANIDAE			
Caprodon schlegeli (Günther) Anthias schlegelli	B	Benedenia ovata	G
Cratinus agassizii Steindachner	B	Neobenedenia muelleri	G
Epinephelus aeneus (Geoffroy Saint-Hilaire) Epinephalus aereus Doderl.	T	Megalocotyle grandiloba	G
Epinephelus akaara (Temminck & Schlegel)	B B E	Allobenedenia convoluta Benedenia epinepheli Encotyllabe spari	G G G
Epinephelus analogus Gill	B T	Benedenia jaliscana Megalocotyloides pseudomarginatus	G G
Epinephelus guaza (Linnaeus) Serranus gigas	T	Megalocotyle hexacantha	G
Epinephelus labriformis (Jenyns)	B T	Benedenia jaliscana Megalocotyloides pseudomarginatus	G G
Epinephelus malabaricus (Bloch & Schneider) Epinephelus malabaricus (Schneider)	T	Megalocotyloides epinepheli	G
Epinephelus septemfasciatus (Thunberg)	B	Metabenedeniella hoplognathi	G
Epinephelus striatus (Bloch)	B	Neobenedenia melleni	?
Mycteroperca olfax (Jenyns)	B	Neobenedenia isabellae	G
Mycteroperca pardalis (Gilbert) Mycteroperca pardalis Gilbert	B B	Neobenedenia adenea Neobenedenia girellae	G G
Mycteroperca sp.	B	Neobenedenia adenea	G
Plectropomus maculatus (Bloch)	T	Trochopus plectropomi	G

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Serranus cabrilla (Linnaeus)	G	*Megalocotyle hexacantha*	G
LATILIDAE			
Caulolatilus sp.	E	*Encotyllabe pagrosomi*	G
RACHYCENTRIDAE			
Rachycentron canadum (Linnaeus) *Rachycentron canadus* (L.)	D	*Dioncus rachycentris*	G
CARANGIDAE			
Caranx hippos (Linnaeus)	D	*Dioncus remorae*+	G
Caranx lutescens (Richardson)	E	*Encotyllabe caranxi*	G
Naucrates ductor (Linnaeus)	B B	*Ancyrocotyle bartschi* *Ancyrocotyle vallei*	G G
Seriola aureovittata Temminck & Schlegel	B	*Benedenia seriolae*	S
Seriola quinqueradiata Temminck & Schlegel "Yellowtail"	B	*Benedenia seriolae*	S
BRAMIDAE			
Brama brama Bonnaterre *Brama mediterranea* *Brama rayi* *Brama rayi* Bl. Sch. *Brama raii*	E	*Encotyllabe nordmanni*	BC
CORYPHAENIDAE			
Coryphaena hippurus Linnaeus	C B	*Tristomella laevis* *Benedenia hendorffi*	? S

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
LUTIANIDAE			
Aphareus rutilans Cuvier & Valenciennes	B	Pseudallobenedenia apharei	G
Aprion virescens Cuvier & Valenciennes	P	Pseudonitzschia uku	G
Etelis carbunculus Cuvier & Valenciennes	B	Lagenivaginopseudobenedenia etelis	G
Lutjanus apodus (Walbaum) Lutianus apodus	B	Neobenedenia melleni	?
Lutjanus argentimaculatus (Forskål) Lutianus argentimaculatus (F.)	T	Trilobiodiscus lutiani	G
Lutjanus johni (Bloch)	E	Encotyllabe lutiani	?
Pristipomoides microlepis (Bleeker)	B	Pseudallobenedenia opakapaka	G
NEMIPTERIDAE			
Synagris sp.	B	Benedenia synagris	G
POMADASYIDAE			
Diagramma pictum (Thunberg) Plectorhynchus pictus (Thunberg)	E	Encotyllabe spari	G
Pomadasys macracanthus (Günther)	E	Encotyllabe pagrosomi	G
SCIAENIDAE			
Argyrosomus regium (Asso) Sciaena aquila Sciaena aquila Lacépède	B	Benedenia sciaenae	S

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Sciaena umbra Linnaeus Sciaena umbra Cuvier	B	Benedenia sciaenae	S,?
Umbrina cirrosa (Linnaeus) Umbrina cirrhosa L.	B	Benedenia sciaenae	S
LETHRINIDAE			
Lethrinus haematopterus (Temminck & Schlegel) Lethrinus sp.? ("Kuchibi-dai")	B	Allobenedenia ishikawae	G
SPARIDAE			
Archosargus probatocephalus (Walbaum)	MO	Monocotyle pricei+	G
Calamus bajonado (Bloch & Schneider)	E	Encotyllabe monticellii	BC
Calamus calamus (Valenciennes) Calamus calamus (C. & V.)	E	Encotyllabe lintoni	G
Chrysophrys auratus (Bloch & Schneider) Pagrosomus auratus (Houttuyn) Pagrosomus auratus	E	Encotyllabe pagrosomi	BC
Chrysophrys major Schlegel Pagrosomus major	B B	Benedenia madai Benedenia pagrosomi	G G
Chrysophrys unicolor Quoy & Gaimard Pagrosomus unicolor (Quoy & Gaimard)	B	Benedenia sekii	S
Dentex sp. ?	E	Encotyllabe vallei	G
Pagellus bogaraveo (Brünnich)	E	Encotyllabe pagelli	G,BC

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Pagellus centrodontus Sparus centrodontus De la Roche			
Sparus aurata Linnaeus Chrysophrys aurata	E	Encotyllabe vallei	?
Sparus australis (Günther)	A	Anoplocotyle australis	S
Sparus macrocephalus (Basilevsky)	E A	Encotyllabe spari Pseudomicrobothrium spari	G G
Spondyliosoma cantharus (Linnaeus) Cantharus lineatus	T	Trochopus differens	G, ?
GIRELLIDAE			
Girella nigricans (Ayres)	B	Neobenedenia girellae	S
EPHIPPIDAE			
Platax pinnatus (Linnaeus)	T	Sprostoniella multitestis	G
CHAETODONTIDAE			
Chaetodon capistratus Linnaeus	B	Neobenedenia melleni	?
Chaetodon ocellatus Bloch	B	Neobenedenia melleni	?
Chaetodon striatus Linnaeus	B	Neobenedenia melleni	?
Holacanthus ciliaris (Linnaeus)	B	Neobenedenia melleni	?
Holacanthus tricolor (Bloch)	B	Neobenedenia melleni	?
Pomacanthus paru (Bloch) Pomacanthus arcuatus (Linnaeus)	B	Neobenedenia melleni	?

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
HOPLEGNATHIDAE			
Oplegnathus fasciatus (Temminck & Schlegel) *Hoplognathus fasciata*	B	*Metabenedenialla hoplognathi*	G
Oplegnathus punctatus (Temminck & Schlegel) *Hoplognathus punctatus* (T. & S.)	B	*Metabenedeniella hoplognathi*	G
EMBIOTOCIDAE			
Amphistichus argenteus Agassiz	E	*Encotyllabe embiotocae*	BC
Cymatogaster aggregata Gibbons	E	*Encotyllabe embiotocae*	BC
POMACENTRIDAE			
Chromis chromis (Linnaeus) *Heliastes chromis* L.	E	*Encotyllabe nordmanni*	BC
LABRIDAE			
Thalassoma bifasciatum (Bloch) *Thalassoma bifasciatus* (Bloch)	B	*Benedenia* sp. of Hutton, 1964	?
Thalassoma pavo (Linnaeus) *Crenilabrus pavo*	E	*Encotyllabe paronae*	?
SCARIDAE			
Scarops perrico (Jordan & Gilbert) *Scarus perrico* (Jordan & Gilbert)	B B	*Neobenedenia adenea* *Neobenedenia girellae*	G G

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
HAPLODACTYLIDAE			
Goniistius zonatus (Cuvier & Valenciennes)	T	*Trochopus goniistii*	G
CHEILODACTYLIDAE			
Cheilodactylus spectabilis (Hutton) *Chironemus spectabilis* (Hutton)	E	*Encotyllabe chironemi*	G
LATRIDAE			
Latridopsis forsteri (Castelnau) *Latris forsteri*	E	*Encotyllabe latridis*	G
Latris lineata (Forster) *Latrix lineata* (Forster)	T	*Allomegalocotyla johnstoni*	G
	T	*Pseudomegalocotyla latridis*	G
NOTOTHENIIDAE			
Notothenia magellanica (Forster) *Notothenia macrocephala*	T	*Pseudobenedenia nototheniae*	S
Notothenia microlepidota Hutton *Notothenia colbecki* Boulenger *Notothenia colbecki*	T	*Pseudobenedenia nototheniae*	S
Notothenia rossi Richardson	T	*Pseudobenedenia nototheniae*	S
PHOLIDAE			

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Enedrias nebulosus (Temminck & Schlegel)	MO	*Monocotyle* sp. of Layman, 1930	G
ACANTHURIDAE			
Acanthurus sandvicensis (Streets)	B	*Benedenia* sp. of Randall, 1961	S
Acanthurus triostegus sandvicensis			
Naso hexacanthus (Bleeker)	B	*Oligoncobenedenia nasonis*	G
Naso unicornis (Forskål)	B	*Dioncopseudobenedenia kala*	G
SCOMBRIDAE			
Auxis thazard (Lacépède)	C	*Caballerocotyla manteri affinis*	G
Euthynnus affinis (Cantor)	C	*Caballerocotyla gouri*	OP
Thynnus thunnina C.V.	C	*Caballerocotyla manteri affinis*	G
	C	*Caballerocotyla notosinense*	G
	C	*Caballerocotyla paucispinosa*	G
Euthynnus alletteratus (Rafinesque)	C	*Caballerocotyla manteri*	G
	C	*Tristomella onchidiocotyle*	G
Euthynnus alletterata			
Euthynnus pelamis (Linnaeus)	C	*Caballerocotyla katsuwoni*	G
Katsuwonus vagans			
Gymnosarda pelamys	C	*Tristomella lintoni*	G
Sarda chiliensis (Cuvier)	C	*Caballerocotyla gregalis*	G
Sarda lineolata (Girard)	C	*Capsala* sp. of Koratha & Martin, 1960	?
Sarda orientalis (Temminck & Schlegel)	C	*Caballerocotyla caballeroi*	G

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Sarda sarda (Bloch)	C	Caballerocotyla pelamydis	G, ?
Pelamys sarda			
Thunnus alalunga (Bonnaterre)	C	Tricotyla thynni	G
Thynnus alalonga			
Thunnus albacares (Bonnaterre)	C	Caballerocotyla biparasitica	CP
Thynnus albacora	C	Caballerocotyla klawei	NC, ?
Neothunnus macropterus (Temminck & Schlegel)			
Neothunnus albacores			
Neothunnus albacora Lowe			
Thunnus obesus Lowe	C	Tristomella nozawae	S
Parathunnus obesus (Lowe)	C	Tristomella onchidiocotyle	G
Thynnus sibi			
Thunnus thynnus orientalis (Temminck & Schlegel)	C	Caballerocotyla albsmithi	G
Thunnus saliens	C	Caballerocotyla magronum	G
Jordan & Evermann	C	Caballerocotyla paucispinosa	G
Thunnus orientalis			
Thunnus thynnus	C	Caballerocotyla sp. of Mamaev, 1968	G (?)
Thunnus thynnus thynnus (Linnaeus)	C	Tristomella interrupta	G
	C	Tristomella nozawae	?
Thynnus thynnus (L.)	C	Tristomella onchidiocotyle	G, ?
"tonno"			
Thunnus thynnus			
Thynnus brachypterus			
Thunnus sp.	C	Tristoma levinsenii	G
undertermined sp.; perhaps of Cybium	C	Tristomella ovalis	BC
HISTIOPHORIDAE			
Histiophorus sp. [=? I. platypterus]	C	Capsaloides sinuatus	BC

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Histiophorus sp. [=? I. platypterus]	C	Tristomella ovalis	BC
Histiophorus sp. [=? I. platypterus]	C C	Tristomella megacotyle Tristomella ovalis	S S
Istiophorus platypterus (Shaw & Nodder) Istiophorus greyii Histiophorus orientalis Istiophorus americanus	C C C	Tristoma coccineum Tristomella pricei Tristomella ovalis	G ? BC
Makaira indica (Cuvier) Istiompax marlina (Jordan & Hill) Makaira marlina Jordan & Evermann Histrophorus brevirostris	C C C	Tristomella laevis Tristomella poeyi Tristomella pricei	? ? S, ?
Makaira nigricans Lacépède Makaira ampla (Poey)	C	Tristomella poeyi	S, ?
Tetrapturus albidus Poey ? Tetrapturus imperator (B. & S.) Tetrapturus lessonae Canestrini	C C C	Capsaloides cornutus Capsaloides magnaspinosus Tristomella laevis	G NC G, BC
Tetrapturus audax (Philippi) Makaira mitzukurii (Jordan & Snyder)	C	Tristomella pricei	S
Tetrapturus belone Rafinesque	C C C	Capsaloides perugiai Tristoma coccineum Tristoma integrum	G G G, ?
XIPHIIDAE			
Xiphias gladius Linnaeus	C C C	Tristoma coccineum Tristoma integrum Tristomella laevis	G,?,BC G, ? G

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
GOBIIDAE			
Gobius (Macrogobius) paganellus Linnaeus Bathygobius paganellus (L.)	B	Benedenia monticellii	G
SCORPAENIDAE			
Helicolenus percoides Richardson & Solander Helicolenus percoides Richardson	T T	Megalocotyle australis Megalocotyle helicoleni	G G
Scorpaena guttata Girard	T	Trochopus sprostoni	G
Scorpaena plumieri Bloch	E	Encotyllabe pricei	G
Scorpaena porcus Linnaeus Scorpaena porcus (L.)	T	Trochopus sp. of Reichenbach-Klinke, 1957	G
Sebastes alutus (Gilbert) Sebastodes alutus Sebastodes alutus (Gilbert)	B T	Benedenia derzhavini Megalocotyle trituba	G ?
Sebastes caurinus Richardson Sebastodes caurinus (Richardson)	T	Megalocotyle marginata	G
Sebastes diploproa (Gilbert) Sebastodes diploproa	T	Megalocotyle trituba	?
Sebastes inermis Cuvier Sebastodes inermis	B	Benedenia sebastodis	G
Sebastes introniger (Gilbert) Sebastodes introniger (Gilbert)	B	Benedenia derzhavini	G
Sebastes maliger (Jordan & Gilbert) Sebastodes maliger (Jordan & Gilbert)	T	Megalocotyle marginata	G

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Sebastes melanops Girard Sebastodes melanops (Girard) "a dark grey rock fish, probably Sebastodes melanops"	T	Megalocotyle marginata	G
Sebastes nebulosus Ayres Sebastodes nebulosus (Ayres)	T	Megalocotyle marginata	G
Sebastes paucispinis Ayres Sebastodes paucispinus Sebastodes paucispinus (Ayres)	T T	Megalocotyle trituba Pseudobenedenia noblei	G G
Sebastes pinniger (Gill) Sebastodes pinniger	T	Megalocotyle trituba	?
Sebastes ruberrimus (Cramer) Sebastodes ruberrimus Sebastodes ruberrimus Cramer	T T	Megalocotyle marginata Megalocotyle trituba	G ?
Sebastes schlegelii Hilgendorf Sebastodes schlegeli (Hilg.)	B	Benedenia derzhavini	G, BC
Sebastes spp. Sebastodes spp.	B T	Entobdella squamula Megalocotyle marginata	S, BC, ? G
TRIGLIDAE			
Chelidonichthys kumu (Lesson) Chelidonichthys kumu (Lesson & Garnot)	T	Trochopus hobo	G
Chelidonichthys (Aspitrigla) cuculus (Linnaeus) Trigla pini Bloch Trigla cuculus L.	T	Trochopus pini	S, ?

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Chelidonichthys (Aspitrigla) obscurus (Bloch & Schneider)	T	*Trochopus diplacanthus*	G
Trigla obscura	T	*Trochopus micracanthus*	G
Chelidonichthys (Chelidonichthys) lucerna (Linnaeus)	T	*Trochopus brauni*	G
	T	*Trochopus diplacanthus*	G
	T	*Trochopus gaillimhe*	G
Trigla hirundo Day	T	*Trochopus heteracanthus*	G, S
Trigla corax	T	*Trochopus micracanthus*	G
Trigla hirundo Bloch	T	*Trochopus pini*	G, S, ?
Trigla lucerna	T	*Trochopus tubiporus*	G, ?
Chelidonichthys (Trigloporus) lastoviza (Bonnaterre)	T	*Trochopus lineatus*	BC
Trigla lineata			
Peristedion cataphractum Linnaeus	T	*Trochopella candida*	G
Peristhedion cataphractum Linnaeus			
Trigla sp.	T	*Trochopus* sp. of Kearn, 1963	G
COTTIDAE			
Cottus gobio Linnaeus	T	*Megalocotyle zschokkei* +	S
	T	*Trochopus brauni* +	S
DACTYLOPTERIDAE			
Dactylopterus volitans (Linnaeus)	T	*Megalocotyle zschokkei*	G
BOTHIDAE			
Paralichthys adspersus (Steindachner)	B	*Entobdella brattstroemi*	S
Paralichthys californicus (Ayres)	B	*Entobdella squamula*	S, ?, BC

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
Scophthalmus maximus (Linnaeus)	B	Entobdella hippoglossi	S, ?
	T	Megalocotyle rhombi	S
Rhombus maximus L.	CA	Calicotyle kröyeri +	?
PLEURONECTIDAE			
Atheresthes stomias (Jordan & Gilbert)	B	Entobdella hippoglossi	G
	B	Pseudoentobdella pugetensis	G
Atherestes stomias Jordan & Gilbert			
Hippoglossina macrops Steindachner	B	Entobdella squamula	S
Hippoglossus hippoglossus (Linnaeus)	B	Entobdella curvunca	S
	B	Entobdella hippoglossi	S,?,BC
Hippoglossus gigas			
Hippoglossus vulgaris Flem.			
Pleuronectes hippoglossus L.			
Hippoglossus vulgaris			
Hippoglossus maximus			
Hippoglossi maximi			
"halibut"			
Hippoglossus stenolepis Schmidt	B	Entobdella hippoglossi	G, ?
	B	Entobdella squamula	S
Hippoglossus hippoglossus stenolepis Schmidt			
Hippoglossus hippoglossus			
Hyppoglossus hyppoglossus			
Hippoglossus sp. [?]	C	Tristoma uncinatum	?
SOLEIDAE			
Pegusa lascaris (Risso)	B	Entobdella soleae	S
Solea lascaris			
Solea solea (Linnaeus)	B	Entobdella soleae	S, ?
Solea vulgaris			
Solea vulgaris Quensel			

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
ECHENEIDAE			
Echeneis naucrates Linnaeus	D	*Dioncus agassizi*	G
	D	*Dioncus remorae*	G
Remora brachyptera (Lowe)	D	*Dioncus agassizi*	G
Remoropsis brachyptera (Lowe)			
Remora remora (Linnaeus)	D	*Dioncus agassizi*	G
MOLIDAE			
Mola mola (Linnaeus)	C	*Capsala martinierei*	S,?
Orthragoriscus mola	C	*Tricotyla cutanea*	S,?,G
Orthagoriscus mola	C	*Tricotyla molae*	S,G,?
Tetraodon luna	C	*Tristoma integrum*	G,?
Mola rotunda	C	*Tristoma coccineum*	G,?
Mola aspera	C	*Tristomella grimaldii*	S
"Diodons de Linné"	C	[*Tristomella grimaldii* (*cephala*)]	S
UNIDENTIFIED FISH			
Host unknown	T	*Trochopus oncacanthus*	?
No mention	C	*Caballerocotyle pelamydis*	?
No mention	B	*Benedenia derzhavini*	?
No mention	B	*Entobdella bumpusii*	?
No mention	B	*Entobdella diadema*	?
No mention	N	*Nitzschia sturionis*	?
No mention	CA	*Calicotyle kröyeri*	?
Undetermined species of fish (Japanese name = Hazara)	C	*Caballerocotyla foliacea*	G
"undetermined species of fish"	B	*Benedenia hendorffi*	S

Table 234 continued

Host	Caps. subf.	Capsaloid	Location
"undetermined fish"	B	*Entobdella squamula*	?
Undetermined fish	B	*Entobdella steingroeveri*	?
"unidentified, spotted, grouper-like fish"	B	*Neobenedenia isabellae*	G

Table 235. Capsaloid genera and their host families, including a summary of organ-specificity by parasite genus and host family.

Only natural hosts are included; hosts of unknown families are not included. Doubtful hosts are indicated by a plus (+). The number of species in each capsaloid genus is included in parentheses after the generic name. Symbols for parasite locations on/in the hosts are explained on p. 16. The most frequently parasitized location is listed first, followed by the other locations in descending order.

Capsaloid genus	No. species	No. host sp.	Host family	Location
CAPSALINAE				
Capsala (3)	1	1	Squalidae	G
	1	1	Scombridae	?
	1	1	Molidae	S, ?
Caballerocotyla (15)	15	9	Scombridae	G, CP, OP, NC, ?
Capsaloides (4)	4	3	Histiophoridae	G, NC, BC
Tricotyla (3)	1	1	Scombridae	G
	2	1	Molidae	S, G, ?
Tristoma (5)	1	1	Carcharhinidae +	G
	1	1	Sphyrnidae +	G
	1	1	Rajidae +	?
	1	1	Scombridae	G
	2	2	Histiophoridae	G, ?
	2	1	Xiphiidae	G, ?, BC
	1	1	Pleuronectidae	?
	2	1	Molidae	G, ?
Tristomella (10)	1	1	Coryphaenidae	?
	5	5	Scombridae	G, ?, BC, S
	5	7[1]	Histiophoridae	S, ?, BC, G
	1	1	Xiphiidae	G
	1	1	Molidae	S

Table 235 continued

Capsaloid genus	No. species	No. host sp.	Host family	Location
BENEDENIINAE				
Benedenia (18)	3	2	Trygonidae	G, S
	1	2	Mugilidae	G
	3	4	Serranidae	G
	1	2	Carangidae	S
	1	1	Coryphaenidae	S
	1	1	Nemipteridae	G
	1	3	Sciaenidae	S, ?
	3	2	Sparidae	G, S
	1	1	Labridae	?
	1	1	Acanthuridae	S
	1	1	Gobiidae	G
	2	4	Scorpaenidae	G, BC
Allobenedenia (2)	1	1	Serranidae	G
	1	1	Lethrinidae	G
Ancyrocotyle (2)	2	1	Carangidae	G
Benedeniella (2)	2	2	Myliobatidae	S
Dioncopseudobenedenia (1)	1	1	Acanthuridae	G
Entobdella (11)	1	1	Platyrhinidae	S
	1	1	Rajidae +	S
	5	10[2]	Trygonidae	S, G, ?
	1	1	Myliobatidae	?
	1	1	Gadidae +	G
	1	?[3]	Scorpaenidae +	S, BC, ?
	3	3	Bothidae	S, BC, ?
	3	4	Pleuronectidae	S, G, ?, BC
	1	2	Soleidae	S, ?
Lagenivaginopseudobenedenia (1)	1	1	Lutianidae	G
Metabenedeniella (1)	1	1	Serranidae	G
	1	2	Hoplegnathidae	G
Neobenedenia (5)	5	6[4]	Serranidae	G, ?
	1	1	Lutianidae	?
	1	1	Girellidae	S
	1	6	Chaetodontidae	?
	2	1	Scaridae	G

Table 235 continued

Capsaloid genus	No. species	No. host sp.	Host family	Location
Neobenedeniella (1)	1	1	Congridae	G
Oligoncobenedenia (1)	1	1	Acanthuridae	G
Pseudallobenedenia (2)	2	2	Lutianidae	G
Pseudoentobdella (2)	1	1	Myliobatidae	BC(?), S(?), ?
	1	1	Pleuronectidae	G
ENCOTYLLABINAE				
Encotyllabe (15)	1	1	Salmonidae +	G
	1	1	Serranidae	G
	1	1	Latilidae	G
	1	1	Carangidae	G
	1	1	Bramidae	BC
	1	1	Lutianidae	?
	2	2	Pomadasyidae	G
	6	7	Sparidae	G, BC, ?
	1	2	Embiotocidae	BC
	1	1	Pomacentridae	BC
	1	1	Labridae	?
	1	1	Cheilodactylidae	G
	1	1	Latridae	G
	1	1	Scorpaenidae	G
NITZSCHIINAE				
Nitzschia (4)	4	12[5]	Acipenseridae	G, BC, ?, OP
PSEUDONITZSCHIINAE				
Pseudonitzschia (1)	1	1	Lutianidae	G
TROCHOPODINAE				
Trochopus (16)	1	1	Serranidae	G
	1	1	Sparidae	G, ?
	1	1	Haplodactylidae	G
	2	2	Scorpaenidae	G
	10	6	Triglidae	G, S, ?, BC
	1	1	Cottidae +	S

Table 235 continued

Capsaloid genus	No. species	No. host sp.	Host family	Location
Allomegalocotyla (1)	1	1	Latridae	G
Macrophyllida (1)	1	1	Carcharhinidae	G
Megalocotyle (8)	2	3	Serranidae	G
	4	10[6]	Scorpaenidae	G, ?
	1	1	Cottidae +	S
	1	1	Dactylopteridae	G
	1	1	Bothidae	S
Megalocotyloides (2)	2	3	Serranidae	G
Pseudobenedenia (2)	1	3	Nototheniidae	S
	1	1	Scorpaenidae	G
Pseudomegalocotyla (1)	1	1	Latridae	G
Sprostonia (1)	1	1	Squatinidae	G
Sprostoniella (1)	1	1	Ephippidae	G
Trochopella (1)	1	1	Triglidae	G
Trilobiodiscus (1)	1	1	Lutianidae	G
DIONCIDAE				
Dioncus (3)	1	1	Rachycentridae	G
	1	1	Carangidae +	G
	2	3	Echeneidae	G
LOIMOIDAE				
Loimos (4)	4	5	Carcharhinidae	G
Loimopapillosum (1)	1	2	Trygonidae	G
Loimosina (1)	1	3	Sphyrnidae	G
MICROBOTHRIINAE				
Microbothrium (2)	2	2	Carcharhinidae	S
	1	1	Squalidae	S, ?

Table 235 continued

Capsaloid genus	No. species	No. host sp.	Host family	Location
Leptobothrium (1)	1	1	Scyliorhinidae	S
Leptocotyle (1)	1	2	Scyliorhinidae	S,?,G,BC,C
Leptomicrobothrium (1)	1	1	Scyliorhinidae	G
Pseudoleptobothrium (1)	1	1	Rhinobatidae	S
ANOPLOCOTYLINAE				
Anoplocotyle (1)	1	1	Sparidae	S
Pseudomicrobothrium (1)	1	1	Sparidae	G
ASTHENOCOTYLINAE				
Asthenocotyle (1)	1	1	Squalidae	S
ENOPLOCOTYLINAE				
Enoplocotyle (1)	1	1	Muraenidae	S
PSEUDOCOTYLINAE				
Pseudocotyle (2)	1	1	Squalidae	S
	1	1	Squatinidae	S,?
DERMOPHTHIRIINAE				
Dermophthirius (1)	1	4	Carcharhinidae	S,NC,?
Neodermophthirius (1)	1	1	Carcharhinidae	G,S(?)
MONOCOTYLINAE				
Monocotyle (9)	7	7	Trygonidae	G,BC
	2	2	Myliobatidae	G,?
	1	1	Sparidae +	G
	1	1	Pholidae	G
Anoplocotyloides (1)	1	1	Rhinobatidae	G
Dasybatotrema (1)	1	3[7]	Trygonidae	G,S
Decacotyle (1)	1	1	Trygonidae	G

Table 235 continued

Capsaloid genus	No. species	No. host sp.	Host family	Location
Diploheterocotyla (1)	1	1	Trygonidae	G
Heterocotyle (6)	1	1	Squalidae	G
	6	7[8]	Trygonidae	G
Horricauda (2)	2	2	Rhinobatidae	G, ?
Neoheterocotyle (1)	1	1	Pristidae	G
Papillicotyle (2)	2	2	Myliobatidae	G
Spinuris (1)	1	1	Rhinobatidae	G, ?
Troglocephalus (1)	1	1	Rhinobatidae	G
Tympanocirrus (1)	1	1	Trygonidae	?
Monocotylidae n. sp. of Koratha & Martin, 1963	1	1	Rhinobatidae	NC
CALICOTYLINAE				
Calicotyle (8)	2	2	Carcharhinidae	C, RG, R
	2	2	Squalidae	C, R
	2	2	Rhinobatidae	C, "on"
	3	16[9]	Rajidae	C, S, R, ?, A, RA, RG, SI, CO, G
	1	1	Chimaeridae	C, R, RA, G, ST, ?
	1	1	Bothidae +	?
Dictyocotyle (1)	1	6[10]	Rajidae	CO
Gymnocalicotyle (1)	1	1	Pristiophoridae	O
DENDROMONOCOTYLINAE				
Dendromonocotyle (3)	3	4	Trygonidae	S
Clemacotyle (1)	1	1	Myliobatidae	BC

Table 235 continued

Capsaloid genus	No. species	No. host sp.	Host family	Location
MERIZOCOTYLINAE				
Merizocotyle (5)	5	6[11]	Rajidae	G,NC,?
Cathariotrema (1)	1	1	Lamnidae	NC
	1	2	Carcharhinidae	NC
	1	1	Sphyrnidae	NC
Empruthotrema (1)	1	4	Rajidae	NC,G
Thaumatocotyle (5)	1	1	Rajidae	G,NC
	4	5[12]	Trygonidae	G,NC,S
	1	1	Myliobatidae	S

[1] If the two hosts listed as *Histiophorus* sp. (Tables 37 & 40) were either *Istiophorus platypterus* or *Makaira indica*, then there would be fewer host species.

[2] There would be nine host species if the "sting ray" of Hammen & Lum (1962:2419) (Table 71) was, as I suspect, *Dasyatis centroura*.

[3] As the hosts were listed as *Sebastes* spp. (Table 77), one cannot determine the number of host species.

[4] If either the *Myctoperca* sp. or the "grouper-like fish" (Tables 82 & 84) was identical to an identified host, then the number of host species would be decreased.

[5] If the two hosts designated as *Acipenser* sp. (Table 110) were either *Acipenser oxyrhynchus* or *Acipenser brevirostrum*, then there would be 10 host species.

[6] There may be more than 10 host species because *Sebastes* spp. were listed as hosts (Table 130).

[7] If the "*Dasybatus pastinacus*" listed by MacCallum (1916) (Table 180) was *Dasyatis centroura*, then there are two host species.

Table 235 continued

[8] If the "*Dasybatus pastinacus*" listed by MacCallum (1916) (Table 186) was *Dasyatis centroura*, or if the *Dasyatis* sp. listed by Hargis (1955b) (Table 187) was *Dasyatis americana*, then the number of host species would be decreased.

[9] There may be more than 16 host species because *Raja* spp. were listed as hosts (Table 197).

[10] There may be more, or less, than six host species because *Raja* sp. was listed as a host (Table 205).

[11] If the *Raja* sp. listed by Cerfontaine (1898) (Table 213) was *Raja oxyrinchus*, then there would be five host species.

[12] If the "*Dasybatis pastinacus*" listed by MacCallum (1916) (Table 219) was *Dasyatis centroura*, then there would be four host species.

Table 236. Host families parasitized by each capsaloid subfamily.

Only natural hosts are considered. Doubtful host families are indicated by a plus (+). Symbols for the parasite locations on/in the hosts are explained on p. 16. The most frequently parasitized location is listed first, followed by the other locations in descending order.

HOSTS \ CAPSALOIDS	Capsalinae	Benedeniinae	Encotyllabinae	Nitzschiinae	Pseudonitzschiinae	Trochopodinae	Dioncidae	Loimoidae	Microbothriinae	Anoplocotylinae	Asthenocotylinae	Enoplocotylinae	Pseudocotylinae	Dermophthiriinae	Monocotylinae	Calicotylinae	Dendromonocotylinae	Merizocotylinae
Laminidae																		NC
Scyliorhinidae									S,G,?,BC,C									
Carcharhinidae	G+					G		G	S					S,NC,G,?		C,RG,R		NC
Sphyrnidae	G+							G										NC
Squalidae	G								S,?		S		S		G	C,R		
Squatinidae						G							S,?					
Pristiophoridae																O		
Rhinobatidae									S						G,NC,?	C,"on"		
Pristidae															G			
Platyrhinidae		S																
Rajidae	?+	S+														C,CO,S,?,SI,R,A,RA,RG,U,G		G,NC,?
Trygonidae	S,G,?							G							G,S,BC,?		S	G,NC,S
Myliobatidae		S,?,BC(?)													G,?		BC	S
Chimaeridae																C,R,RA,G,SI?		
Acipenseridae				G,BC,?,OP														
Salmonidae			G+															
Muraenidae												S						
Congridae		G																
Gadidae		G+																
Mugilidae		G																
Serranidae		G,?	G			G												
Latilidae			G															
Rachycentridae							G											
Carangidae		G,S	G				G+											
Bramidae			BC															
Coryphaenidae	?	S																
Lutjanidae		G,?	?		G	G												
Nemipteridae		G																
Pomadasyidae			G															
Sciaenidae		S,?																
Lethrinidae		G																
Sparidae		G,S	G,BC,?			G,?				S,G					G+			
Girellidae		S																
Ephippidae						G												
Chaetodontidae		?																
Hoplegnathidae		C																
Embiotocidae			BC															
Pomacentridae			BC															
Labridae		?	?															
Scaridae		G																
Haplodactylidae						G												
Cheilodactylidae			G															
Latridae			G			G												
Nototheniidae						S												
Pholidae															G			
Acanthuridae		G,S																
Scombridae	G,?,S,BC,NC,OP,CP																	
Histiophoridae	G,S,BC,?,NC																	
Xiphiidae	G,?,BC																	
Gobiidae		G																
Scorpaenidae		G,S,BC,?	G			G,?												
Triglidae						G,S,BC,?												
Cottidae						S+												
Dactylopteridae						G												
Bothidae		S,?,BC				S										?+		
Pleuronectidae	?	S,G,?,BC																
Soleidae		S,?																
Echeneidae							G											
Molidae	S,G,?																	
TOTALS 59	10	26	14	1	1	14	3	3	4	1	1	1	2	1	7	7	2	6
TOTALS after doubtful host fam. dropped 56	7	24	13	1	1	13	2	3	4	1	1	1	2	1	6	6	2	6

Table 237. Numbers of genera, species, reports (for natural hosts only), and host families parasitized (doubtful host families not included) by each capsaloid subfamily.

Monocotylidae n. sp. of Koratha & Martin, 1963 not included.

Capsaloid subfamily	No. genera	No. species	No. reports	No. host families parasitized
Benedeniinae	13	49	197	24
Encotyllabinae	1	15	23	13
Trochopodinae	11	35	85	13
Capsalinae	6	40	198	7
Monocotylinae	12	27	46	6
Calicotylinae	3	10	124	6
Merizocotylinae	4	12	26	6
Microbothriinae	5	6	39	4
Loimoidae	3	6	16	3
Dioncidae	1	3	15	2
Pseudocotylinae	1	2	16	2
Dendromonocotylinae	2	4	5	2
Nitzschiinae	1	4	44	1
Pseudonitzschiinae	1	1	1	1
Anoplocotylinae	2	2	2	1
Asthenocotylinae	1	1	1	1
Enoplocotylinae	1	1	1	1
Dermophthiriinae	2	2	7	1
Totals 18	70	220	846	

Table 238. Capsaloids that are species-specific.

Symbols for the parasite locations on/in the hosts are explained on p. 16. The most frequently parasitized location is listed first, followed by the other locations in descending order. Symbols for the host classes are C (Chondrichthyes), O (Osteichthyes), and ? (not given).

Host class	Capsaloid	Location
O	*Capsala martinierei*	S,?
C	*C. squali*	G
O	*Capsala* sp. of Koratha & Martin, 1960	?
O	*Caballerocotyla biparasitica*	CP
O	*C. albsmithi*	G
O	*C. caballeroi*	G
?	*C. foliacea*	G
O	*C. gouri*	OP
O	*C. gregalis*	G
O	*C. katsuwoni*	G
O	*C. klawei*	NC,?
O	*C. magronum*	G
O	*C. manteri*	G
O	*C. notosinense*	G
O	*C. pelamydis*	G,?
O	*Caballerocotyla* sp. of Mamaev, 1968	G(?)
O	*Capsaloides cornutus*	G
O	*C. magnaspinosus*	NC
O	*C. perugiai*	G
O	*C. sinuatus*	BC
O	*Tricotyla molae*	S,G,?
O	*T. cutanea*	S,?,G
O	*T. thynni*	G
C	*Tristoma fuhrmanni*	?
O	*T. levinsenii*	G
?	*T. uncinatum*	?
O	*Tristomella grimaldii*	S
O	*T. interrupta*	G
O	*T. lintoni*	G
O	*T. megacotyle*	S
O	*Benedenia epinepheli*	G
O	*B. hendorffi*	S
C	*B. leucanthemum*	G
O	*B. madai*	G
C	*B. micracantha*	S
O	*B. ovata*	G
O	*B. pagrosomi*	G
O	*B. sebastodis*	G
O	*B. sekii*	S
O	*B. synagris*	G

Table 238 continued

Host class	Capsaloid	Location
C	*Benedenia* sp. of Porter, 1954	G
O	*Benedenia* sp. of Randall, 1961	S
O	*Benedenia* sp. of Hutton, 1964	?
O	*Allobenedenia convoluta*	G
O	*A. ishikawae*	G
O	*Ancyrocotyle vallei*	G
O	*A. bartschi*	G
C	*Benedeniella macrocolpa*	S
C	*B. posterocolpa*	S
O	*Dioncopseudobenedenia kala*	G
O	*Entobdella brattstroemi*	S
C	*E. bumpusii*	S,?,G
O	*E. curvunca*	S
C	*E. guberleti*	G
?	*E. steingroeveri*	?
O	*Lagenivaginopseudobenedenia etelis*	G
O	*Neobenedenia muelleri*	G
O	*Neobenedeniella congeri*	G
O	*Oligoncobenedenia nasonis*	G
O	*Pseudallobenedenia apharei*	G
O	*P. opakapaka*	G
C	*Pseudoentobdella pacifica*	S(?) BC(?),?
O	*P. pugetensis*	G
O	*Encotyllabe caranxi*	G
O	*E. chironemi*	G
O	*E. latridis*	G
O	*E. lintoni*	G
O	*E. lutiani*	?
O	*E. masu*	G
O	*E. monticellii*	BC
O	*E. pagelli*	G, BC
O	*E. paronae*	?
O	*E. pricei*	G
O	*Nitzschia monticellii*	BC, OP
O	*Pseudonitzschia uku*	G
O	*Trochopus tubiporus*	G, ?
O	*T. brauni*	G
O	*T. differens*	G, ?
O	*T. gaillimhe*	G
O	*T. goniistii*	G
O	*T. heteracanthus*	G, S
O	*T. hobo*	G
O	*T. lineatus*	BC
?	*T. oncacanthus*	?
O	*T. plectropomi*	G
O	*T. sprostoni*	G

Table 238 continued

Host class	Capsaloid	Location
O	*Trochopus* sp. of Reichenbach-Klinke, 1957	G
O	*Trochopus* sp. of Kearn, 1963	G
O	*Allomegalocotyla johnstoni*	G
C	*Macrophyllida antarctica*	G
O	*Megalocotyle australis*	G
O	*M. grandiloba*	G
O	*M. helicoleni*	G
O	*M. rhombi*	S
O	*M. zschokkei*	G
O	*Megalocotyloides epinepheli*	G
O	*Pseudobenedenia noblei*	G
O	*Pseudomegalocotyla latridis*	G
C	*Sprostonia squatinae*	G
O	*Sprostoniella multitestis*	G
O	*Trochopella candida*	G
O	*Trilobiodiscus lutiani*	G
O	*Dioncus rachycentris*	G
O	*D. remorae*	G
C	*Loimos salpinggoides*	G
C	*L. winteri*	G
C	*Microbothrium tolloi*	S
C	*Leptobothrium pristiuri*	S
C	*Leptomicrobothrium longiphallus*	G
C	*Pseudoleptobothrium aptychotremae*	S
O	*Anoplocotyle australis*	S
O	*Pseudomicrobothrium spari*	G
C	*Asthenocotyle kaikourensis*	S
O	*Enoplocotyle minima*	S
C	*Pseudocotyle squatinae*	S, ?
C	*P. lepidorhini*	S
C	*Neodermophthirius harkemai*	G, S(?)
C	*Monocotyle myliobatis*	G, ?
C	*M. granulatae*	G
C	*M. ijimae*	BC
C	*M. kuhlii*	G
C	*M. tritestis*	G
C	*Monocotyle* sp. of Euzet & Maillard, 1967	G
C	Monocotylidae n. sp. of Koratha & Martin, 1963	NC
C	*Anoplocotyloides papillatus*	G
C	*Decacotyle lymmae*	G
C	*Diploheterocotyla dasyatis*	G
C	*Heterocotyle pastinacae*	G
C	*H. americana*	G
C	*H. granulatae*	G
C	*H. pseudominima*	G
C	*H. robusta*	G

Table 238 continued

Host class	Capsaloid	Location
C	*Horricauda rhynchobatis*	?
C	*H. rhinobatidis*	G
C	*Neoheterocotyle inpristi*	G
C	*Papillicotyle octona*	G
C	*Spinuris lophosoma*	G, ?
C	*Troglocephalus rhinobatidis*	G
C	*Tympanocirrus spirophallus*	?
C	*Calicotyle australis*	"on"
C	*C. macrocotyle*	SI
C	*C. mitsukurii*	C
C	*C. ramsayi*	C
C	*Gymnocalicotyle inermis*	O
C	*Dendromonocotyle kuhlii*	S
C	*D. taeniurae*	S
C	*Clemacotyle australis*	BC
C	*Merizocotyle diaphana*	G
C	*M. amplidiscata*	G
C	*M. minor*	G, ?
C	*M. pugetensis*	NC
C	*Merizocotyle* sp. of Palombi, 1943	G
C	*Thaumatocotyle concinna*	NC
C	*T. longicirrus*	S
C	*T. pseudodasybatis*	S
C	*T. retorta*	G

Table 239. Capsaloids that are genus-specific.

Symbols for the parasite locations on/in the hosts are explained on p. 16. The most frequently parasitized location is listed first, followed by the other locations in descending order.

Capsaloid	Location	Host genus
Tristomella nozawae	S, ?	Thunnus
T. poeyi	S, ?	Makaira
Benedenia derzhavini	G, BC, ?	Sebastes
B. jaliscana	G	Epinephelus
B. seriolae	S	Seriola
Entobdella corona	S, G, ?	Dasyatis
Nitzschia quadritestes	G, BC	Acipenser
N. superba	G, BC	Acipenser
Trochopus diplacanthus	G	Chelidonichthys
T. micracanthus	G	Chelidonichthys
T. pini	G, S, ?	Chelidonichthys
Megalocotyle marginata	G	Sebastes
M. trituba	?, G	Sebastes
Megalocotyloides pseudomarginatus	G	Epinephelus
Pseudobenedenia nototheniae	S	Notothenia
Loimopapillosum dasyatis	G	Dasyatis
Loimosina wilsoni	G	Sphyrna
Leptocotyle minor	S, ?, G, BC, C	Scyliorhinus
Monocotyle diademalis	G	Dasyatis
M. pricei	G	Dasyatis
Dasybatotrema dasybatis	G, S	Dasyatis
Calicotyle kröyeri	C, ?, S, R, A, RG, CO, U, G	Raja
C. stossichi	RG	Mustelus
Dictyocotyle coeliaca	CO	Raja
Dendromonocotyle octodiscus	S	Dasyatis
Empruthotrema raiae	NC, G	Raja

Table 240. Capsaloids that are family-specific.

Symbols for the parasite locations on/in the hosts are explained on p. 16. The most frequently parasitized location is listed first, followed by the other locations in descending order.

Capsaloid	Location	Host family
Caballerocotyla manteri affinis	G	Scombridae
C. paucispinosa	G	Scombridae
Tristomella onchidiocotyle	G,?	Scombridae
T. pricei	S,?	Histiophoridae
Benedenia sciaenae	S,?	Sciaenidae
Entobdella soleae	S,?	Soleidae
Neobenedenia isabellae	G	Serranidae
Encotyllabe embiotocae	BC	Embiotocidae
E. vallei	G,?	Sparidae
Nitzschia sturionis	G,?,BC,OP	Acipenseridae
Megalocotyle hexacantha	G	Serranidae
Dioncus agassizi	G	Echeneidae
Loimos scoliodoni	G	Carcharhinidae
L. secundus	G	Carcharhinidae
Dermophthirius carcharini	S,NC,?	Carcharhinidae
Papillicotyle floridana	G	Myliobatidae

Table 241. Capsaloids that are order-specific.

Only natural hosts are considered for Neobenedenia melleni. Symbols for the parasite location on/in the hosts are explained on p. 16. The most frequently parasitized location is listed first, followed by the other locations in descending order.

Capsaloid	Location	Host order
Tristomella laevis	?, G, BC	Perciformes
T. ovalis	BC, S	Perciformes
Entobdella hippoglossi	S, ?, G, BC	Pleuronectiformes
E. apiocolpos	S	Rajiformes
E. diadema	?, S	Rajiformes
Metabenedeniella hoplognathi	G	Perciformes
Neobenedenia melleni	?	Perciformes
N. adenea	G	Perciformes
N. girellae	G, S	Perciformes
Encotyllabe nordmanni	BC	Perciformes
E. pagrosomi	G, BC	Perciformes
E. spari	G	Perciformes
Cathariotrema selachii	NC	Lamniformes
Thaumatocotyle dasybatis	NC, G	Rajiformes

Table 242. Capsaloids that are specific to more than one order of hosts.

Symbols for the parasite locations on/in the hosts are explained on p. 16. The most frequently parasitized location is listed first, followed by the other locations in descending order.

Capsaloid	Location	Specificity
Tristoma coccineum	G,?,BC	on 6 species of 6 genera of 5 families of 3 orders (Lamniformes, Perciformes, Tetraodontiformes)
T. integrum	G,?	on 3 species of 3 genera of 3 families of 2 orders (Perciformes, Tetraodontiformes)
Benedenia monticellii	G	on 3 species of 2 genera of 2 families of 2 orders (Mugiliformes, Perciformes)
Entobdella squamula	S,?,BC	on 4 species of 4 genera of 3 families of 2 orders (Perciformes [?], Pleuronectiformes)
Microbothrium apiculatum	S,?	on 2 species of 2 orders (Lamniformes, Squaliformes)
Monocotyle sp. of Layman, 1930	G	on 2 species of 2 orders (Rajiformes, Perciformes)
Heterocotyle minima	G	on 2 genera of 2 orders (Lamniformes, Rajiformes)
Calicotyle affinis	C,R,RA,G,ST,?	on 2 species of 2 orders (Rajiformes, Chimaeriformes)
C. palombi	C,R	on 3 species of 2 genera of 2 orders (Lamniformes, Squaliformes)

PHYSIOLOGICAL SPECIFICITY (Phylogenetic specificity)

Noble and Noble (1964:623) noted that "Physiological compatibility often means that the parasite and its host have evolved together. This association over a period of many millions of years results in a phylogenetic specificity, which situation is often used to help solve problems of host taxonomy." Llewellyn (1965) noted that the physiological specificity for a particular organ in a particular host can lead to phylogenetic specificity (see ORGAN SPECIFICITY). There is strong evidence "that dependence on hosts has led to gradual adaptive modifications, physiological and morphological, in those groups which have adopted the parasitic habit" (Stunkard, 1957b:255).

Very little experimental work has been done on the physiological aspects of host-specificity of Monogenea. Works by Kearn (1963d, 1967b), Llewellyn (1954, 1957a), and Halton and Jennings (1965) illustrate concepts about physiological specificity, but complete answers about physiological specificity of Monogenea have not yet been obtained.

Several attempts have been made to infect unnatural hosts to test, or examine, physiological bases for host-specificity, as by placing them in small aquaria with infected natural hosts (Jahn and Kuhn, 1932; Nigrelli, 1937; Sproston, 1946), or exposing them to larvae (Frankland, 1955; Izumova, 1956), or directly transferring adult parasites to them (Izumova (1953) 1954).

Frankland (1955) found that larvae of *Diclidophora denticulata* which naturally infect Gadus virens would not live on G. callarias, and Sproston (1946) found that adults of Entobdella soleae could transfer to other specimens of the natural host species (Solea solea) and to Pegusia lascaris but not to Pleuronectes platessa. Jahn and Kuhn (1932), Nigrelli and Breder (1934), and Nigrelli (1937, 1940, 1947) found that Neobenedenia melleni, normally a parasite of eight species (Table 81), could parasitize as many as an additional 72 host species (Table 81), most of which belonged to the order Perciformes. Llewellyn (1957) thought that, because N. melleni destroyed the cornea of its hosts, the possible absence of blood-borne antibodies in a non-vascularized cornea might enable the parasite to establish itself on a variety of hosts. Nigrelli and Breder (1934) and Nigrelli (1935a, 1935b) found that fish heavily parasitized by N. melleni that survived were less susceptible to reinfection and did not become infected on previously infected areas of the skin. Nigrelli (1935a) showed that mucus from immune fish had a greater lethal effect on N. melleni that mucus from non-immune fish.

Of the Monogenea studied thus far, the Monopisthocotylea, retaining the ancestral feeding habits, feed on the epidermal tissues and associated secretions, and the Polyopisthocotylea ingest little host tissue other than blood (Halton and Jennings, 1965). Food studies have been made on some capsaloids. Llewellyn (1954: 434) examined the capsaloids Leptocotyle minor, Calicotyle kröyeri, and Tristoma papillosum (=T. coccineum) and thought they were "...not blood feeders." Kearn (1963d) concluded that

Entobdella soleae fed on epidermis, mucus, and mucus cells within the epidermis of its host. Kearn (1963d: 758) noted that since Entobdella hippoglossi, E. diadema, E. bumpusii, Neobenedenia melleni, Capsala martinierei, Trochopus sp., and Nitzschia sturionis all had "...a conspicuous feeding organ containing prominent gland cells and papillae," they might feed on host epidermis similar to Entobdella soleae. Kearn (1963d), after studying Capsala martinierei, thought there was little doubt that it fed on host epidermis. Kearn (1963d) also thought it probable that Trochopus sp. fed on host epidermis. Halton and Jennings (1965) found that Calicotyle kröyeri and Entobdella hippoglossi both fed on host epidermis and epidermal secretions. Similar feeding habits have been attributed to Entobdella squamula (Heath, 1902) and Megalocotyle marginata (Folda, 1928). Nitzschia sturionis is the only capsaloid reported thus far that "...consumes large quantities of its host's blood" (Dogiel, Petrushevskii & Polyanskii, 1961: 306).

Kearn (1963d) said that the present evidence suggested that most, if not all, monopisthocotylineans were epidermal feeders. Although Kearn (1963d) thought that the control of host-specificity in Monogenea by blood-borne antibodies seemed unlikely, the demonstration by O'Rourke (1961) that some of the same antigens were present in both the blood and the mucus of sea bass could indicate such a possibility.

Kearn (1967b), in an excellent series of experiments, found that the larva of Entobdella soleae responded to a substance secreted by the host epidermis, probably from the epidermal mucus cells themselves, and said that it "...indicates that blood-borne antibodies are not responsible for host specificity in monogeneans" (Kearn, 1967b: 603). This statement, unfortunately, should have been restricted to the species studied, as not enough experimental work has been done on the Monogenea to justify the broader statement. The statement by Kearn (1967b: 602), "Thus each monogenean parasite is effectively isolated on a single species of host because the free-swimming larvae of the parasite are attracted only by the specific odour of this host," is plausible. Rogers (1957) also indicated that host secretions may play a role in host-specificity. However, it could be possible that after attraction to a particular host that blood-borne antibodies, or some other substance(s), could be involved that would be a further restriction to the parasite. The problem is complex, and by no means solved, as Kearn's (1967b) theories do not explain the phenomenon of a parasite that exhibits both ecological specificity and phylogenetic specificity (e.g., *Tristoma coccineum* on sharks ond Molidae (ecological) and on Xiphiidae and Histiophoridae (phylogenetic)). Kearn (1967b) also did not give us any idea as to whether the M.S. 222 used to anaesthetize the hosts could have been differentially absorbed by the various host skins and thus have modified the parasite responses.

Noble (1960:595) said that "Host-specificity is fundamentally a function of physiology and of evolution, and the explanations of this phenomenon are, therefore, to be found in experimental studies in biochemistry of parasites and of their hosts." Hargis (1957: 616) noted that "Genus, subfamily, and higher level infraspecificity can undoubtedly be interpreted as being of phylogenetic significance." Concerning the Monogenea, Hargis (1953:99) said "It is possible that the direct mode of development is a major factor in this phenomenon."

The phenomenon of physiological phylogenetic specificity can be used to ascertain (1) those species available as biological tags, (2) the relative rates of evolution of the parasites, and (3) various aspects concerning host taxonomy.

BIOLOGICAL TAGS

Various workers (e.g., Margolis, 1956, 1965; Hargis, 1958; Sindermann, 1961; Manter, 1966) have noted that since some species-specific parasites show marked geographical restriction they can be used "...as living indicators or tags" (Hargis, 1958:71). Migrating fishes may acquire different parasites in different environments (Noble, 1960), and these parasites can be used as indicators of the environments in which the hosts have lived (Margolis, 1963; Pippy, 1969). In addition, species-specificity can enable one to distinguish the hosts based on their parasite fauna alone (Hargis, 1953, 1957; Bychowsky, 1957).

In the present study, 156 of 221 capsaloids (70.6 per cent) are species-specific (Table 238). Based on the present knowledge of the Capsaloidea, most of the hosts of these parasites could be distinguished from each other on the basis of their capsaloids alone.

The capsaloids of the following hosts from the present study, for example, might prove useful as biological tags (Table 234): *Aetobatus narinari*, *Euthynnus affinis*, *Thunnus thynnus orientalis*, *Thunnus thynnus thynnus*, *Istiophorus platypterus*, *Makaira indica*, *Chelidonichthys* (*Chelidonichthys*) *lucerna*.

The occurrence of *Papillicotyle floridana* on *Aetobatus narinari* in the western Atlantic (Table 193), and *Papillicotyle octona* in Australian waters (Table 192) might be an indication of separate host populations, which could be distinguished by these parasites.

The occurrence of four species of Caballerocotyla (Table 234) on Euthynnus affinis might be due to different environments through which the migrating host passes, which could be of help to ichthyologists studying the migration of this host species. Caballerocotyla gouri is reported on this host from the Indian Ocean (Table 10), and the other three species are reported from the South China Sea (Tables 16, 17, 18).

Thunnus thynnus orientalis is host to four species of Caballerocotyla (Table 234): C. albsmithi (Table 7) from Baja California, C. magronum (Table 14) from Japan, C. paucispinosa (Table 18) from the South China Sea, and Caballerocotyla sp. of Mamaev, 1968, (Table 20) from the South China Sea. These parasites could probably be used as indicators of different populations of hosts, or different environments through which the hosts have passed. Gibbs and Collette (1967) noted that there was some interchange between the eastern and western North Pacific areas by the hosts.

Thunnus thynnus thynnus is host to three species of Tristomella (Table 234): T. interrupta (Table 35) from the eastern North Atlantic, T. nozawae (Table 38) from the North Sea, and T. onchidiocotyle (Table 39) from the Mediterranean region. After the capsaloids of this host are ascertained for the other areas of the Atlantic, they may prove useful as tags. Gibbs and Collette (1967) noted that there was some interchange of this species of host between the eastern and the western North Atlantic.

Morrow and Harbo (1969) combined all sailfish into one cosmopolitan species, Istiophorus platypterus. The capsaloid parasites of this species are confused (Table 40, footnote 2; Table 234), there being Tristoma coccineum (Table 28) from Woods Hole, Tristomella ovalis (Table 40) from Japan, and Tristomella pricei (Table 42) from Panama Bay reported from Istiophorus platypterus, and Capsaloides sinuatus (Table 24) and Tristomella ovalis (Table 40) from Japan, and Tristomella megacotyle (Table 37) from Ceylon reported from hosts designated only as "Histiophorus sp." There is no way of determining the true identities of these Histiophorus spp. If any of them refer to the old name "Histiophorus brevirostris," then the host was Makaira indica (Cuvier) (Paxton & Talbot, personal communication); if any of them refer to a sailfish Histiophorus, then the host was Istiophorus platypterus (Shaw and Nodder) (Morrow and Harbo, 1969). Thus Istiophorus platypterus could possibly be a host to five capsaloids. Further studies need to be made in order to ascertain precisely what capsaloids parasitize sailfish, as the parasites may prove useful as tags in separating possible different populations of sailfish. The occurrence of Tristomella ovalis in Japan and Tristomella pricei in Panama Bay may indicate that there are separate populations of sailfish on each side of the Pacific.

Makaira indica is host to three species of Tristomella (Table 234): T. laevis (Table 33) from Madras, India and off South Africa, T. poeyi (Table 41) from Hawaii, and T. pricei (Table 42) from the Pacific off Panama and from off South Africa. These capsaloids might prove useful as tags as they appear to change as one goes from Africa to the eastern Pacific.

Chelidonichthys (*Chelidonichthys*) *lucerna* has been indicated as a host for seven species of *Trochopus* (Table 234). Only two species, *T. pini* (Table 123) and *T. heteracanthus* (Table 118), have been reported during the last forty years (Euzet, 1957b; Reichenbach-Klinke, 1957). It is possible that some of the remaining ones may not be valid species. Because they might prove useful as tags, studies need to be made to determine if seven species of *Trochopus* actually parasitize this host.

RELATIVE RATES OF EVOLUTION

The "...parallel evolution of hosts and parasites has been recognized for more than 50 years" (Stunkard, 1970:1046). Huff (1958:33) said "Rates of evolution in the parasite will be conditioned by alteration of host anatomy and physiology and will thus be functions of the rates of evolution of the hosts." Various authors (e.g., Dogiel, 1947; Manter, 1955a, 1967; Hargis, 1957) have noted that since parasites have a remarkably uniform environment they, as a rule, evolve more slowly than their hosts. This slower rate of evolution of the parasites was termed Rubcov's rule by Gussev in a symposium on "Parasitic Worms and Aquatic Conditions" held in Prague in 1964 (page 241). Later works (Bychowsky and Gussev, 1964; Gussev, 1967a) noted that, while parallel evolution of parasites and hosts exists, the evolution rates of parasites may lag behind, coincide with, or pass ahead of the evolution rates of their hosts. Bychowsky and Gussev (1964:9) said "The latter takes place at the fixation of a topological differentiation of the parasite populations or at the long-term segregation of different areas of the water body." Examples of the above three rates may be found in the present study. The slower evolving capsaloids are those that exhibit phylogenetic specificity and parasitize more than one host. The extent of the ecological specificity that might be present in each of the parasite-host combinations below is unknown. Those capsaloid species whose evolution rates appear to lag behind that of their hosts may be listed as follows (see Table 234):

1. *Caballerocotyla manteri affinis* on two species of Scombridae (Table 16).
2. *Caballerocotyla paucispinosa* on two species of Scombridae (Table 18).
3. *Tristoma coccineum* on Xiphiidae and Histiophoridae (Table 28).
4. *Tristoma integrum* on Xiphiidae and Histiophoridae (Table 30).
5. *Tristomella laevis* on Xiphiidae and Histiophoridae (Table 33).
6. *Tristomella nozawae* on two species of *Thunnus* (Table 38).
7. *Tristomella onchidiocotyle* on three species of Scombridae (Table 39).
8. *Tristomella ovalis* on Histiophoridae and Scombridae (Table 40).
9. *Tristomella poeyi* on two species of *Makaira* (Table 41).
10. *Tristomella pricei* on three species of Histiophoridae (Table 42).
11. *Benedenia sciaeniae* on three species of Sciaenidae (Table 43).
12. *Benedenia jaliscana* on two species of *Epinephelus* (Table 47).
13. *Benedenia monticellii* on two species of *Liza* (Table 51).
14. *Benedenia seriolae* on two species of *Seriola* (Table 56).
15. *Entobdella hippoglossi* on Bothidae and Pleuronectidae (Table 68).

16. *Entobdella apiocolpos* on Platyrhinidae and Trygonidae (Table 69).
17. *Entobdella corona* on three species of *Dasyatis* (Table 71).
18. *Entobdella diadema* on Trygonidae and Myliobatidae (Table 73).
19. *Entobdella soleae* on Soleidae (Table 74).
20. *Entobdella squamula* on Bothidae and Pleuronectidae (Table 75).
21. *Metabenedeniella hoplognathi* on Hoplegnathidae and Serranidae (Table 80).
22. *Neobenedenia melleni* on eight species of members of the families Serranidae, Lutianidae, and Chaetodontidae (Table 81).
23. *Neobenedenia adenea* on Serranidae and Scaridae (Table 82).
24. *Neobenedenia girellae* on Girellidae, Serranidae, and Scaridae (Table 83).
25. *Encotyllabe nordmanni* on Bramidae and Pomacentridae (Table 92).
26. *Encotyllabe embiotocae* on two species of Embiotocidae (Table 95).
27. *Encotyllabe pagrosomi* on Sparidae, Latilidae, and Pomadasyidae (Table 102).
28. *Encotyllabe spari* on Sparidae, Pomadasyidae, and Serranidae (Table 105).

29. *Encotyllabe vallei* on two species of Sparidae (Table 106).

30. *Nitzschia sturionis* on six species of Acipenseridae (Table 107).

31. *Nitzschia quadritestes* on two species of *Acipenser* (Table 109).

32. *Nitzschia superba* on two species of *Acipenser* (Table 110).

33. *Trochopus diplacanthus* on two species of *Chelidonichthys* (Table 115).

34. *Trochopus micracanthus* on two species of *Chelidonichthys* (Table 121).

35. *Trochopus pini* on two species of *Chelidonichthys* (Table 123).

36. *Megalocotyle marginata* on five species of *Sebastes* (Table 130).

37. *Megalocotyle hexacantha* on two species of Serranidae (Table 134).

38. *Megalocotyle trituba* on five species of *Sebastes* (Table 136).

39. *Megalocotyloides pseudomarginatus* on two species of *Epinephelus* (Table 139).

40. *Pseudobenedenia nototheniae* on three species of *Notothenia* (Table 140).

41. *Dioncus agassizi* on three species of Echeneidae (Table 147).

42. *Loimos scoliodoni* on two species of Carcharhinidae (Table 151).

43. Loimos secundus on two species of Carcharhinidae (Table 152).

44. Loimopapillosum dasyatis on two species of Dasyatis (Table 154).

45. Loimosina wilsoni on three species of Sphyrna (Table 155).

46. Leptocotyle minor on two species of Scyliorhinus (Table 159).

47. Dermophthirius carcharini on four species of Carcharhinidae (Table 168).

48. Monocotyle diademalis on three species of Dasyatis (Table 171).

49. Monocotyle pricei on two species of Dasyatis (Table 175).

50. Dasybatotrema dasybatis on two species of Dasyatis (Table 180).

51. Papillicotyle floridana on two species of Myliobatidae (Table 193).

52. Calicotyle kröyeri on 15 species of Raja (Table 197).

53. Calicotyle palombi on two species of Mustelus (Table 202).

54. Calicotyle stossichi on two species of Mustelus (Table 204).

55. Dictyocotyle coeliaca on six species of Raja (Table 205).

56. Dendromonocotyle octodiscus on two species of Dasyatis (Table 207).

57. Cathariotrema selachii on Carcharhinidae, Sphyrnidae, and Laminidae (Table 216).

58. Empruthotrema raiae on four species of Raja (Table 217).

59. Thaumatocotyle dasybatis on Dasyatis and Raja (Table 219).

The presence of the above capsaloids on their respective hosts probably reflects the close relationships of their hosts, and could indicate that there has been a fairly recent evolutionary delimitation of some of the host species. Those capsaloids that lag behind their hosts are more widely distributed than their individual hosts. At the generic level, for example, the evolution rate of the genus Dioncus is lagging behind the evolution rate of its hosts--the parasite having evolved into different species but the hosts are now at the family level (Table 235). Several other such examples can be derived from Table 235.

The capsaloids whose rates of evolution approximate those of their hosts are those species-specific ones (Table 238) which have no close relatives on the same host. If they had a close relative on the same host it could be an indication of faster evolution of parasites than the host.

The capsaloid taxa which appear to be evolving faster than their hosts are less obvious, mainly because one does not know if the various host and parasite taxa (genera and above) had monophyletic or polyphyletic origins. Also unknown is whether the capsaloid fauna of each host listed in Table 234 evolved on that host or whether more than one infection has taken place during the evolutionary history of the host (i.e., there being acquisitions due primarily to ecological relations rather than phylogenetic relations). Some of the more obvious cases are (Table 242):

1. Loimos with two species of Carcharhinus obscurus. Apparently two species have evolved due to the isolation of host populations by the Panama land bridge.
2. Two species of Monocotyle on Dasyatis kuhlii.
3. Two species of Benedenia on Dasyatis marmorata.
4. Two species of Papillicotyle on Aetobatus narinari.
5. Two species of Nitzschia on Acipenser sturio.
6. Two species of Ancyrocotyle on Naucrates ductor.
7. Two species of Caballerocotyla on Thunnus albacares.
8. Caballerocotyla albsmithi and C. magronum on Thunnus thynnus orientalis.
9. Capsaloides cornutus and C. magnaspinosus on Tetrapturus albidus.
10. The four species of Trochopus that are species-specific for Chelidonichthys lucerna.
11. Two species of Entobdella on Hippoglossus hippoglossus.
12. Two species of Tricotyla on Mola mola.

The occurrence of several closely related capsaloids on one host is not necessarily an indication of faster evolution of the parasites. Some of the capsaloids may also occur on other hosts, which could be an indication of either a common ancestral host, in which case the evolutionary rate of the parasites would be slower; in addition, it could be an example of ecological specificity. Thus, on a particular host there could be capsaloids of older age which were derived from a common ancestral parasite on a common ancestral host; if a capsaloid were on more than one closely related host, then its evolution would be slower than its hosts. On the same host there could be more recent species-specific acquisitions which probably evolved on that particular host; if there were more than one species-specific closely related capsaloid on the host, then the evolution of the parasites would be faster than their host. In addition, on the same host there could be capsaloids present which also parasitize an unrelated host and are due to the close ecological relationships of the hosts. These possibilities would explain the occurrence of species-specific parasites and parasites of lower specificity on the same host.

Hargis (1957:616) pointed out that "...hosts which have most recently diverged and therefore are most closely related will bear the same fluke species--infraspecificity--while those which diverged earlier and differentiated more will bear different but related, to greater or lesser degree, parasite species--supraspecificity."

The evolutionary ideas concerning Monogenea are discussed by Llewellyn (1965), who presented an evolutionary scheme based on the ontogenetic development of the haptors (see Figure 3).

Marshall (1957) presented a review of the evolutionary aspects of fish. The major points of interest to this study of capsaloids are as follows:

1. "Present knowledge merely points to the ancestral jawed-fishes having given rise to three very distinct evolutionary complexes; placoderms, cartilaginous fishes and bony-

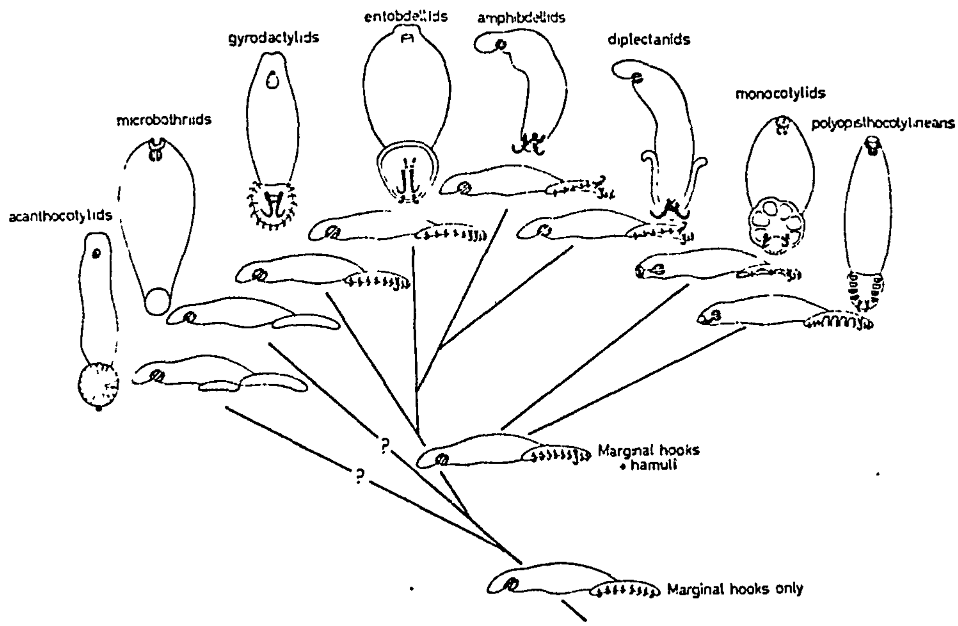


Figure 3. Phylogenetic relationships of some monogeneans, based on ontogenetic development of haptors (After Llewellyn, 1965).

fishes. This radiation must have occurred before the Devonian; in Silurian or even in Ordovician times" (Marshall, 1957:173).

2. There are two well-marked evolutionary trends within the cartilaginous fishes, sharks and rays, and the Holocephali.
3. The Chondrichthyes first appeared in the upper Devonian; they apparently lived in salty water.
4. The Euselachii (sharks and rays) are found first in the Jurassic.
5. Holocephali first appeared in the Triassic.
6. Acipenseroid fishes are known from the lower Jurassic onwards.
7. The Percomorphi gave rise to Scleroparei, Heterosomata, Plectognathi.

At present there is no fossil record of Monogenea. However, if we utilize the above information, and disregard doubtful host records, several comments can be made about the possible evolutionary trends of Capsaloidea (see Tables 234, 235 and 236, and Figure 4).

1. A comparison of the parasite genera and their host families (Table 235) can give an indication of the evolution of the capsaloid genera. Some of the more obvious examples are Caballerocotyla evolving on Scombridae, Capsaloides evolving on Histiophoridae, etc.

2. The Capsalinae, found on Perciformes and Tetraodontiformes, could have evolved on ancestral Percomorpha. However, they could have transferred from one order to the other via the pelagic environment of their hosts.
3. Benedeniinae are found on rays, Anguilliformes, Perciformes, Scorpaeniformes, and Pleuronectiformes. This could indicate that they either evolved on ancestral jawed-fishes, or transferences have occurred resulting in ecological specificity. If they evolved on ancestral jawed-fishes they were probably present before the Devonian.
4. Encotyllabinae occur primarily on Perciformes, with one species reported from Scorpaeniformes, which could indicate their evolution on ancestral Percomorpha, or ecological specificity.
5. Nitzschiinae occur on Acipenseriformes and could have been present in the lower Jurassic.
6. Trochopodinae are found on sharks, Perciformes, Scorpaeniformes, Dactylopteriformes, and Pleuronectiformes. They probably evolved on ancestral Percomorpha; their occurrence on sharks could be ecological specificity.
7. Loimoidae occur on sharks and rays and probably evolved on ancestral Euselachii. After the sharks and rays diverged <u>Loimos</u> and <u>Loimosina</u> evolved on sharks, and <u>Loimopapillosum</u> evolved on rays.

8. Microbothriinae are found on sharks and rays and probably evolved on ancestral Euselachii. The occurrence of one species on Rhinobatidae might, however, be due to ecological specificity.

9. Calicotylinae occur on sharks, rays, and Holocephali; they probably evolved on ancestral Chondrichthyes before divergences into the previous took place. They were probably present by at least the Triassic, maybe as early as the upper Devonian.

10. Merizocotylinae occur on sharks and rays; they probably evolved on ancestral Euselachii. Merizocotyle, Empruthotrema, and Thaumatocotyle, found only on rays, and Cathariotrema, found only on sharks, probably evolved after the divergence of sharks and rays. This would probably be at about the upper Jurassic.

11. Monocotylinae and Dendromonocotylinae both occur on rays; they probably evolved after sharks and rays diverged. Similar comments could be made about the remaining subfamilies (see Table 236).

The above information can be presented as a tentative evolutionary scheme for the Capsaloidea (Figure 4). Use of the "Fahrenholz Rule," "Common ancestors of present-day parasites were themselves parasites of the common ancestors of present-day hosts" (Noble & Noble, 1964: 651), facilitates the construction of this scheme. This scheme does not preclude any transfer to unrelated hosts (ecological specificity) and thus the formation of a different evolutionary line, or a polyphyletic origin of the Capsaloidea. It appears that Benedeniinae is the oldest capsaloid group; its occurrence on 24 families of hosts (Tables 236 and 237), and its cosmopolitan distribution (Table 252 and Figures 7 and 18) are further indications of this.

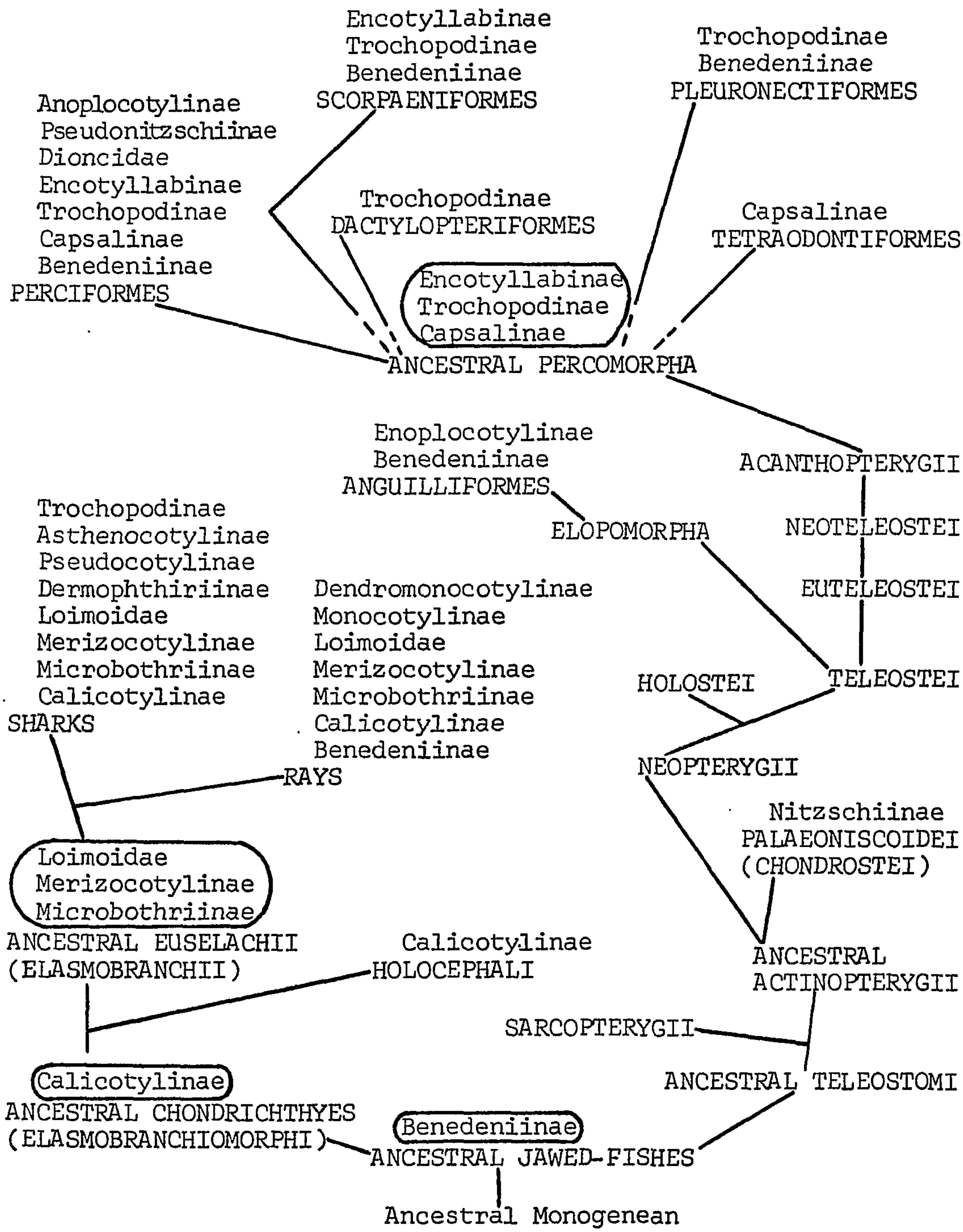


Figure 4. Relationships of Capsaloidea, based on the hosts they parasitize.

Parasite subfamilies encircled indicate where they possibly had their initial hosts. Host relationships based on Marshall (1957), with modifications after Greenwood et al (1966), Nelson (1969), and Rosen and Patterson (1969). Doubtful host records disregarded.

HOST TAXONOMY

Various workers (e.g., Metcalf, 1929; Hargis, 1953, 1957, 1958; Bychowsky, 1957; Mayr, 1957; Koratha, 1960; Szidat, 1961; Huff, 1958; Mueller, 1965; Manter, 1966) have recognized the fact that phylogenetic specificity, or parallel phylogeny of hosts and parasites, might prove useful concerning questions of host taxonomy and phylogeny. Huff (1958:36) said "Since groups of parasites often evolve within groups of hosts, the relations between the parasites of two or more hosts may indicate relations between these hosts." The use of this knowledge of host-specificity in solutions of problems of host phylogeny and paleodistribution was first published by von Ihering (1891), and has been termed the "Von Ihering method" (Metcalf, 1929). Some workers (e.g., Baer, 1951; Hargis, 1957; Noble, 1957) have indicated the "Von Ihering" method should be applied with caution because "...ecological factors may be as or more important than phylogenetic ones in determining the parasite fauna of a given taxon of animals" (Arai, 1967:2162). Arai (1967) also noted that Dogiel (1962) indicated a number of factors which could determine or influence the parasitocenose of any host or group of hosts, such as: host age, season, host food, host habits, and host geographical distribution. Llewellyn (1957a:210) also warned that circular reasoning concerning host and parasite phylogenies can be dangerous: "The above phylogenetic scheme has of course been based upon very scanty evidence, one of its firmest foundations being an assumption of the phylogeny of the hosts. It is therefore especially dangerous to speculate upon the contribution that may be made by a study of the phylogeny of the parasites to the study of the phylogeny of the hosts."

Ass (1939:50) quoted Fuhrmann's (1908) rule as follows: "Each order of birds, with a very few exceptions, is characterized by his own specific helminthic fauna, whose representatives can not live in birds of other orders." Ass (1939:53) said that phylogenetically related hosts are parasitized by phylogenetically related parasites only if:

"1) the parasites have acquired towards their host a specificity of 2-nd kind [= organ-specificity for a particular host].

2) the evolution of the parasite has followed the evolution of its host in all ecological and geographic transmigrations."

The "Von Ihering" method has, for example, been used on opalinids of frogs (Metcalf, 1929, 1940); flagellates of termites (Kirby, 1937); cestodes of birds (Baer, 1948); lice of mammals (Ewing, 1926; Vanzolini and Guimaraes, 1955; Hopkins, 1957); lice of birds (Clay, 1957); and Digenea of marine fishes (Manter, 1955a, 1957).

For Monogenea, one example is especially noteworthy. Hargis (1955c) and Koratha (1955a) independently speculated on the close relationship of the families Rachycentridae and Echeneidae (at that time considered to be in different orders) based on their harboring members of the same genus of Capsaloidea (<u>Dioncus</u>).

Greenwood *et al* (1966), in the most important recent revision of the teleosts, indicated that these two host families were closely related and both belonged in the suborder Percoidei. Thus, the original speculations of Hargis (1955c) and Koratha (1955a) concerning host phylogeny, based on parasite phylogeny, are presently indicative of the value of using parasites in problems of host taxonomy.

In order to make more sound speculations on host phylogeny using parasitological data, it would be best to analyze critically the entire parasitic fauna of the hosts in question. Such an undertaking was not possible in the present study; however, some speculations can be made using the capsaloid parasites of fishes.

Bailey (1970) listed the bluefin tuna, *Thunnus thynnus* (Linnaeus), as being a single species in both the Atlantic and the Pacific. Gibbs and Collette (1967) recognized two subspecies, *Thunnus thynnus thynnus* in the Atlantic and *Thunnus thynnus orientalis* in the Pacific. Table 234 shows that the Pacific bluefin tuna is host to four species of *Caballerocotyla*, and the Atlantic bluefin tuna is host to three species of *Tristomella*. Both capsaloid genera are circumtropical (Table 251), and thus probably evolved before the land bridge at Panama became finalized. The occurrence of the different genera on the bluefin tunas of the two oceans is a strong indication of the long isolation of the two populations. Noble and Noble (1964:643) said "When a species of host is divided into two or more population groups separated geographically in different environments, their respective parasite faunas normally exhibit differences." Although the capsaloid parasites do not prove subspecific evolution of bluefins, they represent a strong point in favor of the subspecific distinction of the hosts as noted by Gibbs and Collette (1967). Since both capsaloid genera are circumtropical, it is not known why both are not parasitic on both the Atlantic and Pacific bluefins, or why just one genus is not parasitic on bluefins of both oceans. This could be an indication that the bluefins of both oceans were not parasitized by either capsaloid until after their isolation. It also could be that, after isolation, different factors were involved in the two oceans which selected for Caballerocotyla in the Pacific and Tristomella in the Atlantic. Perhaps future studies will reveal the factors involved.

The close relationships of several families of hosts can be ascertained from their parasites (Table 235), e.g., Rajidae, Trygonidae and Myliobatidae are related because they harbor a common genus, Thaumatocotyle.

In considering the classification schemes of fishes, we find that Greenwood et al (1966) (Table 243) have made the following changes, which pertain to the teleost hosts of Capsaloidea, from Berg (1947):

1. The placement of Anguilliformes in a separate division from the rest of the teleostean hosts.
2. The change of Salmonidae from Clupeiformes to Salmoniformes.

3. The removal of Scorpaenidae and Triglidae from Perciformes and their placement in Scorpaeniformes.
4. The deletion of Echeneiformes and the placement of Echeneidae in Perciformes.
5. The transfer of Mugilidae from Mugiliformes to Perciformes.
6. The formation of Scophthalmidae from part of Bothidae.

Applying the parasite evidence against these changes we find the following:

1. The monotypic genera _Enoplocotyle_ (also a monotypic subfamily) and _Neobenedeniella_ occur on the families Muraenidae and Congridae, respectively (Table 234). The occurrence of the monotypic subfamily Enoplocotylinae on Muraenidae _might_ indicate that the Muraenidae were not closely related to the rest of the teleosts. Nothing concerning host relationships can be gleaned from _Neobenedeniella_ because the Benedeniinae parasitize many families of fish (Table 236) and exhibit ecological specificity (see below).
2. The occurrence of a capsaloid on a salmonid is probably accidental (Table 99, footnote 1).
3. The occurrence of the genus _Megalocotyle_ on Scorpaenidae and Serranidae (Table 235) *might indicate a closer* relationship between the hosts than Greenwood _et al_ (1966) noted. The occurrence of the genus _Trochopus_ on Perciformes (Serranidae, Sparidae, Haplodactylidae)

and on Scorpaeniformes (Scorpaenidae and Triglidae) (Table 235), and the occurrence of *Benedenia* on Scorpaenidae (Table 235) while most of its hosts are Perciformes, might also indicate a closer relationship between the host orders than Greenwood *et al* (1966) indicated. However, the capsaloids of these two orders could have been derived from ecological relationships. The Scorpaenidae and Triglidae are closely related, both harboring mostly Trochopodinae (Table 234).

4. This change is tenable, on parasitological grounds, as the occurrence of *Dioncus* on both Rachycentridae and Echeneidae indicates these host families are related. See discussion above.
5. This change is tenable, as most of the species of *Benedenia* are parasites of Perciformes (Table 235).
6. The capsaloids of *Scophthalmus maximus* (Table 234) were reported so long ago (Tables 68, 135, 197) that any speculation concerning host phylogeny, especially above the family level, would be futile.

A great deal more work needs to be done on the capsaloids of teleosts before well-founded speculations on host phylogeny can be made based on the capsaloid parasites.

Table 243. Classification of the teleostean hosts of Capsaloidea.

Extracted from Greenwood et al (1966) and modified after Nelson (1969), and Rosen & Patterson (1969). Natural hosts only. Doubtful host records for the superfamily Capsaloidea are indicated by a plus (+).

ELOPOMORPHA

Superorder Elopomorpha
    Order Anguilliformes
        Suborder Anguilloidei
            Muraenidae
            Congridae

EUTELEOSTEI

Superorder Protacanthopterygii
    Order Salmoniformes
        Suborder Salmonoidei
            Salmonidae +

Superorder Ostariophysi
    Order Cypriniformes
        Suborder Cyprinoidei
            Cyprinidae +

Superorder Neoteleostei
  Series Salmopercomorpha
    Order Gadiformes
        Suborder Gadoidei
            Gadidae +

  Series Acanthopterygii
    Order Scorpaeniformes
        Suborder Scorpaenoidei
            Scorpaenidae
            Triglidae
        Suborder Cottoidei
            Cottidae +
    Order Dactylopteriformes
            Dactylopteridae
    Order Perciformes
        Suborder Percoidei
            Serranidae
            Branchiostegidae (Latilidae included)
            Rachycentridae
            Echeneidae
            Carangidae

Table 243 continued

Coryphaenidae
Bramidae
Lutjanidae
Nemipteridae
Pomadasyidae
Lethrinidae
Sparidae
Sciaenidae
Kyphosidae (Girellidae included)
Ephippidae
Chaetodontidae
Oplegnathidae
Embiotocidae
Pomacentridae
Aplodactylidae (Haplodactylidae)
Cheilodactylidae
Latridae
Suborder Mugiloidei
Mugilidae
Suborder Labroidei
Labridae
Scaridae
Suborder Notothenioidei
Nototheniidae
Suborder Blennioidei
Pholididae (Pholidae included)
Suborder Gobioidei
Gobiidae
Suborder Acanthuroidei
Acanthuridae
Suborder Scombroidei
Scombridae
Xiphiidae
Istiophoridae
Order Pleuronectiformes
Suborder Pleuronectoidei
Scophthalmidae
Bothidae
Pleuronectidae
Suborder Soleoidei
Soleidae
Order Tetraodontiformes
Suborder Tetraodontoidei
Molidae

CHAPTER 6

ORGAN-SPECIFICITY
(Also see PHYSIOLOGICAL SPECIFICITY)

The niches on or in the hosts occupied by members of the superfamily Capsaloidea are quite varied (Table 234). Unfortunately, very few workers have indicated how carefully they examined the various alternate sites or the numbers of capsaloids found in each location; there is very little negative data about sites examined in hosts of capsaloids in the literature. Such shortcomings limit the utility of the data. The computations for organ-specificity for the whole superfamily are based on the data obtained when only the most frequently parasitized location was considered for each species (Tables 238-242). Because the number of hosts, number of locations on the hosts, and number of reports for each species of Capsaloidea vary, comparison of the data for the superfamily as a whole would be difficult if otherwise treated.

For all Capsaloidea, the gills are occupied almost three times (65.6 per cent) as much as the skin (21.1 per cent), with lesser percentages for the buccal cavity (4.3), nasal cavity (3.8), cloaca (2.4), and other locations (all less than 1.0 per cent each) (Table 244). For all locations the capsaloids are predominantly species-specific (Table 245), and for all levels of specificity they are predominantly gill parasites (Table 244).

For capsaloids on Chondrichthyes, 53.0 per cent occur on the gills, 26.5 per cent on the skin, 7.2 per cent in the nasal cavity, 6.0 per cent in the cloaca, and lesser percentages for the other locations(Table 246). At all levels of specificity except one (order-specific) the capsaloids on the Chondrichthyes are mostly gill parasites (Table 246), and for all locations they are predominantly species-specific (Table 247).

For capsaloids on Osteichthyes, 74.0 per cent occur on the gills, 17.3 per cent on the skin, 5.5 per cent in the buccal cavity, and lesser percentages for the other locations (Table 248). At all levels of specificity they are predominantly gill parasites (Table 248), and for all locations they are predominantly species-specific (Table 249).

The much higher percentage (74.0) occurring on gills of Osteichthyes than on gills of Chondrichthyes (53.0) is not presently explainable.

At the species level there are many capsaloids which exhibit organ-specificity (see Tables 238-242). Besides the more frequent specificity for gills or skin, noteworthy examples are specific for the nasal cavity (Caballerocotyla klawei, Capsaloides magnaspinosus, Monocotylidae n. sp. of Koratha & Martin, 1963, Merizocotyle pugetensis, Thaumatocotyle concinna, Cathariotrema selachii), oviducts (Gymnocalicotyle inermis), cloaca (Calicotyle mitsukurii, Calicotyle ramsayi), coelom (Dictyocotyle coeliaca), spiral intestine (Calicotyle macrocotyle), and rectal gland (Calicotyle stossichi). It should be noted that the majority of these parasitize Chondrichthyes (Tables 238-242). For organ-specificity at the generic and subfamily levels, see Tables 235 and 236, respectively.

In general, the present study shows a slight decrease in the percentage occurring on the gills and a slight increase in the percentage occurring on the skin as the level of host-specificity decreases, an indication that gill forms are more species-specific than skin forms; however, the percentage occurring on the gills remains higher at each level of specificity (one exception) than the percentage occurring on the skin. As indicated above, there are more niches parasitized in the Chondrichthyes than in the Osteichthyes. Whether this pronounced organ-specificity of capsaloids is due to morphological, physiological, or other factors (or combinations, thereof) remains to be established.

Llewellyn (1957a:208) speculated that "The ancestral monogeneans were facultative skin parasites whose most direct descendants are the modern Capsaloideans." Stunkard (1970:1042), commenting on the Monogenea, said "Originally parasitic on the surface of fishes, they have invaded the oral, nasal, and proctodeal cavities; in the first they have found a rich feeding ground on the gills and from the last they have entered the urogenital ducts." Llewellyn (1957a) also speculated that an early divergence was invasion of the sheltered gills by the skin parasites. As shown above, the majority of the capsaloids at present are species-specific gill parasites.

Mueller (1937:9), in a review of the gyrodactylid Monogenea then known from North America, observed that <u>Gyrodactylus</u> were found on the general body surface of trout, suckers, and cyprinids, and Dactylogyrus occurred on the gills only of cyprinids. Various workers (Jahn & Kuhn, 1932; Nigrelli & Breder, 1934; Nigrelli, 1940; MacCallum, 1927b) have showed that Neobenedenia melleni can infect the skin and eyes of many species in confined quarters (Table 81). Llewellyn (1957a) speculated that the parasitism of the eyes of many species of hosts in confinement by Neobenedenia melleni might be due to the possible non-vascularised cornea of the hosts. For parasites on other organs he thought there might be blood-borne antibodies which could contribute to the mechanism of host-specificity. Malmberg (1964) found organ-specificity in some species of Gyrodactylus, with some living only on skin and/or fins and others living on the gill filaments of the host. He found that Gyrodactylus callariatis Malmberg, 1967 parasitized the skin and fins of Gadus callarias in salt water (salinity not given), but in brackish water (salinity of about 6 o/oo) it was found primarily on the gill arches of the same host. Thus, in this instance, salinity can affect organ-specificity.

Organ-specificity is probably due to the physiological requirements of the parasite (see above), morphological adaptations and the environment (or combinations, thereof). Noble (1960:595) said that "Distribution of parasites within a host is controlled by the same basic forces that govern distribution of the hosts. Temperature, moisture, mechanical barriers, chemistry of surrounding medium, food supply and other ecological factors continuously restrict or encourage the movements, growth or development of parasites."

Table 244. Totals of Capsaloidea for each level of specificity per most frequently parasitized location.

Only natural hosts are considered. Unknown locations are not treated; only the most frequently parasitized locations for the capsaloids were used in the computations. Based on host-specificity data after doubtful hosts were disregarded.

LOCATION	No. of species-specific	Per cent species-specific	No. of species genus-specific	Per cent genus-specific	No. of species family-specific	Per cent family-specific	No. of species order-specific	Per cent order-specific	No. species specific to more than one order	Per cent specific to more than one order	Total species/location	Per cent species per location
Gills	100	69.0	15	57.7	11	68.8	6	46.2	5	55.6	137	65.6
Skin	28	19.3	7	26.9	4	25.0	3	23.1	2	22.2	44	21.1
Buccal cavity	6	4.1	----	----	1	6.3	2	15.4	----	----	9	4.3
Nasal cavity	5	3.4	1	3.8	----	----	2	15.4	----	----	8	3.8
Cloaca	2	1.4	1	3.8	----	----	----	----	2	22.2	5	2.4
Copepod on gills	1	0.7	----	----	----	----	----	----	----	----	1	0.5
Opercules	1	0.7	----	----	----	----	----	----	----	----	1	0.5
Spiral intestine	1	0.7	----	----	----	----	----	----	----	----	1	0.5
Oviducts	1	0.7	----	----	----	----	----	----	----	----	1	0.5
Coelom	----	----	1	3.8	----	----	----	----	----	----	1	0.5
Rectal gland	----	----	1	3.8	----	----	----	----	----	----	1	0.5
TOTALS	145	----	26	----	16	----	13	----	9	----	209	----

Table 245. Totals of Capsaloidea for most frequently parasitized location per level of specificity.

Only natural hosts are considered. Unknown locations are not treated; only the most frequently parasitized locations for the capsaloids were used in the computations. Based on host-specificity data after doubtful hosts were disregarded.

	No. on gills	Per cent on gills	No. on skin	Per cent on skin	No. in buccal cavity	Per cent in buc. cav.	No. in nasal cavity	Per cent in nasal cav.	No. in cloaca	Per cent in cloaca	No. on copepod on gills	Per cent on copepod	No. on opercules	Per cent on opercules	No. in spiral intestine	Per cent in sp. int.	No. in oviducts	Per cent in oviducts	No. in coelom	Per cent in coelom	No. in rectal gland	Per cent in rect. gl.	Total no. of species per level of specif.	Per cent of species per level of specificity
Species-specific	100	73.0	28	63.6	6	66.7	5	62.5	2	40.0	1	100.	1	100.	1	100.	1	100.	---	---	---	---	156[1]	70.6
Genus-specific	15	10.9	7	15.9	---	---	1	12.5	1	20.0	---	---	---	---	---	---	---	---	1	100.	1	100.	26	11.8
Family-specific	11	8.0	4	9.1	1	11.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	16	7.2
Order-specific	6	4.4	3	6.8	2	22.2	2	25.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14[1]	6.3
Specific to more than one order	5	3.6	2	4.5	---	---	---	---	2	40.0	---	---	---	---	---	---	---	---	---	---	---	---	9	4.1
TOTALS	137	---	44	---	9	---	8	---	5	---	1	---	1	---	1	---	1	---	1	---	1	---	221[1]	----

[1]When capsaloids from unknown locations are included.

Table 246. Totals of Capsaloidea on Chondrichthyes for each level of specificity per most frequently parasitized location.

Only natural hosts are considered. Unknown locations are not treated; only the most frequently parasitized locations for the capsaloids were used in the computations. Based on host-specificity data after doubtful hosts were disregarded.

LOCATION	No. of species species-specific	Per cent species-specific	No. of species genus-specific	Per cent genus-specific	No. of species family-specific	Per cent family-specific	No. of species order-specific	Per cent order-specific	No. of species specific to more than one order	Per cent specific to more than one order	Total species per location	Per cent species per location
Gills	33	57.9	5	41.7	3	75.0	----	----	3	50.0	44	53.0
Skin	15	26.3	3	25.0	1	25.0	2	50.0	1	16.7	22	26.5
Buccal cavity	2	3.5	----	----	----	----	----	----	----	----	2	2.4
Nasal cavity	3	5.3	1	8.3	----	----	2	50.0	----	----	6	7.2
Cloaca	2	3.5	1	8.3	----	----	----	----	2	33.3	5	6.0
Spiral intestine	1	1.8	----	----	----	----	----	----	----	----	1	1.2
Oviducts	1	1.8	----	----	----	----	----	----	----	----	1	1.2
Coelom	----	----	1	8.3	----	----	----	----	----	----	1	1.2
Rectal gland	----	----	1	8.3	----	----	----	----	----	----	1	1.2
TOTALS	57	----	12	----	4	----	4	----	6	----	83	----

Table 247. Totals of Capsaloidea on Chondrichthyes for most frequently parasitized location per level of specificity.

Only natural hosts are considered. Unknown locations are not treated; only the most frequently parasitized locations for the capsaloids were used in the computations. Based on host-specificity data after doubtful hosts were disregarded.

	No. on gills	Per cent on gills	No. on skin	Per cent on skin	No. in buccal cavity	Per cent in buc. cav.	No. in nasal cavity	Per cent in nasal cav.	No. in cloaca	Per cent in cloaca	No. in spiral intest.	Per cent in sp. int.	No. in oviducts	Per cent in oviducts	No. in coelom	Per cent in coelom	No. in rectal gland	Per cent in rect. gl.	Total no. of species per level of specif.	Per cent of species per level of specif.
Species-specific	33	75.0	15	68.2	2	100.	3	50.0	2	40.0	1	100.	1	100.	---	---	---	---	61[1]	70.1
Genus-specific	5	11.4	3	13.6	---	---	1	16.7	1	20.0	---	---	---	---	1	100.	1	100.	12	13.8
Family-specific	3	6.8	1	4.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4	4.6
Order-specific	---	---	2	9.1	---	---	2	33.3	---	---	---	---	---	---	---	---	---	---	4	4.6
Specific to more than one order	3	6.8	1	4.5	---	---	---	---	2	40.0	---	---	---	---	---	---	---	---	6	6.9
TOTALS	44	---	22	---	2	---	6	---	5	---	1	---	1	---	1	---	1	---	87[1]	---

[1] When capsaloids from unknown locations are included.

Table 248. Totals of Capsaloidea on Osteichthyes for each level of specificity per most frequently parasitized location.

Only natural hosts are considered. Unknown locations are not treated; only the most frequently parasitized locations for the capsaloids were used in the computations. Based on host-specificity data after doubtful hosts were disregarded.

LOCATION	No. of species species-specific	Per cent species-specific	No. of species genus-specific	Per cent genus-specific	No. of species family-specific	Per cent family-specific	No. of species order-specific	Per cent order-specific	No. of species specific to more than one order	Per cent specific to more than one order	Total species per location	Per cent species per location
Gills	66	75.9	10	71.4	8	66.7	6	66.7	4	80.0	94	74.0
Skin	13	14.9	4	28.6	3	25.0	1	11.1	1	20.0	22	17.3
Buccal cavity	4	4.6	----	----	1	8.3	2	22.2	----	----	7	5.5
Nasal cavity	2	2.3	----	----	----	----	----	----	----	----	2	1.6
Copepod on gills	1	1.1	----	----	----	----	----	----	----	----	1	0.8
Opercules	1	1.1	----	----	----	----	----	----	----	----	1	0.8
TOTALS	87	----	14	----	12	----	9	----	5	----	127	----

Table 249. Totals of Capsaloidea on Osteichthyes for most frequently parasitized location per level of specificity.

Only natural hosts are considered. Unknown locations are not treated; only the most frequently parasitized locations for the capsaloids were used in the computations. Based on host-specificity data after doubtful hosts were disregarded.

	No. on gills	Per cent on gills	No. on skin	Per cent on skin	No. in buccal cav.	Per cent in buc. c.	No. in nasal cav.	Per cent in n. cav.	No. on copepod on gills	Per cent on copepod on gills	No. on opercules	Per cent on operc.	Total no. of species per level of specificity	Per cent of species per level of specificity
Species-specific	66	70.2	13	59.1	4	57.1	2	100.	1	100.	1	100.	91[1]	68.9
Genus-specific	10	10.6	4	18.2	----	----	----	----	----	----	----	----	14	10.6
Family-specific	8	8.5	3	13.6	1	14.3	----	----	----	----	----	----	12	9.1
Order-specific	6	6.4	1	4.5	2	28.6	----	----	----	----	----	----	10[1]	7.6
Specific to more than one order	4	4.3	1	4.5	----	----	----	----	----	----	----	----	5	3.8
TOTALS	94	----	22	----	7	----	2	----	1	----	1	----	132[1]	----

[1]When capsaloids from unknown locations are included.

CHAPTER 7

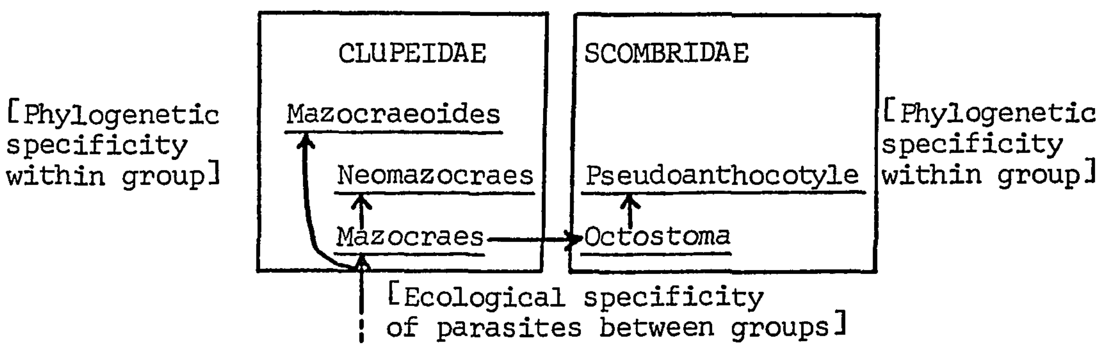
ECOLOGICAL SPECIFICITY

As various workers have pointed out (e.g., Bychowsky, 1957; Rogers, 1962; Arai, 1967; Sprent, 1969; Burt, 1970; Stunkard, 1970), ecological specificity of parasites can be the result of similar habits or habitats of their hosts. Burt (1970:131) said that "The opportunities for transference from one host to another are greater where the same biotope is shared by different animals ...such transfers do occur and then one finds an ecological specificity and not a phylogenetic one." Kearn (1967b:603) said "There is little doubt that ecological speciation has taken place occasionally in the Monogenea."

Work by Llewellyn and Kearn (Kearn, 1967b) indicated that a transfer of *Entobdella* from flat elasmobranchs to flat teleosts living in the same habitat has taken place. Kearn (1967b) noted that this transfer could have taken place because of common chemical attractants (=physiological specificity) produced by these fishes. However, because Kearn (1967b) indicated that the eggs of *Entobdella soleae* are attached to sand grains and they hatch without any stimulus from the host, the patterns in the genus *Entobdella* could also be explained by ecological specificity, because the flat elasmobranchs and flat teleosts are demersal fishes, "...living in the same habitat..." (Kearn, 1967b:603), and are both potentially available for parasitism by *Entobdella*.

Bychowsky (1957) showed that the closely related mazocraeid parasites of Clupeidae and Scombridae, which are not closely related, were due not to a phylogenetic relationship but to an ecological one, which substantiates the earlier suspicion of Hargis (1955d: 370), who said, "It is not known whether this pattern of ectoparasite infestation reflects an obscure taxonomic or only an ecological relationship of the host families." Bychowsky (1957) pointed out that the hosts had a common pelagic environment, that the scombrids fed on young clupeids, and that he had observed mixed migratory schools of young clupeids and scombrids. He concluded that the relatively frequent and close contact between the herrings and the scombrids enabled transfer of the mazocraeids from the Clupeidae to the Scombridae to occur. This is an example of ecological specificity at the parasite family level.

Further study of Bychowsky's (1957: 307) "Diagram of interrelations between the genera of Mazocraeidae and their hosts," reproduced below, suggests that specificity of parasites on unrelated hosts can lead to phylogenetic specificity of the parasites after they have transferred.



Arai (1967:2162) said "that ecological factors may be as or more important than phylogenetic ones in determining the parasite fauna of a given taxon of animals." But, as Manter (1957:196) pointed out, "The difficulty is to untangle the relationships due to ecological causes and those arising from phylogeny."

Those capsaloids on closely related hosts predominantly exhibit phylogenetic specificity, but also may have an undetermined amount of ecological specificity due to the common habits or habitats of their hosts. Ecological specificity of capsaloids on closely related hosts is not readily apparent from the present type of study. For those capsaloids on unrelated hosts, where there is less evidence for phylogenetic specificity, ecological specificity is more readily apparent. Lack of evidence for phylogenetic specificity implies ecological specificity. For capsaloids on unrelated hosts the determinations of phylogenetic specificity and ecological specificity will depend on the taxonomic schemes of the hosts and parasites employed. With different schemes employed, especially for parasites on unrelated hosts, one can get closer, or more distant, relationships of the hosts or parasites, and ecological specificity would become less, or more, respectively, apparent to the observer. Thus "ecological specificity" is a relative condition, to the observer, which will vary with the taxonomic schemes employed and their soundness. In interpreting the data one must also remember that if one were to go back far enough in the evolutionary history of the hosts one might demonstrate an original phylogenetic specificity.

BY SPECIES

If the taxonomic scheme of Berg (1947) is utilized, then the following species, found on unrelated hosts, presently exhibit ecological specificity: Tristoma coccineum (Table 28), Tristoma integrum (Table 30), Benedenia monticellii (Table 51), Entobdella squamula (Table 75), Microbothrium apiculatum (Table 156), Monocotyle sp. of Layman, 1930 (Table 177), Heterocotyle minima (Table 186), Calicotyle affinis (Table 198), and Calicotyle palombi (Table 202) (see Table 242). However, if we utilize the teleostean classification of Greenwood et al (1966) and the scheme for Chondrichthyes presented by Bailey (1970), then Benedenia monticellii, Microbothrium apiculatum, and Calicotyle palombi all appear to be order-specific, and their apparent exhibition of ecological specificity is diminished. Although there may be phylogenetic specificity of one of these capsaloid species on some of its hosts, when all of its hosts are considered ecological specificity also appears to be present.

Tristoma coccineum has been recorded from Xiphias gladius, Istiophorus platypterus, Tetrapturus belone, Mola mola, Prionace glauca, and Sphyrna zygaena (Table 28). The last two host records may be erroneous (Table 28, footnote 1). However, the possible occurrence on these two species, in addition to the other hosts recorded, is not untenable if one considers Tristoma coccineum to exhibit ecological specificity. All of its host species are oceanic pelagic fishes. As the larva of Tristoma coccineum is probably also pelagic, it could potentially parasitize pelagic fish. The occurrence of Tristoma integrum on the pelagic fish

Xiphias gladius, Tetrapturus belone, and Mola mola (Table 30) might be similarly explained.

Calicotyle affinis, having been reported from Chimaera monstrosa and Raja fullonica (Table 198), could be in the process of making a transference to Raja fullonica. Both hosts are demersal. The specificity exhibited by the other capsaloid species listed above might be explained by their hosts having similar habits or habitats. All the hosts for each capsaloid above have similar, or overlapping distributions (Table 253).

All host-specificity for species of Capsaloidea above the order-specific level is probably attributable primarily to ecological specificity.

BY HIGHER TAXA

Table 235 gives a list of the capsaloid genera and the families of fish they parasitize. If we assume that host-specificity of taxa not explainable by phylogenetic specificity is attributable to ecological specificity, and we employ the taxonomic scheme of Berg (1947) for the hosts, then the following 13 genera appear to exhibit ecological specificity: Capsala, Tricotyla, Tristoma, Tristomella, Benedenia, Entobdella, Pseudoentobdella, Megalocotyle, Dioncus, Microbothrium, Monocotyle, Heterocotyle, Calicotyle. If we utilize the teleostean classification of Greenwood et al (1966) and the scheme for Chondrichthyes presented by Bailey (1970), then the following 14 genera appear to exhibit ecological specificity: Capsala, Tricotyla, Tristomella, Benedenia, Entobdella, Pseudoentobdella, Encotyllabe, Trochopus, Megalocotyle, Pseudobenedenia, Monocotyle, Heterocotyle, and Calicotyle (Table 235). Similarly the following subfamilies (or families) exhibit ecological specificity when Berg (1947) is utilized: Capsalinae, Benedeniinae, Trochopodinae, Dioncidae, Loimoidae, Microbothriinae, Monocotylinae, Calicotylinae, and Merizocotylinae (Table 236); and Capsalinae, Benedeniinae, Encotyllabinae, Trochopodinae, Loimoidae, Microbothriinae, Monocotylinae, Calicotylinae, and Merizocotylinae (Table 236) when the schemes of Greenwood et al (1966) and Bailey (1970) are employed.

BY HOST HABITS

Paling (1965:667) noted that "Relatively little is known of the way in which the populations of monogenean parasites are related to the behaviour and physiology of their hosts or how such populations vary in composition over the year." Bychowsky (1957) found that Mazocraes alosae Hermann, 1782 attached its eggs to gills of herring (Alosa brashnikovi (Borodin), A. saposhnikovi (Grimm), and A. caspia (Eichwald)), that it occurred only on adult fishes starting with three-year-olds, and that it deposited large numbers of eggs during the period of the approach of the herring toward the shores for spawning. Thus, this parasite has its reproductive cycle coinciding with that of its hosts, and the adult hosts become infected when they congregate for spawning. Bychowsky (1957) also found that Protancyrocephalus strelkowi Bychowsky, 1957, found on Limanda aspera (Pallas), parasitized immature hosts in the littoral environment and rarely parasitized mature hosts because the adult flounders were either completely or almost completely absent in littoral regions. Paling (1965:692) noted that the wide variation in the life-history of *Discocotyle sagittata* (Leuckart, 1842) Diesing, 1850 on *Salmo trutta* L. was best explained "...in terms of the geographical isolation of the two fish populations and the consequent evolution of two races of the parasite." Thus, for some Monogenea, parasitism of hosts is influenced by geographical isolation, or isolation of age classes of the hosts (behavioral or chronological factors), in addition to physiological, morphological, and ecological factors, all of which are involved in the exhibition of host-specificity.

It was initially intended to try to analyze host-specificity with respect to schooling versus non-schooling hosts. The schooling habits of fishes might facilitate exchange of capsaloids between hosts and lead to higher incidences and intensities of infection. However, this does not seem to be the case in some of the tunas which school together. Migdalski (1958) noted that both *Euthynnus pelamis* and *Thunnus obesus* may be found mixed with schools of *Thunnus albacares*. None of the capsaloids of any of these hosts have been found on any other of the hosts (Table 234). However, *Euthynnus affinis* and *Auxis thazard*, which sometimes school together (Gosline & Brock, 1965), do have one capsaloid in common, *Caballerocotyla manteri affinis* (Table 234). A comparison of the host-specificity of capsaloids of schooling fishes versus the host-specificity of non-schooling hosts has not yet been done. However, as Breder (1951:24) pointed out "...schooling and non-schooling appear at very diverse times in the ontogeny of different species." For example, non-schooling adults may have a closely schooling larval stage, and some schooling adults may not school as young until a certain developmental stage is reached (Breder, 1951). Information on the extent and time of occurrence of schooling for the hosts of capsaloids was not found in many instances for the present study (Table 253). Apparently data on schooling for many of the hosts of capsaloids are nonexistent. In addition, the parasitological information for each species of capsaloid is very incomplete, or nonexistent, with respect to the size (or age) of host initially infected and predominantly infected. Although it would probably be useful to correlate parasitological data with schooling data in order to examine the significance of schooling with respect to host-specificity, it is futile to try to make a comparison of host-specificity of capsaloids of schooling versus non-schooling hosts at the present time due to the above reasons.

CHAPTER 8

ZOOGEOGRAPHY

Manter (1955a:68) said that "...Monogenea of marine fishes are too little known as yet to furnish adequate pictures of faunal areas except in a few localities." This statement applies to several zones concerning the Capsaloidea (see below). Utility of the data on Capsaloidea are also limited by the fact that 133 of 221 species studied have been reported only once (Appendix C). This general paucity of information concerning Capsaloidea is due primarily to the lack of collections from many hosts in several regions and does not necessarily indicate a sparsity of parasitism by capsaloids of fishes in these areas.

The zoogeographical zones utilized herein (see Figure 5 and below) are based on those divisions indicated by Hedgpeth (1957), who compiled data primarily from Ekman, for the littoral provinces of the world. As the majority of capsaloids have been collected near land masses, I believe that their distributions can be fairly accurately discussed using this system of zonation. Zones arbitrarily designated without consideration of factors such as temperature can be compared with each other, but rarely to environmental factors, which might help explain the presence or absence of species in the respective zones. Following is a list of the zones, their code numbers for Tables 250-252, and Figure 5, and the number of capsaloid species recorded from each zone:

1. Arctic Western North Atlantic (2)
2. Arctic Eastern North Atlantic (1)
3. Boreal-antiboreal Western North Atlantic (5)
4. Boreal-antiboreal Eastern North Atlantic (22)
5. Warm temperate Western North Atlantic (42)
6. Warm temperate Eastern North Atlantic (64)
7. Tropical West Atlantic (16)
8. Tropical East Atlantic (1)
9. Warm temperate Western South Atlantic (1)
10. Boreal-antiboreal Western South Atlantic (0)
11. Boreal-antiboreal Eastern South Atlantic (1)
12. Tropical Indian Ocean (10)
13. Boreal-antiboreal Indian Ocean (1)
14. Warm temperate Western Indian Ocean (2)
15. Warm temperate Eastern Indian Ocean (5)
16. Arctic Western North Pacific (0)
17. Arctic Eastern North Pacific (0)
18. Boreal-antiboreal Western North Pacific (5)
19. Boreal-antiboreal Eastern North Pacific (11)
20. Warm temperate Western North Pacific (18)
21. Warm temperate Eastern North Pacific (7)
22. Tropical West Pacific (21)
23. Tropical East Pacific (12)
24. Tropical Central Pacific (10)
25. Warm temperate Western South Pacific (5)
26. Warm temperate Eastern South Pacific (1)

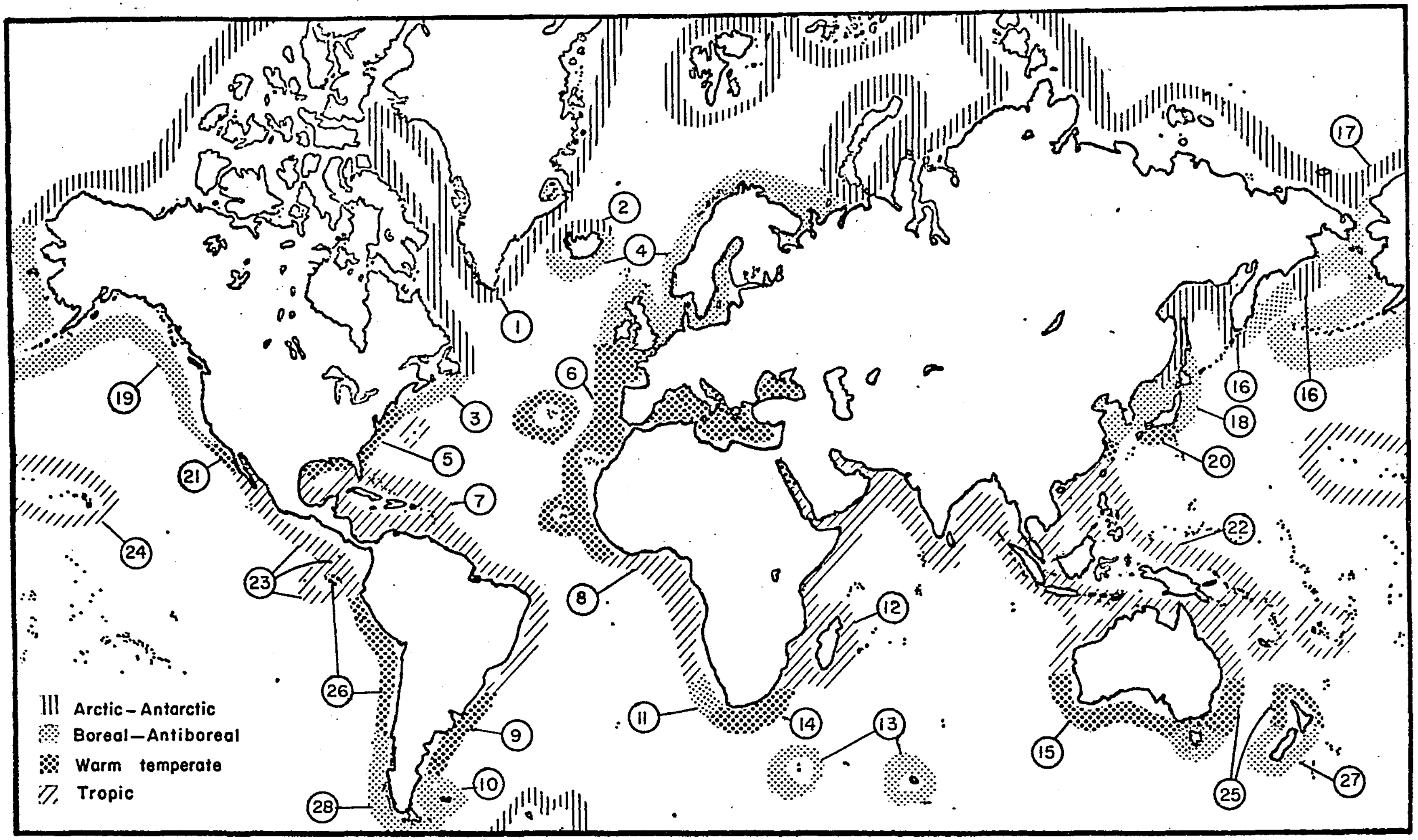


Figure 5. Littoral provinces of the world (After Hedgpeth, 1957).
Numbers refer to zones listed on p. 416.

27. Boreal-antiboreal Western South Pacific (10)

28. Boreal-antiboreal Eastern South Pacific (3)

BY ZONES AND SPECIES (see Tables 250-252)

(Endemic genera are indicated by "&"; species which are probably circumtropical are indicated by a plus (+).)

1. Arctic Western North Atlantic

Endemic: Entobdella curvunca

Circumpolar: Entobdella hippoglossi

2. Arctic Eastern North Atlantic

Circumpolar: Entobdella hippoglossi

3. Boreal-antiboreal Western North Atlantic

Amphi-Atlantic: Capsala martinierei + (also in zone 19)
Tricotyla molae +
Tristoma integrum + (also in zone 20)
Microbothrium apiculatum

Circumpolar: Entobdella hippoglossi

4. Boreal-antiboreal Eastern North Atlantic

	Species		Genera		Subfam.
Total	22		15		10
	No.	%	No.	%	No.
Endemic	6	27.3	1	6.7	0
Also in warm temp. E. North Atlantic	9	40.9			
Amphi-Atlantic (all Western zones considered)	5	22.7			
Also in boreal-ant. W. North Pacific	1	4.6			
Circumpolar	1	4.6			

Almost 41 per cent of the species in this zone also occur in the warm temperate Eastern North Atlantic; there is a lower, but still significant, affinity to the western side of the Atlantic.

Endemic: *Trochopus gaillimhe*
T. lineatus
Leptobothrium pristiuri &
Heterocotyle pastinacea
Calicotyle affinis
Thaumatocotyle concinna

Also in warm temperate Eastern North Atlantic:
Entobdella soleae
Benedenia pagelli
Nitzschia sturionis
Trochopus diplacanthus
Leptocotyle minor
Pseudocotyle squatinae
P. lepidorhini
Calicotyle kröyeri
Dictyocotyle coeliaca

Amphi-Atlantic: *Tricotyla molae* +
T. cutanea +
Tristoma coccineum +
T. integrum (also in zone 20) +
Microbothrium apiculatum

Also in boreal-antiboreal Western North Pacific:
Tristomella nozawae +

Circumpolar: *Entobdella hippoglossi*

5. Warm temperate Western North Atlantic

	Species		Genera		Subfam.
Total	42		25		11
	No.	%	No.	%	No.
Endemic	20	47.6	3	12.0	0
Amphi-Atlantic (all Eastern zones considered	13	31.0			
Also in tropical W. Atlantic	6	14.3			
Also in bor.-ant. E. N. Pacific + warm temp. E. S. Pacific	1	2.4			
Also in boreal-ant. W. South Pacific	1	2.4			
Circumpolar	1	2.4			

This zone, although with a fairly high endemism, has a higher affinity for the Eastern Atlantic zones than for the zone next to it. This could be an indication that temperature is a limiting factor.

Endemic:
Capsaloides cornutus
Heterocotyle americana

C. magnaspinosus
Tristomella lintoni
Entobdella bumpusii
Encotyllabe pricei
Nitzschia superba
Loimos salpinggoides
L. scoliodoni
Loimopapillosum dasyatis &
Monocotyle diademalis
M. pricei
H. minima
H. pseudominima
Neoheterocotyle inpristi &
Cathariotrema selachii &
Thaumatocotyle dasybatis
T. longicirrus
T. pseudodasybatis
T. retorta

Amphi-Atlantic:
Tricotyla molae +
T. cutanea +
Tristoma coccineum +
T. integrum (also in zone 20)+
Tristomella laevis (also in zone 14)+
T. onchidiocotyle +
Dioncus remorae +
Loimosina wilsoni
Microbothrium apiculatum
Dermophthirius carcharini
Neodermophthirius harkemai
Dasybatotrema dasybatis
Dendromonocotyle octodiscus

Also in tropical West Atlantic:
Caballerocotyla manteri +
Benedeniella posterocolpa
Entobdella corona
Dioncus agassizi (also in zone 12) +
D. rachycentris +
Papillicotyle floridana

Also in boreal-antiboreal E. North Pacific + warm temp. E. South Pacific: Entobdella squamula

Also in boreal-antiboreal Western South Pacific:
Empruthotrema raiae

Circumpolar: Entobdella hippoglossi

6. Warm temperate Eastern North Atlantic

	Species		Genera		Subfam.	
Total	64		28		15	
	No.	%	No.	%	No.	%
Endemic	40	62.5	2(1)	(3.6)	1	6.7
Amphi-Atlantic (all Western zones considered)	14	21.9				
Also in boreal-ant. E. North Atlantic	9	14.1				
Circumpolar	1	1.6				

A high percentage of the species is endemic, and there is a stronger affinity for the Western Atlantic zones than for the zone next to it and to the north. This could be an indication that temperature affects the distribution. If we consider that Trochopella (Table 145, foonote 1) is a synonym of Trochopus, there there is one endemic genus (Enoplocotyle).

Endemic:

- Caballerocotyla pelamydis
- C. perugiai
- Tricotyla thynni
- Tristomella grimaldii
- T. interrupta
- Benedenia sciaenae
- B. leucanthemum
- B. micracantha
- B. monticellii
- Benedenia sp. of Porter, 1954
- Ancyrocotyle vallei
- Entobdella apicolpos
- E. diadema
- Encotyllabe nordmanni
- E. paronae
- E. vallei
- Nitzschia monticellii
- Trochopus tubiporus
- T. brauni
- T. differens
- T. heteracanthus
- T. micracanthus
- Trochopus oncacanthus
- T. pini
- Trochopus sp. of Reichenbach-Klinke, 1957
- Trochopus sp. of Kearn, 1963
- Megalocotyle grandiloba
- M. hexacantha
- M. rhombi
- M. zschokkei
- Trochopella candida &
- Enoplocotyle minima &
- Monocotyle myliobatis
- Monocotyle sp. of Euzet & Maillard, 1967
- Calicotyle palombi
- C. stossichi
- Dendromonocotyle taeniurae
- Merizocotyle diaphana
- M. minor
- Merizocotyle sp. of Palombi, 1943

Amphi-Atlantic:

- Tricotyla molae +
- T. cutanea +
- Tristoma coccineum +
- T. integrum (also in zone 20) +
- Tristomella laevis (also in zones 12 & 14) +
- T. onchidiocotyle +
- Dioncus remorae +
- Loimosina wilsoni
- Microbothrium apiculatum
- Dermophthirius carcharini
- Neodermophthirius harkemai
- Dasybatotrema dasybatis
- Dendromonocotyle octodiscus
- Capsala martinierei (also in zone 19) +

Circumpolar: Entobdella hippoglossi

Also in boreal-antiboreal Eastern North Atlantic:
Entobdella soleae
Encotyllabe pagelli
Nitzschia sturionis
Trochopus diplacanthus
Leptocotyle minor
Pseudocotyle squatinae
P. lepidorhini
Calicotyle kröyeri
Dictyocotyle coeliaca

7. Tropical West Atlantic

	Species		Genera	Subfam.
Total	16		12	6
	No.	%	No.	No.
Endemic	5	31.3	0	0
Amphi-Atlantic (all Eastern zones considered)	4	25.0		
Also in warm temp. W. N. Atlantic	6	37.5		
Also in tropical Central Pacific.	1	6.3		

Here we find a slightly larger percentage in common with the warm temperate Western North Atlantic than either endemic or amphi-Atlantic.

Endemic: *Benedenia* sp. of Hutton, 1964
Ancyrocotyle bartschi
Neobenedenia melleni
Encotyllabe lintoni
E. monticellii

Amphi-Atlantic: *Tricotyla cutanea* +
Tristomella laevis (also in zones 12 & 14) +
Dioncus remorae +
Loimosina wilsoni

Also in tropical Central Pacific: *Tristomella poeyi* +

Also in warm temperate Western North Atlantic:
Caballerocotyla manteri +
Benedeniella posterocolpa
Entobdella corona
Dioncus agassizi (also in zone 12) +
D. rachycentris +
Papillicotyle floridana

8'. Tropical East Atlantic

Amphi-Atlantic: Tristomella onchidiocotyle +

Also in Tropical East Pacific: Caballerocotyla klawei +

9. Warm temperate Western South Atlantic

Endemic: Calicotyle macrocotyle

11. Boreal-antiboreal Eastern South Atlantic

Endemic: Entobdella steingroeveri

12. Tropical Indian Ocean

	Species		Genera		Subfam.
Total	10		8		6
	No.	%	No.	%	No.
Endemic	7	70.0	1	12.5	0
Also amphi-Atl. + warm temp. W. Indian Ocean	1	10.0			
Also warm temp. W. North Pacific	1	10.0			
Also warm temp. + tropical West Atlantic	1	10.0			

Endemic: Caballerocotyla gouri
Tristomella megacotyle
Benedeniella macrocolpa
Encotyllabe lutiani
Liomos secundus
Horricauda rhynchobatis
Tympanocirrus spirophallus &

Also in warm temperate Western Indian Ocean + Amphi-Atlantic:
Tristomella laevis +

Also in warm temperate Western North Pacific:
Tristomella ovalis

Also in warm temperate + tropical West Atlantic:
Dioncus agassizi +

13. Boreal-antiboreal Indian Ocean

Also in boreal-antiboreal Western South Pacific:
Pseudobenedenia nototheniae

14. Warm temperate Western Indian Ocean

Also amphi-Atlantic + in tropical Indian Ocean:
Tristomella laevis +

Also in tropical East Pacific: *T. pricei*

15. Warm temperate Eastern Indian Ocean

Endemic: *Macrophyllida antarctica* &
Megalocotyle helicoleni
Calicotyle australis
Gymnocalicotyle inermis &

Also in warm temp. Western South Pacific:
Encotyllabe caranxi

18. Boreal-antiboreal Western North Pacific

Endemic: *Monocotyle* sp. of Layman, 1930
Benedenia derzhavini
Allobenedenia ishikawae

Circumpolar: *Entobdella hippoglossi*

Also in boreal-antiboreal E. North Atlantic:
Tristomella nozawae +

19. Boreal-antiboreal Eastern North Pacific

	Species		Genera		Subfam.
Total	11		8		5
	No.	%	No.	%	No.
Endemic	7	63.6	1	12.5	0
Also amphi-Atlantic	1	9.1			
Also in warm temp. E. S. Pacific + warm temp. W. N. Atlantic	1	9.1			
Also in boreal-ant. E. South Pacific	1	9.1			
Circumpolar	1	9.1			

Endemic: *Pseudoentobdella pacifica* &
P. pugetensis
Nitzschia quadritestes
Megalocotyle marginata
M. trituba
Pseudobenedenia noblei
Merizocotyle pugetensis

Also amphi-Atlantic: *Capsala martinierei* +

Also in warm temperate E. South Pacific + warm temperate Western North Atlantic: *Entobdella squamula*

Winter (1958) termed this species "...'bipolar' in the sense of occurring in temperate to cold waters of both the northern and southern hemispheres but not in the tropics."

Also in boreal-antiboreal Eastern South Pacific:
Benedenia hendorffi

Circumpolar: *Entobdella hippoglossi*

20. Warm temperate Western North Pacific

	Species No.	Species %	Genera No.	Genera %	Subfam. No.
Total	18		13		7
Endemic	15	83.3	3	23.1	0
Also in tropical Central Pacific	1	5.6			
Also in tropical Indian Ocean	1	5.6			
Also amphi-Atlantic	1	5.6			

Endemic:
Caballerocotyla foliacea
Capsaloides sinuatus
Benedenia epinepheli
B. ovata
B. sebastodis
B. sekii
B. seriolae
Allobenedenia convoluta
Metabenedeniella hoplognathi &
Neobenedeniella congeri &
Encotyllabe spari
Trochopus hobo
Pseudomicrobothrium spari &
Monocotyle ijimae
Calicotyle mitsukurii

Also in tropical Central Pacific:
Caballerocotyla biparasitica

Also in tropical Indian Ocean: *Tristomella ovalis*

Also amphi-Atlantic: *Tristoma integrum* +

21. Warm temperate Eastern North Pacific

	Species No.	Species %	Genera No.	Genera %	Subfam. No.
Total	7		6		5
Endemic	6	85.7	2	33.3	0
Also in tropical East Pacific	1	14.3			

Endemic: Caballerocotyla albsmithi
C. gregalis
Encotyllabe embiotocae
Trochopus sprostoni
Anoplocotyloides papillatus &
Spinuris lophosoma &

Also in tropical East Pacific: Neobenedenia girellae

Winter (1958) noted that 15 of 31 (48 per cent) of the Monogenea in the temperate Eastern North Pacific (apparently a larger zone than employed herein) were endemic.

22. Tropical West Pacific

All 21 species recorded from this zone are endemic (100 per cent); 7 of 16 genera (43.8 per cent) are endemic; 0 of 6 subfamilies are endemic. This region shows a considerable independence at the species level.

Endemic:
Caballerocotyla manteri affinis
C. notosinense
C. paucispinosa
Caballerocotyla sp. of Mamaev, 1968
Benedenia synagris
Trochopus plectropomi
Megalocotyloides epinepheli
Sprostonia squatinae &
Sprostoniella multitestis
Trilobiodiscus lutiani &
Pseudoleptobothrium aptychotremae &
Monocotyle granulatae
M. kuhlii
M. tritestis
Decacotyle lymmae &
Heterocotyle granulatae
Horricauda rhinobatidis
Papillicotyle octona
Troglocephalus rhinobatidis &
Dendromonocotyle kuhlii
Clemacotyle australis &

23. Tropical East Pacific

	Species		Genera	Subfam.
Total	12		8	5
	No.	%	No.	No.
Endemic	8	66.7	0	0
Also in tropical East Atlantic	1	8.3		
Also in warm temp. W. Indian Ocean.	1	8.3		
Also in warm temp. E. N. Pacific	1	8.3		
Amphi-Pacific	1	8.3		

Winter (1958) noted that 49 of 70 (70 per cent) of the Monogenea in the Eastern Pacific were endemic.

Endemic: Caballerocotyla caballeroi
Benedenia jaliscana
Entobdella guberleti
Neobenedenia adenea
N. isabellae
N. muelleri
Megacotyloides pseudomarginatus
Loimos winteri

Also in tropical East Atlantic: Caballerocotyla klawei +

Also in warm temp. W. Indian Ocean: Tristomella pricei

Also in warm temp. E. North Pacific: Neobenedenia girellae

Also in warm temp. W. South Pacific (=amphi-Pacific):
Encotyllabe pagrosomi

24. Tropical Central Pacific

	Species No.	Species %	Genera No.	Genera %	Subfam. No.	Subfam. %
Total	10		9		4	
Endemic	8	80.0	6	66.7	1	25.0
Also in warm temp. W. North Pacific	1	10.0				
Also in tropical West Atlantic	1	10.0				

Endemic: Benedenia sp. of Randall, 1961
Dioncopseudobenedenia kala &
Lagenivaginopseudobenedenia etelis &
Oligoncobenedenia nasonis &
Pseudallobenedenia apharei &
P. opakapaka
Pseudonitzschia uku &
Diploheterocotyla dasyatis &

Also in warm temperate Western North Pacific:
Caballerocotyla biparasitica

Also in tropical West Atlantic: Tristomella poeyi +

25. Warm temperate Western South Pacific

Endemic: Heterocotyle robusta
Encotyllabe latridis
Anoplocotyle australis &

Amphi-Pacific: Encotyllabe pagrosomi

Also in warm temp. E. Indian Ocean: Encotyllabe caranxi

26. Warm temperate Eastern South Pacific

Also in boreal-antiboreal Eastern North Pacific + warm temperate Western North Atlantic: Entobdella squamula

27. Boreal-antiboreal Western South Pacific

	Species		Genera		Subfam.	
Total	10		10		6	
	No.	%	No.	%	No.	%
Endemic	8	80.0	4	40.0	1	16.7
Also in boreal-ant. Indian Ocean	1	10.0				
Also in warm temp. Western North Atlantic	1	10.0				

Endemic: Encotyllabe chironemi
Allomegallocotyla johnstoni &
Megalocotyle australis
Pseudomegalocotyla latridis &
Leptomicrobothrium longiphallus &
Asthenocotyle kaikourensis &
Calicotyle ramsayi
Merizocotyle amplidiscata

Also in boreal-antiboreal Indian Ocean:
Pseudobenedenia nototheniae

Also in warm temperate Western North Atlantic:
Empruthotrema raiae

28. Boreal-antiboreal Eastern South Pacific

Endemic: Entobdella brattstroemi
Microbothrium tolloi

Also in boreal-antiboreal E. North Pacific:
Benedenia hendorffi

SUMMARY OF SPECIES

If we total up the distributions for all the species of Capsaloidea, we have:

	No. species	% total (209)
Endemic to one of the zones..........	166	79.4
Amphi-Atlantic........................	14	6.7
Amphi-Pacific.........................	1	0.5
Circumpolar...........................	1	0.5

Endemism: The percentage of endemic species is relatively high for most of the zones. An extreme case is the tropical West Pacific, where all 21 species are endemic. The percentage of endemic genera is always lower than the percentage of endemic species. Except for monotypic subfamilies, there are no endemic capsaloid subfamilies. If we delete the 11 species for which there are insufficient locality data to ascertain their correct zones, then 166 of 209 (79.4 per cent) capsaloids are endemic to a single zone.

Amphi-Atlantic: Fourteen of 209 (6.7 per cent) capsaloids are amphi-North Atlantic:

Capsala martinierei
Tricotyla molae
T. cutanea
Tristoma coccineum
T. integrum
Tristomella laevis
T. onchidiocotyle
Dioncus remorae
Loimosina wilsoni
Microbothrium apiculatum
Dermophthirius carcharini
Neodermophthirius harkemai
Dasybatotrema dasybatis
Dendromonocotyle octodiscus

In addition, one species, *Entobdella hippoglossi*, is circumpolar (0.5 per cent). Thus 7.2 per cent of capsaloids are amphi-Atlantic. In order to determine those capsaloids that have a potential amphi-Atlantic distribution, note the hosts listed in

Tables 254 and 255 and then note the parasites of these hosts which are given in Table 234.

Amphi-Pacific: There is one amphi-Pacific species, Encotyllabe pagrosomi, and one circumpolar species, Entobdella hippoglossi, making 1.0 per cent of the capsaloids amphi-Pacific. Thus the Pacific Ocean presents a greater barrier to the distribution of the capsaloids than does the Atlantic. In order to ascertain those capsaloids that have a potential amphi-Pacific distribution, note the hosts listed in Tables 254 and 257 and then consider the parasites of these hosts listed in Table 234.

Amphi-American: Only three of 209 (1.4 per cent) capsaloids are amphi-American. They are:

Capsala martinierei .... in zones 3, 6, 19
Entobdella hippoglossi .... circumpolar
Entobdella squamula .... in zones 5, 19, 26

Winter (1958) noted that 5 of 35 species (14 per cent) of Monogenea in the tropical waters of both oceans were amphi-American. The occurrence of different species of Loimos on Carcharhinus obscurus (Table 234) on different sides of Panama indicates these species probably evolved after the land bridge became finalized. In order to ascertain those capsaloids that have a potential amphi-American distribution, note the hosts listed in Tables 254 and 256 and then note the parasites of these hosts which are given in Table 234.

Circumpolar: Entobdella hippoglossi is the only circumpolar species reported thus far (0.5 per cent). Microbothrium apiculatum has the potential of being circumpolar because Squalus acanthias is also amphi-Pacific (Table 257).

Circumtropical: No species has yet been found to be circumtropical, though several species approach a circumtropical distribution (Table 250). In order to ascertain those capsaloids that have a potential circumtropical distribution, first note the hosts listed in Table 254 and then note the parasites of these hosts which are given in Table 234.

Zone totals: If we total up those species in the different types of zones (Table 250) we find:

	Total	% total
Arctic	3	1.1
Boreal-antiboreal	58	21.0
Warm temperate	145	52.4
Tropical	71	25.6
	277	

The total of 277 is greater than the number of species (209) because some species are found in more than one type of zone. Thus, using the zones of Hedgpeth (1957), the majority of known capsaloids can be classed as warm temperate (also see Figure 18). The latitudinal occurrences for each subfamily are given in Figure 18.

Zone affinities: The affinities between the various zones are apparent from the tables in the above discussion of the zones. The species that some zones have in common with other zones in other oceans probably represent circumtropical species (indicated by + above). Except for the North Atlantic, where there are several species common to both sides and to neighboring zones, there are high percentages for endemic species per zone. The species in zones in the Pacific are fairly well isolated from each other.

Table 250. Distribution of Capsaloidea by species and zone.

Numbers for zones are explained on p. 416 (also see Figure 5). A question mark (?) indicates that insufficient information was given to distinguish zone. Monocotylidae n. sp. of Koratha & Martin, 1963 not included.

Species / Zone	Reported from zone																								
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Capsala martinierei			■			■										■									
C. squali																						?		?	
Capsala sp. of Koratha & Martin, 1960																?		?							
Caballerocotyla biparasitica																	■				■				
C. albsmithi																		■							
C. caballeroi																				■					
C. foliacea																	■								
C. gouri											■														
C. gregalis																		■							
C. katsuwoni															?		?								
C. klawei						?		■												■					
C. magronum															?		?								
C. manteri					■		■																		
C. manteri affinis																			■						
C. notosinense																			■						
C. paucispinosa																			■						
C. pelamydis						■																			
Caballerocotyla sp. of Mamaev, 1968																			■						
Capsaloides cornutus					■																				
C. magnaspinosus					■																				
C. perugiai						■																			
C. sinuatus																	■								
Tricotyla molae			■	■	■	■																			

Table 250 continued

Species	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Tricotyla cutanea				■	■	■	■																		
Tricotyla thynni						■																			
Tristoma coccineum				■	■	■																			
T. fuhrmanni	Collection locality not given																								
T. integrum			■	■	■	■											■								
T. levinsenii	Collection locality not given																								
T. uncinatum	Collection locality not given																								
Tristomella laevis					■	■	■				■		■												
T. grimaldii						■																			
T. interrupta						■																			
T. lintoni					■																				
T. megacotyle											■														
T. nozawae				■											■										
T. onchidiocotyle					■	■		■																	
T. ovalis											■						■								
T. poeyi							■														■				
T. pricei													■							■					
Benedenia sciaenae						■																			
B. derzhavini															■										
B. epinepheli																	■								
B. hendorffi																■									■
B. jaliscana																				■					
B. leucanthemum						■																			
B. madai															?		?								
B. micracantha						■																			
B. monticellii						■																			
B. ovata																	■								
B. pagrosomi															?		?								
B. sebastodis																	■								
B. sekii																	■								

Table 250 continued

	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Benedenia seriolae																	■								
B. synagris																			■						
Benedenia sp. of Porter, 1954						■																			
Benedenia sp. of Randall, 1961																					■				
Benedenia sp. of Hutton, 1964							■																		
Allobenedenia convoluta																	■								
A. ishikawae															■										
Ancyrocotyle vallei						■																			
A. bartschi							■																		
Benedeniella macrocolpa											■														
B. posterocolpa					■		■																		
Dioncopseudobenedenia kala																					■				
Entobdella hippoglossi	■	■	■	■	■	■									■	■									
E. apicolpos						■																			
E. brattstroemi																									■
E. bumpusii					■																				
E. corona					■		■																		
E. curvunca	■																								
E. diadema						■																			
E. guberleti																				■					
E. soleae				■		■																			
E. squamula					■											■							■		
E. steingroeveri										■															
Lagenivaginopseudobenedenia etelis																					■				
Metabenedeniella hoplognathi																	■								
Neobenedenia melleni							■																		
N. adenea																				■					
N. girellae																		■		■					
N. isabellae																				■					
N. muelleri																				■					
Neobenedeniella congeri																	■								

Table 250 continued

	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Oligoncobenedenia nasonis																					■				
Pseudallobenedenia apharei																					■				
P. opakapaka																					■				
Pseudoentobdella pacifica																■									
P. pugetensis																■									
Encotyllabe nordmanni						■																			
E. caranxi														■								■			
E. chironemi																								■	
E. embiotocae																		■							
E. latridis																						■			
E. lintoni							■																		
E. lutiani											■														
E. masu															?		?								
E. monticellii							■																		
E. pagelli				■		■																			
E. pagrosomi																				■		■			
E. paronae						■																			
E. pricei					■																				
E. spari																	■								
E. vallei						■																			
Nitzschia sturionis				■		■																			
N. monticellii						■																			
N. quadritestes																■									
N. superba					■																				
Pseudonitzschia uku																					■				
Trochopus tubiporus						■																			
T. brauni						■																			
T. differens						■																			
T. diplacanthus				■		■																			
T. gaillimhe				■																					
T. goniistii	Collection locality not given																								

Table 250 continued

	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Trochopus heteracanthus						■																			
T. hobo																	■								
T. lineatus				■																					
T. micracanthus						■																			
T. oncacanthus						■																			
T. pini						■																			
T. plectropomi																			■						
T. sprostoni																		■							
Trochopus sp. of Reichenbach-Klinke, 1957						■																			
Trochopus sp. of Kearn, 1963						■																			
Allomegalocotyla johnstoni																								■	
Macrophyllida antarctica														■											
Megalocotyle marginata																■									
M. australis																								■	
M. grandiloba						■																			
M. helicoleni														■											
M. hexacantha						■																			
M. rhombi						■																			
M. trituba																■									
M. zschokkei						■																			
Megalocotyloides epinepheli																			■						
M. pseudomarginatus																				■					
Pseudobenedenia nototheniae												■												■	
P. noblei																■									
Pseudomegalocotyla latridis																								■	
Sprostonia squatinae																			■						
Sprostoniella multitestis																			■						
Trochopella candida						■																			
Trilobiodiscus lutiani																			■						
Dioncus agassizi					■		■				■														
D. rachycentris					■		■																		

Table 250 continued

	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Dioncus remorae					■	■	■																		
Loimos salpinggoides					■																				
L. scoliodoni					■																				
L. secundus											■														
L. winteri																				■					
Loimopapillosum dasyatis					■																				
Loimosina wilsoni					■	■	■																		
Microbothrium apiculatum			■	■	■	■																			
M. tolloi																									■
Leptobothrium pristiuri				■																					
Leptocotyle minor				■		■																			
Leptomicrobothrium longiphallus																								■	
Pseudoleptobothrium aptychotremae																			■						
Anoplocotyle australis																						■			
Pseudomicrobothrium spari																	■								
Asthenocotyle kaikourensis																								■	
Enoplocotyle minima						■																			
Pseudocotyle squatinae				■		■																			
P. lepidorhini				■		■																			
Dermophthirius carcharini					■	■																			
Neodermophthirius harkemai					■	■																			
Monocotyle myliobatis						■																			
M. diademalis					■																				
M. granulatae																			■						
M. ijimae																	■								
M. kuhlii																			■						
M. pricei					■																				
M. tritestis																			■						
Monocotyle sp. of Layman, 1930															■										
Monocotyle sp. of Euzet & Maillard, 1967						■																			
Anoplocotyloides papillatus																		■							

Table 250 continued

	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Dasybatotrema dasybatis					■	■																			
Decacotyle lymmae																			■						
Diploheterocotyla dasyatis																					■				
Heterocotyle pastinacea				■																					
H. americana					■																				
H. granulatae																			■						
H. minima					■																				
H. pseudominima					■																				
H. robusta																						■			
Horricauda rhynchobatis											■														
H. rhinobatidis																			■						
Neoheterocotyle inpristi					■																				
Papillicotyle octona																			■						
P. floridana					■		■																		
Spinuris lophosoma																		■							
Troglocephalus rhinobatidis																			■						
Tympanocirrus spirophallus											■														
Calicotyle kröyeri				■		■																			
C. affinis				■																					
C. australis														■											
C. macrocotyle									■																
C. mitsukurii																	■								
C. palombi						■																			
C. ramsayi																								■	
C. stossichi						■																			
Dictyocotyle coeliaca				■		■																			
Gymnocalicotyle inermis														■											
Dendromonocotyle octodiscus					■	■																			
D. kuhlii																			■						
D. taeniurae						■																			
Clemacotyle australis																			■						

Table 250 continued

		1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Merizocotyle diaphana							■																			
M. minor							■																			
M. amplidiscata																									■	
M. pugetensis																	■									
Merizocotyle sp. of Palombi, 1943							■																			
Cathariotrema selachii						■																				
Empruthotrema raiae						■																			■	
Thaumatocotyle concinna					■																					
T. dasybatis						■																				
T. longicirrus						■																				
T. pseudodasybatis						■																				
T. retorta						■																				
Totals	220	2	1	5	22	42	64	16	2	1	1	10	1	2	5	5	11	18	7	21	12	10	5	1	10	3

BY ZONES AND GENERA (Table 251)

(+ = probably circumtropical)

A summary of Table 251 is as follows:

	Genera (Total 70) No.	%
Endemic to one of the zones	33	47.1
Amphi-Atlantic (some also in other zones)	16	22.9
Circumtropical	6	8.6
Amphi-Pacific	5	7.1
Amphi-American	2	2.9
In zones 18, 20	1	1.4
In zones 5, 7, 12	1	1.4
In zones 5, 27	1	1.4
In zones 4, 6	3	4.3
In zones 12, 22	1	1.4
In zones 5, 7, 22	1	1.4

The 33 genera that are endemic to one of the zones listed are as follows:

Zone 4:	Leptobothrium
Zone 5:	Loimopapillosum Neoheterocotyle Cathariotrema
Zone 6:	Trochopella Enoplocotyle (If Trochopella is considered a synonym of Trochopus (Table 145, footnote 1), then there is only one endemic genus.)
Zone 12:	Tympanocirrus
Zone 15:	Macrophyllida Gymnocalicotyle
Zone 19:	Pseudoentobdella
Zone 20:	Metabendeniella Neobenedeniella Pseudomicrobothrium
Zone 21:	Anoplocotyloides Spinuris

Zone 22: Sprostonia
Sprostoniella
Trilobiodiscus
Pseudoleptobothrium
Decacotyle
Troglocephalus
Clemacotyle

Zone 24: Dioncopseudobenedenia
Lagenivaginopseudobenedenia
Oligoncobenedenia
Pseudallobenedenia
Pseudonitzschia
Diploheterocotyla

Zone 25: Anoplocotyle

Zone 27: Allomegalocotyla
Pseudomegalocotyla
Leptomicrobothrium
Asthenocotyle

Amphi-Atlantic: Capsaloides (also in zone 20) +
Tricotyla +
Tristoma (also in zone 20) +
Ancyrocotyle
Nitzschia (also in Zone 19)
Dioncus (also in zone 12) +
Loimosina
Microbothrium (also in zone 28)
Dermophthirius
Neodermophthirius
Monocotyle (also in zones 18, 20, 22) +
Dasybatotrema
Heterocotyle (also in zones 22, 25)
Calicotyle (also in zones 15, 20, 27)
Dendromonocotyle (also in zone 22)
Thaumatocotyle

Circumtropical: Capsala
Caballerocotyla
Tristomella
Benedenia
Entobdella (also circumpolar...North Pole)
Encotyllabe

Amphi-Pacific: Trochopus (also in zones 4 & 6)
Megalocotyle (also in zone 6)
Megalocotyloides
Merizocotyle (also in zone 6)

Table 251. Distribution of Capsaloidea by genus and zone.

Numbers for zones are explained on p. 416 (also see Figure 5). A question mark (?) indicates that insufficient information was given to distinguish zone. Monocotylidae n. sp. of Koratha & Martin, 1963 not included.

Genus \ Zone	Number of species reported from each zone																								
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Capsala			1			1										1		?				?		?	
Caballerocotyla					1	1	1	1			1				?		2	2	4	2	1				
Capsaloides					2	1											1								
Tricotyla			1	2	2	3	1																		
Tristoma			1	2	2	2											1								
Tristomella				1	3	4	2	1			3		2		1		1			1	1				
Benedenia						5	1								1	1	5		1	1	1				1
Allobenedenia															1		1								
Ancyrocotyle						1	1																		
Benedeniella					1		1				1														
Dioncopseudobenedenia																					1				
Entobdella	2	1	1	2	4	4	1			1					1	2				1			1		1
Lagenivaginopseudobenedenia																					1				
Metabenedeniella																	1								
Neobenedenia							1											1		4					
Neobenedeniella																	1								
Oligoncobenedenia																					1				
Pseudallobenedenia																					2				
Pseudoentobdella																2									
Encotyllabe				1	1	4	2				1			1	?		1	1		1		3		1	
Nitzschia				1	1	2										1									
Pseudonitzschia																					1				
Trochopus				3		10											1	1	1						

Table 251 continued

	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Allomegalocotyla																								1	
Macrophyllida														1											
Megalocotyle						4								1		2								1	
Megacotyloides																			1	1					
Pseudobenedenia												1				1								1	
Pseudomegalocotyla																								1	
Sprostonia																			1						
Sprostoniella																			1						
Trochopella						1																			
Trilobiodiscus																			1						
Dioncus					3	1	3				1														
Loimos					2						1									1					
Loimopapillosum					1																				
Loimosina					1	1	1																		
Microbothrium			1	1	1	1																			1
Leptobothrium				1																					
Leptocotyle				1		1																			
Leptomicrobothrium																								1	
Pseudoleptobothrium																			1						
Anoplocotyle																						1			
Pseudomicrobothrium																	1								
Asthenocotyle																								1	
Enoplocotyle						1																			
Pseudocotyle				2		2																			
Dermophthirius					1	1																			
Neodermophthirius					1	1																			
Monocotyle					2	2									1		1		3						
Anoplocotyloides																		1							
Dasybatotrema					1	1																			
Decacotyle																			1						
Diploheterocotyla																					1				
Heterocotyle				1	3														1			1			

Table 251 continued

		1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Horricauda												1								1						
Neoheterocotyle						1																				
Papillicotyle						1		1												1						
Spinuris																			1							
Troglocephalus																				1						
Tympanocirrus												1														
Calicotyle					2		3			1					1			1							1	
Dictyocotyle					1		1																			
Gymnocalicotyle															1											
Dendromonocotyle						1	2													1						
Clemacotyle																				1						
Merizocotyle							3										1								1	
Carthariotrema						1																				
Empruthotrema						1																			1	
Thaumatocotyle					1	4																				
Totals	70	2	1	5	22	42	64	16	2	1	1	10	1	2	5	5	11	18	7	21	12	10	5	1	10	3

Pseudobenedenia (also in zone 13)
(If P. noblei is not a member of the genus (Table 141, footnote 1), then zone 19 could be deleted, and Pseudobenedenia would not be amphi-Pacific.)

Amphi-American: Neobenedenia
Loimos (also in zone 12) +

In zones 18, 20: Allobenedenia

In zones 5, 7, 12: Benedeniella

In zones 5, 27: Empruthotrema

In zones 4, 6: Leptocotyle
Pseudocotyle
Dictyocotyle

In zones 12, 22: Horricauda

In zones 5, 7, 22: Papillicotyle +

BY ZONES AND SUBFAMILIES (Table 252)

(+ = probably circumtropical)

A summary of Table 252 is as follows:

	Subfam. Total 18 No.	%
Endemic to one zone	3	16.7
Circumtropical	6	33.3
Amphi-Atlantic (some also in other zones)	6	33.3
Amphi-Pacific (some also in other zones)	1	5.6
In zones 20, 25	1	5.6
In zones 4, 6	1	5.6

Endemic:
Zone 6: Enoplocotylinae (monotypic)
Zone 24: Pseudonitzschiinae (monotypic)
Zone 27: Asthenocotylinae (monotypic)

Circumtropical: Capsalinae
Benedeniinae
Encotyllabinae
Microbothriinae
Monocotylinae
Merizocotylinae

Table 252. Distribution of Capsaloidea by subfamily and zone.

Numbers for zones are explained on p. 416 (also see Figure 5). A question mark (?) indicates that insufficient information was given to distinguish zone. Monocotylidae n. sp. of Koratha & Martin, 1963 not included.

Zone / Subfamily	Number of species reported from each zone																								
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	18	19	20	21	22	23	24	25	26	27	28
Capsalinae			3	5	10	12	4	2			4		2		1	1	5	2	4	3	2	?		?	
Benedeniinae	2	1	1	2	5	10	5			1	1				3	5	8	1	1	6	6		1		2
Encotyllabinae				1	1	4	2				1			1	?		1	1		1		3		1	
Nitzschiinae				1	1	2										1									
Pseudonitzschiinae																					1				
Trochopodinae				3		15						1		2		3	1	1	5	1				4	
Dioncidae					3	1	3				1														
Loimoidae					4	1	1				1									1					
Microbothriinae			1	3	1	2													1					1	1
Anoplocotylinae																	1					1			
Asthenocotylinae																								1	
Enoplocotylinae						1																			
Pseudocotylinae				2		2																			
Dermophthiriinae					2	2																			
Monocotylinae				1	8	3	1				2				1		1	2	8		1	1			
Calicotylinae				3		4			1					2			1							1	
Dendromonocotylinae					1	2													2						
Merizocotylinae				1	6	3										1								2	
TOTALS 18	2	1	5	22	42	64	16	2	1	1	10	1	2	5	5	11	18	7	21	12	10	5	1	10	3

Amphi-Atlantic:	Nitzschiinae (also in zone 19) Dioncidae (also in zone 12) + Loimoidae (also in zones 12, 21) + Dermophthiriinae Calicotylinae (also in zones 15, 20, 27) Dendromonocotylinae (also in zone 22) +
Amphi-Pacific:	Trochopodinae (also in zones 4, 6, 13, 15)
In zones 20, 25:	Anoplocotylinae
In zones 4, 6:	Pseudocotylinae

To determine the potential range of any capsaloid, note its hosts in the correct parasite-host locality record table, then consider the ranges of the hosts given in Table 253. Because the majority of capsaloids are species-specific, most of their ranges would presently be limited to that of one host species. Ranges of many animals may have changed greatly during their evolution (Darlington, 1959), so any speculations concerning past parasite distributions must consider the host ranges throughout geological time. To have done this in the present study would have presented too massive a problem, especially since parasite distributions during geological time cannot presently be ascertained due to the lack of fossil records.

More taxa of Capsaloidea, as presently known, occur in the Atlantic than any other ocean, there being 109 of 216 species (number obtained when the four species with no collection localities are disregarded) (50.5 per cent) (Table 250), 39 of 70 genera (55.7 per cent) (Table 251), and 15 of 18 subfamilies (83.3 per cent) (Table 252) in the Atlantic. These data probably indicate that the Capsaloidea originated in the Atlantic region. However, it could also be that this concentration of Capsaloidea in the Atlantic is the result of the more intensive studies done in the Atlantic. The large number of circumtropical genera, amphi-Atlantic genera which are also found in Pacific zones, and amphi-Pacific genera which are also found in Atlantic zones indicates that the capsaloids probably evolved, and dispersed, before the land bridge at Panama became finalized in the lower Pliocene (Ekman, 1953). The circumpolar distribution of Entobdella hippoglossi indicates a former polar connection between the Atlantic and Pacific. Krotov (1960) noted that the similarity of the faunas of the northern parts of the Pacific and Atlantic Oceans can be explained by the fact that in early Quaternary times and at the end of the Tertiary, animals could migrate from one ocean to the other along the northern coast of America because of a warmer climate. The amphi-Atlantic and Eastern North Pacific distribution of Nitzschia could also be explained by the dispersal of their hosts at these times.

As would be expected, there are lesser percentages of endemic genera and subfamilies than endemic species (see above). Of special interest is the subfamily Trochopodinae, which is amphi-Pacific and also occurs in zones 4, 6, 13, and 15. This subfamily has been reported in all major oceans; however, it has not yet been reported from the Western Atlantic. Trochopodinae mostly parasitize Perciformes and Scorpaeniformes (Table 235). Potential hosts are available in the Western Atlantic; possibly Trochopodinae have not yet been reported from the Western Atlantic because the potential hosts have not yet been well examined. The Atlantic

Calicotylinae have been reported from the Eastern North Atlantic and the Western South Atlantic. It is expected that, upon study of potential hosts of *Raja*, this subfamily will be reported from the Western North Atlantic. The distributions of the capsaloid subfamilies and the superfamily Capsaloidea as a whole are presented in Figures 6 through 17.

Noble and Noble (1964:602) said that "Temperature is the most important single extrinsic factor which influences the existence of parasites." The littoral zones employed herein (after Hedgpeth, 1957) are based on temperature. The high percentage (79.4) of endemic species to a single zone, and the high affinities of some Atlantic zones to similar zones on the other side of the Atlantic could indicate that the distributions of the hosts of capsaloids, and thus the capsaloids, are largely determined by temperature.

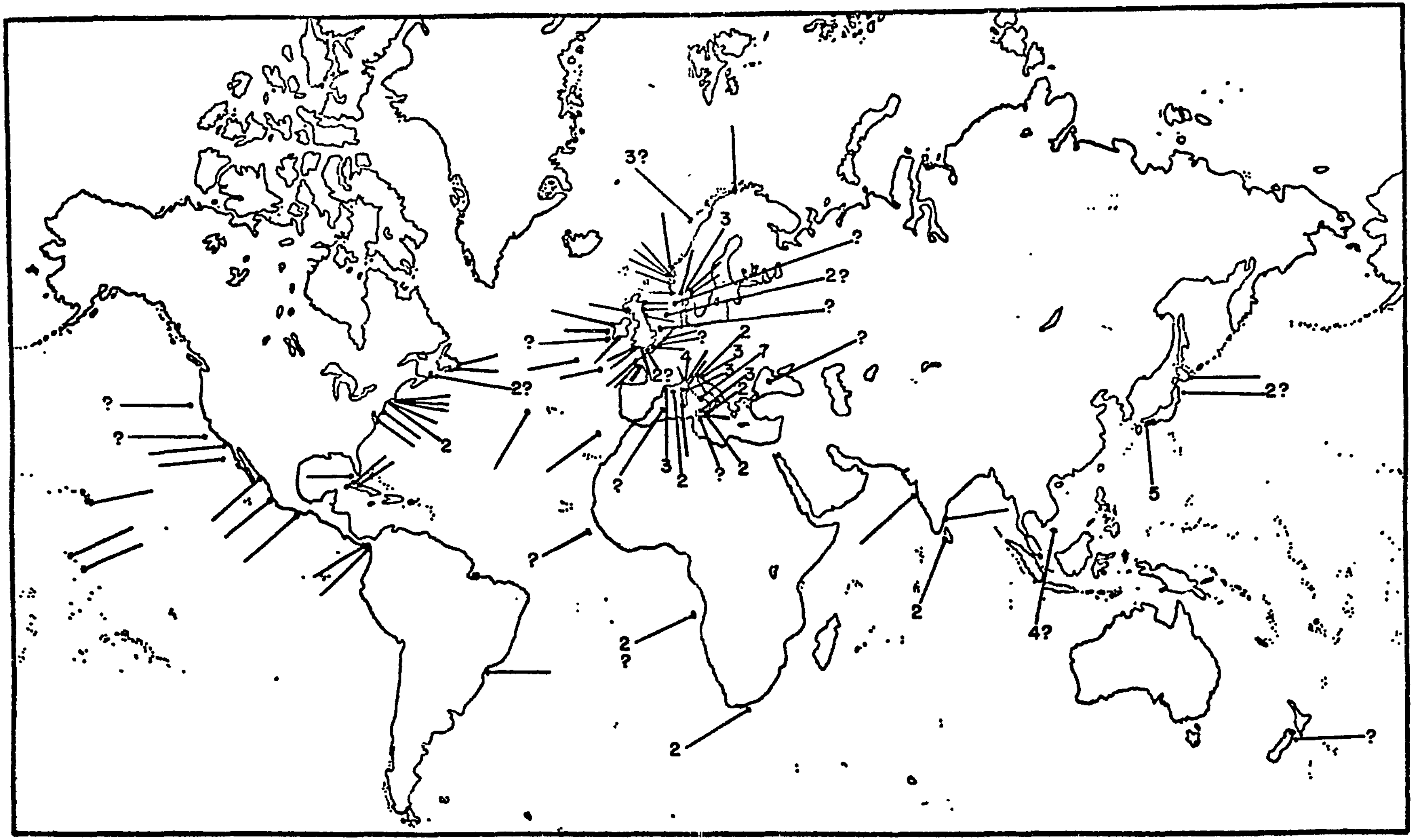


Figure 6. Distribution of Capsalinae.

Unless otherwise indicated, each line represents one species. A question mark (?) indicates that only a general locality was given.

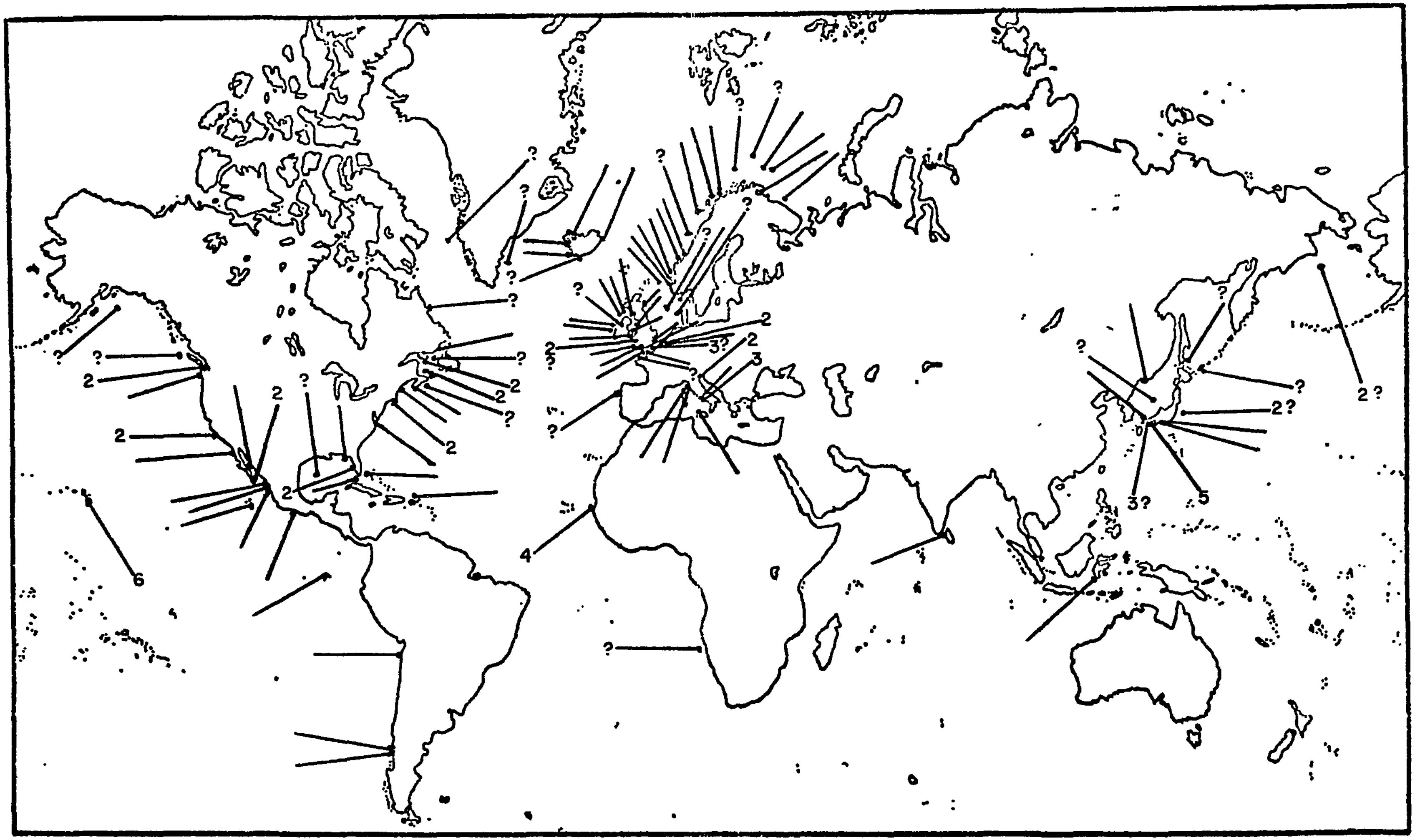


Figure 7. Distribution of Benedeniinae.

Unless otherwise indicated, each line represents one species. A question mark (?) indicates that only a general locality was given.

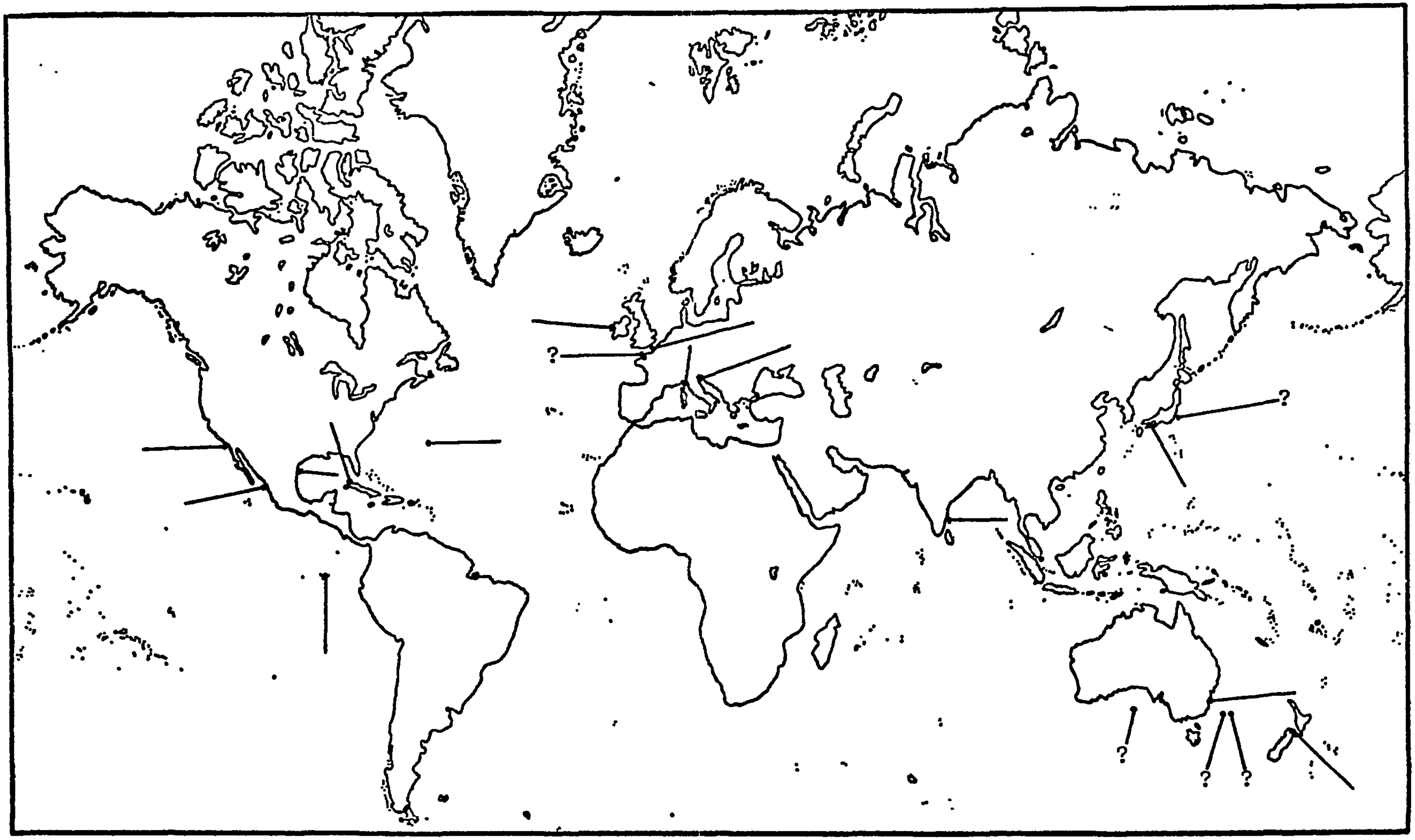


Figure 8. Distribution of Encotyllabinae.

Each line represents one species. A question mark (?) indicates that only a general locality was given.

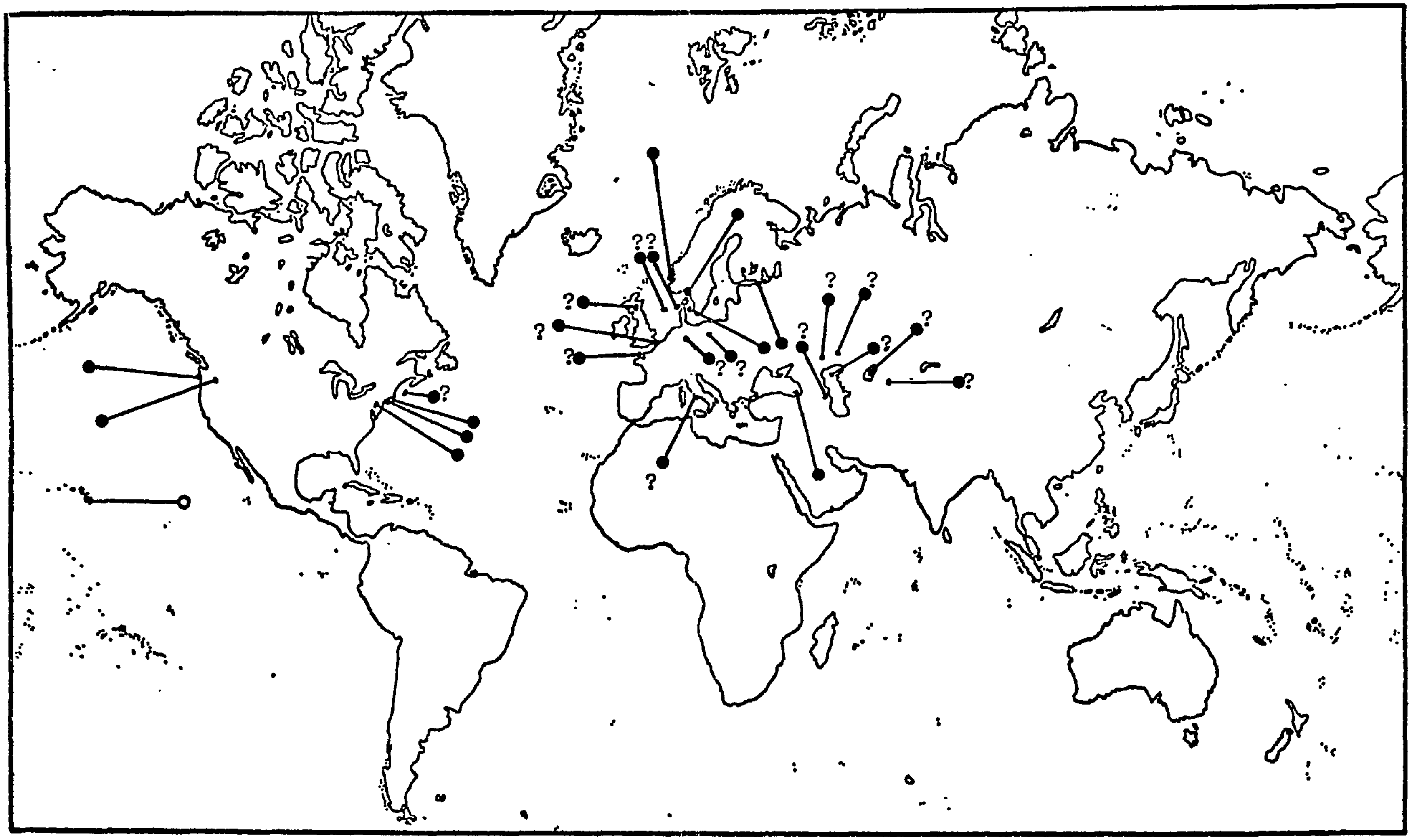


Figure 9. Distribution of Nitzschiinae (●) and Pseudonitzschiinae (o).

Each line represents one species. A question mark (?) indicates that only a general locality was given.

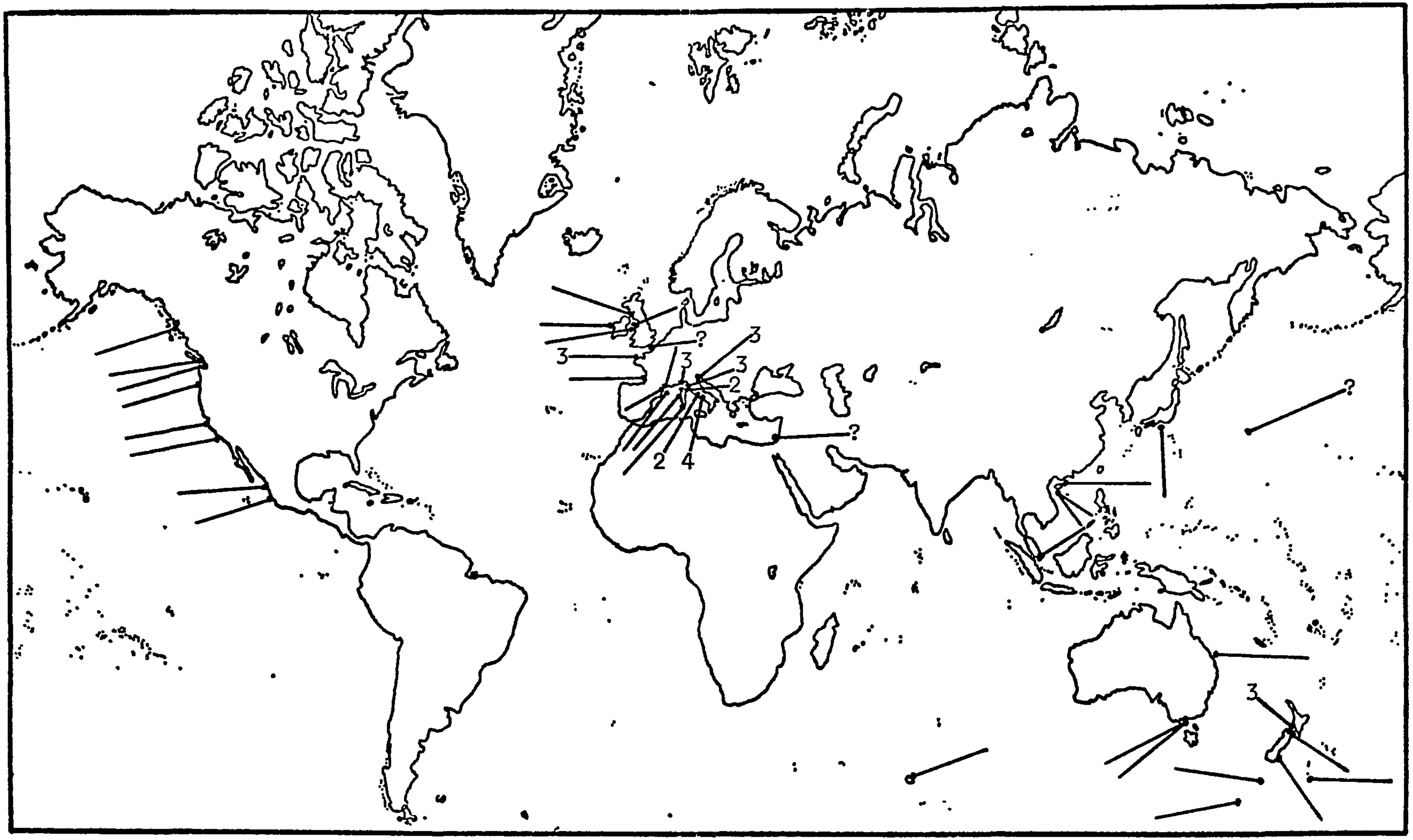


Figure 10. Distribution of Trochopodinae.

Unless otherwise indicated, each line represents one species. A question mark (?) indicates that only a general locality was given.

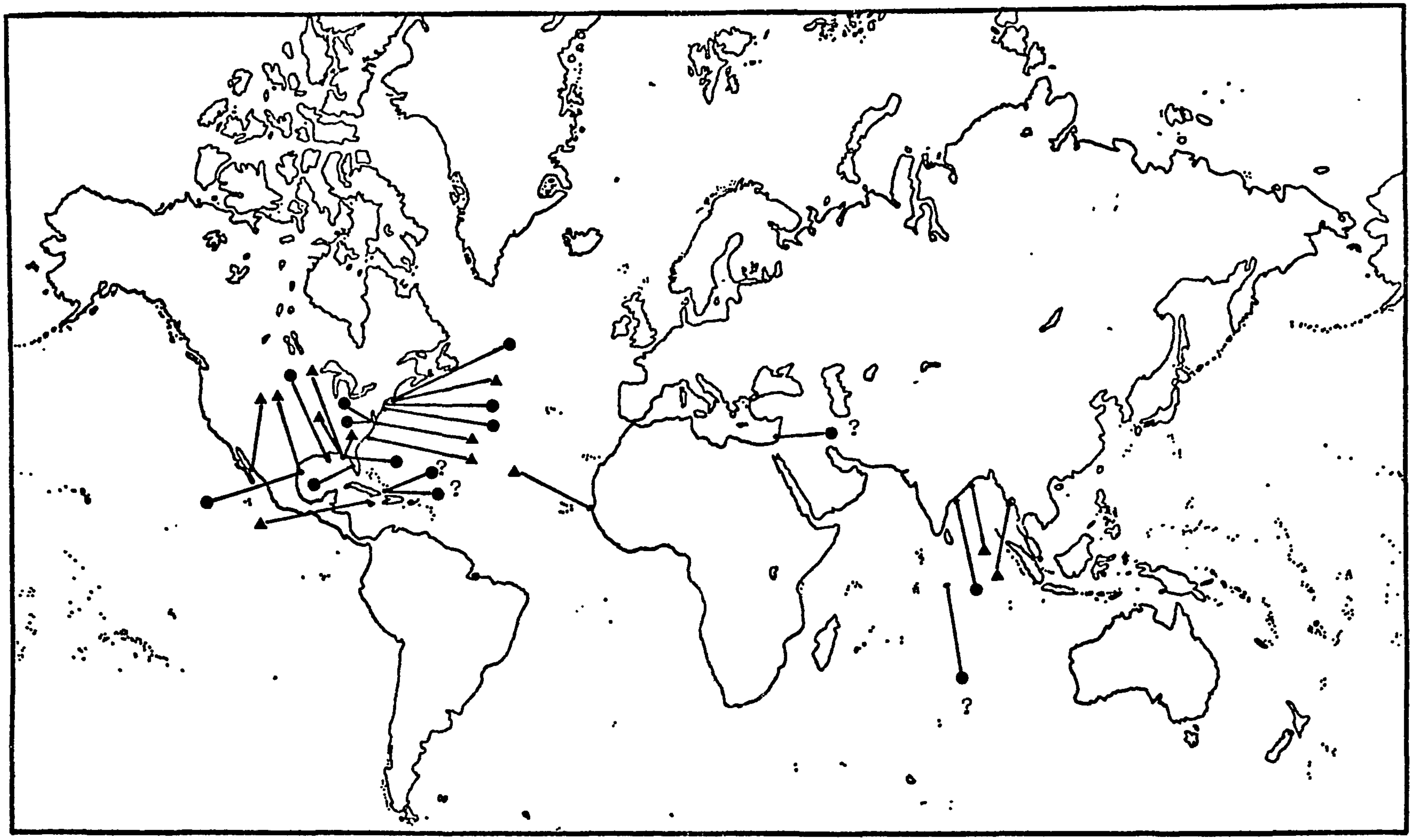


Figure 11. Distribution of Dioncidae (●) and Loimoidae (▲).

Each line represents one species. A question mark (?) indicates that only a general locality was given.

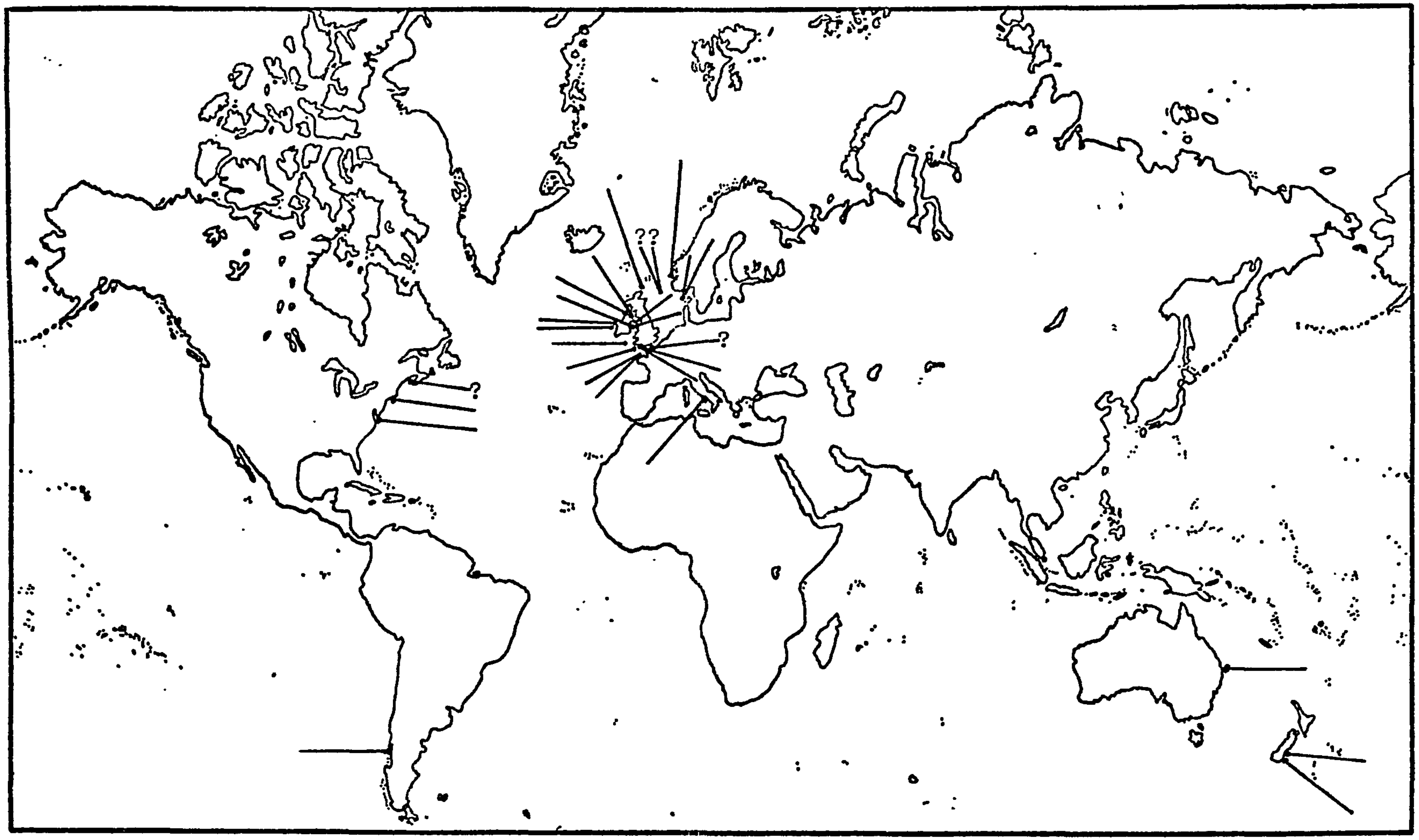


Figure 12. Distribution of Microbothriinae.

Each line represents one species. A question mark (?) indicates that only a general locality was given.

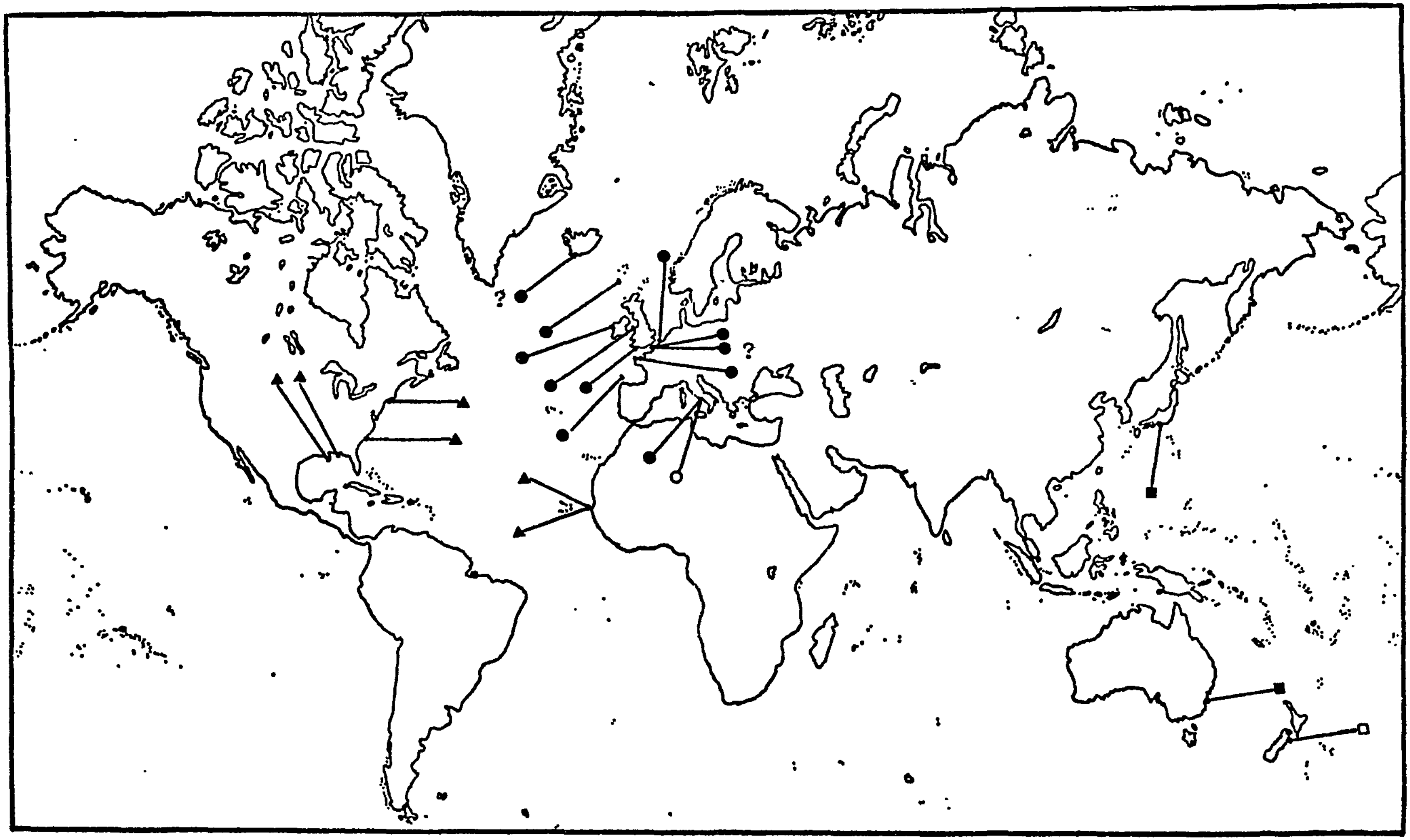


Figure 13. Distribution of Anoplocotylinae (■), Asthenocotylinae (□), Enoplocotylinae (○), Pseudocotylinae (●), and Dermophthiriinae (▲).

Each line represents one species. A question mark (?) indicates that only a general locality was given.

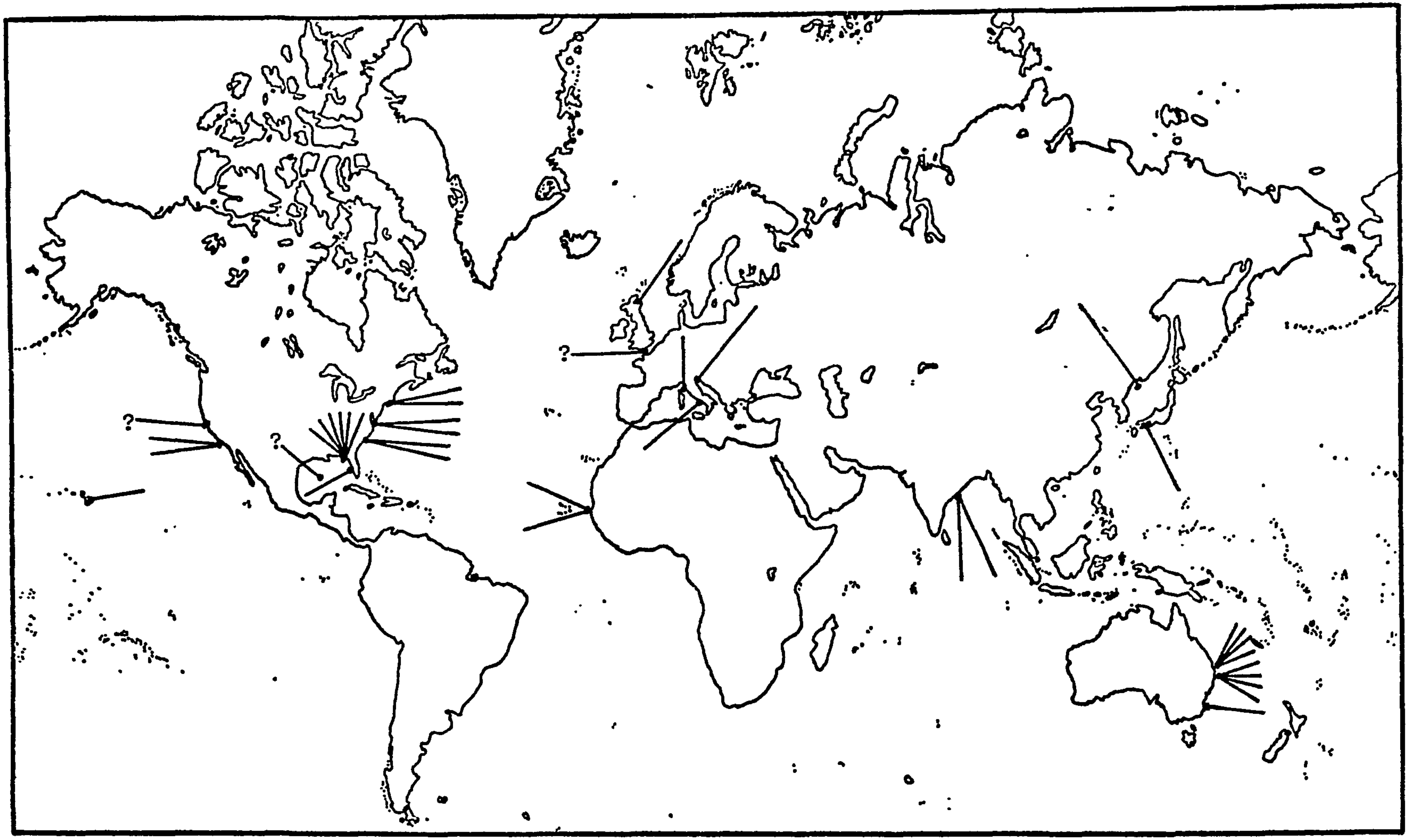


Figure 14. Distribution of Monocotylinae.

Each line represents one species. A question mark (?) indicates that only a general locality was given.

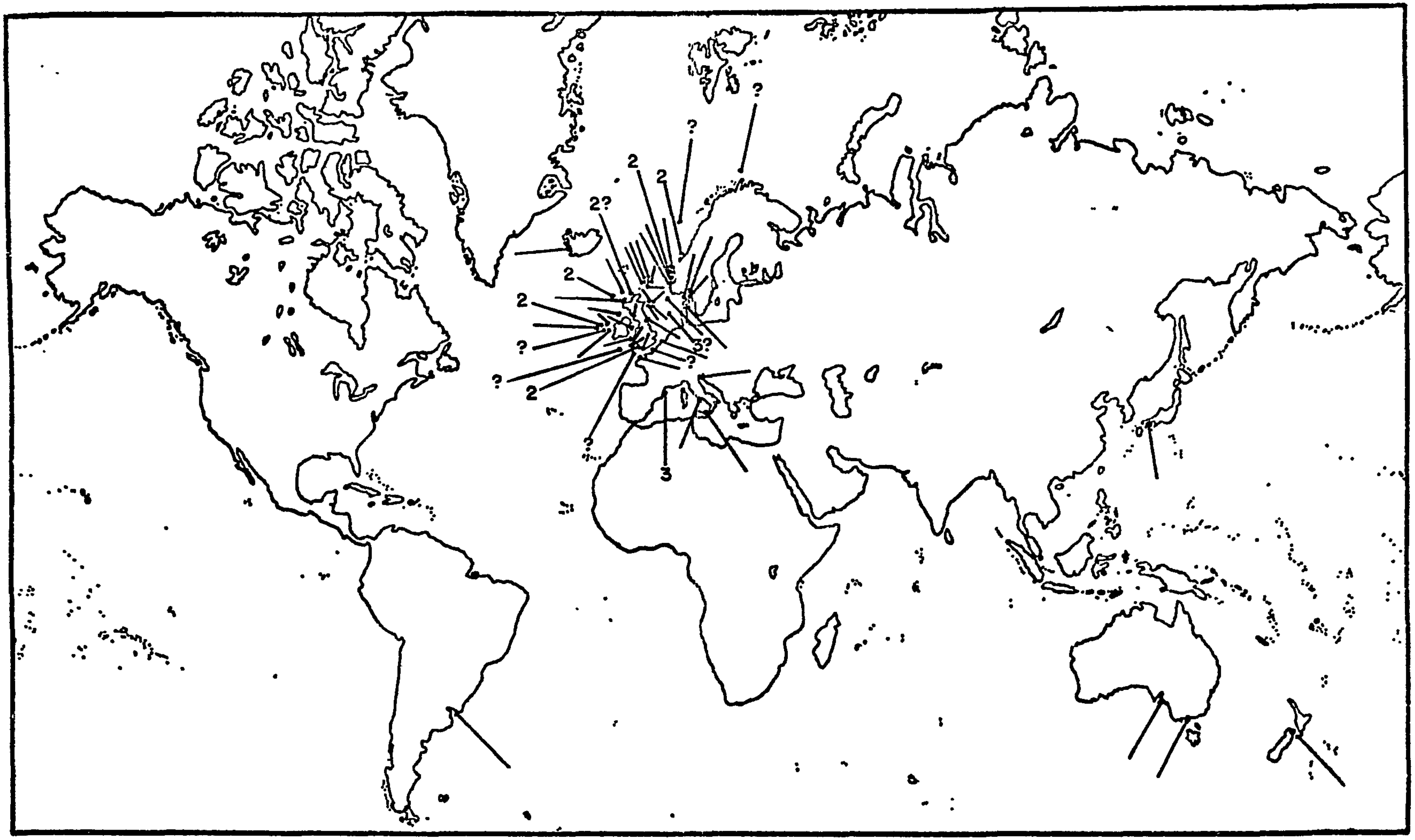


Figure 15. Distribution of Calicotylinae.

Unless otherwise indicated, each line represents one species. A question mark (?) indicates that only a general locality was given.

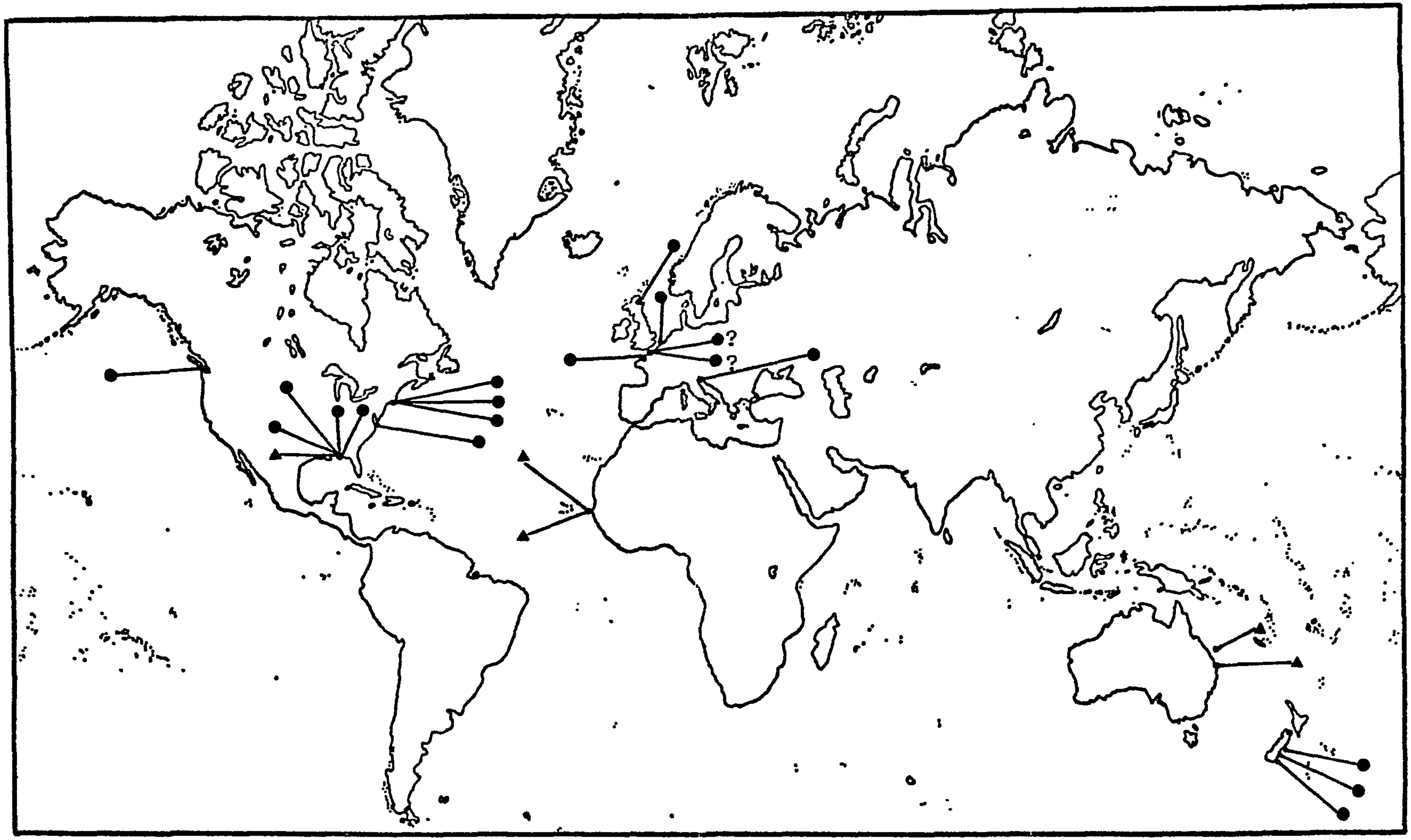


Figure 16. Distribution of Dendromonocotylinae (▲) and Merizocotylinae (●).

Each line represents one species. A question mark (?) indicates that only a general locality was given.

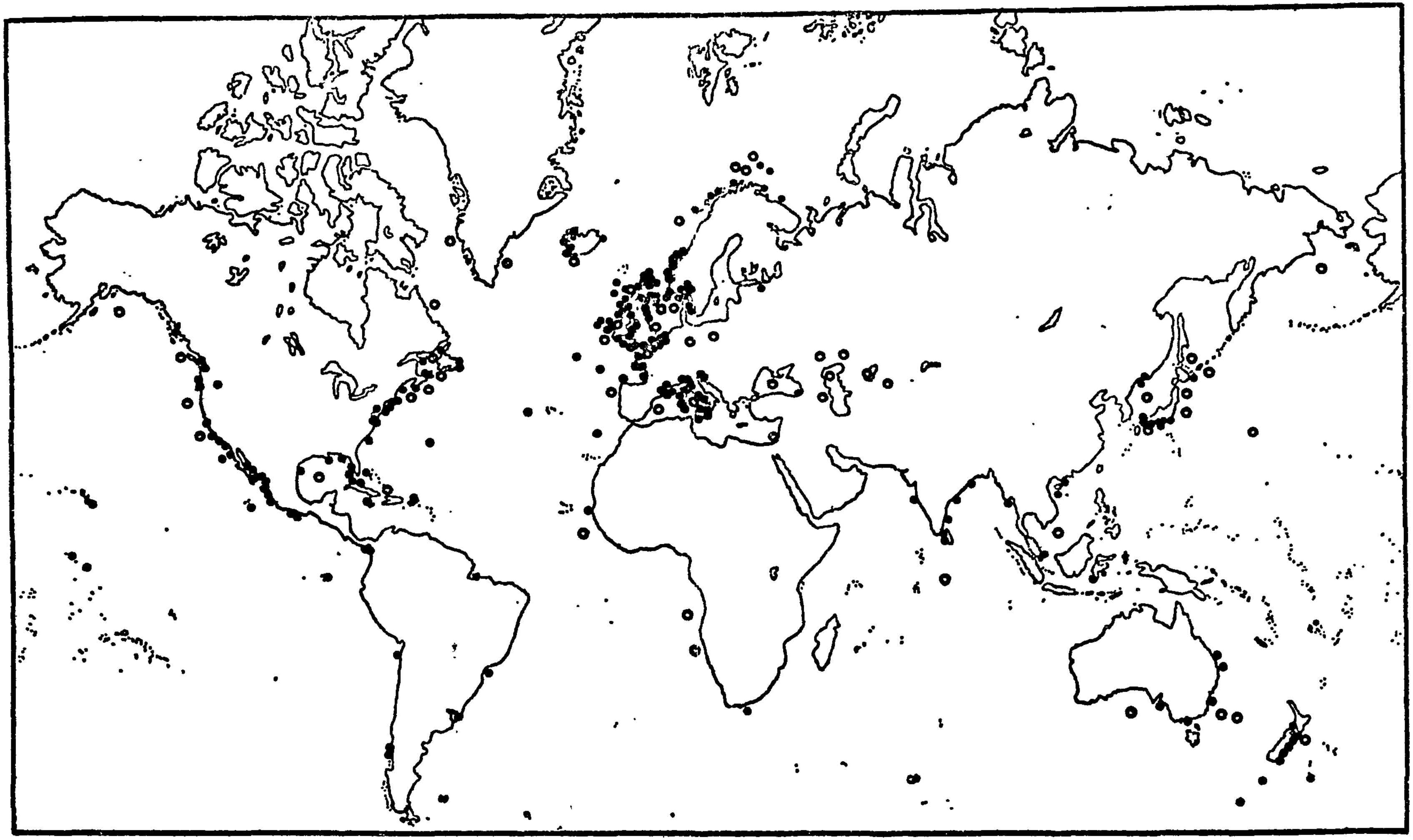


Figure 17. Distribution of Capsaloidea.
An open circle indicates that only a general locality was given.

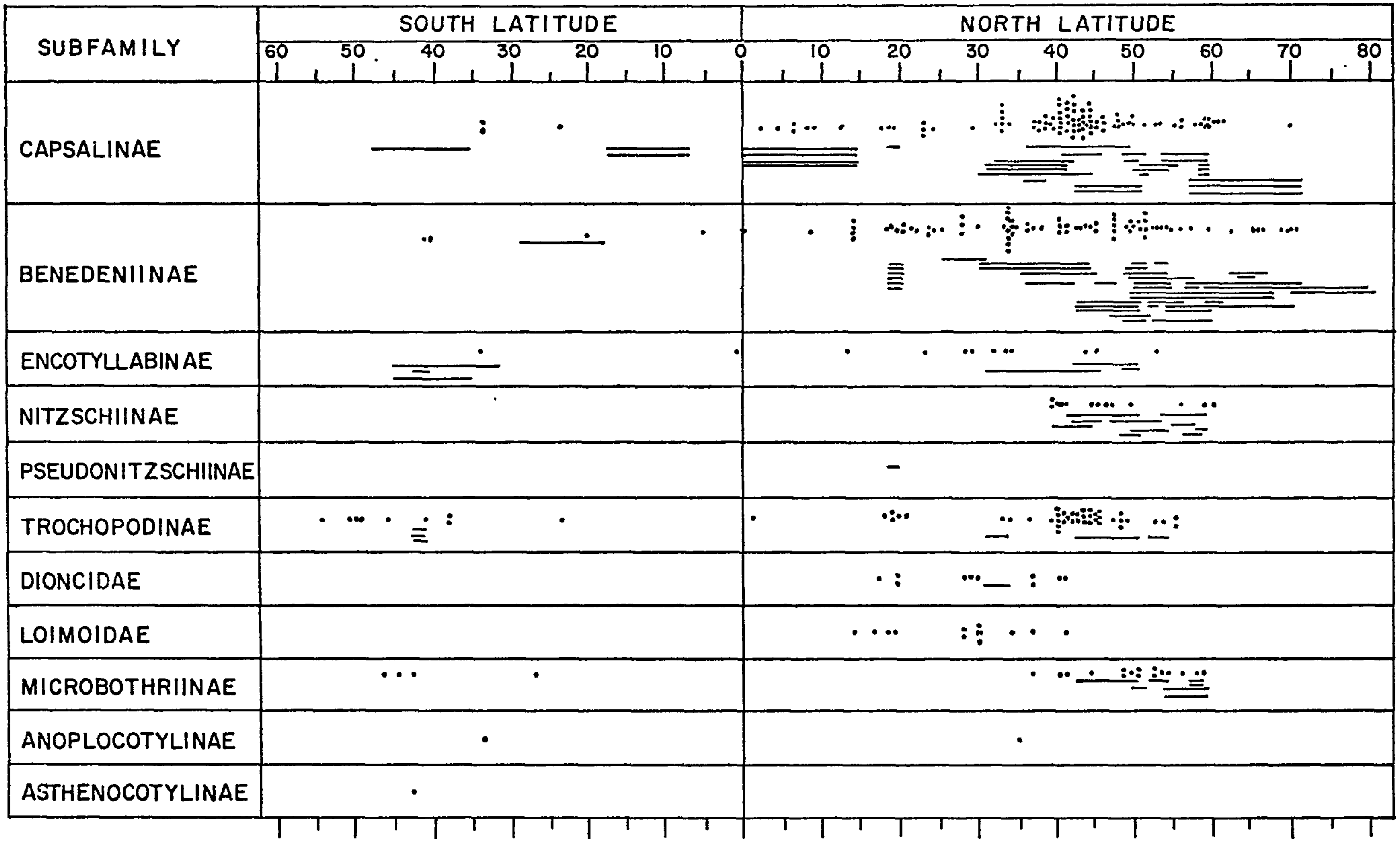


Figure 18. Latitudinal distribution of species by subfamily of Capsaloidea.

The numbers of species per half-degree increment are indicated by dots. Horizontal lines, one per species, represent the approximate latitudinal ranges within which those species for which only general localities were given occur.

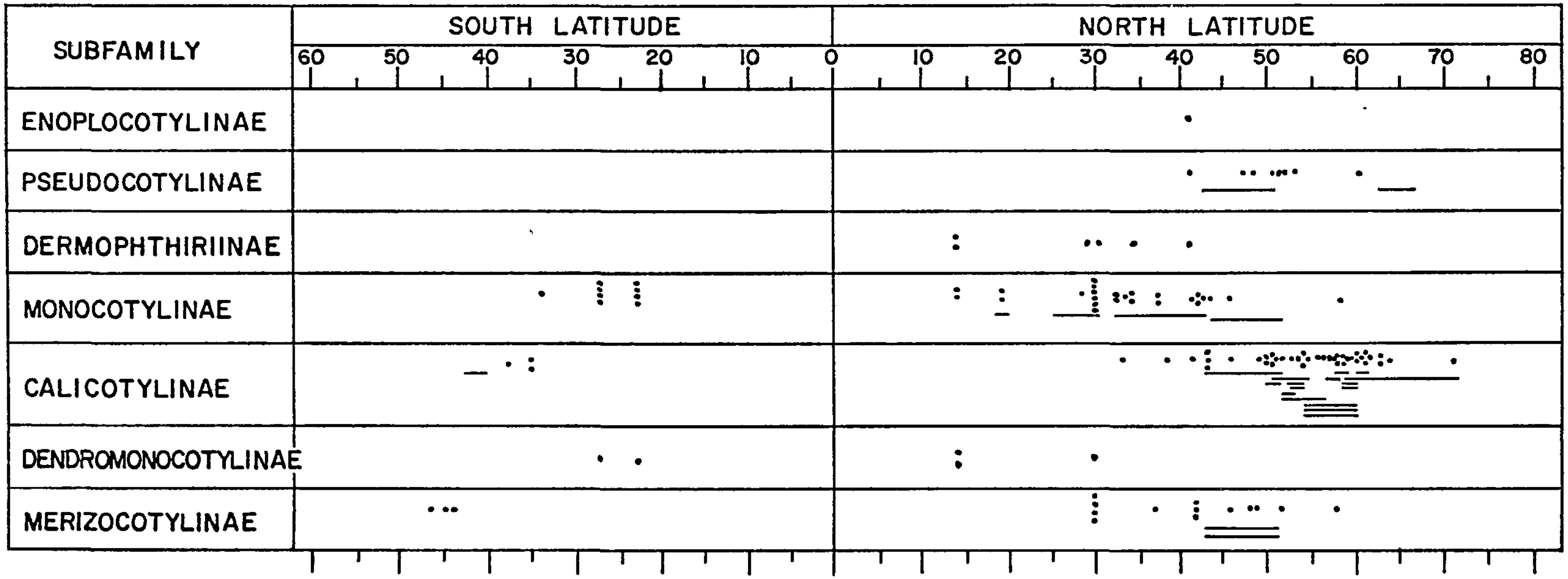


Figure 18 continued

Table 253. Phylogenetic list of current names of hosts of Capsaloidea, authorities followed, and host ranges.

Experimental hosts for Neobenedenia melleni are indicated by a plus (+). Host names in brackets indicate the names of the hosts as listed by the parasitological workers. Hosts given in source publications by generic names only are not included.

LAMINIDAE

Alopias vulpinus (Bailey, 1970)

Circumtropical (Briggs, 1958:234). "Worldwide in tropical and temperate waters; in the western Atlantic from Nova Scotia to northern Argentina and the northern Gulf of Mexico. Pelagic" (Briggs, 1958:248). Mediterranean and Atlantic, extending north to the coast of Britain and exceptionally into Scandinavian waters (Hvass, 1965:143). Southern Ireland and the North Sea to Madeira and the Mediterranean; also from the Cape of Good Hope (Bigelow & Schroeder, 1953a: 33). Oregon to Panama and Chile (Berdegue, 1956:102). Hawaiian Islands, Fanning Island, Polynesia, Japan, Korea, China, New Zealand, Australia, Ceylon, Arabia, and Natal (Bigelow, Schroeder & Farfante, 1948:173).

"Threshers of this same type are also found in the central and western Pacific and in the Indian Ocean. Whether the thresher of the eastern side of the Pacific is identical with that of the Indian Ocean remains to be determined" (Bigelow & Schroeder, 1953a:33).

SCYLIORHINIDAE

Cephaloscyllium isabellum (Bonnaterre) (Stead, 1964)

New Zealand, New South Wales, Victoria, Tasmania, South Australia (Stead, 1964:22). Apparently not in schools (D. Graham, 1956:68).

Galeus melastomus Rafinesque-Schmaltz (Wheeler, 1969)

Mainly in Mediterranean, to the southwestern European coast and further south in the Atlantic to Madeira; but also in the Norwegian fjords north to Tromso; isolated in depths of North Sea, Skagerrak, and Kattegat (Ehrenbaum, 1930 In Joubin, 1929-38:12).

Table 253 continued

Scyliorhinus caniculus (Linnaeus) (Wheeler, 1969)

In Mediterranean as well as on the southwestern and west coasts of Europe; isolated also in the east and southeastern North Sea, in Kattegat and in Scandinavian waters (Ehrenbaum, 1930 In Joubin, 1929-38:10). Adriatic Sea (Soljan, 1948: 54). Senegal (Cadenat, 1950:87).

Scyliorhinus stellaris (Linnaeus) (Wheeler, 1969)

Mediterranean, west European coast, north to Shetlands, North Sea, rare on Scandinavian coast (Ehrenbaum, 1930 In Joubin, 1929-38:9).

CARCHARHINIDAE

Carcharhinus limbatus (Valenciennes) (Bailey, 1970)

Circumtropical (Briggs, 1958:234; Randall, 1968:13). "Worldwide in tropical and temperate waters; in the western Atlantic from southern New England to southern Brazil and the northern Gulf of Mexico. Pelagic" (Briggs, 1958:249). "...extends along our east coast as far as Mossel Bay" (Smith, 1950:41). "...Madeira, Cape Verde Islands and Tropical West Africa (Dakar, and Kribi in Cameroon) in the eastern Atlantic; also eastern tropical Pacific, from Lower California to Peru. A shark (or sharks) is also reported under this same name from Cochin China, India, Red Sea, Seychelles, Madagascar and Natal. But its actual relationship to limbatus of the eastern Pacific and Atlantic cannot be determined until specimens from the different ocean areas have been compared critically" (Bigelow, Schroeder & Farfante, 1948:351). Often in schools at the surface (Perlmutter, 1961:245; Casey, 1964:26).

Carcharhinus maculipinnis (Poey) (Bailey, 1970)

Reported only from Cuba, from Puerto Rico by name only, and from both sides of southern Florida (Bigelow, Schroeder & Farfante, 1948:367). "Tropical and subtropical western Atlantic; may stray north of Cape Hatteras" (Casey, 1964:26).

Carcharhinus obscurus (Lesueur) (Bailey, 1970)

Garrick (1967:89) listed C. obscurus "...as world-wide in the sense of occurring in the Atlantic, Pacific, and Indian Oceans." "Both sides of the Atlantic; in the western

Table 253 continued

Atlantic from southern Massachusetts and Bermuda to southern Brazil and the northern part of the Gulf of Mexico. Pelagic" (Briggs, 1958:249). "From southern California south at least to Mazatlan, Mexico" (Roedel & Ripley, 1950: 57) [under C. lamiella (Jordan & Gilbert)]. "A shark very closely allied to obscurus has been reported under that name in the eastern Atlantic, from Spain to Table Bay, South Africa, including Madeira, the Canaries, the Cape Verdes, Ascension Island, and St. Helena. But we have yet to learn its precise relationship to the obscurus of the western Atlantic" (Bigelow & Schroeder, 1953a:43).

Mustelus antarcticus Günther (Marshall, 1966)

Every state of Australia; New Zealand (Stead, 1964:108).

Mustelus canis (Mitchill) (Bailey, 1970)

Bay of Fundy to Brazil and Uruguay; South Africa. "...seems to be fairly common off the coast of Natal and in the Mediterranean" (Baughman & Springer, 1950:99). In packs (Bigelow & Schroeder, 1953a:36). Bermuda (Bigelow, Schroeder & Farfante, 1948:250).

Mustelus mento Cope (Bigelow, Schroeder & Farfante, 1948)

"Coasts of Peru and Chile; perhaps Argentina" (Bigelow, Schroeder & Farfante, 1948:260).

Mustelus mustelus (Linnaeus) (Wheeler, 1969; Chubb, personal communication)

Mediterranean, around British Isles, Biscay (Wheeler, 1969: 62). South Africa, Red Sea (Fowler, 1956:28). "Eastern Atlantic, South Africa, Red Sea (Fowler, 1941:208). South coast of Africa as far as Natal (Smith, 1950:46). Adriatic (Soljan, 1948:60). Hvass (1965:148) said it is common in the North Atlantic from Cape Cod to Cuba; Hildebrand & Schroeder (1928:48) said Cape Cod to Cuba.

Negaprion brevirostris (Poey) (Bailey, 1970)

Both sides of the Atlantic and recorded from the eastern Pacific; in the western Atlantic from New Jersey to northern Brazil, including the Gulf of Mexico and Central American coast (Böhlke & Chaplin, 1968:19).

Table 253 continued

<u>Prionace glauca</u> (Linnaeus) (Bailey, 1970)

In the warmer parts of all oceans (Bigelow & Schroeder, 1953a:39; Bigelow, Schroeder & Farfante, 1948:293; Lindberg & Legeza, 1959 (1967):70; Berdegue, 1956:107). North Carolina (as a stray to Bay of Fundy) to Uruguay (Bigelow, Schroeder & Farfante, 1948:293); northward to outer Nova Scotia (Bigelow & Schroeder, 1953a:39); Morocco to Cameroon (Bigelow, Schroeder & Farfante, 1948:293); Mediterranean, north to England and Scotland, with strays to Orkneys and southern Norway (Bigelow & Schroeder, 1953a:39); Mexico to Panama in the eastern Pacific (Bigelow, Schroeder & Farfante, 1948:293); British Columbia to Chile (Berdegue, 1956:107); China and Japan to Australia in the western Pacific (Bigelow, Schroeder & Farfante, 1948:293); Indian Ocean, including Red Sea and Arabian Gulf, south to Natal (Bigelow, Schroeder, & Farfante, 1948:293).

<u>Rhizoprionodon acutus</u> (Rüppell) (Springer, 1964)

"This species is widely distributed from the Madeira Islands to Australia and Japan" (Springer, 1964:597). Under <u>Scoliodon sorrakowah</u> (Cuvier): "Mekran, India, Ceylon, Malacca, Singapore, East Indies, Philippines, Indo-China, China, Japan" (Fowler, 1941:141). Yellow Sea, southern Japan and China to Indian Ocean (Lindberg & Legeza, 1967:72).

<u>Rhizoprionodon terraenovae</u> (Richardson) (Bailey, 1970)

"Both sides of the Atlantic; in the western Atlantic from the Bay of Fundy to Uruguay and the northern Gulf of Mexico" (Briggs, 1958:248). Morocco to Cameroon and the Cape Verde Islands (Bigelow & Schroeder, 1953a:41).

SPHYRNIDAE

<u>Sphyrna couardi</u> Cadenat (Gilbert, 1967)

"Apparently restricted to coast of west Africa, in an area centered around the Gulf of Guinea" (Gilbert, 1967:76).

<u>Sphyrna lewini</u> (Griffith & Smith) (Bailey, 1970)

Circumtropical (Gilbert, 1967:76). New Jersey to southern Brazil, including the Gulf of Mexico and Central American coast (Böhlke & Chaplin, 1968:24). Mediterranean and Atlantic, tropical West Africa (Bigelow, Schroeder & Farfante, 1948:419). Senegal (Cadenat, 1950:97).

Table 253 continued

Australia, New Zealand, Tasmania (Marshall, 1965:17). Hawaii (Gosline & Brock, 1965:91). Tropical and subtropical waters of eastern and western Indo-Pacific (Bigelow, Schroeder & Farfante, 1948:419). "The previously recorded occurrence in our Pacific waters is believed to be erroneous" (Bailey, 1970:66). Hunt in packs (Marshall, 1966:163).

Sphyrna zygaena (Linnaeus) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). "...a world-wide anti-tropical distribution; there are no authenticated records from truly tropical waters" (Gilbert, 1967:71). Occurs in cooler waters of both hemispheres, but absent from the intervening tropical waters (Gilbert, 1967:76). Massachusetts Bay and Bermuda to northern Argentina and the northcentral Gulf of Mexico (Briggs, 1958:249). English Channel and Mediterranean to South Africa (Bigelow, Schroeder & Farfante, 1948:442). Known in our area from the Cape eastwards (Smith, 1950:47). Red Sea, Madagascar, Philippines, Japan, New Zealand, Queensland, New South Wales, Victoria, South Australia, Polynesia, Hawaii (Fowler, 1941:220). Ceylon (Munro, 1955:8). Probably in Indian Ocean (Bigelow & Schroeder, 1953a:46). Southern California to Taracapa, Chile (Berdegue, 1956:99). Both coasts of Mexico (Carvallo, 1967:81). Schools (Perlmutter, 1961:249).

SQUALIDAE

Centrophorus squamosus (Bonnaterre) (Wheeler, 1969)

Near edge of continental shelf; north to Iceland, and the western Scottish coast (Wheeler, 1969:65). "Azores and Madeira to the North Sea and Iceland" (Fowler, 1936:78).

Centrophorus uyato (Rafinesque-Schmaltz) (Wheeler, 1969)

Mediterranean and adjacent eastern Atlantic (Wheeler, 1969: 65).

Scymnodon plunketi (Waite) (Stead, 1964)

"Off Kaikoura and the southern coasts of the North Island" (Parrott, 1958:117).

Table 253 continued

Squalus acanthias Linnaeus (Bailey, 1970)

"Both sides of the North Atlantic and North Pacific; in the western Atlantic from Nova Scotia to Cuba" (Briggs, 1958: 250). Southeastern Labrador to North Carolina (Perlmutter, 1961: 250). Mediterranean and North Seas (Hvass, 1965:141). Adriatic (Soljan, 1948: 67). South Africa (Fowler, 1941: 258). Northern Pacific south to Japan, northern China and the Hawaiian Islands (Bigelow, Schroeder & Farfante, 1948: 463). Seas of Tohoku, Hokkaido and southeastern Korea (Okada, 1955:21). Oregon, Washington, British Columbia, southeast Alaska, Gulf of Alaska, Alaska Peninsula, Strait of Juan de Fuca, Prince William Sound; Shelikof Strait (Alverson et al, 1964:129). Schools (Herre, 1953: 31; Hvass, 1965:141).

Squalus lebruni (Vaillant) =? Squalus fernandinus Molina (Paxton & Talbot, personal communication)

Squalus lebruni: New Zealand (D. Graham, 1956: 80; Parrott, 1958:116). Congregate in schools to mate (D. Graham, 1956: 82).
Squalus fernandinus: "Mediterranean and temperate Atlantic (both coasts) possibly reaching as far north as northern Europe" (Wheeler, 1969: 65). "Circumpolar and widespread throughout boreal and cool temperate latitudes of the Southern Hemisphere" (Halstead, 1970:3).

SQUATINIDAE

Squatina squatina (Linnaeus) (Wheeler, 1969)

Mediterranean and warm and temperate parts of the Pacific and Atlantic Oceans (Hvass, 1965:143). Bahia Blanca, Mar de Plata, Montevideo, and along the whole south coast of Argentina (Evermann & Kendall, 1906: 69). "...uncommon on our coast from Cape Cod southward..." (Nichols & Breder, 1927: 22). Around British Isles, North Sea into Skagerrak, south to Canary Islands and Mediterranean (Wheeler, 1969: 75). North to Orkneys (Hvass, 1965:143). Adriatic Sea (Soljan, 1948: 349). Red Sea (Fowler, 1956: 32).

PRISTIOPHORIDAE

Pristiophorus cirratus (Latham) (Stead, 1964)

Philippines to South Africa, Australia, and Tasmania (Herre,

Table 253 continued

1953:33). "At times they mass together in pursuit of small bottom-dwelling fishes and crustaceans..." (Stead, 1964: 129).

RHINOBATIDAE

Aptychotrema banksii (Müller & Henle) (Stead, 1964)

Every state of Australia; New Zealand (Stead, 1964:201).

Rhinobatos productus (Ayres) (Bailey, 1970)

"Central California south to and into the Gulf of California. Rare north of Pt. Conception..." (Roedel & Ripley, 1950:65). Lower California to San Francisco (Barnhart, 1936:11).

[Rhinobatos typus Bennet] (Young, 1967b)

"India, Singapore, East Indies, Western Australia, Northwest Territory, North Australia, Queensland, Melanesia" (Fowler, 1941:320).

Rhynchobatus djiddensis (Forskål) (Herre, 1953)

New South Wales, Queensland, Northern Territory, Western Australia plus coastal waters from southeastern Africa round the coasts of southern Asia to India, Ceylon, the Malay Peninsula, southeastern Asia, Japan, the Philippines, through the waters of Indonesia and out into Melanesia (Stead, 1964:139-140).

Trygonorrhina fasciata Müller & Henle (Stead, 1964)

Southern Queensland, Victoria, Tasmania, South Australia, Western Australia, and New Zealand (Stead, 1964:143). New South Wales (Marshall, 1965:33).

PLATYRHINIDAE

Zanobatus schoenleinii (Müller & Henle) (Fowler, 1936)

Tropical West Africa (Bigelow & Schroeder, 1953b:49). "Eastern Atlantic and Indian Oceans" (Fowler, 1936:103).

Table 253 continued

RAJIDAE

Raja alba Lacépède (Wheeler, 1969)

South and west African coast to the English Channel and southern coast of Ireland; enters the Mediterranean (Clark, 1930 *In* Joubin, 1929-38:53).

Raja asterias De la Roche (Bailey, personal communication)

Mediterranean; French coasts (Clark, 1931 *In* Joubin, 1929-38:35).

Raja batis Linnaeus (Wheeler, 1969)

Atlantic from the Murmansk coast and Iceland to Madeira, and also in the Mediterranean and North Seas (Hvass, 1965: 139). "...reaches Algoa Bay, rather rare here" (Smith, 1950:66).

Raja binoculata Girard (Bailey, 1970)

Northwestern Alaska to southern California (Roedel & Ripley, 1950:70).

Raja brachyura Lafont (Wheeler, 1969; Bailey, personal communication)

British Isles (mostly west coasts), English Channel, Bay of Biscay south to Mediterranean and Madeira (Wheeler, 1969: 104).

Raja circularis Couch (Wheeler, 1969)

Atlantic coasts of Europe in water from 70-275 meters; enters Mediterranean and northern North Sea (Clark, 1929 *In* Joubin, 1929-38:47).

Raja clavata Linnaeus (Wheeler, 1969)

Atlantic from Trondheim to Madeira, in the North, Mediterranean, and Black Seas (Hvass, 1965:139).

Raja eglanteria Bosc (Bailey, 1970)

"Massachusetts Bay to Florida and the northeastern part of the Gulf of Mexico" (Briggs, 1958:250).

Table 253 continued

Raja erinacea Mitchill (Bailey, 1970)

Southern side of the Gulf of St. Lawrence and northern Nova Scotia to Virginia (Bigelow & Schroeder, 1953a: 70). "Massachusetts Bay to Florida" (Perlmutter, 1961: 259).

Raja fullonica Linnaeus (Wheeler, 1969)

European coasts from Madeira to Iceland and Murman coast, Mediterranean (Clark, 1930 In Joubin, 1929-38: 48).

Raja fyllae Lütken (Wheeler, 1969)

From Barents Sea, northern Norway, Iceland, and the Faroe Channel south to Skagerrak (Wheeler, 1969: 87). Barents Sea, Bear Island, western Spitzbergen, Murman coast, northern Norway, Denmark Strait west of Iceland, Davis Strait off west Greenland, Iceland, Skagerrak, slope westward from Gibraltar; in the west to southern slope of Georges Bank (Bigelow & Schroeder, 1953b: 199).

Raja lintea Fries (Wheeler, 1969)

Southern Norwegian Sea, Faroe-Shetland Bank, Skagerrak, Iceland, rarely west coast of Ireland (Wheeler, 1969: 85). On the West Greenland side of Davis Strait (Bigelow & Schroeder, 1953b: 236).

Raja microocellata Montagu (Wheeler, 1969)

West coast of Ireland, south coast of Ireland and England, and European coast south to Morocco (Wheeler, 1969: 102).

Raja miraletus (Linnaeus) (Bailey, personal communication)

Mediterranean and adjacent parts of the Atlantic, north to the French coast and south off the West African coast to Cape Colony (Clark, 1931 In Joubin, 1929-38: 36).

Raja montagui Fowler (Wheeler, 1969)

Atlantic coast of Europe from Morocco to the Shetlands; entering Mediterranean (Clarks, 1930 In Joubin, 1929-38: 37). North to Shetlands (p. 87), Denmark south to Mediterranean (Wheeler, 1969: 99).

Table 253 continued

Raja naevus Müller & Henle (Wheeler, 1969)

Atlantic coast of Europe from Portugal to the Shetlands; entering Mediterranean; northern North Sea; southern Skagerrak to Swedish coast (Clark, 1930 *In* Joubin, 1929-38: 46). Mediterranean, to Danish coast (Wheeler, 1969:97).

Raja nasuta Müller & Henle (Stead, 1964)

New South Wales, Victoria, and Bass Strait near Tasmania; New Zealand (Stead, 1964:153).

Raja nidarosiensis Collett (Wheeler, 1969)

Icelandic and Norwegian waters (Wheeler, 1969:84).

Raja ocellata Mitchill (Bailey, 1970)

"...offing of northern North Carolina to northern Nova Scotia, southern side of the Gulf of St. Lawrence, and Newfoundland Banks" (Bigelow & Schroeder, 1953b:249).

Raja oxyrinchus Linnaeus (Wheeler, 1969)

Moroccan coast to Faroes and Norway; Mediterranean (Clark, 1930 *In* Joubin, 1929-38:57).

Raja radiata Donovan (Bailey, 1970)

South to Irish and central North Seas (p. 86); around Iceland; Skagerrak; coast of Norway; Arctic Seas; Greenland and northern American Atlantic coast (Wheeler, 1969:95). Hudson Bay south to the offing of New York, and as a stray to the offing of Charleston, South Carolina (Bigelow & Schroeder, 1953a:73).

Sympterygia microps (Günther) (Bigelow & Schroeder, 1953b; McEachran, personal communication)

Rio de la Plata; Mar del Plata; Buenos Aires market (Evermann and Kendall, 1906:70). Buenos Aires (Bigelow & Schroeder, 1953b:137).

TRYGONIDAE

Dasyatis americana Hildebrand & Schroeder (Bailey, 1970)

New Jersey to southeastern Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:29).

Table 253 continued

Dasyatis centroura (Mitchill) (Bailey, 1970)

"Both sides of the Atlantic; in the western Atlantic from southern New England to the northern part of the Gulf of Mexico" (Briggs, 1958:251). Mediterranean, eastern Atlantic north to Gulf of Gascony (Wheeler, 1969:106).

[*Dasyatis grànulata* (Macleay)] (Young, 1967b)

North Queensland, New Guinea, Santa Cruz Islands (Marshall, 1965:40). Indo-Pacific (Halstead, 1970:14).

Dasyatis hawaiiensis Jenkins (Gosline & Brock, 1965)

Hawaii (Gosline & Brock, 1965:93).

Dasyatis kuhlii (Müller & Henle) (Stead, 1964)

"...from the east coast of Africa, round the north of the Indian Ocean, through Indian, Malayan, and Indonesian waters, to the Philippines, China and Japan and out into Melanesia, Micronesia and Polynesia. It has managed to find its way round the greater part of the Australian coastline from Western Australia to Queensland and New South Wales; and also to New Zealand" (Stead, 1964:169).

[*Dasyatis marmorata* (Steindachner)] (Euzet & Maillard, 1967)

Cadenat (1950:295) listed this as "*Dasyatis marmorata* (*pastinaca* var. *marmorata*) Steindachner" and reported it from Senegal.

Dasyatis pastinaca (Linnaeus) (Wheeler, 1969)

"Eastern Atlantic and Mediterranean mainly, reaches Natal, not common. Stated also to occur in Indian waters" (Smith, 1950:70). "Eastern North Atlantic to North Sea, Skagerrak and western Baltic; Mediterranean; south to South Africa; also reported from India and East Africa south to Agulhas Bank" (Bigelow & Schroeder, 1953b:344). "It is not yet certain whether the ray reported under this name from the Indian Ocean is identical with *D. pastinaca* of the Mediterranean and eastern Atlantic" (Bigelow & Schroeder, 1953b:344).

Dasyatis sabina (Lesueur) (Bailey, 1970)

"Chesapeake Bay to Florida and the northern part of the Gulf of Mexico" (Briggs, 1958:251).

Table 253 continued

Dasyatis sayi (Lesueur) (Bailey, 1970)

"Southern Massachusetts to southern Brazil and the northern part of the Gulf of Mexico" (Brigss, 1958: 251).

Dasyatis sephen (Forskål) (Herre, 1953)

Sumatra, Malay Peninsula, Indo-China, Philippines; Red Sea to India and Ceylon; through Melanesia and Micronesia in Pacific (Stead, 1964: 166). Red Sea, Arabia, Zanzibar, Cape of Good Hope, Madagascar, Seychelles (Fowler, 1956: 43).

Dasyatis violacea (Bonaparte) (Bailey, 1970)

Pelagic in habit. In the Atlantic known only from the Mediterranean and from the western Atlantic between latitudes 36°46' and 38°35' N, over deep water. Reported in print from Pacific only from Japanese waters and from the Marianas Islands to the east of the Philippines. "...Dr. C. L. Hubbs has informed us...of...specimens of violacea from the Pacific, northwest of the Galapagos, off Lower California, north and south of Hawaii, off the Marshall Islands, and off Japan, all taken on long-lines near the surface..." (Bigelow & Schroeder, 1962: 234). If the purpurea as reported by Smith is a synonym of violacea, then "...violacea can justly be characterized as cosmopolitan in all the great oceans in temperate and tropical latitudes for which it doubtless has its pelagic habit to thank" (Bigelow & Schroeder, 1962: 234). This species has "...a surface-layer, open-ocean distribution," and its "...range...in the Atlantic includes the region of South Africa and extends from 46°10'N to 38°18'S" (Wilson & Beckett, 1970: 696). The purpurea specimen that Bigelow & Schroeder (1962) referred to was "...found to be D. violacea" (Wilson & Beckett, 1970: 696).

Taeniura grabata (Geoffroy Saint-Hilaire) (Fowler, 1936, 1956)

"Red Sea, Mediterranean, and eastern Atlantic" (Fowler, 1936: 130).

Taeniura lymma (Forskål) (Herre, 1953)

Red Sea to Fiji (Herre, 1953: 48). "Occurs throughout almost the whole Indo-Pacific" (Smith, 1950: 70). China Sea, south of Singapore, Australia, Red Sea, part of east coast of Africa, India, Indonesia, the Philippines, Siam, Melanesia and Polynesia, New Guinea (Stead, 1964: 162). Ceylon (Munro, 1955: 13). North Queensland, Northern Australia, South Africa (Marshall, 1965: 41).

Table 253 continued

<u>Urolophoides giganteus</u> Lindberg (Lindberg & Legeza, 1959 (1967))

Peter the Great Bay (Basargin Cape); Askold Island (Lindberg & Legeza, 1959 (1967):133).

<u>Urolophus halleri</u> Cooper (Bailey, 1970; Kanazawa, personal communication)

"Point Conception to Panama Bay" (Roedel & Ripley, 1950:75).

<u>Urolophus testaceus</u> (Müller & Henle) (Marshall, 1965)

New South Wales, Victoria, South Australia, southern Queensland (Stead, 1964:175). Tasmania (Bigelow & Schroeder, 1953b:419).

MYLIOBATIDAE

<u>Aetobatus narinari</u> (Euphrasen) (Bailey, 1970)

"Worldwide in tropical and temperate waters" (Briggs, 1958: 251). Tropical and warm temperate regions of the Atlantic, from Angola to near Cape Verde in the east; southern Brazil to North Carolina and straying to Chesapeake Bay in the west; also in corresponding thermal belts on both sides of the Pacific including its island groups, in the East Indian-Philippine-Australian region, in the Indian Ocean around India, and along East Africa to Knysna, also in the Red Sea (Bigelow & Schroeder, 1953b:461). Occurs singly, in pairs, or in schools (p. 459). Seldom encountered more than a mile or two from land (p. 460).

<u>Myliobatis aquila</u> (Linnaeus) (Wheeler, 1969)

In the tropical Atlantic, the Mediterranean and along the southwestern coasts of Europe (Hvass, 1965:139). Senegal (Cadenat, 1950:115).

<u>Myliobatis californica</u> Gill (Bailey, 1970)

Lower California to Cape Mendocino (Barnhart, 1936:14).

<u>Myliobatis freminvillei</u> Lesueur (Bailey, 1970)

"Cape Cod to Rio de Janeiro and the northern part of the Gulf of Mexico" (Briggs, 1958:251).

Table 253 continued

Pteromyleus bovina (Geoffroy Saint-Hilaire) (Halstead, 1970)

Adriatic (Soljan, 1948: 75). "An Atlantic warm water form which penetrates our area as far as Delagoa Bay, but is not often seen" (Smith, 1965: 69). "Eastern Atlantic, Mediterranean Sea" (Halstead, 1970: 19).

Rhinoptera bonasus (Mitchill) (Bailey, 1970)

"Cape Cod to Rio de Janeiro and the northern part of the Gulf of Mexico" (Briggs, 1958: 251). In the Mediterranean (Hvass, 1965: 139). Sometimes in large schools (Gordon, 1960: 19; Perlmutter, 1961: 269).

Rhinoptera javanica Müller & Henle (Herre, 1953)

"The Philippines and East Indies, west to India and Ceylon, and north to China" (Herre, 1953: 52). Has been taken in southern Queensland (Marshall, 1966: 168). South Africa to Pacific (Smith & Smith, 1963: 6). Listed as from the west coast of Africa (Cadenat, 1950: 115). "Central tropical Indo-Pacific, reaches Delagoa Bay" (Smith, 1950: 504).

CHIMAERIDAE

Chimaera monstrosa Linnaeus (Wheeler, 1969)

Deep water; southern coast of Iceland and deep waters to Norway, Skagerrak; off west coast of British Isles, south to western Mediterranean Sea (Wheeler, 1969: 113). About the Cape of Good Hope (Smith, 1950: 76).

ACIPENSERIDAE

Acipenser baeri Brandt (Berg, 1948 (1962))

"Rivers of Siberia from the Ob' to the Kolyma. Occasionally in the Pechora. Present in the gulfs of the Ob', Taz, Yenisei, and Khatanga" (Berg, 1948 (1962): 85).

HYBRID: Acipenser ruthenus n. marsiglii Brandt x Acipenser baeri Brandt found in Ob' and Yenisei (Berg, 1948 (1962): 90).

Acipenser brevirostrum Lesueur (Bailey, 1970)

Only locality records are from Provincetown and Waquoit, Mass.; from Hudson River, N.Y.; from Delaware Bay and River; and from Charleston, S.C. (Bigelow & Schroeder, 1953a: 85). "Atlantic seaboard of North America, from New Brunswick, Canada, to Florida, mostly in rivers, including the Connecticut, Hudson, Delaware, and Potomac" (Vladykov & Greeley, 1963: 39).

Table 253 continued

Acipenser güldenstädti Brandt (Berg, 1948 (1962))

Northern Caspian Sea, entering rivers to spawn. Volga, Kama, and other rivers (Berg, 1948 (1962):76). Berg (1948 (1962):79,81) listed two subspecies for this fish: Acipenser güldenstädti persicus Borodin, with the main area of distribution being the Kura and the Sefid-rud (p. 80); and, Acipenser güldenstädti colchicus V. Marti, being in the Black Sea and the Sea of Azov and their rivers (p. 81). "Persian and Siberian rivers, Caspian Sea, Danube" (Halstead, 1967:903).

HYBRIDS: Huso huso (Linnaeus) x Acipenser güldenstädti Brandt is reported for the Danube and the western coasts of the Caspian Sea (Berg, 1948 (1962):61).

Acipenser nudiventris Lovetzky x A. güldenstädti Brandt occurs (Berg, 1948 (1962):67).

A. ruthenus Linnaeus x A. güldenstädti Brandt is not uncommon in the Volga (Berg, 1948 (1962):74,75).

Acipenser medirostris Ayres (Bailey, 1970)

"Northern part of the Pacific Ocean; along the American coast, known from Monterey (south of San Francisco) to the Columbia River, but probably also present in the Bering Sea; along the coast of Asia found rarely in northern Japan (Hokkaido), Sakhalin, Kunsan (Korea), Peter the Great Bay, the Suchan River, the Adzhemi and Kopi Rivers, the Datta (Tumnin) River; finally a single specimen is known from the mouth of the Amur" (Berg, 1948 (1962):95). "Southern Alaska to California; enters salt water" (Vladykov & Greeley, 1963:36).

Acipenser nudiventris Lovetzky (Berg, 1948 (1962))

Black, Caspian, and Aral Seas, entering rivers. Only member of sturgeon family in the Aral Sea (Berg, 1948 (1962):63).

HYBRIDS: Huso huso (Linnaeus) x A. nudiventris occurs quite frequently in the lower reaches of the Kura (Berg, 1948 (1962):61).

Acipenser stellatus Pallas x A. nudiventris found in Ural, Kura, and Sefid-rud (Berg, 1948 (1962):67).

Acipenser güldenstädti Brandt x A. nudiventris occurs (Berg, 1948 (1962):67).

Table 253 continued

<u>Acipenser</u> <u>oxyrhynchus</u> Mitchill (Bailey, 1970)

"Coastal waters from the St. Lawrence River to the Gulf of Mexico, running up into rivers to spawn; reported from Hudson Bay" (Bigelow & Schroeder, 1953a:81). "The regular range of A. oxyrhynchus is limited to the Atlantic coast of North America and the Gulf of Mexico. The northern subspecies, A. oxyrhynchus oxyrhynchus, occurs from Hamilton Inlet on the Atlantic coast of Labrador and the Gulf of St. Lawrence to eastern Florida. In the Gulf of Mexico is found the southern subspecies A. oxyrhynchus desoti" (Vladykov & Greeley, 1963:54).

<u>Acipenser</u> <u>stellatus</u> Pallas (Berg, 1948 (1962))

"Northern part of the Caspian Sea, the Black Sea, and the Sea of Azov. Anadromous. Individual specimens sometimes penetrate the Maritsa and even the Adriatic Sea, where they are taken near Zara (Zadar)" (Berg, 1948 (1962):97). A subspecies, Acipenser stellatus stellatus natio cyrensis Berg, is found in the South and Central Caspian, entering rivers (Berg, 1948 (1962):100,102). "Black Sea, Sea of Azov and their rivers, Caspian Sea, Ural and Kur Rivers" (Halstead, 1967:904).

HYBRIDS: Huso huso (Linnaeus) x A. stellatus...a rare hybrid in Danube, Volga, and Ural rivers (Berg, 1948 (1962):61).

A. nudiventris x A. stellatus found in Ural, Kura, and Sefid-rud (Berg, 1948 (1962):67).

A. ruthenus Linnaeus x A. stellatus is not uncommon in Volga, Don, and Danube (Berg, 1948 (1962):75).

<u>Acipenser</u> <u>sturio</u> Linnaeus (Wheeler, 1969, personal communication)

"Along the entire coastline of Europe from North Cape to the Baltic, the Mediterranean, and the Black Seas. Along the Atlantic coast of North America from Hudson Bay to South Carolina. Enters the rivers" (Berg, 1948 (1962):93). (North American population herein considered as A. oxyrhynchus Mitchill. See above.)

<u>Acipenser</u> <u>transmontanus</u> Richardson (Bailey, 1970)

East coast of the Pacific from Alaska to California (Hvass, 1965:131). "Southern Alaska to California; enters salt water" (Vladykov & Greeley, 1963:36).

Table 253 continued

Huso huso (Linnaeus) (Berg, 1948 (1962))

Danube and rivers of Russia; Sea of Azov; Black Sea; Caspian Sea (p. 56); Adriatic Sea (River Po) (Berg, 1948 (1962):57). "Black Sea, Sea of Azov, Caspian Sea, Mediterranean Sea, and rivers that drain into these seas" (Halstead, 1967:904).

HYBRIDS: Acipenser nudiventris x Huso huso occurs quite frequently in the lower reaches of the Kura (Berg, 1948 (1962):61).

Acipenser stellatus x Huso huso is rare, and occurs in the Danube, Volga, and Ural (Berg, 1948 (1962):61).

Acipenser güldesntädti x Huso huso is reported for the Danube and the western coasts of the Caspian Sea (Berg, 1948 (1962):61).

SALMONIDAE

Oncorhynchus masu (Brevoort) (Berg, 1948 (1962))

"From the mouth of the Amur to Rusan. Sakhalin (Tym' and Poronai Rivers), Japan (Hokkaido, Hondo). Western coast of Kamchatka" (Berg, 1948 (1962):211).

CYPRINIDAE

Abramis sapa (Pallas) (Berg, 1949 (1964))

Basins of Danube, Dniester, Bug, Dnieper, Don, Kuban', Volga, Kama, Vyatka, Ural, and Terek (Berg, 1949 (1964):337).

Subspecies of Abramis sapa bergi Belyaeff in South and Central Caspian; entering all the rivers (Berg, 1949 (1964):337). Variety of Abramis sapa bergi natio aralensis Tjapkin in the Aral Sea (Berg, 1949 (1964):338).

Aspius aspius (Linnaeus) (Berg, 1949 (1964))

Central Europe (basins of the North and Baltic Seas) east to the Ural and the Embra Rivers. Not reaching to Basin of the Rhone. Absent south of Danube basin, and from Italy, France, Switzerland, England, and Denmark (Berg, 1949 (1964): 141).

Table 253 continued

HYBRID: Aspius aspius (L) x Leuciscus idus (Linnaeus): Delta of the Volga (Berg, 1949 (1964):99-100).

Subspecies: Aspius aspius taeniatus (Eichwald): Southern portion of the Caspian Sea; entering Kura and the Araks and other rivers (Berg, 1949 (1964):143).

Variety: Aspius aspius taeniatus *natio* iblioides (Kessler): Entire coast of Aral Sea, entering rivers (Berg, 1949 (1964):145).

HYBRID: Aspius aspius taeniatus natio iblioides (Kessler) x Leuciscus idus oxianus (Kessler): In the Amu-Darya near Turt-Kul' (Petroaleksandrovsk) and further downstream (Berg, 1949 (1964):101).

Barbus barbus (Linnaeus) (Berg, 1949 (1964))

Central Europe; eastward to rivers near Liepaja. Replaced by subspecies borysthenicus in the basin of the upper and middle Dniester (Berg, 1949 (1964):233).

Subspecies: Barbus barbus borysthenicus Dybowski: Upper Dniester; and basins of the Bug and the Dniepér (Berg, 1949 (1964):234).

Chalcalburnus chalcoides (Güldenstädt) (Berg, 1949 (1964))

Caspian Sea, entering rivers--mainly the Kura and the Terek (Berg, 1949 (1964):285).

HYBRIDS: Chalcalburnus chalcoides (G.) x Vimba vimba persa (Gmelin): (Berg, 1949 (1964):287).

Chalcalburnus chalcoides (G.) x Leuciscus cephalus orientalis (Nordmann): Near Kayakent in Daghestan (Berg, 1949 (1964):91).

Subspecies: Chalcalburnus chalcoides danubicus (Antipa): Lower Danube as far as Bulgaria; Bulgarian tributaries of Danube (Berg, 1949 (1964):288).

Chalcalburnus chalcoides schischkovi Drensky: Sea of Azov and Black Sea; enters rivers (Berg, 1949 (1964):289).

HYBRID: Chalcalburnus chalcoides schischkoffi Drensky x Leuciscus cephalus orientalis (Nordmann): Basin of the Kuban' (Berg, 1949 (1964):91).

Table 253 continued

Chalcalburnus chalcoides mentoides (Kessler): Salgir and Alma Rivers (Berg, 1949 (1964): 290).

Chalcalburnus chalcoides derjugini (Berg): West Transcaucasia: from Sochi to the Coruh basin--Cherynaya River, Vel'yaminovka River (Berg, 1949 (1964): 291).

Chalcalburnus chalcoides aralensis (Berg): All coasts of Aral Sea; lower reaches of the Syr-Darya and the Amu-Darya; Zeravshan River (Berg, 1949 (1964): 293).

HYBRID: Chalcalburnus chalcoides aralensis (Berg) x Rutilus rutilus aralensis (Berg): Single occurrence in Aral Sea (Berg, 1949 (1964): 61).

Rutilus rutilus caspicus (Jakowlew) (Berg, 1949 (1964))

All coasts of Caspian Sea; does not migrate far upstream (Berg, 1949 (1964): 42).

Varieties: Rutilus rutilus caspicus natio kurensis Berg: Kizilagach Bay; enters rivers; ascends Kura to Zardob and Kerpikent and the Araks to the Sary-su region (Berg, 1949 (1964): 55).

Rutilus rutilus caspicus natio knipowitschi Pravdin: Southwestern Caspian; enters rivers (Berg, 1949 (1964): 56).

Rutilus rutilus caspicus natio tscharchalensis Berg: Lake Charkhal (Berg, 1949 (1964): 57).

ARIIDAE

+ Arius felis (Linnaeus) (*Kanazawa, personal communication*)

"Atlantic slope of North America from Cape Cod to Yucatan, entering rivers in the southern part of its range" (Miller, 1966: 795).

MURAENIDAE

Muraena helena Linnaeus (Wheeler, 1969)

Mediterranean and west coast of Europe through the English Channel (Wheeler, 1969: 226). Mediterranean and adjacent parts of the Atlantic (Hvass, 1965: 83). Senegal (Cadenat, 1950: 133).

Table 253 continued

CONGRIDAE

Astroconger myriaster (Brevoort) (Okada, 1955)

Coast of Japan, from Hokkaido to Kyushu, and Korea (Okada, 1955:102).

HOLOCENTRIDAE

+ Holocentrus ascensionis (Osbeck) (Bailey, 1970)

Both sides of the Atlantic; on the western side from Bermuda, the Bahamas and Florida to southeastern Brazil, including the Gulf of Mexico and Central American coast (Böhlke & Chaplin, 1968:145). Islands of the tropical middle and eastern Atlantic (Randall, 1968:48).

MUGILIDAE

Liza auratus (Risso) (Wheeler, 1969; Chubb, personal communication)

Western coasts of Europe from southern Norway to the Canary Islands, and in the Mediterranean and Black Seas (Hvass, 1965:62). "Eastern Atlantic and Mediterranean, from Scandinavia to South Africa" (Fowler, 1936:590).

Liza ramada (Risso) (Wheeler, 1969; Chubb, personal communication)

Skagerrak and east coasts of British Isles south to Mediterranean (Wheeler, 1969:466). "Occurs in abundance on the south-west coast, about the Cape, and to beyond Agulhas... This species extends to Natal and further north, but is progressively less abundant. It is stated to occur right round Africa" (Smith, 1950:322).

SERRANIDAE

Caprodon schlegeli (Günther) (Katayama, 1960)

Chile, New Zealand, New South Wales, Hawaiian Islands, Formosa, Korea, southern Japan (Katayama, 1960:137).

Table 253 continued

+ <u>Centropristis</u> <u>striata</u> (Linnaeus) (Bailey, 1970)

Coastal waters of eastern United States from northern Florida to Cape Cod with strays to Maine (Migdalski, 1958: 340).

+ <u>Cephalopholis</u> <u>fulva</u> (Linnaeus) (Bailey, 1970)

Bermuda, the Bahamas and south Florida to southeastern Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:264).

<u>Cratinus</u> <u>agassizii</u> Steindachner (Norman, 1966)

Galapagos Islands and coast of Peru (Norman, 1966:237).

+ <u>Dermatolepis</u> <u>inermis</u> (Valenciennes) (Bailey, 1970; Böhlke, personal communication; Kanazawa, personal communication)

"Tropical western Atlantic. Not common" (Randall, 1968:69). "Bermuda and West Indies. Rare at Bermuda" (Beebe & Tee-Van, 1933 (1970):125).

+ <u>Dermatolepis</u> <u>punctatus</u> Gill (Böhlke, personal communication; Kanazawa, personal communication)

Baja California, from Point Pescadero to the Revillagigedo Islands; penetrating the Gulf of California (Berdegue, 1956:279).

+ <u>Epinephelus</u> <u>adsensionis</u> (Osbeck) (Bailey, 1970)

Both sides of the Atlantic; on the western side from New England and Bermuda to southeastern Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:281). Mediterranean; from the Cape to Knysna (Smith, 1950:197).

<u>Epinephelus</u> <u>aeneus</u> (Geoffroy Saint-Hilaire) (Bailey, personal communication; Kanazawa, personal communication; Steinitz, personal communication)

Mediterranean and West Africa (Irvine, 1947:129). Bay of Cocody, Ebrie Lagoon--Ivory Coast (Daget & Iltis, 1965:220). "Mediterranean and West Africa, south to Angola" (Fowler, 1936:757).

Table 253 continued

Epinephelus akaara (Temminck & Schlegel) (Katayama, 1960)

China, Korea, southern Japan (Katayama, 1960: 82).

Epinephelus analogus Gill (Bailey, 1970)

"From Gulf of California to Panama (Revilla-Gigedo and Galapagos Islands)" (Berdegue, 1956: 278).

Epinephelus guaza (Linnaeus) (Wheeler, 1969; Böhlke, personal communication; Steinitz, personal communication)

"Mediterranean; both sides of the tropical and subtropical Atlantic; coasts of south-east Africa" (Irvine, 1947: 130). Knysna to Natal (Smith, 1950: 195). Mediterranean, rare north of Biscay (Wheeler, 1969: 311).

+ Epinephelus guttatus (Linnaeus) (Bailey, 1970)

Bermuda and North Carolina to Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968: 282).

+ Epinephelus itajara (Lichtenstein) (Bailey, 1970)

"Both coasts of tropical America; in the western Atlantic from Bermuda and Florida to Rio de Janeiro and the northern Gulf of Mexico" (Briggs, 1958: 273). In Pacific along Lower California, the Gulf of California, south to Panama (Migdalski, 1958: 346).

Epinephelus labriformis (Jenyns) (Berdegue, 1956)

"From the Gulf of California (Cabo San Lucas) to the Galapagos Islands and Peru" (Berdegue, 1956: 277).

Epinephelus malabaricus (Bloch & Schneider) (Herre, 1953)

"Red Sea, east coast of Africa to the Philippines, China, Formosa and southern Japan, Kochi Prefecture" (Katayama, 1960: 88).

+ Epinephelus morio (Valenciennes) (Bailey, 1970)

"Bermuda and Massachusetts to Rio de Janeiro, and widespread in the Gulf of Mexico" (Briggs, 1958: 272).

Table 253 continued

<u>Epinephelus septemfasciatus</u> (Thunberg) (Katayama, 1960)

Australia; China; southern Japan, north to vicinity of Tokyo on Pacific coast and to Niigata on Japan Sea coast (Katayama, 1960:108).

+ <u>Epinephelus striatus</u> (Bloch) (Bailey, 1970)

Bermuda, the Bahamas and North Carolina to the 'hump' of Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:280).

+ <u>Morone saxatilis</u> (Walbaum) (Bailey, 1970)

"Gulf of St. Lawrence to northern Florida and the northeastern Gulf of Mexico" (Briggs, 1958:273). In the Gulf of Mexico tributaries of western Florida, Alabama, Mississippi, and Louisiana (Migdalski, 1958:326). Introduced along Pacific coast of California (Hvass, 1965:22). Grays Harbor, Washington to Los Angeles County, California (Bigelow & Schroeder, 1953a:395). "Southern California to the Columbia River" (Roedel, 1948:52). Orange and San Diego Counties in southern California to Grays Harbor, Washington (Migdalski, 1958:336). (See Table 81, footnote 5.) Smaller fish school; larger fish found singly or in small schools (Perlmutter, 1961:366).

+ <u>Mycteroperca interstitialis</u> (Poey) (Bailey, 1970)

From New England and Bermuda to the 'hump' of Brazil (Böhlke & Chaplin, 1968:284).

<u>Mycteroperca olfax</u> (Jenyns) (Berdegue, 1956)

Gulf of California to Panama (Berdegue, 1956:276). Panama to Galapagos Islands (Migdalski, 1958:352).

<u>Mycteroperca pardalis</u> (Gilbert) (Berdegue, 1956)

Gulf of California from Cape San Lucas, Mexico to Banderas Bay (Migdalski, 1958:351).

+ <u>Paralabrax maculatofasciatus</u> (Steindachner) (Bailey, 1970)

From southern California to Mazatlan, Mexico, and the Gulf of California (Migdalski, 1958:357).

Table 253 continued

+ <u>Paranthias</u> <u>furcifer</u> (Valenciennes) (Bailey, 1970)

Both sides of the Atlantic and the eastern Pacific; on the western side from Bermuda to Ilha Victoria, Brazil, and the northeastern Gulf of Mexico (Briggs, 1958:273). Usually seen as small schools (Randall, 1968:85).

+<u>Petrometopon</u> <u>cruentatum</u> (Lacépède) (Bailey, 1970)

Bermuda, the Bahamas and Florida to the 'hump' of Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:265).

<u>Plectropomus</u> <u>maculatus</u> (Bloch) (Paxton & Talbot, personal communication)

East coast of Africa to the Philippines, China, Pelew Islands, and Tuamotu Archipelago (Herre, 1953:363). Queensland and Western Australia (Parrott, 1959:47).

<u>Serranus</u> <u>cabrilla</u> (Linnaeus) (Wheeler, 1969; Steinitz, personal communication)

Northern limits of range in western English Channel; but recorded in the North Sea; Mediterranean (Wheeler, 1969: 316). Adriatic Sea (Soljan, 1948:286). In 1884 in Red Sea as far south as Massawa (Ben-Tuvia, 1966:257). Mauritania--Senegal (Cadenat, 1950:303). At Knysna and in Natal (Smith, 1950:193). Mediterranean, English Channel to Canaries, Red Sea (Chevey, 1931 <u>In</u> Joubin, 1929-38:215).

THERAPONIDAE

+ <u>Therapon</u> <u>jarbua</u> (Forskål) (Marshall, 1965)

"Tropical Indo-Pacific from Africa east to Fiji and Samoa, north to Japan, south to Australia" (Herre, 1953:429). Sometimes seen near the estuary forming a school (Okada, 1955:223).

LATILIDAE

+ <u>Malacanthus</u> <u>plumieri</u> (Bloch) (Bailey, 1970)

Bermuda, the Bahamas and South Carolina to Brazil and Ascension Island, including the Gulf of Mexico and western Caribbean (Böhlke & Chaplin, 1968:314).

Table 253 continued

POMATOMIDAE

+ _Pomatomus saltatrix_ (Linnaeus) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). In the western Atlantic from Nova Scotia and Bermuda to Argentina (40° S.), and widespread in the Gulf of Mexico (Briggs, 1958:276). Mediterranean and waters off northwestern and southern Africa; along Madagascar, southern Africa, and eastern Indian Ocean; off Malay Peninsula; along southern Australia and New Zealand (Migdalski, 1958:191). Not in central and eastern Pacific (Hvass, 1965:29). Travel in schools (Migdalski, 1958:193).

RACHYCENTRIDAE

Rachycentron canadum (Linnaeus) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). Bermuda and Massachusetts to Argentina (35° S.), and in the Gulf of Mexico (Briggs, 1958:276). Off Cape Verde Islands, Senegal, and Guinea (northwestern Africa) (Migdalski, 1958:212). Southern Japan, East China Sea, the Korean coast and Formosa to the Indian Ocean and Atlantic Ocean (Okada, 1955:177). Queensland and New South Wales (Marshall, 1965:172). "All warm seas except eastern Pacific"(Herre, 1953:287). Often go about in large shoals (Hvass, 1965:28).

CARANGIDAE

+ _Caranx fusus_ (Geoffroy Saint-Hilaire) (Randall, 1968)

"Both sides of the Atlantic; in the western Atlantic from Nova Scotia and Bermuda to Sao Paulo, Brazil, and throughout the Gulf of Mexico. Pelagic" (Briggs, 1958:277). Senegal, Togo (Cadenat, 1955:302). Usually occurs in schools (Randall, 1968:109). "...often found in its northern range in mixed schools with the jack crevally" [_C. hippos_] (Migdalski, 1958:284). "Off Florida it may be mixed with groups of runners" [_C. ruber_] (Migdalski, 1958:284).

+ _Caranx hippos_ (Linnaeus) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). "Worldwide in tropical and temperate waters; in the western Atlantic from Nova

Table 253 continued

Scotia to Uruguay (35° 30' S.) and throughout the Gulf of Mexico" (Briggs, 1958: 277). African Gold Coast (p. 282), Gulf of California south to Peru, Hawaii, western Pacific (Migdalski, 1958: 283). Typically it is a schooling species, but large fish tend to become solitary (Böhlke & Chaplin, 1968: 333).

Caranx lutescens (Richardson) (Kanazawa, personal communication)

New Zealand. (See Table 93, footnote 1.)

+ Naucrates ductor (Linnaeus) (Bailey, 1970)

Circumtropical (Briggs, 1958: 234). Nova Scotia and Bermuda to Argentina (35° 30' S.) and the northeastern Gulf of Mexico (Briggs, 1958: 277). Associated with sharks (Marshall, 1966: 191).

Seriola aureovittata Temminck & Schlegel (Okada, 1955)

Warmer seas around Japan, including the Korean coast; rare north of Kinkazan, Miyagi Prefecture (Pacific coast) and Tsugaru Strait (Sea of Japan) (Okada, 1955: 167). Hawaii (Gosline & Brock, 1965: 171). "Hawaii to Japan" (Fowler, 1928 (1967): 142).

Seriola quinqueradiata Temminck & Schlegel (Okada, 1955)

Each side of Japan from Hokkaido to Formosa, and the east coast of Korea. Migrates in schools (Okada, 1955: 166).

+ Trachinotus carolinus (Linnaeus) (Bailey, 1970)

"Bermuda and Massachusetts to Santos, Brazil and throughout the Gulf of Mexico" (Briggs, 1958: 276).

+ Trachinotus falcatus (Linnaeus) (Bailey, 1970)

Both sides of the Atlantic; on the western side from New England to Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968: 338). Senegal, Sierra Leone, Togo, Dahomey (Cadenat, 1950: 302). Young move in small schools; adults are more solitary (Böhlke & Chaplin, 1968: 338).

+ Trachinotus goodei Jordan & Evermann (Bailey, 1970)

"Both sides of the Atlantic; in the western Atlantic from Bermuda and Massachusetts to Argentina (39° S.), and

Table 253 continued

widespread in the Gulf of Mexico" (Briggs, 1958:276). Eastern Atlantic (Randall, 1968:114). Schools (Böhlke & Chaplin, 1968:339).

+ Vomer setapinnus (Mitchill) (Bailey, 1970)

"Eastern Pacific and both sides of the Atlantic; in the western Atlantic from Nova Scotia to Uruguay and throughout the Gulf of Mexico" (Briggs, 1958:277). Distinguishable race on the west coast of Africa (Nichols & Breder, 1927:114). Senegal, Togo, Dahomey (Cadenat, 1950:302). Tropical portion of the Pacific coast of America (Nichols & Breder, 1927:114).

BRAMIDAE

Brama brama Bonnaterre (Bailey, 1970; Mead, personal communication)

Mid-water fish; southern coast of Ireland, southern Norway and Sweden, Skagerrak, British Isles, Mediterranean, south Atlantic (Wheeler, 1969:338). "Taken at Woods Hole and on the Grand Banks" (Bigelow & Schroeder, 1953a:362). Newfoundland, Bermuda (Le Gall, 1933 In Joubin, 1929-38:229).

CORYPHAENIDAE

Coryphaena hippurus Linnaeus (Bailey, 1970)

Circumtropical (Briggs, 1958:234). "Worldwide in tropical waters; in the western Atlantic from Nova Scotia and Bermuda to Brazil and throughout the Gulf of Mexico. Pelagic" (Briggs, 1958:278). West African coast, southern Italy and Sicily (Migdalski, 1958:83). East Pacific from Columbia River, Oregon to Peru and Chile (Migdalski, 1958:84). Middle of Japan southwards to the East Indies and eastward to the Hawaiian Islands (Okada, 1955:154). Western Australia, South Australia, New South Wales, Queensland, Northern Territory (Scott, 1962:184). Red Sea, India, Malay Archipelago, Sumatra, Sumba, Borneo, Celebes, Sulu Province, Amboina (Herre, 1953:257-258). Schools (Migdalski, 1958:85).

Table 253 continued

LUTIANIDAE

Aphareus rutilans Cuvier & Valenciennes (Herre, 1953)

Tropical Indo-Pacific, Red Sea, Amboina, Hawaii, Sulu Province, Celebes, New Guinea, Philippines, Java (Herre, 1953: 404). Ceylon (Munro, 1955: 139). Deep water; Africa to Pacific (Smith & Smith, 1963: 27). Occasionally taken in North Queensland (Marshall, 1965: 189).

Aprion virescens Cuvier & Valenciennes (Herre, 1953)

"Tropical Indo-Pacific, from Hawaii and the Society Islands to Queensland, the Philippines, Ceylon, Seychelles, and Mauritius" (Herre, 1953: 401).

Etelis carbunculus Cuvier & Valenciennes (Herre, 1953)

"...Madagascar to Australia and Hawaii, and also in the Atlantic Ocean." North to middle part of Japan (Kamohara, 1954: 278). West Indies (Herre, 1953: 403). South Africa to Pacific (Smith & Smith, 1963: 27).

+ Lutjanus analis (Cuvier) (Bailey, 1970)

New England and the Bahamas to southeastern Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968: 352). Introduced to Bermuda (Randall, 1968: 124). As a rule, do not school (Migdalski, 1958: 392).

+ Lutjanus apodus (Walbaum) (Bailey, 1970)

Both sides of the Atlantic; on the western side from New England and Bermuda to Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968: 356). Off West Africa (Migdalski, 1958: 396). School during day--disperse at night for feeding (Migdalski, 1958: 397).

Lutjanus argentimaculatus (Forskål) (Herre, 1953)

"Tropical Indo-Pacific, north to the RiuKiu Islands, south to Australia, east to the Tuamotus" (Herre, 1953: 381).

+ Lutjanus griseus (Linnaeus) (Bailey, 1970)

Both sides of the Atlantic; on the western side from New England and Bermuda to southeastern Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968: 357). Littoral in the tropical Atlantic (Randall, 1968: 122). Schools (Migdalski, 1958: 394).

Table 253 continued

+ *Lutjanus jocu* (Bloch & Schneider) (Bailey, 1970)

New England to the 'hump' of Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:355). Introduced to Brazil (Randall, 1968:124).

Lutjanus johni (Bloch) (Paxton & Talbot, personal communication)

"Coast of Africa to the Philippines, China, Australia, and Tahiti" (Herre, 1953:388).

+ *Lutjanus synagris* (Linnaeus) (Bailey, 1970)

North Carolina and Bermuda to Brazil, including the Gulf of Mexico (Randall, 1968:125). Often schools with *L. griseus* (Migdalski, 1958:397).

+ *Lutjanus viridis* (Valenciennes) (Halstead, 1967; Kanazawa, personal communication)

"Gulf of California to Panama, Galapagos Islands" (Halstead, 1967:100).

+ *Ocyurus chrysurus* (Bloch) (Bailey, 1970)

Both sides of the Atlantic; on the western side from Bermuda and Massachusetts to Rio de Janeiro, including the Gulf of Mexico (Briggs, 1953:279). Cape Verde Islands (Randall, 1968:128). Schools (Migdalski, 1958:399).

Pristipomoides microlepis (Bleeker) (Herre, 1953)

Bourbon, the Philippines, East Indies, and the Hawaiian Islands (Herre, 1953:402). South Africa (Gosline & Brock, 1965:327). Great Barrier Reef (Marshall, 1965:189).

LOBOTIDAE

+ *Lobotes surinamensis* (Bloch) (Bailey, 1970)

"Atlantic, Indian, and western Pacific oceans; in the western Atlantic from Bermuda and Massachusetts to Argentina (38° S.) and throughout the Gulf of Mexico" (Briggs, 1958:280). "Philippines and East Indies, north to China and Japan, south to Australia; west in the Indian Ocean to Natal and Madagascar; Atlantic coast of tropical America, north to Carolina, occasional in Mediterranean" (Herre, 1953:379).

Table 253 continued

Hawaii (Gosline & Brock, 1965:187). Off West Africa and in the Mediterranean (Migdalski, 1958:415). Occurs solitary, in small groups, or in schools (Migdalski, 1958:416).

POMADASYIDAE

+ Anisotremus surinamensis (Bloch) (Bailey, 1970)

Florida and the Bahamas south to the 'hump' of Brazil, including the Central American coast and the Gulf of Mexico. Not observed to be a schooling species, but rather one that occurs singly or in small groups of two to three (Böhlke & Chaplin, 1968:382). In mixed schools with other fishes which frequent waters close to shore (Migdalski, 1958:278).

+ Anisotremus virginicus (Linnaeus) (Bailey, 1970)

"Bermuda and southern Florida to Santa Catarina, Brazil, and the eastern and southern Gulf of Mexico. Shore" (Briggs, 1958:279). Introduced to Bermuda (Randall, 1968:141). Young pick parasites from bodies of larger fishes (Böhlke & Chaplin, 1968:381; Randall, 1968:141). Sometimes in sizeable schools (Randall, 1968:141).

Diagramma pictum (Thunberg) (Paxton & Talbot, personal communication)

"East coast of Africa to the Philippines, China, Japan, Australia, Fiji, and Society Islands" (Herre, 1953:415). From middle Japan southwards to the wide area of the Indo-Pacific, including the Red and Arabian Seas (Oakada, 1955:227). Ceylon (Munro, 1955:150). Queensland, northern New South Wales (Marshall, 1965:197). Reaches just south of Durban (Smith, 1950:261).

+ Haemulon album Cuvier (Bailey, 1970)

Bermuda, the Bahamas and south Florida to Brazil, including the Central American coast. Singly or in small groups; occasional schools (Böhlke & Chaplin, 1968:375).

+ Haemulon flavolineatum (Desmarest) (Bailey, 1970)

"Bermuda and South Carolina to Brazil and the southwestern Gulf of Mexico" (Briggs, 1958:279). Large shoals over reefs in daylight (Böhlke & Chaplin, 1968:373).

Table 253 continued

+ <u>Haemulon</u> <u>macrostomum</u> Günther (Bailey, 1970)

"Bermuda and the Florida Keys to Columbia and the eastern and northwestern Gulf of Mexico" (Briggs, 1958:279).

+ <u>Haemulon</u> <u>plumieri</u> (Lacépède) (Bailey, 1970)

Virginia and Bermuda (introduced) to southeastern Brazil, including the Gulf of Mexico and Central American coast (Böhlke & Chaplin, 1968:377). Schooling (Böhlke & Chaplin, 1968:377).

+ <u>Haemulon</u> <u>sciurus</u> (Shaw) (Bailey, 1970)

Bermuda and South Carolina to southeastern Brazil, including the Central American coast and the Gulf of Mexico. "...often encountered in groups with <u>plumieri</u>" (Böhlke & Chaplin, 1968:379).

<u>Pomadasys</u> <u>macracanthus</u> (Günther) (Miller, 1966; Böhlke, personal communication; Kanazawa, personal communication)

Pacific coast of Mexico (Berdegue, 1956:255). "Pacific coast from Mazatlan, Mexico to Panama" (Miller, 1966:798).

SCIAENIDAE

<u>Argyrosomus</u> <u>regium</u> (Asso) (Wheeler, 1969)

From Skagerrak, around British Isles south to Mediterranean, and Atlantic coast of Africa to Gulf of Guinea (Wheeler, 1969:342). Adriatic (Soljan, 1948:203).

+ <u>Menticirrhus</u> <u>saxatilis</u> (Bloch & Schneider) (Bailey, 1970)

Florida to Cape Cod, strays to Maine (Perlmutter, 1961:378). Runs in schools (Migdalski, 1958:257).

+ <u>Micropogon</u> <u>undulatus</u> (Linnaeus) (Bailey, 1970)

"Massachusetts to Argentina (40° S.) and throughout the Gulf of Mexico" (Briggs, 1958:281).

+ <u>Pogonias</u> <u>cromis</u> (Linnaeus) (Bailey, 1970)

"Massachusetts to Argentina (40° S.) and the northern and eastern Gulf of Mexico" (Briggs, 1958:281). Schooling (Migdalski, 1958:246).

Table 253 continued

Sciaena umbra Linnaeus (Bailey, personal communication; Wheeler, personal communication)

Mediterranean and tropical East Atlantic (Wheeler, personal communication). "Eastern Atlantic and Mediterranean" (Fowler, 1936:884).

Umbrina cirrosa (Linnaeus) (Wheeler, 1969; Steinitz, personal communication)

Mediterranean, Iberian coast north to Biscay, south to Senegal (Wheeler, 1969:341). Adriatic Sea (Soljan, 1948:175).

LETHRINIDAE

Lethrinus haematopterus (Temminck & Schlegel) (Okada, 1955)

Formosa, China Sea and Philippines south to East Indies (Okada, 1955:241). Japan (Herre, 1953:435).

SPARIDAE

Archosargus probatocephalus (Walbaum) (Bailey, 1970)

"Nova Scotia to Florida and throughout the Gulf of Mexico" (Briggs, 1958:281). Travels in small groups and schools (Migdalski, 1958:367).

+ Archosargus rhomboidalis (Linnaeus) (Bailey, 1970; Böhlke, personal communication; Kanazawa, personal communication; Musick; personal communication)

"New Jersey to Brazil, including the eastern Gulf of Mexico and the West Indies" (Randall, 1968:147).

Calamus bajonado (Bloch & Schneider) (Bailey, 1970)

New England and Bermuda to Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:386).

Calamus calamus (Valenciennes) (Bailey, 1970)

Bermuda, the Bahamas and North Carolina to Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:387).

Table 253 continued

Chrysophrys auratus (Bloch & Schneider) (Paxton & Talbot, personal communication)

Australia and New Zealand (Parrott, 1959:97). Schools; larger fish tend to live a solitary life (Marshall, 1965:206).

Chrysophrys major Schlegel (Paxton & Talbot, personal communication)

Hokkaido southward to Japanese islands, southern Korea, Formosa, East and South China Seas and as far as to Hawaii (Okada, 1955:237).

Chrysophrys unicolor Quoy & Gaimard (Paxton & Talbot, personal communication)

Western Australia, South Australia (Scott, 1962:197).

Pagellus bogaraveo (Brünnich) (Wheeler, 1969)

South Norway coast, Skagerrak, and around British Isles south to Mediterranean and the Canaries (Wheeler, 1969:355).

Sparus aurata Linnaeus (Wheeler, 1969)

Rare around British Isles and in English Channel, Bay of Biscay south to Mediterranean and the Canaries (Wheeler, 1969:356). Adriatic Sea (Soljan, 1948:378). Reported from the Cape of Good Hope (Le Gall, 1931 In Joubin, 1929-38:248).

Sparus australis (Günther) (Fowler, 1933)

Western Australia, Victoria, Queensland, New South Wales, Northern Australia, Tasmania, New Hebrides, New Guinea, New Zealand (Fowler, 1933:150-151). "Australia, Melanesia" (Fowler, 1928 (1967):218). Congregate for spawning (Parrott, 1959:100).

Sparus macrocephalus (Basilevsky) (Fowler, 1933)

Middle of Japan southward to Korea, RiuKiu, Formosa, and East China Sea (Okada, 1955:232).

Spondyliosoma cantharus (Linnaeus) (Wheeler, 1969; Chubb, personal communication)

Mediterranean and Atlantic coast from Canaries to English Channel and to south of Norway (Le Gall, 1931 In Joubin,

Table 253 continued

1929-38:243). Adriatic Sea (Soljan, 1948:332). Senegal (Cadenat, 1950:211). Rare in North Sea and to the north (Wheeler, 1969:357).

PSETTIDAE

+ Monodactylus argenteus (Linnaeus) (Herre, 1953; Böhlke, personal communication; Kanazawa, personal communication)

"Indo-Pacific from Africa to the Philippines, China, East Indies, Australia, Melanesia, and east to Samoa" (Herre, 1953:486). South Africa to Pacific (Smith & Smith, 1963: 22). Red Sea and Madagascar through Indian Ocean to southern China, Philippines, Australia, Melanesia and Polynesia to Fiji (Weber & De Beaufort, 1936:209). Schools (Smith & Smith, 1963:22).

GIRELLIDAE

Girella nigricans (Ayres) (Bailey, 1970)

"Central California south to Cape San Lucas, Lower California" (Roedel, 1948:90).

EPHIPPIDAE

+ Chaetodipterus faber (Broussonet) (Bailey, 1970)

"Massachusetts to Brazil, in a variety of habitats. Introduced to Bermuda. Adults often encountered in small schools..." (Randall, 1968:162).

Platax pinnatus (Linnaeus) (Okada, 1955)

Middle part of Honshu southward to RiuKiu, east China Sea, Philippines, East Indies, Indian Ocean and Red Sea (Okada, 1955:287). Western Australia, waters of North Australia, Queensland, and northern New South Wales (Marshall, 1965: 268).

SCATOPHAGIDAE

+ Scatophagus argus (Linnaeus) (Marshall, 1965)

Table 253 continued

"The Philippines, East Indies, and China, west to India and Ceylon, southeast to the New Hebrides, New Caledonia, and Australia" (Herre, 1953:492). Queensland, New South Wales, Northern Territory (Marshall, 1965:246).

CHAETODONTIDAE

Chaetodontidae: "Usually seen as solitary individuals or in pairs" (Randall, 1968:177).

+ <u>Chaetodon</u> <u>capistratus</u> Linnaeus (Bailey, 1970)

New England south through the Lesser Antilles, Bahamas, Gulf of Mexico (Böhlke & Chaplin, 1968:422).

+ <u>Chaetodon</u> <u>collaris</u> Bloch (Okada, 1955)

"...from the middle part of Japan and Fuzan to Red Sea, Madagascar and Micronesia" (Kamohara, 1954:289).

+ <u>Chaetodon</u> <u>ocellatus</u> Bloch (Bailey, 1970)

New England south to Brazil, including the Gulf of Mexico, Bahamas (Böhlke & Chaplin, 1968:421).

+ <u>Chaetodon</u> <u>striatus</u> Linnaeus (Bailey, 1970)

Both sides of the Atlantic; on the western side from New Jersey to southeastern Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:423).

+ <u>Heniochus</u> <u>acuminatus</u> (Linnaeus) (Gosline & Brock, 1965)

"East coast of Africa to East Indies, Philippines, China, Japan, Hawaiian Islands, Australia, Samoan and Gilbert Islands" (Herre, 1953:517).

+ <u>Holacanthus</u> <u>bermudensis</u> Goode (Bailey, 1970; Böhlke, personal communication; Kanazawa, personal communication)

"Bermuda, southern Florida, Gulf of Mexico and the Bahamas" (Randall, 1968:188).

+ <u>Holacanthus</u> <u>ciliaris</u> (Linnaeus) (Bailey, 1970; Böhlke, personal communication; Kanazawa, personal communication; Musick, personal communication)

Table 253 continued

Bahamas to Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968: 417).

+ Holacanthus tricolor (Bloch) (Bailey, 1970)

Bermuda, Bahamas, and Florida to southeastern Brazil (Böhlke & Chaplin, 1968: 416).

+ Hybrid between H. ciliaris and H. bermudensis (=H. isabelita as employed by Feddern (1968)), formerly listed as Holacanthus townsendi (Nichols & Mowbray). (Feddern, 1968; Randall, 1968; Kanazawa, personal communication; Musick, personal communication)

"The type and original description of Holacanthus townsendi (Nichols & Mowbray, 1914) refer to a hybrid between H. isabelita [=H. bermudensis] and H. ciliaris (Feddern, 1968: 380).

+ Pomacanthus paru (Bloch) (Bailey, 1970)

Both sides of the Atlantic; on the western side from the Bahamas and Florida to southeastern Brazil. Young clean other fish (Böhlke & Chaplin, 1968: 419). Introduced to Bermuda (Randall, 1968: 183). (See Table 81, footnote 2.)

HOPLEGNATHIDAE

Oplegnathus fasciatus (Temminck & Schlegel) (Okada, 1955)

In waters southwards from Hokkaido and is rare northwards; young school (Okada, 1955: 249).

Oplegnathus punctatus (Temminck & Schlegel) (Okada, 1955)

Waters southwards from middle Honshu, Korea and East China Sea (Okada, 1955: 250).

EMBIOTOCIDAE

Amphistichus argenteus Agassiz (Bailey, 1970)

"Central and southern California, common along sandy coasts" (Roedel, 1948: 87).

Table 253 continued

<u>Cymatogaster aggregata</u> Gibbons (Bailey, 1970)

"Alaska south into northern Lower California" (Migdalski, 1958:379).

POMACENTRIDAE

<u>Chromis chromis</u> (Linnaeus) (Bailey, personal communication; Steinitz, personal communication)

Mediterranean and eastern Atlantic (Irvine, 1947:173). Adriatic (Soljan, 1948:277). Teneriffa, Canaries (Metzelaar, 1919 (1967):259).

LABRIDAE

\+ <u>Bodianus rufus</u> (Linnaeus) (Bailey, 1970)

Both sides of the Atlantic; in the western Atlantic, from Bermuda, the Bahamas and Florida to Brazil, including the Central American coast and the Gulf of Mexico; also recorded from St. Paul's Rocks, Ascension Island and St. Helena. Young pick parasites from larger fishes (Böhlke & Chaplin, 1968:450).

\+ <u>Diastodon speciosus</u> Bowdich (Fowler, 1936; Kanazawa, personal communication)

"Madeira, Canaries, Cape Verde" (Fowler, 1936:974).

\+ <u>Lachnolaimus maximus</u> (Walbaum) (Bailey, 1970)

Bermuda and North Carolina to the northern coast of South America, including the Central American coast and the Gulf of Mexico (Böhlke & Chaplin, 1968:449). Usually solitary or a few of the smaller ones together (Böhlke & Chaplin, 1968:449). It does not school (Migdalski, 1958:421).

\+ <u>Tautoga onitis</u> (Linnaeus) (Bailey, 1970)

From South Carolina to Nova Scotia (Migdalski, 1958:417).

<u>Thalassoma bifasciatum</u> (Bloch) (Bailey, 1970)

Both sides of the Atlantic; on the western side, from Bermuda, the Bahamas and Florida to the islands off the north coast of South America, including the Gulf of Mexico

Table 253 continued

and the Central American coast. Yellow individuals occasionally pick parasites from other fishes (Böhlke & Chaplin, 1968:453). "Bermuda, southern Florida, southern Gulf of Mexico and Caribbean Sea" (Randall, 1968:211-212).

+ Thalassoma pavo (Linnaeus) (Bailey, personal communication; Steinitz, personal communication; Wheeler, personal communication)

Mediterranean and eastern Atlantic; various parts of the coast of tropical West Africa (Irvine, 1947:176). Adriatic Sea (Soljan, 1948:398).

SCARIDAE

Scarops perrico (Jordan & Gilbert) (Schultz, 1958)

Mazatlan, Santa Catalina Island, Peru (p.23), Panama, Cocos Island, Gulf of California (Schultz, 1958:24). Mazatlan to Galapagos Islands (Halstead, 1967:106).

HAPLODACTYLIDAE

Goniistius zonatus (Cuvier & Valenciennes) (Paxton & Talbot, personal communication)

Middle part of Japan and Fuzan to southern China. (Kamohara, 1954:280).

CHEILODACTYLIDAE

Cheilodactylus spectabilis (Hutton) (Paxton & Talbot, personal communication)

Southern Queensland, New South Wales, and possibly Victoria; in New Zealand along the north coasts of the North Island (Parrott, 1959:127).

LATRIDAE

Latridopsis forsteri (Castelnau) (Paxton & Talbot, personal communication)

South Australia, Victoria, New South Wales, Tasmania (Scott, 1962:206). New Zealand, rare (D. Graham, 1956:259).

Table 253 continued

[*Latris lineata* (Forster)] (Robinson, 1961)

Listed as *L. lineata* (Bloch & Schneider) by Parrott (1959: 52), Parrott (1957:123), D. Graham (1956:256), Scott (1962:206).

South Australia, Victoria, New South Wales, Tasmania (Scott, 1962:206). New Zealand, more especially south of Otago Heads (D. Graham, 1956:258). "...a shoal fish in the smaller or intermediate stages, but they are also a solitary fish" (D. Graham, 1956:259).

NOTOTHENIIDAE

Notothenia magellanica (Forster) (DeWitt, 1970, personal communication)

West coasts of Tierra del Fuego and Patagonia; Falkland Islands; Kerguelen, Macquarie, Aukland and Campbell Islands; South Island of New Zealand; Marion Island (DeWitt, 1970: 310).

Notothenia microlepidota Hutton (DeWitt, 1970, personal communication)

"...known only from the New Zealand region, including Macquarie Island" (DeWitt, 1970:331).

Notothenia rossii Richardson (DeWitt, 1970, personal communication)

N. rossii rossii from the Kerguelen and Macquarie Islands; *N. rossii marmorata* from the islands of the Scotia Ridge system, including the South Shetland Islands (DeWitt, 1970: 317).

PHOLIDAE

Enedrias nebulosus (Temminck & Schlegel) (Okada, 1955)

Hokkaido southward to Kyushu and Korea (Okada, 1955:415).

ACANTHURIDAE

\+ *Acanthurus chirurgus* (Bloch) (Bailey, 1970; Böhlke, personal communication)

Table 253 continued

Both sides of the Atlantic; New England and Bermuda to the 'hump' of Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:657). Recorded from Ashantee, West Africa (Meek & Hildebrand, 1928:785). Coast of West Africa as well as entire tropical and subtropical regions of the West Atlantic (Randall, 1956:224). Frequently in mixed schools with Acanthurus bahianus Castelnau (Longley & Hildebrand, 1941:156).

+ Acanthurus coeruleus Bloch & Schneider (Bailey, 1970)

New York and Bermuda to Brazil, including the Central American coast and the Gulf of Mexico. Reefs (Böhlke & Chaplin, 1968:656).

Acanthurus sandvicensis (Streets) (Gosline & Brock, 1965)

Known only from Hawaii. Reefs. Occurs singly, in small aggregations, or in large schools (Gosline & Brock, 1965: 246).

Naso hexacanthus (Bleeker) (Herre, 1953)

"The East Indies and Philippines to Guam and the Hawaiian Islands" (Herre, 1953:548). Usually occurs in large schools (Gosline & Brock, 1965:251).

Naso unicornis (Forskål) (Herre, 1953)

"Red Sea and Mauritius to the East Indies, Philippines, Japan, Guam, Hawaiian, Samoan, and Society Islands, south to Australia"(Herre, 1953:550).

SCOMBRIDAE

Auxis thazard (Lacépède) (Bailey, 1970)

All tropical and warm seas (Jordan & Evermann, 1902:277; Irvine, 1947:186; Herre, 1953:247; Migdalski, 1958:151; Smith, 1965:298). Cape Cod to Brazil, including Gulf of Mexico; Mediterranean and eastern Atlantic; southern California to Central America (Migdalski, 1958:151-152). "All Australian States except Tasmania" (Scott, 1962:259). Sometimes mixed with schools of Euthynnus yaito (=E. affinis (Gosline & Brock, 1965:257). Collete & Gibbs (1963:27) noted that A. thazard was typically found off shore, at least in the eastern Pacific, and A. rochei, the other world-wide species, was found close to land.

Table 253 continued

Euthynnus affinis (Cantor) (Collette, personal communication)

"New Guinea, coast of Natal, Seychelles, Reunion, Red Sea, Arabian Sea, coasts of India, Siam, Indochina, Japan, Riu Kiu Islands, Formosa, Penang, Philippines, between Admirality Islands and Japan, coasts of New South Wales, Society Islands, Hawaii" (De Beaufort & Chapman, 1951:221). "Coastal waters and Gulf of Manaar" (Munro, 1955:219).

Euthynnus alletteratus (Rafinesque) (Bailey, 1970)

Both sides of the Atlantic, and from the Mediterranean Sea; in the western Atlantic, from New England and Bermuda to Brazil (Böhlke & Chaplin, 1968:572). Mediterranean; west coast of Africa: Morocco, Mauritania; Spain; Portugal; Gulf of Gascogne; Scandinavian coast (Le Gall, 1934 In Joubin, 1929-38:283). Schools (Migdalski, 1958:139). "Various authors have regarded E. alletteratus as occurring in the Pacific, but recent workers tend to confine this species to the Atlantic" (De Sylva & Rathjen, 1961:163).

Euthynnus pelamis (Linnaeus) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). "...in the western Atlantic from the Gulf of Maine to Rio de Janeiro and throughout the Gulf of Mexico" (Briggs, 1958:286). Mediterranean; African west coast: Morocco, Mauritania, Canaries; Spain; Portugal; Gulf of Gascogne; exceptionally on Scandinavian coast (Le Gall, 1934 In Joubin, 1929-38:286). Point Conception and the Channel Islands to Copiapo, Chile; Hawaii; Central Pacific; Japan; Australia; New Zealand; Indian Ocean (Migdalski, 1958:133-134). Vast schools; may combine with yellowfin tuna (=Thunnus albacares) into mixed schools at the surface (Migdalski, 1958:135).

Sarda chiliensis (Cuvier) (Bailey, 1970; Collette, personal communication)

"From Vancouver Island south into Lower California at least as far as Magdalena Bay; not common north of Pt. Conception. A schooling fish" (Roedel, 1948:62).

Sarda orientalis (Temminck & Schlegel) (Bailey, 1970)

Distributed southward from the middle of Japan (Okada, 1955: 148). "Ranging all over the western Pacific Ocean and perhaps occurring in the mid-Pacific" (Herre, 1953:251). South Africa to Pacific (Smith & Smith, 1963:43). Indo-

Table 253 continued

Pacific species, not common in Hawaii; apparently does not occur in the eastern Pacific (Gosline & Brock, 1965:259). From Magdalena Bay to Peru (Berdegue, 1956:173). British Columbia to Peru and Chile, Hawaii and Japan, down to Australia (Migdalski, 1958:142). Open seas in huge schools (Migdalski, 1958:142).

Sarda sarda (Bloch) (Bailey, 1970)

"Both sides of the Atlantic; in the western Atlantic from Nova Scotia to Argentina (38° S.) and the western Gulf of Mexico" (Briggs, 1958:287). North to Scandinavia, including the Mediterranean; southern distribution not clear (Migdalski, 1958:137). Mediterranean and Black Seas (Hvass, 1965:50). West coast of Africa, Senegal, Mauritania, Morocco (Le Gall, 1934 In Joubin, 1929-38:288). Occasionally taken at the Cape of Good Hope (Smith, 1959:299). Travels in schools (Migdalski, 1958:136).

Thunnus alalunga (Bonnaterre) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). From south of New England to southern Brazil (Gibbs & Collette, 1967:101). No records for the Gulf of Mexico. Orkney Islands north of Scotland to Angola off west African coast and in the Mediterranean; may extend south to South Africa. Continuous around South Africa. Across the Indian Ocean from East Africa to Australia between 10° N. and 30° S. In the western Pacific from about 45° N., off the coast of Hokkaido, south to 40° S., off the southern end of Australia. Fairly continuous distribution past the Hawaiian Islands between 30° N. and 20° S. From off Vancouver Island (about 50° N.) south to about 42° S. (Gibbs & Collette, 1967:102). Schools (Migdalski, 1958:126).

Thunnus albacares (Bonnaterre) (Bailey, 1970; Collette, personal communication)

Circumtropical (Gibbs & Collette, 1967:107). From 42° N. south through the Sargasso Sea to Gulf of Mexico and Caribbean and off coast of South America from about 10° N. to 32° S. Spain and Portugal south to Angola; not from Mediterranean. Continuous around South Africa. East African waters and from 20° N. to 30° S. in the Indian Ocean. Off coast of Japan (40° N.) to off coast of Australia (30° S.). Across Pacific in broad belt from 30° N. to 20° S., and as far as 40° S. (Gibbs & Collette, 1967:107). Schools (Migdalski, 1958:118).

Table 253 continued

Thunnus obesus Lowe (Bailey, 1970; Collette, personal communication)

Circumtropical (Briggs, 1958:234). From 42° 18' N., 64° 02' W. south on coast of United States to Florida, Bermuda, Caribbean Sea around West Indies, and south to Margarita Island, Venezuela. North equatorial and Brazil currents off South America. Portugal, Spain, the Azores, and Madeira, south to Angola; not in Mediterranean. Continuous around South Africa. Throughout Indian Ocean from 20° N. to 30° S. In western Pacific from about 40° N. to about 30° S. In eastern Pacific south to 40° S. (Gibbs & Collette, 1967:112). Mixed schools with yellowfin tuna (=Thunnus albacares) (Migdalski, 1958:117).

Thunnus thynnus orientalis (Temminck & Schlegel) (Gibbs & Collette, 1967; Collette, personal communication)

Eastern north Pacific from Shelikof Straits, Gulf of Alaska, off Vancouver Island, off Willapa Bay and mouth of Columbia River, off southern California, and off all of Baja California. Western north Pacific from island of Sakhalin southward on both sides of Japan, to northern Philippines; eastward from Japan between about 30°-40° N. to about 160° W; eastward between about 5°-10° N. from about 135°-175° E. Occasionally in Hawaiian waters (Gibbs & Collette, 1967:119). Schools (Roedel, 1948:60).

Thunnus thynnus thynnus (Linnaeus) (Gibbs & Collette, 1967; Collette, personal communication)

Hamilton Inlet, Labrador, and Newfoundland, south along coast of United States into Gulf of Mexico and Caribbean; off Venezuela and south to northeastern Brazil. Lofoten Islands of Norway south along coast of Europe and north Africa to Canary Islands. Records from near Cape Verde Islands, Angola, and South Africa have been questioned, but gill-raker counts suggest that it does occur west of the Cape Peninsula of South Africa (Gibbs & Collette, 1967:119). Schools, very large fish usually are solitary (Bigelow & Schroeder, 1953a: 340).

HISTIOPHORIDAE

Istiophorus platypterus (Shaw & Nodder) (Bailey, 1970)

Cosmopolitan (Bailey, 1970:82).

Table 253 continued

As Istiophorus albicans (Latreille): Caribbean, Gulf of Mexico, southern Brazil to Massachusetts; in eastern Atlantic along the coast of France, off Africa's Gold Coast, and also in Mediterranean (Migdalski, 1958:31, 32). Once recorded on European coast (Wheeler, 1969:407). "Rhode Island to Brazil and throughout the Gulf of Mexico" (Briggs, 1958:287). Sometimes gather in schools (Migdalski, 1958:32).

As Istiophorus greyi (Jordan & Evermann): Monterey, California, along coast of southern California, Mexico, and Central America to Cabo Blanco, Peru; Seychelles, Madagascar, Tahiti, Solomons, Philippines, Guam, Japan, Hawaii, Galapagos, Cocos Islands (Migdalski, 1958:38-39).

As Istiophorus orientalis (Schlegel): Probably all over the tropical and warm temperate Pacific, from Japan to Hawaii and Australia (Herre, 1953:255). Central and western tropical Pacific (Gosline & Brock, 1965:262). "...in groups of a few fishes..." (Okada, 1955:152).

Makaira indica (Cuvier) (Bailey, 1970)

Warmer waters of the Pacific; also present in Indian Ocean. Southern California into Chilean waters; Hawaii; Fiji; western Pacific from Japan south to Australia and New Zealand (Migdalski, 1958:50).

Makaira nigricans Lacépède (Bailey, 1970)

"Both sides of the Atlantic; in the western Atlantic from Massachusetts to Uruguay, and widespread in the Gulf of Mexico" (Briggs, 1958:287). Off France, off French West Africa; complete range unknown (Migdalski, 1958:43). Tropical Pacific and possibly the Indian Ocean; Formosa, Hawaii (Gosline & Brock, 1965:264). Pacific (Robins & De Sylva, 1960:400). Pacific coast U.S. (Bailey, 1970:54). Solitary, sometimes in pairs (Migdalski, 1958:44).

Tetrapturus albidus Poey (Bailey, 1970)

Caribbean to New Jersey and Block Island (Migdalski, 1958: 62-63). Rare straggler to northern European waters, more numerous off southern Spain and north African coasts (Wheeler, 1969:407).

Tetrapturus audax (Philippi) (Bailey, 1970)

Throughout the tropical and subtropical Pacific (Gosline & Brock, 1965:264). From Japan to California, Mexico, Hawaii,

Table 253 continued

Tahiti, the Philippines, south to Australia and New Zealand, and in Indian Ocean (Herre, 1953:255). Point Conception south into Mexico (Roedel, 1948:64). Coasts of Chile, Peru, Ecuador, Panama, Mexico (Migdalski, 1958:58). Ceylon (Munro, 1955:223). East African coast, Ceylon, Formosa (Migdalski, 1958:58). Usually travel alone, or in pairs (Migdalski, 1958:60). In groups of 2 or 3 (Okada, 1955:151).

Tetrapturus belone Rafinesque (Robins & De Sylva, 1960)

Mediterranean (Wheeler, 1969:408). Mediterranean Sea (except for the eastern end?) (Robins & De Sylva, 1960:401). "Presumably it will be found elsewhere in the eastern temperate and tropical Atlantic" (Robins & De Sylva, 1960:401). Adriatic (Soljan, 1948:169). (*Tetrapturus pflugerei* Robins & De Sylva was separated from the Mediterranean spearfish, *T. belone* (Bailey, 1970:82)).

XIPHIIDAE

Xiphias gladius Linnaeus (Bailey, 1970)

Circumtropical (Briggs, 1958:234). Newfoundland and Bermuda to Argentina (38° S.) and northeastern and western parts of Gulf of Mexico (Briggs, 1958:287). North to northern Norway, Mediterranean, about Cape of Good Hope, Red Sea, widespread in Indian and Pacific Oceans (Bigelow & Schroeder, 1953a:354-355). Bosporus, Sea of Marmora (Migdalski, 1958:72). Ceylon (Munro, 1955:222). Northern Japan to Australia and New Zealand (Migdalski, 1958:72). Philippines and China Sea to Hawaii and Fuji (Herre, 1953:256). Santa Cruz Island off California to Valparaiso, Chile (Migdalski, 1958:72). Off Oregon (Roedel, 1948:65). Do not school (Migdalski, 1958:77). Solitary (Parrott, 1958:48). Singly, or in pairs (Perlmutter, 1961:352).

GOBIIDAE

Gobius (*Macrogobius*) *paganellus* Linnaeus (Wheeler, 1969)

Western British Isles south to Mediterranean and Madeira (Wheeler, 1969:430).

SCORPAENIDAE

Helicolenus percoides Richardson & Solander (Eschmeyer, personal communication)

Table 253 continued

New Zealand, Tasmania (Parrott, 1957:161). South Australia (Waite, 1923:188).

Scorpaena guttata Girard (Bailey, 1970)

"Point Abreojos, Baja California, to Point Arguello, California" (Migdalski, 1958:372).

Scorpaena plumieri Bloch (Bailey, 1970)

"Eastern Pacific and Massachusetts to Rio de Janeiro in the Atlantic; also known from St. Helena and Ascension" (Randall, 1968:172-173). Bermuda (Böhlke & Chaplin, 1968: 649).

Scorpaena porcus Linnaeus (Eschmeyer, 1969, personal communication; Steinitz, personal communication)

Biscay southwards, Mediterranean; two specimens reported from English Channel (Wheeler, 1969:475). Adriatic Sea (Soljan, 1948:280).

Sebastes alutus (Gilbert) (Bailey, 1970)

"Bering Sea to southern California" (Barnhart, 1936:53). Oregon, Washington, British Columbia, southeast Alaska, Gulf of Alaska, Alaska Peninsula, Strait of Juan de Fuca, Prince William Sound, Shelikof Strait (p. 90), eastern Bering Sea (Alverson et al, 1964:89).

Sebastes caurinus Richardson (Bailey, 1970)

"Monterey, California to S.E. Alaska" (Phillips, 1957:96).

Sebastes diploproa (Gilbert) (Bailey, 1970)

"Los Coronados Islands, Baja California to Vancouver, British Columbia" (Phillips, 1957:86).

Sebastes inermis Cuvier (Eschmeyer, personal communication)

From Hakodate, Hokkaido, to Kyushu (Okada, 1955:309).

Sebastes introniger (Gilbert)

Bering Sea and Sea of Okhotsk; Pacific coast of America south to Santa Barbara (Taranetz, 1937:95). "Bering Sea to Santa Barbara, California" (Schultz, 1936:167). "Santa Barbara

Table 253 continued

Islands to Bering Sea" (Barnhart, 1936:54). Bering Sea, Aleutian Islands and shores of Alaska, ranging as far south as California; in Sea of Okhotsk, at western coast of Kamchatka (Shmidt, 1950 (1965):130). Not listed by Phillips (1957).

Sebastes maliger (Jordan & Gilbert) (Bailey, 1970)

"Monterey, California, to southeast Alaska" (Migdalski, 1958:371).

Sebastes melanops Girard (Bailey, 1970)

"San Miguel Island to southeast Alaska" (Migdalski, 1958: 372). Alaska Peninsula (Alverson et al, 1964:90).

Sebastes nebulosus Ayres (Bailey, 1970)

"Point Buchon, California to S.E. Alaska" (Phillips, 1957: 126). Gulf of Alaska (Alverson et al, 1964:90).

Sebastes paucispinis Ayres (Bailey, 1970)

"Ensenada, Baja California, to Queen Charlotte Sound, British Columbia" (Migdalski, 1958:371). Southeast Alaska and Gulf of Alaska (Alverson et al, 1964:90).

Sebastes pinniger (Gill) (Bailey, 1970)

"Cape Colnett, Baja California, to Dixon Entrance, British Columbia" (Migdalski, 1958:371). Southeast Alaska (Alverson et al, 1964:90).

Sebastes ruberrimus (Cramer) (Bailey, 1970)

"Ensenada, Baja California to Gulf of Alaska" (Phillips, 1957:104).

Sebastes schlegelii Hilgendorf (Eschmeyer, personal communication)

Hokkaido, Honshu, Kyushu and Korea (Okada, 1955:313). Sea of Japan and east coast of Japan, south of Korea (Fusan) and Japan (Nagasaki), Yellow Sea, Sea of Okhotsk (Shmidt, 1950 (1965):131).

TRIGLIDAE

Table 253 continued

Chelidonichthys kumu (Lesson) (Richards, personal communication)

Central tropical and temperate Indo-Pacific (Smith, 1950: 383). "New Zealand, all Australia, China, Japan, Indo-Australian Archipelago, South Africa" (Marshall, 1965: 440). "This is distributed from South Africa to Australia and New Zealand with some suspect references to islands off Chile. It is not found in the China Sea--that is another species C. spinosa (McClelland)" (Richards, personal communication).

Chelidonichthys (Aspitrigla) cuculus (Linnaeus) (Richards, 1968)

From North Sea along coast of Europe, Mediterranean, possibly Black Sea, and south to Cape Blanc, Mauritania; recorded from Madeira (Richards, 1968: 92). South Norway and Skagerrak to Mediterranean (Wheeler, 1969: 488).

Chelidonichthys (Aspitrigla) obscurus (Bloch & Schneider) (Richards, 1968)

North to British Isles, around Iberian Peninsula, Mediterranean; apparently ranges south to Cape Blanc, Mauritania, and Madeira (Richards, 1968: 94). Adriatic (Wheeler, 1969: 487).

Chelidonichthys (Chelidonichthys) lucerna (Linnaeus) (Richards, 1968)

Norway and the North Sea along coast of Europe, around British Isles, Mediterranean and Black Seas; reported from Cape Verde (Richards, 1968: 96).

Chelidonichthys (Trigloporus) lastoviza (Bonnaterre) (Richards, 1968)

North to Norway, south to Mediterranean and to Bay of Elephants, Angola (Richards, 1968: 88). Except on south and southwest coasts of British Isles it is uncommon; English Channel south to Mediterranean and Canaries (Wheeler, 1969: 486).

Peristedion cataphractum Linnaeus (Richards, personal communication)

Deep-water fish, reported as far north as western end of English Channel, south to Mediterranean (Wheeler, 1969: 484). Morocco and Mauritania (Le Gall, 1932 In Joubin, 1929-38: 357).

Table 253 continued

+ Prionotus evolans (Linnaeus) (Bailey, 1970)

"Massachusetts to Florida" (Briggs, 1958:295). "...from South Carolina to Cape Cod and as a stray into the Gulf of Maine" (Perlmutter, 1961:392).

COTTIDAE

Cottus gobio Linnaeus (Wheeler, 1969)

"Widely distributed, almost throughout Europe, Siberia, Asia Minor, in clear mountain and lowland streams, also not infrequent in brackish water in the Baltic..." (Sterba, 1966:813).

DACTYLOPTERIDAE

Dactylopterus volitans (Linnaeus) (Bailey, 1970)

Mediterranean, both sides of the Atlantic, and Ascension Island; on the western side from Massachusetts and Bermuda to Argentina, including the Gulf of Mexico and the Central American coast (Böhlke & Chaplin, 1968:653).

BOTHIDAE

Paralichthys adspersus (Steindachner) (Norman, 1934)

"Coasts of Peru and Chile" (Norman, 1934:84). "...material examined covers the range from Callao, Peru, to Lota, Chile; existing records also include this range and San Juan I." (Ginsburg, 1952b:306).

Paralichthys californicus (Ayres) (Bailey, 1970)

Tomales Bay, California to Magdalena Bay, Lower California (Ginsburg, 1952b:308).

Scophthalmus maximus (Linnaeus) (Wheeler, 1969)

From Black Sea and Mediterranean north on European coast to level of Trondheim, Norway and into the Baltic (Schnakenberg, 1930 In Joubin, 1929-38:380). "Coasts of Europe, from Scandinavia to the Mediterranean; Iceland" (Norman, 1934:265).

Table 253 continued

PLEURONECTIDAE

Atheresthes stomias (Jordan & Gilbert) (Bailey, 1970)

"Pacific coast of North America, from the Bering Sea to San Francisco" (Norman, 1934: 287).

Hippoglossina macrops Steindachner (Norman, 1934)

"Coast of Chile" (Norman, 1934: 67). "This species was described from Mazatlan, the Pacific coast of Mexico..." (Ginsburg, 1952b: 291). Identification and range of this species confused (Ginsburg, 1952b: 292).

Hippoglossus hippoglossus (Linnaeus) (Bailey, 1970)

"North Atlantic, from Spitzbergen, Murman coast and Iceland, southwards to the Bay of Biscay, and from Greenland southwards to Cape Cod and Sandy Hook" (Norman, 1934: 293).

Hippoglossus stenolepis Schmidt (Bailey, 1970)

"Central California north to the Bering Sea; to northern Japan on the Asiatic side. Reported once from Santa Rosa Island" (Roedel, 1948:125).

SOLEIDAE

Pegusa lascaris (Risso) (Wheeler, 1969)

English Channel, western sides of British Isles, south to Mediterranean and eastern tropical Atlantic (Wheeler, 1969: 553). Adriatic Sea (Soljan, 1948: 33). Senegal, Togo (Cadenat, 1950: 299). Gibraltar, Angola, Cape Blanco (Metzelaar, 1919 (1967): 278-279).

Solea solea (Linnaeus) (Wheeler, 1969)

Western Norway to the Mediterranean and north-west Africa, as well as in the western Baltic (Hvass, 1965:19). Adriatic Sea (Soljan, 1948: 373).

ECHENEIDAE

Echeneis naucrates Linnaeus (Bailey, 1970)

Table 253 continued

All warm seas (Marshall, 1965:470; Marshall, 1966:218; Herre, 1953:775; Bigelow & Schroeder, 1953a:485; Hildebrand & Schroeder, 1928:329; Nichols & Breder, 1927:155; Perlmutter, 1961:396; Nichols & Bartsch, 1945:104; Smith, 1950:342). "Atlantic, Indian, and western Pacific Oceans; in the western Atlantic from Nova Scotia and Bermuda to Maceio, Brazil, and throughout the Gulf of Mexico" (Briggs, 1958:298). From Mossel Bay to Beira (Smith, 1950:342). Northwards to Portuguese waters (Wheeler, 1969:560). "...sometimes as far north as San Francisco" (Barnhart, 1936:84). Attaches to sharks, rays, sea turtles, and many fishes--larger reef fishes (Randall, 1968:100). Prefers large sharks as hosts (Smith, 1950:342).

Remora _brachyptera_ (Lowe) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). In the western Atlantic from Maine to Brazil (Briggs, 1958:298). "Atlantic, north to Portugal" (Wheeler, 1969:560). "...ranges from middle Japan southward to China Sea, Madeira, and Sumatra and eastward to North America and Brazil" (Okada, 1955:354). Philippines, Hawaii (Herre, 1953:776). New Zealand (Phillipps, 1927:52). "Warm and warm-temperate seas generally, probably paralleling that of the swordfish" (Bigelow & Schroeder, 1953a:486).

Remora _remora_ (Linnaeus) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). "...in the western Atlantic from Bermuda and Massachusetts to Argentina (38° S.), and widespread in the Gulf of Mexico" (Briggs, 1958:298). North to Danish waters (Wheeler, 1969:560). From Knysna to Delagoa Bay (Smith, 1950:341). All Australian states (Scott, 1962:263). Hawaii, Indian Archipelago, Madeira (Gosline & Brock, 1965:291,342). New Guinea (Munro, 1958:286). Ceylon (Munro, 1955:268). Adriatic Sea (Soljan, 1948:107). North to San Francisco (Barnhart, 1936:84). Off shore sharks are the usual hosts (Randall, 1968:101).

BALISTIDAE

+ _Aluterus_ _schoepfi_ (Walbaum) (Bailey, 1970)

"Nova Scotia and Bermuda to Bahia, Brazil, and throughout the Gulf of Mexico. Shore" (Briggs, 1958:299).

Table 253 continued

+ Aluterus scriptus (Osbeck) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). "Worldwide in tropical waters; in the western Atlantic from Massachusetts to Brazil and the northern Gulf of Mexico. Shore" (Briggs, 1958:299). Knysna to Beira, adults unknown south of Delagoa Bay (Smith, 1950:406). China Seas, New Guinea, Ponape, Greenwich, Tahiti, Hawaii, Society Islands, Indian Seas, New Ireland, Bismark Archipelago, Fiji, Zanzibar, Mauritius, India, East Indies, Siam, China, Japan, Micronesia, Melanesia, Polynesia, tropical Atlantic and eastern Pacific (Fowler, 1928 (1967): 461).

+ Balistes capriscus Gmelin (Bailey, 1970)

"Both sides of the Atlantic; in the western Atlantic from Nova Scotia and Bermuda to Argentina (35° 30' S.) and throughout the Gulf of Mexico. Shore" (Briggs, 1958:298). North to southern England and western English Channel; Mediterranean, eastern Tropical Atlantic (Wheeler, 1969:566).

+ Balistes vetula Linnaeus (Bailey, 1970)

Both sides of the Atlantic; in the western Atlantic from New England to southeastern Brazil, including the Gulf of Mexico. Schools (Böhlke & Chaplin, 1968:664).

+ Canthidermis sufflamen (Mitchill) (Bailey, 1970; Böhlke, personal communication)

Pelagic; Bermuda and Massachusetts to the Caribbean; probably much more widely distributed (Randall, 1968:263). Occurs in loose groups of about six individuals, sometimes with Melichthys niger (Bloch) (Böhlke & Chaplin, 1968:668).

+ Melichthys niger (Bloch) (Bailey, 1970; Böhlke, personal communication; Kanazawa, personal communication; Musick, personal communication)

Circumtropical (Randall, 1968:261). In the western Atlantic from Bermuda, Bahamas, South Florida, and Texas to Brazil (Moore, 1967:713-714).

+ Monacanthus hispidus (Linnaeus) (Bailey, 1970)

"Both sides of the Atlantic; in the western Atlantic from Nova Scotia and Bermuda to Santos, Brazil, and throughout the Gulf of Mexico" (Briggs, 1958:299).

Table 253 continued

OSTRACIIDAE

+ Lactophrys quadricornis (Linnaeus) and/or L. polygonia (Poey) (See Table 81, footnote 20.)
(Bailey, 1970)

L. quadricornis: "Massachusetts and Bermuda to Brazil; two unusual records from South Africa" (Randall, 1968:277).

L. polygonia: "...Bermuda and the Bahamas, south through the Greater and Lesser Antilles, along the Caribbean coast of Central and South America and the Atlantic coast of South America to Brazil. No specimens are known from the Gulf of Mexico..." (Tyler, 1965:9).

+ Lactophrys trigonus (Linnaeus) (Bailey, 1970)

New England and Bermuda to Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:683).

+ Lactophrys triqueter (Linnaeus) (Bailey, 1970)

New England and Bermuda to southeastern Brazil, including the Gulf of Mexico (Böhlke & Chaplin, 1968:681).

TETRODONTIDAE

+ Sphoeroides annulatus (Jenyns) (Bailey, 1970)

"Pacific coast of tropical America and the Galapagos Islands" (Snodgrass & Heller, 1905:412). "Pacific coast from Gulf of California to northern Peru and the Galapagos Islands" (Miller, 1966:800).

+ Sphoeroides maculatus (Bloch & Schneider) (Bailey, 1970)

"Nova Scotia to Florida and the northern Gulf of Mexico" (Briggs, 1958:300).

DIODONTIDAE

+ Diodon hystrix Linnaeus (Bailey, 1970)

Circumtropical (Briggs, 1958:234). Massachusetts to Santos, Brazil, and the northern Gulf of Mexico (Briggs, 1958:300). "...from the Cape to Beira" (Smith, 1950:415). Tropical Indo-Pacific (Herre, 1953:849).

Table 253 continued

MOLIDAE

Mola mola (Linnaeus) (Bailey, 1970)

Circumtropical (Briggs, 1958:234). "Worldwide in tropical and temperate waters; in the western Atlantic from Newfoundland to Argentina (42° S.) and the northern Gulf of Mexico" (Briggs, 1958:300). North to Tokyo, San Francisco, the Gulf of Maine, and England (Herre, 1953:851). North to Alaska (Roedel, 1948:141). North to outer coast of Nova Scotia and northern Norway (Bigelow & Schroeder, 1953a:530).

Table 254. Hosts of Capsaloidea having a circumtropical distribution.

Hosts in confinement for *Neobenedenia melleni* are indicated by a plus (+).

Host	Reference
Aetobatus narinari (Euphrasen)	Briggs (1958)
Alopias vulpinus (Bonnaterre)	Briggs (1958)
+ *Aluterus scriptus* (Osbeck)	Briggs (1958)
Auxis thazard (Lacépède)	Herre (1953), Smith (1965)
+ *Caranx hippos* (Linnaeus)	Briggs (1958)
Carcharhinus limbatus (Valenciennes)	Briggs (1958)
Coryphaena hippurus Linnaeus	Briggs (1958)
Dasyatis violacea (Bonaparte)	Bigelow & Schroeder (1962)
+ *Diodon hystrix* Linnaeus	Briggs (1958)
Echeneis naucrates Linnaeus[1]	Herre (1953)
Euthynnus pelamis (Linnaeus)	Briggs (1958)
Istiophorus platypterus (Shaw & Nodder)	Bailey (1970)
+ *Melichthys niger* (Bloch)	Randall (1968)
Mola mola (Linnaeus)	Briggs (1958)
+ *Naucrates ductor* (Linnaeus)	Briggs (1958)
+ *Pomatomus saltatrix* (Linnaeus)[2]	Briggs (1958)
Prionace glauca (Linnaeus)	Bigelow & Schroeder (1953a)
Rachycentron canadum (Linnaeus)[3]	Briggs (1958)
Remora brachyptera (Lowe)	Briggs (1958)
Remora remora (Linnaeus)	Briggs (1958)

Table 254 continued

Host	Reference
Sphyrna lewini (Griffith & Smith)[4]	Gilbert (1967)
Sphyrna zygaena (Linnaeus)	Briggs (1958)
Thunnus alalunga (Bonnaterre)	Briggs (1958)
Thunnus albacares (Bonnaterre)	Gibbs & Collette (1967)
Thunnus obesus Lowe	Briggs (1958)
Xiphias gladius Linnaeus	Briggs (1958)

[1]Several authors indicated that this species was found in all warm seas (Table 253). Briggs (1958:298) noted that it was found in the Pacific on the western side.

[2]Briggs (1958:234) indicated this species was circumtropical. Hvass (1965:29) said it was absent from the central and eastern Pacific.

[3]Briggs (1958:234) indicated this species was circumtropical. Herre (1953:287) said that it was found in "All warm seas except eastern Pacific."

[4]Gilbert (1967:76) indicated this species was circumtropical. Bailey (1970:66) noted that its "...previously recorded occurrence in our Pacific waters is believed to be erroneous."

Table 255. Hosts of Capsaloidea having an amphi-Atlantic distribution.

Hosts in confinement for *Neobenedenia melleni* are indicated by a plus (+).

Host	Reference
+ *Acanthurus chirurgus* (Bloch)	Böhlke & Chaplin (1968)
+ *Balistes capriscus* Gmelin	Briggs (1958)
+ *Balistes vetula* Linnaeus	Böhlke & Chaplin (1968)
+ *Bodianus rufus* (Linnaeus)	Böhlke & Chaplin (1968)
Brama brama Bonnaterre	Mead (personal communication)
+ *Caranx fusus* (Geoffroy-St. Hilaire)	Briggs (1958)
Carcharhinus obscurus (Lesueur)	Briggs (1958)
+ *Chaetodon striatus* Linnaeus	Böhlke & Chaplin (1968)
Dactylopterus volitans (Linnaeus)	Böhlke & Chaplin (1968)
Dasyatis centroura (Mitchill)	Briggs (1958)
+ *Epinephelus adscensionis* (Osbeck)	Böhlke & Chaplin (1968)
Epinephelus guaza (Linnaeus)	Irvine (1947)
Euthynnus alletteratus (Rafinesque)	Böhlke & Chaplin (1968)
Hippoglossus hippoglossus (Linnaeus)	Norman (1934)
+ *Holocentrus ascensionis* (Osbeck)	Böhlke & Chaplin (1968)
+ *Lobotes surinamensis* (Bloch)	Briggs (1958)
+ *Lutjanus apodus* (Walbaum)	Böhlke & Chaplin (1968)
+ *Lutjanus griseus* (Linnaeus)	Böhlke & Chaplin (1968)
Makaira nigricans Lacépède	Briggs (1958)
+ *Monacanthus hispidus* (Linnaeus)	Briggs (1958)

Table 255 continued

Host	Reference
Mustelus canis (Mitchill)	Baughman & Springer (1950)
Negaprion brevirostris (Poey)	Böhlke & Chaplin (1968)
+ *Ocyurus chrysurus* (Bloch)	Briggs (1958)
+ *Paranthias furcifer* (Valenciennes)	Briggs (1958)
+ *Pomacanthus paru* (Bloch)	Böhlke & Chaplin (1968)
Raja fyllae Lütken	Bigelow & Schroeder (1953b)
Raja radiata Donovan	Wheeler (1969)
Rhinoptera bonasus (Mitchill)	Hvass (1965)
Rhizoprionodon terraenovae (Richardson)	Briggs (1958)
Sarda sarda (Bloch)	Briggs (1958)
Squalus acanthias Linnaeus	Briggs (1958)
Tetrapturus albidus Poey	Migdalski (1958) + Wheeler (1969)
Thalassoma bifasciatum (Bloch)	Böhlke & Chaplin (1968)
Thunnus thynnus thynnus (Linnaeus)	Gibbs & Collette (1967)
+ *Trachinotus falcatus* (Linnaeus)	Böhlke & Chaplin (1968)
+ *Trachinotus goodei* Jordan & Evermann	Briggs (1958)
+ *Vomer setapinnus* (Mitchill)	Briggs (1958)

Plus all circumtropical fish (See Table 254).

Table 256. Hosts of Capsaloidea having an amphi-American distribution.

Hosts in confinement for *Neobenedenia melleni* are indicated by a plus (+).

Host	Reference
Carcharhinus obscurus (Lesueur)	Briggs (1958) + Roedel & Ripley (1950)
+ *Epinephelus itajara* (Lichtenstein)	Briggs (1958)
Makaira nigricans Lacépède	Bailey (1970) + Briggs (1958)
Negaprion brevirostris (Poey)	Böhlke & Chaplin (1968)
+ *Paranthias furcifer* (Valenciennes)	Briggs (1958)
Scorpaena plumieri (Bloch)	Randall (1968)
+ *Vomer setapinnus* (Mitchill)	Briggs (1958)

Plus all circumtropical fish (See Table 254) with the possible exceptions of *Echeneis naucrates* Linnaeus, *Pomatomus saltatrix* (Linnaeus), *Rachycentron canadum* (Linnaeus), and *Sphyrna lewini* (Griffith & Smith), which are said to be absent from the eastern Pacific by some authors (See Table 253).

Table 257. Hosts of Capsaloidea having an amphi-Pacific distribution.

Host	Reference
Acipenser medirostris Ayres	Berg (1948 (1962))
Hippoglossus stenolepis Schmidt	Roedel (1948)
Makaira indica (Cuvier)	Migdalski (1958)
Makaira nigricans Lacépède	Bailey (1970) + Gosline & Brock (1965)
Sarda orientalis (Temminck & Schlegel)	Migdalski (1958)
Sebastes introniger (Gilbert)	Taranetz (1937), Shmidt (1950 (1965))
Squalus acanthias Linnaeus	Briggs (1958)
Tetrapturus audax (Philippi)	Herre (1953)
Thunnus thynnus orientalis (Temminck & Schlegel)	Gibbs & Collette (1967)

Plus all circumtropical fish (See Table 254) with the possible exceptions of *Echeneis naucrates* Linnaeus, *Pomatomus saltatrix* (Linnaeus), *Rachycentron canadum* (Linnaeus), and *Sphyrna lewini* (Griffith and Smith), which are said to be absent from the eastern Pacific by some authors (See Table 253).

CHAPTER 9

SUMMARY

A list of recommendations is presented, which, if followed, would ensure more meaningful parasite-host locality records in the future.

The parasite-host locality records for all Capsaloidea through April 1968 are presented.

Various comments are made about confused and erroneous data on Capsaloidea.

The majority, 70.6 per cent, of the capsaloids are species-specific. Most of these species-specific parasites occur on the gills of their hosts.

The relative rates of evolution of Capsaloidea are shown to be slower than, coincident with, or faster than their hosts. The slower evolving capsaloids are those that exhibit phylogenetic specificity and parasitize more than one host. The capsaloids whose rates of evolution approximate those of their hosts are those species-specific ones which have no close relatives on the same host. The faster evolving capsaloids can be those which have a close relative on the same host.

The occurrence of Benedeniinae on rays and Osteichthyes could indicate their evolution on ancestral jawed-fishes, if so, then they probably represent the oldest capsaloid subfamily. Their occurrence on a far larger number of host families than any other subfamily, and their cosmopolitan distribution are further indications of their antiquity.

About three times as many capsaloids occur on the gills than on the skin of their hosts. At all levels of host-specificity the capsaloids on both Osteichthyes and Chondrichthyes are mostly gill parasites. In all organs the capsaloids are predominantly species-specific. There is a slight decrease in the percentage occurring on the gills and a slight increase in the percentage occurring on the skin as the level of host-specificity decreases, an indication that gill forms are more species-specific than skin forms. The capsaloids of Osteichthyes are more gill-specific than those of Chondrichthyes.

It appears that host-specificity for capsaloid species above the order-specific level can be attributed primarily to ecological specificity.

A majority of the capsaloids (79.4 per cent) are endemic to a single zone. There is greater affinity between zones in the Atlantic than zones in the Pacific. More taxa of Capsaloidea occur in the Atlantic than any other ocean, a possible indication of an Atlantic origin. The distributions of capsaloids are apparently largely determined by temperature.

Capsaloids as presently known are primarily species-specific gill parasites of warm temperate Osteichthyes.

Much more work needs to be done before a comprehensive picture of the host-specificity and zoogeography of the Capsaloidea can be obtained.

APPENDIX A

GLOSSARY

Ecological specificity-----"A form of correlation exhibited by parasites, which are not necessarily closely related, but are restricted to hosts with similar habits or living in similar environments" (Sprent, 1969:53).

Euryhospitalic-----"A parasite with a phylogenetically wide range of hosts" (Sprent, 1969:53).

Family-specificity-----the occurrence of a single parasite species on members of a single host family (Hargis, 1957:611).

Genus-specificity-----the occurrence of a single parasite species on members of a single host genus (Hargis, 1957:611).

Host-specificity-----the occurrence of a parasite in/on a limited number of host species.

Order-specificity-----the occurrence of a single parasite species on members of a single host order (Hargis, 1957:611).

Organ-specificity-----the occurrence of a parasite in/on a limited number of host organs.

Parasitocenose-----"All the parasite species in a host" (Sprent, 1969:54).

Phylogenetic specificity-----"A form of correlation exhibited by closely related parasites which are restricted to phylogenetically closely related hosts" (Sprent, 1969:54).

Physiological specificity-----"A form of correlation exhibited by parasites, not necessarily closely related, but which require certain physiologic factors for development and are thus restricted to hosts which provide them" (Sprent, 1969:54).

Species-specificity-----the occurrence of a single parasite species on a single host species (Hargis, 1957:611).

Stenohospitalic-----"A parasite with a phylogenetically narrow range of hosts" (Sprent, 1969:54).

Synhospitalic-----"Parasite species which have differentiated in the environment of a single host species or group of closely related species" (Sprent: 1969:54).

APPENDIX B

PUBLICATIONS LACKING INFORMATION ON CAPSALOID SPECIES

The following papers, carefully screened, contained no references to species of Capsaloidea. Because complete citations (except in a few cases which are given below) may be found in the bibliographies of Hargis *et al* (1969, 1970, 1971), only the authors and dates are presented. Unless otherwise indicated the papers below appear in the 1969 issue of those bibliographic works. When two or more citations with the same author and date appear in Hargis *et al* (1969, 1970, or 1971), page numbers of the intended citation are given.

Paper	Issue
Abdel-Azim (= Azim, A.M.). 1939.	
Abildgaard. 1794.	
Aderounmu. 1966.	
______. 1967.	
Agapova. 1956. p. 5-60.	
______. 1956. p. 269-277.	
______. 1965.	
Akazaki. 1965.	
Akhmerov. 1949.	
______. 1954. p. 167-168.	
______. 1954. p. 89-98.	
______. 1955.	
______. 1957. p. 13-16.	
______. 1957. p. 1251-1252.	
______. 1959.	
______. 1964.	
______. 1965.	
Akhmerov and Bogdanova. 1954.	
Alarotu. 1944.	
Al'bova. 1948.	
Alexander. 1954.	
Allison, L.N. 1954.	
Allison, R. 1957.	
Allison, T.C. 1967.	
Allison, T.C., and McGraw. 1967.	
Alvey. 1934a.	
______. 1934b.	
______. 1936.	
Alvey and Martin. 1934.	
Anderson. 1965.	

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Paper	Issue
Andre. 1910. p. 191-202.	
______. 1910. p. 203-220.	
Anthony. 1963.	
Arai. 1967.	
Arcadi. 1948.	
Ass. 1939.	
Astakhova. 1953.	
______. 1959.	
Atkins. 1901.	
Baer. 1932.	
______. 1946.	
______. 1961.	
Bailenger and Chanseau. 1955.	
Bangham. 1926.	
______. 1927. p. 214.	
______. 1927. p. 223-230.	
______. [1927].	1970
______. 1933.	
______. 1938.	1970
______. 1939.	
______. 1940.	
______. 1941. p. 161-171.	
______. 1941. p. 441-448.	
______. 1946.	
______. 1951.	
______. 1955.	
Bangham and Adams. 1954.	
Bangham and Hunter. 1936.	
______ ______. 1939.	
Bangham and Vernard. 1942.	
______ ______. 1946.	
Bartsch. 1957.	
Barysheva. 1949.	
Bauer. 1948. p. 383-386.	
______. 1951.	
______. 1953. p. 44-46.	
______. 1954. p. 9-15.	
Bauer and Nikol'skaya. 1954.	
______ and Strelkov. 1959.	
______ and Uspenskaya. 1959.	
Baugh. 1957.	
Baylis. 1951	
Beauchamp. 1912.	
______. 1913.	

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Paper	Issue
Becker and Head. 1965.	
Becker, Head, and Holmes. 1966.	
Beneden, E. 1868.	
Beneden, P.J. 1856.	
Bennett. 1938.	
Bennett and Sharp. 1938.	
Berry. 1966.	
Berry, Onofrio, and Mizelle. 1955.	
Beverley-Burton. 1962.	
Blackburn. 1960.	
Boeva. 1959.	
Bogatova. 1936.	
Bogdanova. 1957. p. 1391-1393.	
______. 1959. p. 144-148.	
______. 1960. p. 49-52.	
Bogolepova. 1950.	
Bonham and Guberlet. 1937.	
Borovitzkaya. 1952.	
Bovet. 1959.	
______. 1967.	
Bradley. 1861. p. 209-210.	
______. 1861. p. 257.	
Brandes. 1894.	
Braun. 1890. p. 43.	
______. 1896.	
Bravo-Hollis. 1954.	
______. 1960.	
______. (1966) 1967.	
Bravo-Hollis and Arroyo. 1962.	
Brinkmann. 1942. p. 1-32.	
______. 1967.	
Briot. 1904.	
Brooks. 1934.	
Brown, E.M. 1929.	
Brown, T.G. 1953.	
Buschkiel. 1930.	
Butskaia. 1952.	
Bychowsky. 1928.	
______. 1929.	
______. 1931. p. 233-240.	
______. 1933. p. 44-58.	
______. 1933. p. 243-251.	
______. 1933. p. 17-38.	
______. 1933. p. 269-296.	

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Paper	Issue
Bychowsky. 1934.	
______. 1936. p. 245-275.	
______. 1936. p. 437-482.	
______. 1947.	
______. 1948.	
______. 1949.	
______. 1951.	
______. 1957. p. 109-123.	
Bychowsky and Gussev. 1950.	
______ ______. 1955.	
______ ______. 1964.	
Bychowsky, Gussev, and Nagibina. 1965.	
Bychowsky and Nagibina. 1954.	
______ ______. 1957.	
______ ______. 1959. p. 211-236.	
______ ______. 1959. p. 362-377.	
______ ______. 1966.	
______ ______. 1968.	
Bychowsky and Petrushevskii. 1957.	
Bychowsky, Petrushevskii, and Polyanskii. 1959.	
Bykhovskaya-Pavlovskaya. 1949.	
______. 1952.	
Caballero y Caballero. 1938.	
______. 1940.	
Caballero y Caballero and Bravo-Hollis. 1955.	
______ ______. (1959) 1960.	
______ ______. (1960) 1961. p. 197-205.	
______ ______. 1961.	
______ ______. 1962. p. 107-114.	
______ ______. (1963) 1964.	
______ ______. 1965. p. 535-547.	
______ ______. 1965. p. 101-121.	
______ ______. 1967.	1971
Caballero y Caballero, Bravo-Hollis, and Grocott. 1953.	
______ ______ ______. 1954.	
______ ______ ______. 1955.	
Caballero y Caballero and Brenes. 1958.	
Caballero y Caballero and Herrera Rosales. 1947.	
Caballero y Caballero, Hidalgo, and Grocott. 1956.	
Caballero y Caballero and Cerecero. 1941.	
Caballero y Caballero, Cerecero, and Grocott. 1957.	
Cameron. 1964.	
Causey. 1926.	
______. 1956.	

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Paper	Issue
Causey. 1961.	
Cerfontaine. 1895a.	
______. 1895b.	
______. 1898. p. 301-328.	
______. 1899.	
Chatin. 1874.	
Chauhan. 1945.	
______. 1950.	
______. (1950) 1952. p. 51-54.	
Chechina, Malevitskaia, and Konova. 1953.	
Chen. 1956.	
Cherepanov. 1962.	
Chernyshenko. 1957.	
Chiaje. 1835.	
Chiriac and Udrescu. 1957.	
Choquette. 1951.	
Chubb. 1962.	
______. 1963.	
______. 1964.	
______. 1965.	
Clemens and Sneed. 1958.	
Cobbold. 1862.	
Cognetti de Martiis. 1925.	
Combes. 1964.	1970
______. 1965.	
______. 1966. p. 5-17.	
______. 1966. p. 439-444.	
______. 1967. p. 1051-1052.	
______. 1967. p. 129-133.	
______. 1967. p. 205-214.	
______. 1968.	
Cooper. 1915.	
Coupland. 1962.	
Crane and Mizelle. 1967. p. 270-273.	
______ ______. 1968.	
Crofton. 1940.	
Curtin. 1956.	
Dall and Stephenson. 1953.	1970
Davies. 1966.	
Davis. 1929.	
______. 1944.	1970
______. 1946.	
______. 1947.	
Dawes. 1940. p. 271-286.	

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Paper	Issue
Dawes. 1940. p. 287-295.	
Dayal. 1941.	
Dechtiar. 1966.	
_____. 1967.	
Delage and Ephrussi. 1923.	
Delamare-Deboutteville. 1950.	
Delaroche. 1811.	
Diesing. 1858. p. 269-272.	
Dillon. 1966.	
Dobrokhotova. 1953.	
Dogiel. 1933.	
_____. 1947. p. 481-492.	
_____. 1955.	
_____. 1957.	
Dogiel and Bychowsky. 1934.	
Dogiel and Petrushevskii. 1933.	
Dollfus. 1913.	1971
_____. 1922. p. 348-352.	
_____. 1937.	
_____. 1946. p. 95-96.	
_____. 1950.	
_____. 1953.	
_____. 1956.	
_____. 1958.	
_____. 1961. p. 267-281.	1971
_____. 1961. p. 234-245.	1971
Dollfus, Euzet, and Combes. 1965.	1971
Driagin. 1954.	
Dyk. 1955.	
Dyk and Lucky. 1954.	
Dzhalilov. 1965.	
Embody, D.R. (1941) 1942.	
Engbert. 1964.	
Engelbrecht. 1963.	
Ergens. 1956. p. 346-376.	
_____. 1956. p. 45-52.	
_____. 1957.	
_____. 1958.	
_____. 1959. p. 73-85.	
_____. 1959. p. 87-92.	
_____. 1959. p. 156-160.	
_____. 1960. p. 49-90.	
_____. 1960. p. 3-8.	
_____. 1961.	

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Paper	Issue
Ergens. 1962. p. 327-331.	
______. 1962. p. 133-134.	
______. 1962. p. 167-190.	
______. 1963. p. 287-291.	
______. 1963. p. 154-159.	
______. 1964 [1962-63].	
______. 1965. p. 359-370.	
______. 1965. p. 173-184.	
______. 1965. p. 145-169.	
______. 1965. p. 319-322.	
______. 1966. p. 28-35.	
______. 1966. p. 277-280.	
______. 1966. p. 212-221.	
______. 1966. p. 222-236.	
______. 1967.	
Ergens and Bychowsky. 1967.	
Ergens and Dulmaa. 1967.	
Ergens and Gussev. 1965.	
Ergens and Kakacheva-Avramova. 1966.	
Ergens and Lucky. 1959.	
Ershov. 1956.	
Esch and Gibbons. 1967.	
Euzet. 1957. p. 187-194.	
______. 1958. p. 79-84.	
Euzet and Audouin. 1959.	
Euzet and Combes. 1964.	
______ ______. 1965.	
______ ______. 1966.	
______ ______. 1967.	
Euzet, Combes, and Knoepffler. 1966.	
Euzet and Marc. 1963.	
Euzet and Oliver. 1965. p. 517-523.	
______ ______. 1965. p. 261-264.	
______ ______. 1966.	
______ ______. 1967.	
Euzet and Raibaut. 1960.	
______ ______. 1961.	
______ ______. 1962.	
Euzet and Razarihelisoa. 1959.	
Euzet and Trilles. 1960. p. 189-198.	
______ ______. 1960. p. 504-508.	
______ ______. 1961. p. 291-295.	
______ ______. 1961. p. 182-193.	
Fantham and Porter. 1948.	

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Paper	Issue
Faust. 1932.	1970
Findenegg. 1932.	
Fischthal. 1945.	
_____. 1949.	
_____. 1950.	
_____. 1952.	
_____. 1953.	
_____. 1956.	
Fischthal and Allison. 1940.	
_____ _____. 1942.	
Fischthal and Kuntz. 1963.	
_____ _____. 1964.	
Fish. 1947.	1970
Fraipont. 1880. p. 397-402.	
Frayne. 1943.	
Fried. 1965.	
Friend. 1939.	
Fritts. 1959.	
Fujii. 1944.	
Fujita. 1935.	
Fukui. 1958.	
_____. 1961.	
Fukui and Ogata. 1936.	
_____ _____. 1939.	
Gallien. 1932. p. 1852-1854.	
_____. 1932. p. 77-79.	
_____. 1933.	
_____. 1934. p. 229-231.	
_____. 1934. p. 68-73.	
_____. 1935.	
_____. 1938. p. 249-251.	
_____. 1938. p. 251-254.	
_____. 1947.	
_____. 1956.	
Gavrilova, Gussev, and Dzhalilov. 1965.	
George. 1960.	
Gläser. 1965. p. 485-490.	
_____. 1965. p. 459-484.	
_____. 1967.	
Gläser and Gussev. 1967.	1971
Glukhova. 1955.	
Goldschmidt. 1902. p. 180-189.	
_____. 1909.	
Gopalakrishnan. 1964	1970

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Paper	Issue
Goto. 1891. p. 103-104.	
______. 1893.	
Goto and Kikichi. 1917.	
Gowanloch. 1927.	
Grabda. 1956.	
Grabda, Grabda, and Wierzbicki. 1961. p. 173-175.	
Griffith. 1953.	
Gröben. 1940. p. 611-636.	
Grossman and Sandner. 1954.	
Guberlet. 1926.	
______. 1933.	
Guberlet, Hansen, and Kavanagh. 1927.	
Guilford. 1959.	
Gupta. 1961.	
Gupta and Khullar. 1967. p. 409-411.	1970
Gupta and Khullar. 1967. p. 429-431.	1970
Gussev. (1953) 1954.	
______. 1954.	
______. 1955. p. 291-294.	
______. 1955. p. 171-399.	
______. 1955. p. 119-124.	
______. 1958.	
______. 1961. p. 490-493.	
______. 1961. p. 1480-1482.	
______. 1963.	
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______. 1967. p. 1630-1640.	
______. 1967. p. 250-255.	
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______. 1958. p. 13.	
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______. 1960.	
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______. 1932.	
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Herrera-Rosales. 1951.	
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______. 1930.	
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______. 1959.	
______. 1962.	1970
______. 1967.	
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______. 1961. p. 264-271.	1971
______. 1967.	
Ivasik, Karpenko, and Kulakovskaya. 1967.	1971
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______. 1958 [1959]. p. 295-303.	
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Kulweic. 1927.	
Kurochkin, Gorbunov, and Koblitskaya. 1959.	
Kurochkina. 1968.	
Kutikova. 1950.	
Lahav, M., and S. Sarig. 1967. _Ergasilus sieboldi_, Nordmann infestation of grey mullet in Israel fish ponds. Bamidgeh 19 (4): 69-80.	
Lahav, M., S. Sarig, and M. Shilo. 1966. Experiments in the use of BROMEX-50 as a means of eradicating the ectoparasites of carp. Bamidgeh 18(3/4): 57-66.	
Lahille. 1918.	1970
Laird. 1927.	
Laird and Embody. 1931.	
Laird. 1958. p. 441-446.	
Lamothe-Argumedo. 1963. p. 73-88.	
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_____. (1966) 1967.	
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_____. 1967. p. 47-58.	1971
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______. 1952.	
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______. 1959. p. 213-225.	
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______. 1968.	
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______. 1960.	
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_____. 1943. p. 1-8.	
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_____. 1926.	
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_____. 1960.	
_____. 1963.	
_____. 1966.	1970
_____. (1966) 1967.	
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______. 1965.	1971
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______. 1958. p. 612-615.	
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Wagener. 1860.	
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Paper	Issue
Walton. 1949. p. 40.	
_____. 1950.	
Ward. 1917.	
Wedl. 1857.	
Wellborn. 1967.	
Wellborn and Rogers. 1967.	
Westman and Nigrelli. 1955.	
Wilde. 1935.	
_____. 1937. p. 203-236.	
_____. 1937. p. 309-311.	
Wiles. 1965. Ph.D. Diss.	
_____. 1965. p. 4P-5P.	
_____. 1968.	
Wilkinson. 1939.	
Willem. 1906.	
_____. 1907.	
Willemoes-Suhm. 1872.	
Williams, H. 1960. p. 551-559.	
_____. 1961.	
_____. 1962.	
_____. 1964. p. 155-171.	
Williams, J. 1959. p. 205-206.	
_____. 1959. p. 207-208.	
_____. 1960. p. 151-192.	
_____. 1960. p. 323-346.	
_____. 1961.	
Williams, R. 1953.	
Wisniewski. 1958.	
Witenberg. 1961.	1970
Wood and Mizelle. 1957.	
Wunder. 1926. p. 748-755.	
_____. 1926. p.1097-1103.	
_____. 1940.	1971
Yamaguti. 1936.	
_____. 1937. 15 p.	
_____. 1938.	
_____. 1940. p. 84-85.	
Yin and Sproston. 1948.	
Young. 1967. p. 1016-1022.	
Zaika. 1965.	1971
_____. 1966.	
Zakhvatkin. 1935.	
Zandt. 1924.	
Zeller. 1888. p. 233-239.	

APPENDIX B continued

Paper	Issue
Zercero y Diaz. 1948.	
______. 1960.	
Zhukov. 1960.	
Zitnan. 1960.	
______. 1964. p. 105-107.	
______. 1964. p. 49-51.	
______. 1964. p. 115-122.	
______. 1965. p. 29-48.	
______. 1965. p. 35-44.	1971
______. 1966. p. 681-692.	
______. 1967.	
Zschokke. 1933.	

APPENDIX C

SPECIES OF CAPSALOIDEA THAT HAVE BEEN REPORTED ONLY ONCE

Species	Year reported	Table
Capsala squali	1847	4
Capsala sp. of Koratha & Martin, 1960	1960	5
Caballerocotyla albsmithi	1962	7
C. caballeroi	1955	8
C. foliacea	1894	9
C. gouri	1951	10
C. gregalis	1967	11
C. katsuwoni	1936	12
C. magronum	1936	14
C. manteri affinis	1968	16
C. notosinense	1968	17
C. paucispinosa	1968	18
Caballerocotyla sp. of Mamaev, 1968	1968	20
Capsaloides magnaspinosus	1939	22
C. perugiai	1898	23
C. sinuatus	1894	24
Tricotyla thynni	1938	27
Tristoma fuhrmanni	1928	29
T. levinsenii	1891	31
T. uncinatum	1889	32
Tristomella lintoni	1898	36
T. megacotyle	1906	37
Benedenia epinepheli	1937	45
B. leucanthemum	1967	48
B. madai	1938	49
B. micracantha	1967	50
B. ovata	1894	52
B. pagrosomi	1938	53
B. sebastodis	1934	54
B. sekii	1937	55
B. synagris	1953	57
Benedenia sp. of Porter, 1954	1954	58
Benedenia sp. of Randall, 1961	1961	59
Benedenia sp. of Hutton, 1964	1964	60
Allobenedenia convoluta	1937	61
A. ishikawae	1894	62
Ancyrocotyle vallei	1895	63
A. bartschi	1934	64
Benedeniella macrocolpa	1906	65
Dioncopseudobenedenia kala	1965	67
Entobdella apiocolpos	1967	69

APPENDIX C continued

Species	Year reported	Table
Entobdella brattstroemi	1952	70
E. curvunca	1957	73
E. guberleti	1962	75
E. steingroeveri	1916	78
Lagenivaginopseudobenedenia etelis	1966	79
Neobenedenia muelleri	1938	85
Neobenedeniella congeri	1958	86
Oligoncobenedenia nasonis	1965	87
Pseudallobenedenia apharei	1966	88
P. opakapaka	1966	89
Pseudoentobdella pugetensis	1961	91
Encotyllabe caranxi	1967	93
E. chironemi	1961	94
E. embiotocae	1966	95
E. latridis	1967	96
E. lintoni	1907	97
E. lutiani	1959	98
E. masu	1938	99
E. monticellii	1940	100
E. paronae	1890	103
E. pricei	1955	104
E. spari	1934	105
Nitzschia monticellii	1908	108
N. quadritestes	1962	109
Pseudonitzschia uku	1965	111
Trochopus gaillimhe	1929	116
T. goniistii	1940	117
T. hobo	1942	119
T. lineatus	1901	120
T. oncacanthus	1906	122
T. plectropomi	1967	124
T. sprostoni	1964	125
Trochopus sp. of Reichenbach-Klinke, 1957	1957	126
Trochopus sp. of Kearn, 1963	1963	127
Allomegalocotyla johnstoni	1961	128
Macrophyllida antarctica	1928	129
Megalocotyle grandiloba	1964	132
M. helicoleni	1936	133
M. rhombi	1863	135
Megalocotyloides epinepheli	1967	138
Pseudobenedenia noblei	1946	141
Pseudomegalocotyla latridis	1961	142
Sprostonia squatinae	1921	143
Sprostoniella multitestis	1967	144

APPENDIX C continued

Species	Year reported	Table
Trochopella candida	1962	145
Trilobiodiscus lutiani	1967	146
Loimos salpinggoides	1917	150
L. winteri	1961	153
Microbothrium tolloi	1952	157
Leptobothrium pristiuri	1937	158
Leptomicrobothrium longiphallus	1965	160
Pseudoleptobothrium aptychotremae	1967	161
Anoplocotyle australis	1930	162
Pseudomicrobothrium spari	1958	163
Asthenocotyle kaikourensis	1961	164
Enoplocotyle minima	1912	165
Monocotylidae n. sp. of Koratha & Martin,1963	1963	179, footnote 1
Monocotyle granulatae	1967	172
M. ijimae	1894	173
M. kuhlii	1967	174
M. tritestis	1967	176
Monocotyle sp. of Layman, 1930	1930	177
Monocotyle sp. of Euzet & Maillard, 1967	1967	178
Anoplocotyloides papillatus	1953	179
Decacotyle lymmae	1967	181
Diploheterocotyla dasyatis	1965	182
Heterocotyle pastinacae	1904	183
H. americana	1955	184
H. granulatae	1967	185
H. pseudominima	1955	187
H. robusta	1922	188
Horricauda rhynchobatis	1959	189
H. rhinobatidis	1967	190
Neoheterocotyle inpristi	1955	191
Papillicotyle octona	1967	192
Troglocephalus rhinobatidis	1967	195
Tympanocirrus spirophallus	1959	196
Calicotyle australis	1934	199
C. macrocotyle	1944	200
C. mitsukurii	1894	201
C. palombi	1960	202
C. ramsayi	1961	203
Gymnocalicotyle inermis	1936	206
Dendromonocotyle kuhlii	1967	208
D. taeniurae	1967	209
Clemacotyle australis	1967	210
Merizocotyle amplidiscata	1965	212
Merizocotyle sp. of Palombi, 1943	1943	215

APPENDIX C continued

Species	Year reported	Table
Thaumatocotyle concinna	1904	218
T. longicirrus	1955	220
T. pseudodasybatis	1955	221
T. retorta	1955	222

APPENDIX D

COLLECTION LOCATIONS LISTED BY CAPSALOID SUBFAMILY

The number of capsaloid species per subfamily are presented for each collection location. Except for cases of oceanic stations, only the location names and their latitudes are given. In cases where general locations were given in the source publications, latitudinal ranges are approximate only. Approximate latitudes are indicated by an asterisk (*). Latitudinal data were derived from The Times Atlas of the World (1967). Data from this appendix were employed in preparing Figures 6-18 .

Location name	Latitude	No. of species
CAPSALINAE		
1. Between Nootka Island, B.C., and Monterey Bay, California	49°45'N-36°35'N*	1
2. West of Flores Island, Azores	39°56'10"N, 34°W	1
3. English Channel	49-52°N*	1
4. Naples, Italy	40°50'N	7
5. Plymouth, England	50°23'N	1
6. Fermeuse, Long Pond, Newfoundland	47°32'N*	1
7. Conception Bay, Newfoundland	48°N*	1
8. New Zealand	35-47°S*	1
9. California	32°30'-42°N*	1
10. Misaki, Japan	33°20'N*	5
11. Christmas Island, Line Islands	2°14'N, 159°59'W	1
12. Guadalupe Island, Baja Calif.	29°15'N*	1
13. Acapulco, Guerrero, Mexico	16°51'N	1
14. Bombay, India	18°56'N	1
15. Newport Beach, California	33°38'N	1
16. Japan	31-46°N*	2
17. -----------	18°24'N, 104°38'W	1
18. Atlantic Ocean off coast of Africa	------------	1
19. Tortugas, Florida	24°34'N*	1
20. Offshore from Quinby, Virginia	37°30'N*	1
21. South China Sea	0-15°N*	4
22. Trieste, Italy	45°39'N	3
23. Pisa, Italy	43°43'N	1
24. Genova, Italy	44°24'N	4
25. Portoferrajo, Elba, Italy	42°49'N	3
26. Black Sea	41-46°30'N*	1
27. Block Island, Rhode Island	41°11'N	2

APPENDIX D continued

Location name	Latitude	No. of species
28. Woods Hole, Mass.	41°32'N	7
29. Spezia, Italy	44°07'N	1
30. Palermo, Sicily, Italy	38°08'N	3
31. England	50-55°N*	1
32. Scandinavia	-------	1
33. Beach Haven, New Jersey	39°34'N	1
34. Island of Groix, France	47°38'N	1
35. Norway	58-71°N*	3
36. Roscoff, France	48°43'N	1
37. Pegli, Italy	44°25'N	1
38. Venezia, Italy	45°26'N	2
39. Off No Man's Land, Mass.	41°15'N	1
40. Near Mallaig, west coast of Scotland	57°00'N	1
41. Firth of Forth, Scotland	56°00'N*	1
42. Maritime Provinces, Canada	45°N*	2
43. Berry Head, Devon, England	50°24'N	1
44. Achill, Ireland	53°56'N	1
45. Ireland	51°30'-55°30'N*	1
46. French waters	43-51°N*	2
47. Salcombe, Devon, England	50°13'N	1
48. Seahouses, Northumberland, Eng.	55°35'N	1
49. Coast of Brittany	49-51°N*	1
50. North Sea	54-60°N*	2
51. --------	48°00'08"N, 17°28'01"W	1
52. --------	43°23'N, 7°36'15"E	2
53. United States (Atlantic & Pacific coasts)	------	1
54. Bergen, Norway	60°23'N	1
55. Oslofjord, Norway	59-60°N*	2
56. Glesvaer, Norway	Not found	1
57. Alta, Norway	70°00'N	1
58. Solsvik, Norway	60°27'N	1
59. Bulandet, Norway	Not found	1
60. Holmengrå, Norway	60°51'N	1
61. Tittelsnes, Norway	59°43'N	1
62. Kalvåg, Norway	61°47'N	1
63. Herdla, Norway	60°34'N	1
64. Lista, Norway	58°10'N*	1
65. Langesund, Norway	59°02'N*	1
66. Matanzas, Cuba	23°04'N	1
67. --------	47°12'N, 10°29'45"W	1
68. Mediterranean Sea	30-45°N*	1

APPENDIX D continued

Location name	Latitude	No. of species
69. Coast of Belgium	51-51°22'N*	1
70. Siracuse, Sicily, Italy	37°04'N	1
71. Madeira, Madeira Islands, Portugal	32°45'N	1
72. Bundefjord (Oslofjord), Norway	59-60°N*	2
73. Sete, France	43°25'N	3
74. Messina, Sicily, Italy	38°13'N	2
75. Carloforte, Sardinia, Italy	39°08'N	1
76. Cork Harbor, Ireland	51°50'N*	1
77. Coast of Galway, Ireland	53°N*	1
78. Nizza, Sicily, Italy	37°59'N	2
79. Sicily, Italy	36°20'-38°15'N*	1
80. Off Martha's Vineyard, Mass.	41°20'N*	1
81. Iddefjord, Norway	59°05'N	1
82. Drøbak, Norway	59°40'N	1
83. Zool. Mus. Copenhagen	-------	1
84. Zool. Mus. Lipsia	-------	1
85. South of Martha's Vineyard, Mass.	41°20'N*	1
86. Madras, India	13°05'N	1
87. 60 miles WSW of Cape Recife, South Africa	34°S*	2
88. Concarneau (Finistere), France	47°53'N	1
89. Ilha Victoria, Sao Paulo, Brazil	24°S*	1
90. Beruwala, Ceylon	6°29'N	2
91. Osatsube, Hokkaido, Japan	Not found	1
92. Coast of Angola	6-17°S*	2
93. Havana, Cuba	23°07'N	1
94. Washington Island, Line Islands	04°48'N, 160°37'W	1
95. Hawaii	19-20°N*	1
96. Mazatlan, Sinaloa, Mexico	23°11'N	1
97. Off Caracoles Point, Panama	7°42'N*	1
98. Panama Bay	9°N*	1
99. Off coast of Fife, Scotland	56°20'N*	1
BENEDENIINAE		
1. Ostende, Belgium	51°13'N	2
2. French waters	43-51°N*	3
3. Viareggio, Italy	43°52'N	1
4. Pisa, Italy	43°43'N	1
5. Zool. Mus. Palermo, Sicily, Italy	38°08'N	1
6. Japanese Sea	35-45°N*	1
7. Vladivostok, U.S.S.R.	43°09'N	1
8. South Sakhalin & South Kuril Islands, U.S.S.R.	45-47°N*	1
9. Bering Sea	50-67°N*	2

APPENDIX D continued

Location name	Latitude	No. of species
10. Tarumi, Inland Sea, Japan	34°N*	1
11. Caleta Buena, Chile	19°55'S	1
12. Spokane, Washington	47°40'N	1
13. Puerto Vallarta, Jalisco, Mexico	20°36'N	1
14. Zihuatanejo, Gro., Mexico	17°39'N	1
15. Goree, Senegal	14°38'N*	4
16. Japan	30-45°N*	2
17. Trieste, Italy	45°39'N	2
18. Lago Fusaro, Italy	40°48'N	1
19. Gulf of Naples, Italy	40°50'N	3
20. Misaki, Japan	33°20'N*	1
21. Ise Bay, Japan	34°39'N*	1
22. Otyo, Hiroshima Pref., Inland Sea, Japan	34°10'N*	1
23. Inland Sea, Japan	34°N*	3
24. Shizuoka Prefecture, Japan	35°N*	1
25. Macassar, Celebes	5°09'S	1
26. Aqua. Zool. Soc. London	51°30'N	1
27. Hawaii	19-20°N*	6
28. Coffin Patch Reef, Key West, Fla.	24°34'N	1
29. Hagi, Japan	34°25'N	1
30. Puerto Rico Deep	19°30'30"N, 65°14'00"W	1
31. Kalpitiya & Dutch Bay, Ceylon	8°13'N	1
32. Tampa Bay, Florida	27°45'N*	2
33. Chesapeake Bay	37°N*	1
34. England	50-55°N*	2
35. West Greenland	60-80°N*	1
36. Norway	57-71°N*	1
37. Denmark	49-57°N*	1
38. Ireland	51°30'-55°30'N*	1
39. Spain ("Hibernia")	36-43°N*	1
40. "Storeggen," Norway	Not found	1
41. Greenland	60-84°N*	1
42. Skagerrack	57°-58°30'N*	1
43. Coast of Finmark (Norway)	57-71°N*	1
44. --------	71°14'N, 32°46'E	1
45. --------	71°30'N, 33°30'E	1
46. --------	69°32'N, 35°10'E	1
47. European Polar Sea	-------	1
48. Abderdeen, Scotland	57°10'N	1
49. Maritime Provinces, Canada	45°N*	1
50. Le Have Island, Nova Scotia	44°10'N*	1
51. Woods Hole, Mass.	41°32'N	2
52. Swans Island, Maine	44°10'N*	1

APPENDIX D continued

Location name	Latitude	No. of species
53. Alaska	54–70°N*	1
54. Bjørnefjord, Norway	60°10'N*	1
55. Andenes, Norway	69°18'N	1
56. Manger, Norway	60°39'N	1
57. Bergen, Norway	60°23'N	1
58. S. Varanger, Norway	70°N*	1
59. Tromsø, Norway	69°42'N	1
60. Kristiansund, Norway	63°06'N	1
61. Tr. Heimsfj., Norway	63°30'N*	1
62. North Sea	54–60°N*	1
63. Barents Sea	70–80°N*	1
64. Iceland	63°30'-66°30'N*	1
65. Seyoisfjorour, Iceland	65°20'N*	1
66. Onundarfjorour, Iceland	66°05'N*	1
67. Faxafloi, Iceland	64–64°45'N*	1
68. Reykjarfjorour, Iceland	65°58'N	1
69. Lofoten Islands, Norwegian Sea	68°N*	1
70. Gulf of St. Lawrence, Canada	47-51°N*	1
71. South West Point, Anticosti Island, Canada	49°25'N*	2
72. Brion Island, Magdalen Islands, Canada	47°48'N	2
73. --------	56°30'N, 7°45'W	1
74. --------	56°30'N, 9°0'W	1
75. Between Shetland Islands and Norwegian coast	60-61°N*	1
76. Canadian Pacific coast	49–54°N*	1
77. Labrador	52–60°N*	1
78. Golfo de Ancud, N of Isla Abtao, Chile	41°47'18"S, 73°20'55"W	1
79. Alligator Harbor, Florida	30°N*	1
80. La Tabatiere, N shore of Gulf of St. Lawrence, Canada	50°50'N*	1
81. English Channel	49–52°N*	1
82. Coast of Brittany	49–51°N*	1
83. Roscoff, France	48°43'N	1
84. British waters	50–55°N*	1
85. Wimereux (Pas-de-Calais), France	50°46'N	1
86. Between Lancashire & Isle of Man	54°N*	1
87. Firth of Clyde, Scotland	55°30'N*	1
88. Irish Sea	53–54°N*	1
89. 2 miles E of Clare Island, Ireland	53°45'N*	1
90. W coast of Ireland off Galway Bay	53°N*	1

APPENDIX D continued

Location name	Latitude	No. of species
91. Cardigan Bay, Wales	52-53°N*	1
92. Plymouth, England	50°23'N	1
93. South Devon, England	50-51°N*	1
94. Whitstable, England	51°22'N	1
95. Monterey Bay, California	36°35'N	2
96. Puget Sound, Washington area	47°40'N*	2
97. Seno Reloncavi, Piedra Azul, Chile	40°31'30"S	1
98. Presumably from the Gulf of Mexico	25-30°N*	1
99. German South West Africa	18-28°S*	1
100. Guaymas, Sonora, Gulf of California, Mexico	27°59'N	1
101. Tokusima (= Tokushima), Japan	34°03'N	1
102. Suma Aquarium, Japan	34°40'N*	1
103. Bimini, British West Indies	25°46'N	1
104. Socorro Island, Mexico	19°N*	1
105. La Paz, Baja California, Mexico	24°10'N	2
106. La Jolla, California	52°40'N	1
107. Bahia de Banderas, Nayarit, Mexico	20°36'N*	1
108. Isabel Island, Mexico	22°N*	1
109. Albemarle Island, Galapagos Isl.	0°0' (equator)	1
110. Mie Prefecture, Japan	34°41'N*	1
ENCOTYLLABINAE		
1. French waters	43-51°N*	1
2. ?	-------	1
3. Great Australian Bight & Tasman Sea	32-45°S*	1
4. Cook Strait, New Zealand	40-42°S*	1
5. Goleta Beach, California	34°26'N	1
6. Tasman Sea	35-45°S*	1
7. Flatts, Bermuda	32°19'N	1
8. Madras (Bay of Bengal), India	13°05'N	1
9. Japan	31-46°N*	1
10. La Chorrera (north of Havana), Cuba	23°07'N*	1
11. Coast of Brittany	49-51°N*	1
12. W coast Ireland off Galway Bay	53°12'N*	1
13. Australian waters (Sydney)	33°55'S	1
14. James Island, Galapagos Islands	0°16'S	1
15. Mazatlan, Sinaloa, Mexico	29°00'N	1
16. Genova, Italy	44°24'N	1
17. Port Aransas, Texas	27°50'N	1
18. Inland Sea, Japan	34°N*	1
19. Trieste, Italy	45°39'N	1
20. ?	-------	1

APPENDIX D continued

Location name	Latitude	No. of species
NITZSCHIINAE		
1. Danish waters	55-57°40'N*	1
2. Europe	-------	1
3. East Prussia	50-55°N*	1
4. Scotland	56-59°N*	1
5. Denmark	55-57°40'N*	1
6. Coast of Brittany	49-51°N*	1
7. Øresund (Denmark)	56°N*	1
8. North Sea	54-60°N*	1
9. Germany	47°20'-54°30'N*	1
10. French waters	43-51°N*	1
11. Leningrad, U.S.S.R.	59°55'N	1
12. Volga River (to Caspian Sea), U.S.S.R.	50°N*	1
13. Oslofjord, Norway	59-60°N*	1
14. Bergen, Norway	60°23'N	1
15. Herøysund (Sundhordl.), Norway	59°55'N	1
16. Aral Sea	43-46°N*	1
17. Syr-Darya River (to Aral Sea), U.S.S.R.	45°N*	1
18. Island of Sara, Caspian Sea	Not found	1
19. Black Sea (near Batumi)	41°37'N*	1
20. Kura River (to Caspian Sea), U.S.S.R.	40°N*	1
21. Mediterranean ?	------	1
22. Off mouth of Columbia River, U.S.	46°20'N*	1
23. Columbia River up to Ranier, Oregon	45°30'N*	1
24. Off coast of New England, U.S.	40-45°N*	1
25. Woods Hole, Mass.	41°32'N	1
26. Delaware River at Philadelphia, Pa.	40°00'N	1
27. N.Y. Aquarium, from Atlantic	40°40'N	1
28. Ural River, U.S.S.R.	47°N*	1
PSEUDONITZSCHIINAE		
1. Hawaii	19-20°N*	1
TROCHOPODINAE		
1. Coast of Brittany (Brest)	48°23'N	3
2. Trieste, Italy	45°39'N	3
3. Bassin d'Arcachon, France	44°43'N	1
4. French waters	43-51°N*	1
5. Rome market, Italy	41°53'N	2

APPENDIX D continued

Location name	Latitude	No. of species
6. Cagliari, Sardinia, Italy	39°13'N	1
7. Pisa, Italy	43°43'N	2
8. Genova, Italy	44°24'N	3
9. Between Lacanshire & Isle of Man	54°N*	1
10. Irish Sea	53-54°N*	1
11. Tirreno, Italy (=? Tirrenia)	43°37'N (Tirrenia)	2
12. Off Galway Bay area, Ireland	53°N*	1
13. Pacific	-------	1
14. Gulf of Naples, Italy	40°50'N	4
15. Hamazima (=Hamajima), Japan	34°N*	1
16. Firth of Clyde, Scotland	55°30'N*	1
17. Portoferraio, Elba, Italy	42°49'N	2
18. Sete, France	43°25'N	1
19. Heron Island, Queensland, Australia	23°25'S	1
20. Santa Catalina Channel, California	33°30'N*	1
21. Banyul sur Mer, France	42°29'N	1
22. Cook Strait, New Zealand	40-42°S*	3
23. Port Phillip Bay, Victoria, Aust.	37°45'S*	2
24. Friday Harbor, Washington	48°33'N	1
25. Puget Sound, Washington	47°40'N*	1
26. Ketchikan, Alaska	55°25'N	1
27. Portobello, Otago Harbor, N. Zealand	45°51'S	1
28. Cape Campbell, New Zealand	41°45'S*	1
29. Israel coast of Mediterranean	31-33°N*	1
30. Newport, Lincoln Co., Oregon	44°39'N	1
31. Alghero, Sardinia, Italy	40°34'N	1
32. South China Sea by N shore of Hainan	20°N*	1
33. Puerto Vallarta, Jalisco, Mexico	20°36'N	1
34. Zihuatanejo, Gro., Mexico	17°39'N	1
35. Antipodes Island, New Zealand	49°42'S	1
36. Macquarie Island, New Zealand	54°29'S	1
37. Auckland Islands	50°35'S	1
38. Kerguelens	49°30'S	1
39. Monterey Bay, California	36°35'N	1
40. Singapore	1°20'N	1
41. South China Sea by S shore of Hainan	18°N*	2
42. Gulf of Lions, France (Med. Sea)	43°N*	1
DIONCIDAE		
1. Newport, Rhode Island	41°30'N	1
2. Woods Hole, Mass.	41°32'N	1
3. Bay of Bengal (off coast of Waltair)	17°45'N	1
4. West Indies	20°N*	2

APPENDIX D continued

Location name	Latitude	No. of species
5. Indian Ocean	-------	1
6. Grand Isle, Louisiana	29°12'N	1
7. Tampa Bay, Florida	27°45'N*	1
8. Port Aransas, Texas	27°50'N	1
9. Alligator Harbor, Florida	30°N*	1
10. Israel coast	31-33°N*	1
11. N. Y. Aquarium	40°40'N	1
12. Buckroe Beach pier, Chesapeake Bay, Virginia	37°05'N*	2
<u>LOIMOIDAE</u>		
1. Woods Hole, Mass.	41°32'N	1
2. Beaufort, North Carolina	34°44'N	1
3. Alligator Harbor, Florida	30°N*	3
4. Port Aransas, Texas	27°50'N	1
5. Rangoon, Burma	16°47'N	1
6. Puri (Bay of Bengal), India	19°49'N	1
7. Miramar, Guaymas, Sonora, Mexico	27°59'N	1
8. Chesapeake Bay	37°N*	1
9. Montego Bay, Jamaica	18°21'N	1
10. Goree, Senegal	14°38'N*	1
<u>MICROBOTHRIINAE</u>		
1. Skagerrack	57-58°30'N*	2
2. Roscoff, France	48°43'N	2
3. Maritime Provinces, Canada	45°N*	1
4. Woods Hole, Mass.	41°32'N	1
5. North Sea & East Atlantic	54-60°N*	2
6. Orkneys	59°N*	1
7. Chesapeake Bay	37°N*	1
8. Plymouth, England	50°23'N	2
9. Seno Reloncavi, Piedra Azul, Chile	41°31'30"S	1
10. West of south of Ireland	53°17'N	1
11. West of south of Ireland	55°55'N	1
12. Timaru, New Zealand	44°23'S	1
13. Taiaroa Heads, New Zealand	45°46'S	1
14. Moreton Bay, Queensland, Australia	27°S*	1
15. Naples, Italy	40°50'N	1
16. Halsnøy Kloster (Sunnhordl.), Norway	59°48'N	1
17. Kristineberg, Sweden	Not found	1
18. Irish Sea	53-54°N*	1
19. Port Erin Aquarium (Isle of Man)	54°05'N	1

APPENDIX D continued

Location name	Latitude	No. of species
20. South Devon, England	50-51°N*	1
21. South of Calf of Man	54°N*	1
22. W coast Ireland off Galway Bay	53°12'N*	1
23. Ballyhenry Bay, Strangford Lough, Ireland	54°30'N*	1
24. Atlantic Ocean near England	50°N*	1
25. French waters	43-51°N*	1
ANOPLOCOTYLINAE		
1. Sidney Harbour, Australia	33°55'S	1
2. Sagami Bay, Japan	35°N*	1
ASTHENOCOTYLINAE		
1. Kaikoura, New Zealand	42°24'S	1
ENOPLOCOTYLINAE		
1. Aquarium at Naples, Italy	40°50'N	1
PSEUDOCOTYLINAE		
1. Ostende, Belgium	51°13'N	1
2. Naples, Italy	40°50'N	1
3. Wimereux, France	50°46'N	1
4. Roscoff, France	48°43'N	1
5. Plymouth, England	50°23'N	1
6. Off Galway Bay, Ireland	53°N*	1
7. French waters	43-51°N*	1
8. Caernarvon Bay, N. Wales	53°N*	1
9. Iceland	63°30'-66°30'N*	1
10. Off Cape Finistere, France	47°40'10"N	1
11. --------	60°23'N	1
DERMOPHTHIRIINAE		
1. Woods Hole, Mass.	41°32'N	1
2. Beaufort, North Carolina	34°44'N	1
3. Goree, Senegal	14°38'N*	2
4. Barataria Pass, Grand Isle, Louisiana	29°12'N*	1
5. Davis Bay, Mississippi	30°20'N*	1

APPENDIX D continued

Location name	Latitude	No. of species
MONOCOTYLINAE		
1. Aquarium at Naples, Italy	40°50'N	1
2. Trieste, Italy	45°39'N	1
3. Museum of Pisa, Italy	43°43'N	1
4. French waters	43-51°N*	1
5. Naples, Italy	40°50'N	1
6. Alligator Harbor, Florida	30°N*	6
7. Chesapeake Bay	37°N*	2
8. Moreton Bay, Queensland, Australia	27°S*	4
9. Hiroshima, Japan	34°23'N	1
10. Beaufort, North Carolina	34°44'N	2
11. Peter The Great Bay, U.S.S.R.	43°09'N*	1
12. Dakar, Senegal	14°38'N	1
13. Long Beach breakwater area, Los Angeles County, California	33°47'N	2
14. Woods Hole, Mass.	41°32'N	2
15. Goree, Senegal	14°38'N*	1
16. Heron Island, Queensland, Australia	23°25'S	4
17. Hawaii	19-20°N*	1
18. Dornoch Firth, Scotland	57°50'N	1
19. Sydney, Australia	33°55'S	1
20. Puri, Bay of Bengal, India	19°49'N	2
21. Gulf of Mexico	25-30°N*	1
22. Tampa Bay, Florida	27°45'N*	1
23. California	32°30'-42°N*	1
24. Chilka Lake, India	19°49'N*	1
CALICOTYLINAE		
1. Kattegat	56-57°N*	1
2. 60 miles SE of Shetland Islands	59°40'N*	1
3. Off Abderdeen, Scotland	57°10'N	1
4. "in the Clyde," Scotland	55°30'N*	1
5. Northumberland, England	55°30'N*	1
6. Swedish W coast in Skagerrak	57-58°30'N*	1
7. West of previous (6) in North Sea	57-58°30'N*	1
8. Norway	58-71°N*	1
9. Herdla, Norway	60°34'N	2
10. Drøbak, Norway	59°40'N	1
11. Reykjavik, Iceland	64°09'N	1
12. ---------	57°02'N, 0°45'E	1
13. ---------	60°01'N, 1°0'W	1
14. England	50-55°N*	1

APPENDIX D continued

Location name	Latitude	No. of species
15. North Sea	54-60°N*	3
16. Trieste, Italy	45°39'N	1
17. Naples, Italy	40°50'N	1
18. Sete, France	43°25'N	3
19. Strömstadt, Sweden (Kloster Island)	58°56'N	1
20. Coast of Belgium	51-51°22'N*	1
21. French waters	43-51°N*	1
22. Atlantic Ocean off southern England	50°N*	1
23. Atlantic Ocean off western England	50-51°N*	1
24. --------	57°40'N, 9°15'W	2
25. --------	57°50'N, 9°15'W	2
26. --------	57°25'N, 0°20'W	1
27. N & NW Scotland	58-59°N*	2
28. Roscoff, France	48°43'N	1
29. Plymouth, England	50°23'N	2
30. Irish Sea	53-54°N*	1
31. Beaumaris Bay, England	53°16'N*	1
32. --------	53°30'-54°N, 11°40'W and/or 52°55'-53°30'N, 14°W	1
33. Messina, Sicily, Italy	38°13'N	1
34. W coast of Ireland off Galway Bay	53°N*	1
35. S. Devon, England	50-51°N*	1
36. Newquay, England	50°25'N	1
37. --------	54°0'N, 11°30'W	2
38. --------	61°01'N, 0°35'W	1
39. Durham, England	54°47'N	1
40. Trondheim, Norway	63°36'N	2
41. Byfjord, Bergen, Norway	60°23'N (Bergen)	1
42. Mangerfjord, Norway	60°39'N*	1
43. Border between Barents & Norwegian Seas	71°N*	1
44. --------	59°30'N, 6°30'W	1
45. Glenelg, South Australia, Australia	34°59'S	1
46. Montevideo, Uruguay	34°55'S	1
47. Mitsugahama (=Mitsuhama), Japan	33°50'N	1
48. Cook Strait, New Zealand	40-42°S*	1
49. Rovigno, Yugoslavia	Not found	1
50. Butt of Lewis, Outer Hebrides	58°30'N*	1
51. Shetland Isles	60-61°N*	1
52. Coral Bank, ENE of Aberdeen, Scotland	57°10'N	1
53. 38' NW-N of Skagen	58°22'N*	1
54. Brixham, England	50°02'N	1
55. Off W coast of Ireland	51°20'-55°20'N*	1

APPENDIX D continued

Location name	Latitude	No. of species
56. --------	56°0'N, 8°5'W	1
57. Port Phillip Bay, Victoria, Aust.	37°45'S*	1
DENDROMONOCOTYLINAE		
1. Alligator Harbor, Florida	30°N*	1
2. Moreton Bay, Queensland, Australia	27°S*	1
3. Heron Island, Queensland, Australia	23°25'S	1
4. Goree, Senegal	14°38'N*	2
MERIZOCOTYLINAE		
1. Ostende, Belgium	51°13'N	1
2. France	43-51°N*	2
3. Roscoff, France	48°43'N	1
4. Friday Harbor, Washington	48°33'N	1
5. Trieste, Italy	45°39'N	1
6. Timaru, New Zealand	44°23'S	1
7. Akaroa, New Zealand	43°50'S	1
8. Woods Hole, Mass.	41°32'N	3
9. Alligator Harbor, Florida	30°N*	4
10. Chesapeake Bay	37°N*	1
11. Portobello, Otago Harbor, New Zealand	45°51'S	1
12. Dornoch Firth, Scotland	57°50'N	1

LITERATURE CITED

PARASITOLOGICAL LITERATURE

All references pertain to capsaloids except those indicated by a plus (+). Unexamined capsaloid literature is indicated by an asterisk (*).

*Abildgaard, P. C. 1794. Beskrivelse af en nye Igle, funden paa Giellerne af Støren. Skr. Naturh. Selsk., Kiøbenhavn. 3(2): 55-56.

*Abildgaard, P. C. 1797. Vers. Götting. J. Naturw. 1:135.

Agapova, A. I. 1957. Resultats des etudes sur les parasites des poissons dans les bassins du Kazakhstan. [in Russian] Trudy Inst. Zool. Akad. Nauk Kazakh. SSR, (Parazitol.) 7:121-130.

Agapova, A. I. 1966. Parasites of fishes of reservoirs of Kazakhstan. [in Russian] Inst. Zool. Akad. Nauk Kazakh. SSR (Alma-Ata). 342 p.

Akhmerov, A. Kh. 1952. New species of monogenetic trematodes of the fishes of Amur River. [in Russian] Parazitol. Sb., Zool. Inst. Akad. Nauk SSSR 14:181-212.

Alvey, C. H. 1936. The morphology and development of the monogenetic trematode Sphyranura oligorchis (Alvey 1933) and the description of Sphyranura polyorchis n. sp. Parasitology 28 (2):229-253.

+Arai, H. P. 1967. Ecological specificity of parasites of some embiotocid fishes. J. Fish. Res. Bd. Can. 24 (10):2161-2168.

Arai, H. P., and C. H. Koski. 1964. A new species of Trochopus (Monogenea:Capsalidae) from Scorpaena guttata Girard. Can. J. Zool. 42 (6):1007-1010.

+Ass, M. Ia. 1939. Fuhrmann's rule (phylogenetic relations between parasites and hosts). [in Russian, Engl. sum.] Trudy Leningr. Obshch. Estest. 67 (4):8-54.

*Audouin, J. V. 1828. Phylline. Phylline. Dict. Class. Hist. Natur. 13:454-455.

+Baer, J. G. 1948. Les helminthes, parasites des vertebres. Relations phylogénetiques-entre leur évolution et celle de leurs hotes. Conséquences biologiques et medicales. Ann. Franche-Compté et l'Univ. de Bescincon. 15 p.

Baer, J. G. 1951. Ecology of animal parasites. Univ. Ill. Press, Urbana. 224 p.

Baer, J. G., and L. Euzet. 1961. Classe des monogenes, p. 243-325. In P.-P. Grasse. Traite de Zoologie. 4 (1). Masson et Cie, Paris.

*Baer, K. E. von. 1826. Sur les entozoaires ou vers intestinaux. Bull. Sci. Nat. Geol., Paris, 9:123-126.

Baer, K. E. von. 1827. Beiträge zur Kenntniss der niedern Thiere. Nova Acta Phys.-Med. Acad. Nat. Curios. Bonnae 13 (2):523-762.

Baird, W. 1853. Catalogue of the species of entozoa or intestinal worms contained in the collection of the British Museum. London. 132 p.

Bane, G. W. 1969. Parasites of the yellowfin tuna, Thunnus albacares, in the Atlantic Ocean (Pisces: Scombridae). Wasmann J. Biol. 27 (1):163-175.

*Basile, F. 1909. Note sui platelminti, trematodi e cestodi parassiti negli elasmobranchi dello stretto di Messina. Stab. d'Arti Grafiche "La Sicilia", Messina. 19 p.

*Baster, J. 1759. Opuscula subseciva, observationes miscellaneas de animalculis et plantis quibusdam marinis, eorumque ovariis et seminibus continentia. [v. 1] Liber 1:1-[48]. Harlem.

Bauer, O. N. 1956. Immunity in fish to parasitic diseases. [in Russian] Trudy 2 Nauch. Konf. Parazitol. Ukr. SSR, p. 275.

Bauer, O. N. 1959. The influence of environmental factors on the reproduction of fish parasites. [in Russian] Vop. Ekol. Mat. Tret'ei Ekol. Konf. 3:132-141. Engl. transl., Fish. Res. Bd. Canada Transl. Ser. No. 1099.

Baylis, H. A. 1928. Records of some parasitic worms from British vertebrates. Ann. Mag. Natur. Hist., Ser. 10, 1 (3):329-343.

Baylis, H. A. 1939. Further records of parasitic worms from British vertebrates. Ann. Mag. Natur. Hist., Ser. 11, 4 (23): 473-498.

Baylis, H. A., and E. I. Jones. 1933. Some records of parasitic worms from marine fishes at Plymouth. J. Mar. Biol. Ass. U.K. 18 (2):627-634.

Bell, F. J. 1891. Description of a new species of Tristomum from Histiophorus brevirostris. Ann. Mag. Natur. Hist., Ser. 6, 7 (42):534-535.

*Beneden, E. van. 1870. Recherches sur la composition et la signification de l'ouef, basees sur l'etude de son mode de formation et des premiers phenomenes embryonnaires, mammiferes, oiseaux, crustaces, vers. [read Aug. 1, 1868] Mem. Couron. et Mem. Sav. Etrang. Acad. Roy. Sci. Belg. (1867-70) 34:283 p.

*Beneden, P. J. van. 1852a. Note sur l'appareil circulatoire des trematodes. Bull. Acad. Roy. Sci. Belg. 19, Pt. 1, (4):573-589.

Beneden, P. J. van. 1852b. Note sur quelques parasites d'un poisson rare sur nos cote (le maigre d'Europe, Sciaena aquila, Cuv.). Bull. Acad. Roy. Sci. Belg. 19, Pt. 3, (9):98-109.

Beneden, P. J. van. 1853. Espece nouvelle du genre Onchocotyle, vivant sur les branchies du Scimnus glacialis. Bull. Acad. Roy. Sci. Belg. 20, Pt. 3, (9):59-68.

Beneden, P. J. van. 1856. Note sur un Trematode nouveau du Maigre d'Europe. Bull. Acad. Roy. Sci. Belg. 23, Pt. 2, (10):502-508.

Beneden, P. J. van. 1858. Memoire sur les vers intestinaux. (Memoire qui a obtenu de l'Institut de France (Acad. Sci.) le grand prix des sciences physiques pour l'annee 1853.) Extrait Suppl. C. R. Seanc. Acad. Sci. 2:376 p.

Beneden, P. J. van. 1871. Les poissons des cotes de Belgique, leurs parasites et leurs commensaux. Mem. Acad. Roy. Sci. Belg. 38 (4 Mem.):1-100.

*Beneden, P, J. van, and C. E. Hesse. 1863. Recherches sur les bdellodes ou hirudinees et les trematodes marins. Bruxelles. 142 p.

Beneden, P. J. van, and C. E. Hesse. 1864. Recherches sur les bdellodes (hirudinees) et les trematodes marins. (Read 8 Nov. 1862) Mem. Acad. Roy. Sci. Belg. 34 (1 Mem.):1-142.

Beneden, P. J. van, and C. E. Hesse. 1865. Recherches sur les bdellodes (hirudinees) et les trematodes marins. (Troisieme et quatrieme appendices au memoire presente a l'Academie, 8 Nov. 1862.) Mem. Acad. Roy. Sci. Belg. 35 (4 Mem., 3 app.):1-10; (4 app.):11-18.

Benham, W. B. S. 1901. The Platyhelmia, Mesozoa and Nemertini. Treatise Zool. (Lankester), Pt. 4:204 p.

Bettendorf, H. 1897. Ueber Musculatur und Sinneszellen der Trematoden. Zool. Jb., Abt. Anat. Ontog., 10 (3):307-358. [Diss. (Rostock), Jena, 54 p.]

*Bittner, H., and C. E. W. Sprehn. 1928. Trematodes. Saugwürmer. Biol. Tiere Deut. (Schulze), Lief. 27, Teil 5:1-133.

*Blainville, M. H. D. de. 1818. In G. B. P. de Lamarck, Histoire naturelle des animaux sans vertèbres, Paris, 5:295.

*Blainville, M. H. D. de. 1827. Sangsue, Hirudo. Vers, p. 205-273. In Dictionnaire des sciences naturelles, Paris, 47.

*Blainville, M. H. D. de. 1828. Vers, p. 365-625. In Dictionnaire des sciences naturelles, Paris, 52.

Blanchard, E. 1847. Recherches sur l'organization des vers. Annls. Sci. Natur., Zool., Ser. 3, 8:271-341.

*Blumberg, C. 1871. Ueber den Bau des Amphistoma conicum. Diss., Dorpat, 40 p.

Bonham, K. 1937. Some monogenetic trematodes of Puget Sound fishes. Diss., Univ. Washington. 108 p.

Bonham, K. 1950. Idem. (Abstr. and Art.) Repr. Studies Honoring Trevor Kincaid, Univ. Wash. Press., 1950, p. 85-103, 154-163.

Bonham, K., and J. E. Guberlet. 1938. Ectoparasitic trematodes of Puget Sound fishes - Acanthocotyle. Amer. Midl. Natur. 20 (3):590-602.

*Bosc, L. A. [1802]. Histoire naturelle des vers, contenant leur description et leurs moeurs. v. 1:324 p.; 2:300 p.; 3:270 p. Paris.

Bosc, L. A.-G. 1811. Sur deux nouveaux genres de vers. Nouv. Bull. Sci. Soc. Philomath. Paris, An. 4 (51), 2:384-385.

Brandes, G. P. H. 1891. Zum feineren Bau der Trematoden. Diss., Halle, 30 p. [Published in: 1892. Z. Wiss. Zool. 53 (4): 558-577.]

*Brandes, G. P. H. 1898. Die Gattung Gastrothylax. Abh. Naturf. Ges. Halle 21 (1-3):[193]-225 (33 p.).

*Braun, M. G. C. 1883. Die thierischen Parasiten des Menschen nebst einer Anleitung zur praktischen Beschäftigung mit der Helminthologie für studierende und Aerzte. Würzburg. 233 p.

Braun, M. G. C. 1889a. Notiz über Tristomum elongatum N. Zool. Anz., Leipzig, 12 (314):433-434.

Braun, M. G. C. 1889b. Die Lage der Excretionspori bei den ectoparasitischen Trematoden. Zool. Anz. 12 (322):620-622.

*Braun, M. G. C. 1889c. Die embryonale Entwickelung der Cestoden. Zusammenfassender Bericht. Centralbl. Bakteriol. 5 (20): 667-671; (21): 697-701; (22): 727-732; (23): 756-760.

Braun, M. G. C. 1890a. Vermes. Bronn's Klass. u. Ordnung. Thier-Reichs, 4, Abt. Ia, (12-14): 401-448; (15-16): 449-512; (17): 513-560.

Braun, M. G. C. 1890b. Einige Bemerkungen über die Körperbedeckung ektoparasitischer Trematoden. Zentbl. Bakt. ParasitKde. 7 (19): 594-598.

*Braun, M. G. C. 1890c. Ueber Temnocephala. Zusammenfassender Bericht. Centralbl. Bakteriol. 7 (3): 84-90; (4): 125-128.

Braun, M. G. C. 1891. Bericht über die Fortschritte in der thierischen Parasitenkunde. Centralbl. Bakteriol. 10 (12), 2 Okt.: 389-392; (13), 10 Okt.: 421-427; (14), 17 Okt.: 465-471; (15), 24 Okt.: 493-498; (16), 31 Okt.: 524-528.

*Braun, M. G. C. 1892. Vermes. Bronn's Klass. u. Ordnung. Thier-Reichs, 4, Abt. Ia, (18-20): 561-640; (21-23): 641-736; (24-27): 737-816.

Braun, M. G. C. 1893. Bericht über thierische Parasiten. Centralbl. Bakteriol. 13 (2), 28 Jan.: 59-68; (3), 28 Jan.: 92-101; (5-6), 17 Feb.: 176-190; (7), 21 Feb.: 230-234; (8-9), 1 Marz: 262-272; (10), 13 Marz: 328-339.

*Braun, M. G. C. 1896. Vermes. [Continuation of 1895] Bronn's Klass. u. Ordnung. Thier-Reichs, 4, Abt. Ib, Lief. 43-44: 1247-1294; Lief. 45-47: 1295-1358.

Braun, M. G. C. 1899. Eine neue Calicotyle - Art des Mittelmeeres. Zentbl. Bakt. ParasitKde., 1 Abt., 26 (2-3): 80-82.

Bravo-Hollis, M. 1952. Acerca de un nuevo trematodo del orden Monogenea van Beneden, 1858. An. Inst. Biol. Univ. Mex. 22 (2): 497-503.

Bravo-Hollis, M. 1953. Monogeneos de las branquias de los peces marinos de las costas de Mexico. Mem. Congr. Cient. Mex. 7: 139-146.

Bravo-Hollis, M. 1958. Trematodos de peces marinos de aguas mexicanas. XIV. Cuatro monogeneos de la familia Capsalidae Baird, 1853, de las costas del Pacifico, incluyendo una especie nueva. An. Inst. Biol. Univ. Mex. 28 (1-2): 195-216.

Breder, C. M., Jr. 1933. Report of the director of the aquarium. 37 Annu. Rep. New York Zool. Soc., p. 63-74.

*Bremser, J. G. 1824a. Traite zoologique et physiologique sur les vers intestinaux de l'homme. Traduit de l'allemand par M. Grundler. Revu et augmente de notes par M. de Blainville. Paris. 547 p. (p. 501-553 Appendix by de Blainville) [Transl. of 1819]

*Bremser, J. G. 1824b. Icones helminthum systema Rudolphi entozoologicum illustrantes. Viennae. 12 p.

Bresslau, E. 1932. Plathelminthes, p. 1105-1138. In Handwörterbuch der Naturwissenschaften. Zweite Auflage, v. 7. Verlag von Gustav Fischer in Jena.

Brinkmann, A., Jr. 1940. Contribution to our knowledge of the monogenetic trematodes. Arbok Bergen Mus. (1939-1940), Naturvit. Rekke (1):1-117.

Brinkmann, A., Jr. 1952a. Some Chilean monogenetic trematodes. Reports of the Lund University Chile Expedition 1948-1949, (No. 6). Lunds Univ. Arsskr., n. F., Avd. 2, 47 (11):1-26. (K. Fysiograf. Sallsk. Handl., n. F., 62 (11).)

Brinkmann, A., Jr. 1952b. Fish trematodes from Norwegian waters. I. The history of fish trematode investigations in Norway and the Norwegian species of the order Monogenea. Arbok Univ. Bergen, Naturvit. Rekke (1):1-134.

Brinkmann, A., Jr. 1956a. Trematoda, p. 1-34. In The zoology of Iceland, 2 (Pt. 11), Ejnar Munksgaard, Copenhagen & Reykjavik.

Brinkmann, A., Jr. 1956b. Demonstration of monogenetic fish trematodes, mainly from Norwegian waters, with some comments. Proc. Int. Congr. Zool. (Copenhagen, 1953) 14:345-346.

*Bruguiere, J.-G. 1791. Tableau encyclopedique et methodique des trois regnes de la nature contenant l'Helminthologie, ou les vers infusoires, les vers intestins, les vers mollusques, etc. v. 7:83 p. Paris.

+Bullock, W. L. 1970. The zoogeography and host relations of the eoacanthocephalan parasites of fishes, p. 161-173. In S. F. Snieszko (ed.). A symposium on diseases of fishes and shellfishes. Amer. Fish. Soc., Spec. Publ. 5.

*Burmeister, H. 1837. Handbuch der Naturgeschichte. Zum Gebrauch bei Vorlesungen entworfen. 2 Abt. (Zoologie):369-858.

Burt, D. R. 1970. Platyhelminthes and parasitism. American Elsevier Publishing Co., Inc., New York. 150 p.

Bychowsky, B. E. 1937. Ontogenese and phylogenetische Beziehungen der parasitischen Plathelminthes. [in Russian, Ger. sum.] Izv. Akad. Nauk SSSR, Ser. Biol., (4):1353-1383.

Bychowsky, B. E. 1957. Monogenetic trematodes, their systematics and phylogeny. [in Russian] Akad. Nauk USSR. 509 p. Engl. transl. by A.I.B.S., Wash., D. C., W. J. Hargis, Jr. (ed.), 1961. Va. Inst. Mar. Sci. Transl. Ser. No. 1.

Bychowsky, B. E. 1959. Class Monogenoidea - monogenetic trematodes, p. 197-198. In A list of the fauna of the sea waters of the South Sakhalin and South Kuril Islands. [in Russian] Issled. Dal'nevostoch. Morei SSSR (6). (Trudy Kurilo-Sakhalinskoi Eksped. (2).)

+Bychowsky, B. E., and A. V. Gussev. 1964. The study of the fauna of parasites of fishes in the Soviet Union and its theoretical and practical results (Rep. presented 1st Int. Congr. Parasitol.) Zool. Inst. Acad. Sci. USSR, 12 p.

Bychowsky, B. E., A. V. Gussev, and M. N. Dubinina. 1964. Parasitological factor in acclimatization of fishes and hydroconstruction. [in Russian] Zool. Inst. Acad. Sci. USSR, Parasitol. Notes, 22:189-195.

Bychowsky, B. E., and L. F. Nagibina. 1967. New Capsalidae (Monogenoidea) from Pacific fishes. [in Russian, Engl. sum.] Akad. Nauk SSSR, Parazitologiia 1 (6):521-528.

Bykhovskaya-Pavlovskaya, I. E., and B. E. Bychowsky. 1940. The parasite fauna of the fishes of the Akhtarinskie limans (Delta of Kuban, Sea of Azov). [in Russian, Engl. sum.] Parazitol. Sb., Zool. Inst. Akad. Nauk SSSR 8:131-161.

Bykhovskaya-Pavlovskaya, I. E., et al. 1962. Key to parasites of freshwater fish of the USSR. [in Russian] Izd. Akad. Nauk SSSR, Zool. Inst., (80):919 p. Engl. transl. by Israel Progr. Scient. Transl. for O.T.S., No. TT 64-11040 (1964).

Caballero y Caballero, E., and M. Bravo-Hollis. (1961) 1962. Trematodos de peces de aguas mexicanas del Pacifico. XX. Tres especies de Monogenoidea Bychowsky, 1937. An. Inst. Biol. Univ. Mex. 32 (1/2):201-217.

Caballero y Caballero, E., and M. Bravo-Hollis. 1962. Trematodos de peces de aguas mexicanas del Pacifico. XXII. Algunos monogenoides de la costa sonorense del Golfo de California. An. Inst. Biol. Univ. Mex. 33 (1/2):57-77.

Canavan, W. P. N. 1934. On a trematode Allopyge undulatus n. sp. parasitic in Lilford's crane (Megalornis grus lilfordi). Parasitology 26 (1):117-120.

*Carriere, J. 1885. Die Sehorgane der Thiere vergleichend anatomisch dargestellt. München und Leipzig. 205 p.

Cerfontaine, P. 1894a. Note sur un nouveau Tristomien: Merizocotyle diaphanum (n. g., n. sp.). Bull. Acad. Roy. Sci. Belg. 64, 3 Ser., 27 (6): 936-948. (Abstracts: Bibliogr. Anat. 2 (5): 175. 1895. Zool. Jahresb. (1894), p. 21. 1895. Zool. Zentbl. 2 (22-23): 698-699.)

Cerfontaine, P. 1894b. Note sur l'existence de fibres musculaires striees chez un trematode. Bull. Acad. Roy. Sci. Belg. 64, 3 Ser., 27 (6): 949-954. (Abstract. 1895. Zool. Jahresb. (1894), p. 21.)

Cerfontaine, P. 1895. Note sur les Diclidophorinae (Cerf.) et description d'une nouvelle espece: Diclidophora labracis (Cerf.). Bull. Acad. Roy. Sci. Belg. 65, 3 Ser., 30 (7): 125-150. (Abstract. 1896. Zool. Zentbl. 3 (7): 230-232.) [1895. Report by E. van Beneden on Cerfontaine. Bull. Acad. Roy. Sci. Belg. 65, 3 Ser., 30 (7): 20-21.]

Cerfontaine, P. 1896. Contribution a l'etude des Octocotylides. I., II., III. [Same as 1895] Arch. Biol., Gand, 14 (3): 497-560.

Cerfontaine, P. 1898. Le genre Merizocotyle (Cerf.). Arch. Biol. 15 (2): 329-366.

Chauhan, B. S. 1951. Trematodes from Indian marine fishes. VII. On monogenetic parasites of the family Capsalidae Baird, 1853 (Capsaloidea) from Indian region, with description of a new species of the genus Capsala Bosc, 1811. Rec. Indian Mus. 49 (1): 45-54.

Chauhan, B. S. 1953. A brief review of our knowledge of monogenetic trematodes of the Indian region. Thapar Commem. Vol., 1953, p. 31-40.

Chauhan, B. S. 1954. Studies on the trematode fauna of India. Part I. Subclass Monogenea. Rec. Indian Mus. 51 (2): 113-207.

Chauhan, B. S., and G. D. Bhalerao. 1945a. Tricotyle secundus n. sp. from the gills of the Indian dog-fish. (Abstr.) Proc. 32nd Indian Sci. Congr., Nagpur, Pt. 3: 98.

Chauhan, B. S., and G. D. Bhalerao. 1945b. Loimos secundus (Monogenea, Trematoda) from the gills of the common Indian dog-fish (Scoliodon sorrakowah). Proc. Indian Acad. Sci., Sect. B, 22 (3): 164-167.

Cheng, T. C. 1964. The biology of animal parasites. W. B. Saunders Company, Philadelphia and London. 727 p.

*Christie, W. F. K. 1839. Fortegnelse over Naturalier, som jeg fra Sept. 1839 har indsamlet, nedlagt i spiritus eller tørret, og indsatt i Bergens Musaeum. F. 10 in Arch. Univ. Lib., Univ. Bergen.

+Clay, T. 1957. The Mallophaga of birds, p. 120-158. In Premier symposium sur la specificite parasitaire des parasites de vertebres. Union Int. Sci. Biol., Ser. B, 32.

*Cobbold, T. S. 1866. Catalogue of the specimens of entozoa in the Museum of the Royal College of Surgeons of England. London. 24 p.

Cobbold, T. S. 1883. Parasites of fish and other aquatic animals. Land and Water 35 (905): 403-404.

Cohn, L. 1916. Epibdella steingröveri n. sp. [in German] Z. Wiss. Zool. 115: 460-488.

*Condorelli-Francaviglia, M. 1899. Invertebrati raccolti dalla R. Nave "Scilla" nell'Adriatico e nel Jonio. Boll. Soc. Romana Studi Zool., Roma, 8 (1/2): 25-49.

Cooper, A. R. 1921. Trematodes and cestodes of the Canadian Arctic Expedition, 1913-1918. Rep. Can. Arctic Exped. 1913-1918, 9 (Pts. G-H): 3-27.

Cordero, E. H. 1944. Dos nuevas especies de trematodos monogeneticos de los plagiostomos de la costa uruguaya: Calicotyle macrocotyle & Neoerpocotyle tudes. Comun. Zool. Mus. Hist. Natur. Montevideo 1 (16): 1-15.

*Costa, A. 1846. Tristomum coccineum, con critiche osservazioni intorno alle specie di questo genere. Diario 8° Congr. Scienz. Ital., Genova, (6): 54.

Coupland, A. C. 1960. Studies on the monogenean gill parasites of elasmobranchs. Thesis, Univ. Birmingham, England. 72 p.

*Creplin, F. C. H. 1837. Distoma. Allg. Encycl. Wissensch. u. Künste (Ersch u. Gruber) [1 sect.], 29, Nachtrag: 309-329.

*Creplin, F. C. H. 1839. Eingeweidewürmer, Binnenwürmer, Thierwürmer. Allg. Encycl. Wissensch. u. Künste (Ersch u. Gruber), 1 Sect., 32: 277-302.

*Creplin, F. C. H. 1846. Nachträge zu Gurlt's Verzeichniss der Thiere, bei welchen Entozoen gefunden worden sind. Arch. Naturg., Berlin, 12 J., 1: 129-160.

+Cressey, R. F., and B. B. Collette. 1970. Copepods and needlefishes: a study in host-parasite relationships. U. S. Fish Wildl. Ser., Fish. Bull., 68 (3): 347-432.

*Crety, C. 1893. Intorno la struttura delle ventose e di alcuni organi tattili nei distomi. Nota preliminare. [French transl. of 1892] Arch. Ital. Biol. 18 (3): 380-384. [Also in: 1892. Atti Roy. Accad. Lincei, Roma, an. 289, 5 Ser., Rendic. Cl. Sci. Fis., Mat. e Nat., 1, 1 semestre (1), 3 Genn.: 21-26.]

Crofton, H. D. 1941. A record of trematode parasites from Mola mola and Raniceps raninus (Linn.). Parasitology 33 (2): 209-210.

*Cuenot, L. C. M. 1927. Contributions a la faune du Bassin d'Arcachon. IX. Revue generale de la faune et bibliographie. Bull. Sta. Biol. Arcachon 24 (2): 229-308.

*Cunningham, J. T. 1887. On Stichocotyle nephropsis, a new trematode. Trans. Roy. Soc. Edinburgh (1883-84), 32 (2): 273-280.

*Cunningham, J. T. 1890. Structure of Phyllonella soleae, van Beneden and Hesse, a parasite of the common sole, p. 93-96. In A treatise on the common sole (Solea vulgaris), considered both as an organism and as a commodity. Plymouth, Engl., Pt. 2.

*Cuvier, G. 1817. Le regne animal distribue d'apres son organisation, pour servir de base a l'histoire naturelle des animaux et d'introduction a l'anatomie comparee. 4: 255p.

*Cuvier, G. 1829. Le regne animal distribue d'apres son organisation, pour servir de base a l'histoire naturelle des animaux et d'introduction a l'anatomie comparee. n. ed., 5: 556 p.

*Cuvier, G. [1836-49]. Le regne animal distribue d'apres son organisation, pour servir de base a l'histoire naturelle des animaux et d'introduction a l'anatomie comparee. Edition accompagnee de planches gravees, representant les types de tous les genres...par une reunion de disciples de Cuvier, M. M. Audouin, Blanchard, Deshayes, Alcide d'Orbigny, Doyere, Duges, Duvernoy, Laurillard, Milne-Edwards, Roulin et Valenciennes. 20 v. Paris.

Dartevelle, E. 1950. On "sun fish" Mola mola (Linne) a Banane. Zooleo, n. s. (8): 35-40.

*Dawes, B. 1947. The trematoda of British fishes. Roy. Soc. Ser. 131: 364 p.

Dawes, B. 1948. A rare coelom-dwelling trematode. Nature, Lond., 161 (4095): 642-643.

Dawes, B. 1956. The Trematoda. With special reference to British and other European forms. Cambridge Univ. Press, London. 644 p.

Dawes, B., and I. Griffiths. 1958. The enigmatical trematode "Dictyocotyle coeliaca." Nature, Lond., 182 (4641): 1033-1034.

Dawes, B., and I. Griffiths. 1959. Relationship between Dictyocotyle and Calicotyle. Nature, Lond., 183 (4664): 835-836.

*Diesing, K. M. 1835. Versuch einer Monographie der Gattung Pentastoma. Ann. Wien. Mus. Naturg. 1 (1): 1-32.

Diesing, K. M. 1836a. Monographie der Gattung Tristoma. Nova Acta Phys.-Med. Acad. Nat. Curios, Vratislaviae et Bonnae, 18 (1): 1-16. [1838. French transl. Annls. Sci. Nat., (2) Zool., 9: 77-89.]

Diesing, K. M. 1836b. Helminthologische Beiträge. Deut. Akad. Naturforsch., Halle, Nova Acta Leopoldina, 18 (2): 305-318. [Same as: Nova Acta Phys.-Med. Acad. Nat. Curios, Vratislaviae et Bonnae.]

Diesing, K. M. 1850. Systema helminthum. 1, 1 L., 679 p. Vindobonae. [Reprinted in 1960 together with vol. 2 as Historiae Naturalis Classica, t. XI, by J. Cramer, Weinheim, Hafner, N. Y.]

Diesing, K. M. 1858a. Revision der Myzhelminthen. Abtheilung: Trematoden. Sitzungsb. K. Akad. Wiss. Wien , Math.-Naturw. Cl., 32 (23): 307-390.

*Diesing, K. M. 1858b. Vierzehn Arten von Bdellideen. Denkschr. Akad. Wiss. Wien 14 (1): 63-80.

Diesing, K. M. 1859. Nachträge und Verbesserungen zur Revision der Myzhelminthen. Sitzungsb. K. Ber. Akad. Wiss. Wien, Math.-Naturw. Cl., 35 (11): 421-451.

Dillon, W. A., and W. J. Hargis, Jr. 1965. Monogenetic trematodes from the southern Pacific Ocean. 1. Monopisthocotyleids from New Zealand fishes, p. 229-249. In Biology of the Antarctic Seas II, Antarctic Res. Ser. 5, Amer. Geophys. Union.

Ditlevsen, H. 1917. Trematoder. Medd. Grønland 23 (4): 1143-1152.

*Dogiel, V. A. 1939. Influence of fish acclimatization on the spreading of fish epizootics. [in Russian, Engl. sum] Izv. Vses. Nauchno-Issled. Inst. Ozern. Rechn. Ryb. Khoz. 21:51-64.

+Dogiel, V. A. 1947. The significance of parasitological data for solving zoogeographical problems. [in Russian] Zool. Zh. 26 (6):481-492. Engl. transl., Fish. Res. Bd. Canada Transl. Ser. No. 250.

*Dogiel, V. A. 1962. General parasitology. Leningr. 516 p.

*Dogiel, V. A., and B. E. Bychowsky. 1938. Parasites of Caspian Sea fishes. [in Russian] Trudy po Kampleksn. Izuch. Kaspiisk. Moria 7:1-150.

*Dogiel, V. A., and A. Lutta. 1937. The death of Acipenser nudiventris in the Aral Sea in 1936. [in Russian] Rybnoe Khoz. (12):26-27.

Dogiel, V. A., G. K. Petrushevskii, and Yu. I. Polyanskii (ed.). 1958. Parasitology of fishes. [in Russian] Leningr. Univ. Press, 364 p. Engl. transl. by Z. Kabata, Oliver & Boyd, Ltd., Edinburgh and London, 1961, 384 p.

Dollfus, R. Ph. 1922. Cyclobothrium charcoti n. sp., trematode ectoparasite sur Meinertia oestroides (Risso). Bull. Soc. Zool. Fr. 47:287-296.

Dollfus, R. Ph. 1940. Helminthes du germon. (In Legendre, R., La faune pelagique de l'Atlantique.) Annls. Inst. Oceanogr., n. s., 20 (4):276-288.

Dollfus, R. Ph. 1946. Essai de catalogue des parasites poisson-lune Mola mola (L. 1758) et autres Molidae. Annls. Soc. Sci. Nat. Charente-Maritime, n. s., 3 (7):69-76.

Dollfus, R. Ph. 1949. Presence de Capsala laevis (A. E. Verrill, 1875) (Trematoda, Monogenea) chez un Tetrapturus (poisson Xiphiiforme) au large de la cote de Bretagne. Bull. Soc. Zool. Fr. 74 (6):317-319.

Dollfus, R. Ph. 1952. Parasites du Germo alalunga (J. F. Gmelin 1788). J. Conseil 18 (1):42-44.

Dollfus, R. Ph. 1962. Deux especes de trematodes monogenetiques parasites du "Bluefin Tuna" de Californie. Annls. Parasitol. Hum. Comp. 37 (4):517-529.

Dollfus, R. Ph., and L. Euzet. 1964 (1965). Supplement to the description of Pseudobenedenia nototheniae T. H. Johnston, 1931 (monogenetic trematode) parasite of a teleost of the genus Notothenia Richardson from the Kerguelen Island. Bull. Mus. Natn. Hist. Nat., Paris, Ser. 2, 36 (6):849-857. Engl. transl., Va. Inst. Mar. Sci. Transl. Ser. No. 16.

Doran, D. J. 1953. New monogenetic trematodes from the shovelnose guitarfish, Rhinobatos productus (Ayres). J. Parasitol. 39 (2):145-151.

Dubinin, V. B. 1952. The fauna of larval parasitic worms among vertebrates from the delta of the Volga River. [in Russian] Parazitol. Sb., Zool. Inst. Akad. Nauk SSSR 14:213-265.

*Dujardin, F. 1845. Histoire naturelle des helminthes ou vers intestinaux. Paris. 654 p.

+Eichler, W. 1948. Some rules in ectoparasitism. Ann. Mag. Natur. Hist. 1 (12):588-598.

*Eichwald, E. 1829. Zoologia speciales quam expositis animalibus tum vivis, tum fossilibus potissimum Rossiae in universum, et Poloniae in specie, in usum lectionum publicarum in Universitate Caesarea Vilnensi habendarum. Vilnae. 1:314 p.

*Elwes, E. V. 1909. The sunfish and its parasites. J. Torquay Natur. Hist. Soc. 1 (1):17-20.

Euzet, L. 1955. Larves gyrodactyloides nageantes de quelques trematodes monogenetiques de poissons marins. Bull. Soc. Neuchatel. Sci. Nat. 78:71-79.

Euzet, L. 1957a. La larva gyrodactyloide nageante de Calicotyle kröyeri Diesing 1850 (Trematoda - Monogenea). Annls. Parasitol. Hum. Comp. 32 (3):197-199.

Euzet, L. 1957b. Recherches sur les Monogenoidea parasites de poissons marins. Annls. Parasitol. Hum. Comp. 32 (5/6):469-481.

Euzet, L. 1958. L'oncomiracidium de Capsala onchidiocotyle (Setti 1899) (Monogenoidea - Monopisthocotylea). Vie et Milieu 9 (2):211-214.

Euzet, L., and C. Maillard. 1967. Parasites de poissons de mer ouest-africains, recoltes par J. Cadenat. VI. Monogenes de selaciens. Bull. Inst. Fr. Afr. Noire, Ser. A, 29 (4):1435-1493.

Euzet, L., and J. P. Quignard. 1961. Sur deux parasites de Xiphias gladius L. Extrait rapports et proces-verbaux des reunions C.I.E.S.M.M. 16 (2):321-323.

Euzet, L., and J. P. Trilles. 1962. Encore un monogene nouveau parasite de Peristhedion cataphractum L. (Teleostei - Triglidae). Annls. Parasitol. Hum. Comp. 37 (3):216-220.

Euzet, L., and H. H. Williams. 1960. A re-description of the trematode Calicotyle stossichii Braun, 1899, with an account of Calicotyle palombi sp. nov. Parasitology 50:21-30.

+Ewing, H. E. 1926. A revision of the American lice of the genus Pediculus, together with a consideration of the significance of their geographical and host distribution. Proc. U. S. Nat. Mus. 68 (Art. 19):1-30.

*Fabricius, O. 1780. Fauna Groenlandica, systematice sistens animalia Groenlandiae occidentalis hactenus indagata, quoad nomen specificum, triviale, vernaculumque; synonyma auctorum plurium, descriptionem, locum, victum, generationem, mores, usum, capturamque singuli prout detegendi occasio fruit, maximaque parte secundum proprias observationes. Hafniae et Lipsiae. 452 p.

*Fabricius, O. 1824. Nye zoologiske bidrag. K. Danske Vidensk. Selsk., Naturv. og Math. Afh., 1:23-80.

*Faust, E. C. 1918a. Eye-spots in Digenea. Biol. Bull. 35 (2): 117-127.

*Faust, E. C. 1918b. Life history studies on Montana trematodes. Illinois Biol. Monogr. 4 (1):120 p.

*Fischer, P. M. 1883. Ueber den Bau von Opisthotrema cochleare nov. genus; nov. spec. Ein Beitrag zur Kenntnis der Trematoden. Diss., Leipzig, 42 p.

Fischthal, J. H., and L. N. Allison. 1941. Acolpenteron ureteroecetes Fischthal and Allison, 1940, a monogenetic trematode from the ureters of the black basses, with a revision of the family Calceostomatidae (Gyrodactyloidea). J. Parasitol. 27 (6):517-524.

Folda, F. 1928. Megalocotyle marginata, a new genus of ecto-parasitic trematodes from the rock fish. Publ. Puget Sound Biol. Sta., Univ. Wash., 6:195-206.

Fraipont, J. 1880. Recherches sur l'appareil excreteur des trematodes et des cestoides. Arch. Biol., Gand, 1 (3):415-456.

Frankland, H. M. T. 1955. The life history and bionomics of Diclidophora denticulata (Trematoda: Monogenea). Parasitology 45 (3/4):313-351.

Freeman, R. S. 1964. Flatworm problems in fish. Can. Fish. Cult. (32):11-18.

Froissant, A. 1930. Contribution a l'etude de quelques trematodes ectoparasites. Imprimerie de la Cour d'Appel, Paris. 86 p.

+Fuhrmann, O. 1908. Die Cestoden der Vögel. Zool. Jahrb., Jena, Suppl. 10 (1):232 p.

Fuhrmann, O. 1928. Zweite Klasse des Cladus Platyhelminthes: Trematoda, p. 1-140. In Kukenthal's Handb. Zool. 2 (2 Teil, Lief. 3, Bogen 1-8).

Gallien, L. 1937a. Recherches sur quelques trematodes monogeneses nouveaux ou peu connus. Annls. Parasitol. Hum. Comp. 15 (1): 9-28; (2):146-154.

Gallien, L. 1937b. Rectification de nomenclature Pseudobothrium L. Gallien 1937, nec. Jules Guiart 1935, remplace par Leptobothrium L. Gallien 1937 nom. nov. Annls. Parasitol. Hum. Comp. 15 (4):383.

Gallien, L., and J. Le Calvez. 1947. Description de la larve d'Octobothrium scombri v. Ben. Hesse trematode monogenetique marin. Bull. Soc. Zool. Fr. 72:76-78.

Gamble, F. W. 1896. Platyhelminthes and Mesozoa. Chapter 2, Trematoda. Cambridge Natur. Hist. 2:1-96. [p. 51-61, 72-73 - monogenetic trematodes] (1901. 2 Ed.)

Garvin, J. W., A. J. Gilmour, and W. B. Neill. 1961. The occurrence of Leptocotyle minor (Monticelli), a little known ectoparasite on the rough hound, Scyliorhinus caniculus (L.). Irish Natur. J. 13 (10):239-240.

*Gmelin, J. F. 1790. Caroli a Linne ... Systema naturae per regna tria naturae, secundum classes ordines, genera, species cum characteribus differentiis, synonymis, locis. v. 1. Editio decima tertia, aucta, reformata, cura Jo. Fred. Gmelin, pt. 5 [Insecta], p. 2225-3020; pt. 6 [Vermes], p. 3021-3910; pt. 7 [Index], p. 3911-4120. Lipsiae.

Goto, S. 1891. On Diplozoon nipponicum, n. sp. J. Coll. Sci. Imp. Univ. Tokyo 4:151-192. (Abstract. J. Roy. Microsc. Soc., Ser. 2, 11 (4):472-473.)

Goto, S. 1894. Studies on the ectoparasitic trematodes of Japan. J. Coll. Sci. Imp. Univ. Tokyo 8 (1):1-273. (Abstract. Amer. Natur. 28 (336):1017-1018.)

Goto, S. 1895. A review of the studies on the ectoparasitic trematodes of Japan. (Abstr. of 1894) Nature, Lond., 51 (1315):244.

Goto, S. 1896. On some ectoparasitic trematodes from the Atlantic coasts of the Unived States of North America. C. R. 3 Congr. Int. Zool. (Leyde 1895), p. 351-352.

Goto, S. 1900. Notes on some exotic species of ectoparasitic trematodes. J. Coll. Sci. Imp. Univ. Tokyo 12 (4):263-295. (1903. Abstract. Arch. Naturg., 62 J., 2 (3):109.)

Grabda, E., A. P. Markevich, and V. K. Mikhailov. 1961. Development of parasitology in Poland. [in Russian] Problemy Parazit., Trudy Ukr. Respubl. Nauch. Obshch. Parazit. (1): 32-54.

*Grube, A. E. 1840. Actinien, Echinodermen und Würmer des Adriatischen-und Mittelmeers, nach eigenen Sammlungen beschrieben. Königsberg. 92 p.

Guberlet, J. E. 1934. Some ecto-parasitic trematodes of Puget Sound fishes. J. Parasitol. 20 (6):324. (Program 10 Annu. Meet. Amer. Soc. Parasitol.)

Guberlet, J. E. 1936. Two new ectoparasitic trematodes from the sting ray, Myliobatus californicus. Amer. Midl. Natur. 17 (6):954-964.

Guberlet, J. E. (1936) 1937. Trematodos ectoparasitos de los peces de las costas del Pacifico. An. Inst. Biol. Univ. Mex. 7:457-467.

Guiart, J. 1938. Trematodes parasites provenant des campagnes scientifiques de S.A.S. le Prince Albert ler. de Monaco (1886-1912). Result. Campagn. Scient. Albert I Prince Monaco, Part C: 75 p.

+Gussev, A. V. 1967a. The results and perspectives in the study of freshwater Monogeneans of the USSR. [in Russian, Engl. sum.] Zool. Inst. Akad. Nauk SSSR 46 (11):1630-1640.

Gussev, A. V. 1967b. Two new species of genus Gyrodactylus Nordmann (Monogenoidea) near off the coast of the Antarctic continent, p. 187-189. [in Russian] In Explorations of the fauna of the seas IV (XII). Biol. results Soviet Ant. Exped. (1955-1958), 3. Zool. Inst. Akad. Nauk SSSR.

Halton, D. W. 1967a. Studies on phosphatase activity in Trematoda. J. Parasitol. 53 (1):46-54.

Halton, D. W. 1967b. Studies on glycogen deposition in Trematoda. Comp. Biochem. Physiol. 23:113-120.

Halton, D. W., and J. B. Jennings. 1965. Observations on the nutrition of monogenetic trematodes. Biol. Bull. 129 (2): 257-272.

Hammen, C. S. 1964. Carbon dioxide fixation in marine invertebrates: a review, p. 48-50. In Proc. Symp. on Experimental Marine Ecology, Occasional Publ. No. 2, Grad. School Oceanogr., Univ. Rhode Island, 1964.

Hammen, C. S., and S. C. Lum. 1962. Carbon dioxide fixation in marine invertebrates. III. The main pathway in flatworms. J. Biol. Chem. 237 (8):2419-2422.

+Hammen, C. S., and P. J. Osborne. 1959. Carbon dioxide fixation in marine invertebrates: a survey of major phyla. Science 130:1409-1410.

+Hargis, W. J., Jr. 1953. Monogenetic trematodes of Westhampton Lake fishes. III. Part 2. A discussion of host-specificity. Proc. Helminth. Soc. Wash. 20 (2):98-104.

Hargis, W. J., Jr. 1955a. A new species of Benedenia (Trematoda: Monogenea) from Girella nigricans, the opaleye. J. Parasitol. 41 (1):48-50.

Hargis, W. J., Jr. 1955b. Monogenetic trematodes of Gulf of Mexico fishes. Part IV. The superfamily Capsaloidea Price, 1936. Rev. Iberica Parasitol., Tomo Extr., p. 1-16.

Hargis, W. J., Jr. 1955c. Monogenetic trematodes of Gulf of Mexico fishes. Part V. The superfamily Capsaloidea. Trans. Amer. Microsc. Soc. 74 (3):203-225.

+Hargis, W. J., Jr. 1955d. Monogenetic trematodes of Gulf of Mexico fishes. Part VI. The superfamilies Polystomatoidea Price, 1936 and Diclidophoroidea Price, 1936. Trans. Amer. Microsc. Soc. 74 (4):361-377.

Hargis, W. J., Jr. 1957. The host-specificity of monogenetic trematodes. Exp. Parasitol. 6 (6):610-625.

+Hargis, W. J., Jr. 1958. Parasites and fishery problems. Proc. Gulf Caribb. Fish. Inst., 11th Annu. Session, p. 70-75.

Hargis, W. J., Jr. 1959. Systematic notes on the monogenetic trematodes. Proc. Helminth. Soc. Wash. 26 (1):14-31.

Hargis, W. J., Jr., A. R. Lawler, R. Morales-Alamo, and D. E. Zwerner. 1969. Bibliography of the monogenetic trematode literature of the world 1758 to 1969. Virginia Institute of Marine Science, Spec. Sci. Rep. No. 55:195 p.

Hargis, W. J., Jr., A. R. Lawler, and D. E. Zwerner. 1970. Bibliography of the monogenetic trematode literature of the world 1758 to 1969. Supplement 1 (with errata). Virginia Institute of Marine Science, Spec. Sci. Rep. No. 55, Suppl. 1, iv + 13.

Hargis, W. J., Jr., A. R. Lawler, and D. E. Zwerner. 1971. Bibliography of the monogenetic trematode literature of the world 1758 to 1969. Supplement 2 (with errata). Virginia Institute of Marine Science, Spec. Sci. Rep. No. 55, Suppl. 2, v + 25.

*Haswell, W. A. 1892. On the systematic position and relationships of the Temnocephaleae. Abh. Naturf. Ges. Halle 17 (3/4): 455-460.

Haswell, W. A. 1893. A monograph of the Temnocephaleae. Macleay Mem: Vol., Linn. Soc. N. S. Wales, Sydney, p. 93-152.

Heath, H. 1902. The anatomy of Epibdella squamula sp. nov. Proc. Calif. Acad. Sci. Zool., 3 Ser., 3 (4): 109-136. (Abstract. Zool. Zentbl. 9 (26): 843.)

*Henry, H. 1913. A list of blood parasites of sea fish taken at Plymouth. J. Mar. Biol. Ass. U. K., n. s., 9 (4): 570-571.

*Herbst, J. F. 1787. Kurze Einleitung zur Kenntniss der Gewürme für Ungeübte und Anfänger. v. 1 (2-3): 1-94. Berlin u. Stralsund.

Hidalgo-Escalante, E. 1959. Hallazgo de una nueva especie de Capsala, Capsala pricei n. sp. (Trematoda, Monogenea) en un pez marino del puerto de Mazatlan, Sinaloa, Mexico. An. Inst. Biol. Univ. Mex. 29 (1/2): 209-217.

Hök, C. T. 1856. Calicotyle kroyeri Diesing. Z. Ges. Naturw. 8 (12): 507-512. ([Transl. of 1857] 1857. Oefvers. K. Vetensk.-Akad. Förh. (1856), 13 (6-7): 157-160.)

*Hofer, B. 1904. Handbuch der Fischkrankheiten. München. 359 p.

+Hopkins, G. H. E. 1957. The distribution of Phthiraptera on mammals, p. 88-119. In Premier symposium sur la specificite parasitaire des parasites de vertebres. Union Int. Sci. Biol., Ser. B, 32.

*Hoyle, W. E. 1888. Trematoda, p. 535-540. In Encycl. Brit., 9 ed., 23.

+Huff, C. G. [Chairman] 1958. An approach toward a course in the principles of parasitism. J. Parasitol. 44 (1): 28-45.

Hughes, W. K. 1928. Some trematode parasites on the gills of Victorian fishes. Proc. Roy. Soc. Victoria, n. s., 41 (1): 45-54. [Also in: 1929. Collect. Papers Sci. Lab. Univ. Melbourne (1910-1928), 5, Zool.: 45-54.]

Hunter, G. C., and R. A. Kille. 1950. Some observations on Dictyocotyle coeliaca Nybelin, 1941 (Monogenea). J. Helminth. 24 (1/2): 15-22.

Hutton, R. F. 1964. A second list of parasites from marine and coastal animals of Florida. Trans. Amer. Microsc. Soc. 83 (4): 439-447.

Hyman, L. H. 1951. The Invertebrates. Vol. II: Platyhelminthes and Rhynchocoela. McGraw Hill, New York. [Monogenea, p. 219-248]

+Ihering, H. von. 1891. On the ancient relations between New Zealand and South America. Trans. Proc. New Zealand Inst., 24: 431-445.

Ijima, I. 1884. Ueber den Zusammenhang des Eileiters mit dem Verdauungscanal bei gewissen Polystomeen. Zool. Anz. 7: 635-639.

Isaichikov, I. M. 1925. Die Tätigkeit des parasitologischen Laboratoriums der Asowschen wissenschaftlichen Fischerei-expedition. [in Russian] Uchen. Trudy Sibirsk. Vet. Inst. (6), Avg.: 19-46.

*Isaichikov, I. M. 1928. Zur Kenntnis der parasitischen Würmer einiger Gruppen von Wirbeltieren der russischen Arktis. Part I. [in Russian] Trudy Morsk. Nauch. Inst., Moscow, 3 (2): 5-79.

Ishii, N. 1936. Some new ectoparasitic trematodes of marine fishes. [in Japanese, Engl. sum.] Zool. Mag., Tokyo, 48 (8-10): 781-790.

Ishii, N., and T. Sawada. 1938a. Studies on the ectoparasitic trematodes - II. Livro Jub. Prof. L. Travassos, p. 231-243.

Ishii, N., and T. Sawada. 1938b. Studies on the ectoparasitic trematodes - III. Jap. J. Exp. Med., Govt. Inst. Infect. Dis., Tokyo Imp. Univ., 16 (3): 239-249.

*Ivanov, A. S., and I. I. Murygin. 1936. Materials on helminthofauna of fishes of the lower Volga: parasitic worms of sturgeons. [in Russian] Trudy Astrakh. Med. Inst. 4: 21-46.

Ivanov, A. S., and I. I. Murygin. 1937. Contribution to the knowledge of the helminth fauna of fishes of the Volga River. [in Russian] Rab. Gel'mint. Skrjabin, p. 253-268.

Ivanov, A. V. 1952. The structure of Udonella caligorum Johnston, 1835 and the position of Udonellidae in the systematics of flatworms. [in Russian] Parazitol. Sb., Zool. Inst. Akad. Nauk SSSR (14): 112-163.

Iverson, E. S., and E. E. Hoven. 1958. Some trematodes of fishes from the Central Equatorial Pacific. Pacif. Sci. 12 (2): 131-134.

+Iziumova, N. A. (1953) 1954. Information concerning methods of studying the host-specificity of monogenetic trematodes. [in Russian] Trudy Zool. Inst. Akad. Nauk SSSR 13: 155-159.

+Iziumova, N. A. 1956. Host-specificity of D. vastator and D. solidus. [in Russian] Parasitol. Sb., Zool. Inst. Akad. Nauk SSSR (16):217-228. Engl. transl., Va. Inst. Mar. Sci. Transl. Ser. No. 14.

Jahn, T. L. 1937. Epibdella melleni, p. 158-160. In Culture methods invertebrate animals (Galtsoff, Lutz, Welch and Needham).

Jahn, T. L., and L. R. Kuhn. 1930. The life history of Epibdella melleni MacCallum, 1927, a monogenetic trematode parasitic on marine fishes. (Abstr.) Anat. Rec. 47:365.

Jahn, T. L., and L. R. Kuhn. 1932. The life history of Epibdella melleni MacCallum, 1927, a monogenetic trematode parasitic on marine fishes. Biol. Bull. 62 (1):89-111.

Johnston, G. 1838. Descriptions of some Entozoa. (Miscellanea Zoologica) Ann. and Mag. Natur. Hist. 1 (6):431-437.

*Johnston, G. 1865. A catalogue of the British non-parasitical worms in the collection of the British Museum. London. 365 p. [Suppl. and index, by Baird, p. 337-365]

Johnston, T. H. 1929. Remarks on the synonymy of certain tristomatid trematode genera. Trans. Roy. Soc. S. Aust. 53: 71-78.

Johnston, T. H. 1930a. The anatomy of the trematode Macrophyllida antarctica (Hughes). Aust. J. Exp. Biol. Med. Sci. 7 (3): 101-107.

Johnston, T. H. 1930b. A new species of trematode, of the genus Anoplodiscus. Aust. J. Exp. Biol. Med. Sci. 7 (3):108-112.

Johnston, T. H. 1931. New trematodes from the Subantarctic and Antarctic. Aust. J. Exp. Biol. Med. Sci. 8 (2):91-98.

Johnston, T. H. 1934a. New trematodes from South Australian elasmobranchs. Aust. J. Exp. Biol. Med. Sci. 12 (1):25-32.

Johnston, T. H. 1934b. Notes on some monocotylid trematodes. Proc. Linn. Soc. N. S. Wales 59 (1/2):62-65.

Johnston, T. H. 1937. Trematoda. Australasian Antarctic Exped. (1911-1914), Sci. Rep., Ser. C: Zool. and Bot., 10 (1):1-29.

Johnston, T. H., and P. M. Mawson. 1943. Endoparasites from the subantarctic islands of New Zealand. Rec. S. Aust. Mus. 7 (3):237-243.

Johnston, T. H., and P. M. Mawson. 1953. Parasitic nematodes and trematodes from Campbell and Auckland Islands (Cape Expedition). Rec. Dominion Mus., Wellington, N. Z., 2 (2): 63-70.

Johnston, T. H., and O. W. Tiegs. 1922. New gyrodactyloid trematodes from Australian fishes, together with a reclassification of the superfamily Gyrodactyloidea. Proc. Linn. Soc. N. S. Wales 47 (2): 83-131.

Johnstone, J. 1911. Internal parasites and diseased conditions of fishes. Proc. and Trans. Liverpool Biol. Soc. (1910-1911), 25: 88-122. [Also in: 1911. Rep. Lacashire Sea-Fish. Lab. (1910), (19): 16-50.]

Jones, E. I. 1933. Studies on the Monogenea (Trematoda) of Plymouth. I. Microbothrium caniculae (Johnstone, 1911). Parasitology 25 (3): 329-332.

*Juel, H. O. 1889. Beiträge zur Anatomie der Trematodengattung Apoblema (Dujard.). Bihang K. Svenska Vetensk.-Akad. Handl., Stockholm, 15, Afd. 4 (6): 46 p.

Kasahara, S. 1967. Studies on the biology of Benedenia seriolae, an ectoparasitic trematode on the yellowtail: I. On the growth and reproduction of the fluke in summer. [in Japanese, Engl. sum.] Hiroshima Univ. Fac. Fish. Anim. Husb. J. 7 (1): 97-104.

Kathariner, L. 1895. Die Gattung Gyrodactylus v. Nrdm. Arb. Zool.-Zootom. Inst. Würzburg 10: 125-164. [1894. Diss. Wiesbaden] (1895. Abstract. Gyrodactylus. J. Roy. Microsc. Soc., 2 Ser., 15 (4): 431.)

Kay, M. W. 1942. Notes on the genus Merizocotyle Cerfontaine, with a description of a new species. Trans. Amer. Microsc. Soc. 61 (3): 254-260.

Kearn, G. C. 1962a. Breathing movements in Entobdella soleae (Trematoda, Monogenea) from the skin of the common sole. J. Mar. Biol. Ass. U. K. 42 (1): 93-104.

Kearn, G. C. 1962b. Some aspects of the biology of monogenean parasites of fishes: Entobdella soleae from the skin of Solea solea. Parasitology 52 (3/4): 14P-15P.

Kearn, G. C. 1963a. The life cycle of the monogenean Entobdella soleae, a skin parasite of the common sole. Parasitology 53: 253-263.

Kearn, G. C. 1963b. The egg, oncomiracidium and larval development of Entobdella soleae, a monogenean skin parasite of the common sole. Parasitology 53 (3/4): 435-447.

Kearn, G. C. 1963c. The oncomiracidium of Capsala martinieri, a monogenean parasite of the sun fish (Mola mola). Parasitology 53 (3/4): 449-453.

Kearn, G. C. 1963d. Feeding in some monogenean skin parasites: Entobdella soleae on Solea solea and Acanthocotyle sp. on Raia clavata. J. Mar. Biol. Ass. U. K. 43 (3): 749-766.

Kearn, G. C. 1963e. Feeding and the nature of the food of Entobdella soleae, a skin parasite of the common sole. Parasitology 53 (3/4): 14P.

Kearn, G. C. 1964. The attachment of the monogenean Entobdella soleae to the skin of the common sole. Parasitology 54 (2): 327-335. (Abstract. Parasitology 54 (4): 11P.)

Kearn, G. C. 1965. The biology of Leptocotyle minor, a skin parasite of the dogfish, Scyliorhinus canicula. Parasitology 55 (3): 473-480.

Kearn, G. C. 1967a. The life-cycles and larval development of some acanthocotylids (Monogenea) from Plymouth rays. Parasitology 57 (1): 157-167.

Kearn, G. C. 1967b. Experiments on host-finding and host-specificity in the monogenean skin parasite Entobdella soleae. Parasitology 57: 585-605.

Kearn, G. C. 1968. The development of the adhesive organs of some diplectanid, tetraonchid and dactylogyrid gill parasites (Monogenea). Parasitology 58: 149-163.

*Kerbert, C. 1881. Beitrag zur Kenntniss der Trematoden. Arch. Mikr. Anat. 19 (4): 529-578.

+Kirby, H., Jr. 1937. Host-parasite relations in the distribution of Protozoa in termites. Univ. Calif. (Berkeley) Publs. Zool. 41: 189-212.

*Knoch, K. 1894. Topographie des Excretions - Apparates und Nervensystems von Distomum lanceolatum. Diss., Würzburg, 18 p.

*Koelliker, A. von. (1847). Dell' anatomia del Tristoma papillosum. Atti Riunione Scienz. Ital. (1846), 8: 469.

Koelliker, A. von. 1849. Ueber Tristoma papillosum Dies. Ber. K. Zootom. Anst. Würzb. (1847-1848), 2: 21-27.

*Kolesnikova, M. N. 1963. Fish parasites of the lower Syr-Darya River. [in Russian] Trudy Inst. Zool. Akad. Nauk Kazakh. SSR 19: 139-144.

Koratha, K. J. 1955a. Studies on the monogenetic trematodes of the Texas coast. I. Results of a survey of marine fishes at Port Aransas, with a review of Monogenea reported from the Gulf of Mexico and notes on euryhalinity, host-specificity, and relationship of the Remora and Cobia. Publ. Inst. Mar. Sci. (U. Texas) 4 (1): 233-249.

Koratha, K. J. 1955b. Studies on the monogenetic trematodes of the Texas coast. II. Descriptions of species from marine fishes of Port Aransas. Publ. Inst. Mar. Sci. (U. Texas) 4 (1): 251-278.

+Koratha, K. J. 1960. Studies on host-specificity and host-parasite zoogeography and phylogeny. II. Monogenetic trematodes and amphibian hosts. Libro Homenaje al Dr. E. Caballero y Caballero, Mex., p. 173-196.

Koratha, K. J., and W. E. Martin. 1960. Preliminary report on the life history of monogenetic trematodes with observations on the survival of adults outside the host. (Abstr.) J. Parasitol. 46 (5, Sect. 2): 14.

Koratha, K. J., and W. E. Martin. 1963. Further studies on the life history of Monogenea mainly from Eastern Pacific fishes. (Abstr.) J. Parasitol. 49 (5, Sect. 2): 27.

*Krabbe, H. 1881. Snylteorme (Entozoa). Schiodte, Jorgen, Christian. Zool. Danica. Kjøbenhavn. 34 p.

+Krotov, A. I. 1960. Zoogeographical analysis and a hypothesis of the origin of the helminth fauna of the vertebrates of Sakhalin. [in Russian] Zool. Zh. 39 (4): 481-489. Engl. transl., Fish. Res. Bd. Canada Transl. Ser. No. 334.

*Krøyer, H. 1838-1840. Danmark's Fiske. v. 1, 8 pts. Kjøbenhavn. 616 p.

*Krøyer, H. 1843-1845. Danmark's Fiske. v. 2, 2 p. 1. Kjøbenhavn. 644 p.

*Krøyer, H. 1852-1853. Danmark's Fiske. v. 3, 2 Afd., 2 p. 1. Kjøbenhavn. p. 705-1279.

Kubota, S. S., and M. Takakuwa. 1963. Studies on the diseases of marine cultured fishes. I. General description and preliminary discussion of fish diseases in Mie Prefecture. [in Japanese] J. Fac. Fish., Prefect. Univ. Mie, 6 (1): 107-124. Engl. transl., Fish. Res. Bd. Canada Transl. Ser. No. 739.

Kurashvili, B. E. 1960. Helminth fauna of fish in the Black Sea (in the area of Poti-Sukhumi and Batumi). [in Russian] Cslka. Parasitol. 7: 251-261.

*de La Martiniere. 1787. Memoire sur quelques insectes. Obs. sur Phys.- J. de Physique 31:207-209, 264-266.

*de La Martiniere. 1797. Memoire sur quelques insectes. In La Perouse, J. F., Voyage de La Perouse authour du monde. Paris. 4:61-72.

*Lameere, A. 1929-1930. Precis de Zoologie. 2:284 p. Bruxelles. [Issued as suppl. to Rec. Inst. Zool. Torley-Rousseau, 2 (2), 1929; 3 (1), 1930.]

Lamothe-Argumedo, R. 1963. Estudio de algunos monogeneos y digeneos. Diss., Univ. Nac. Mexico, 111 p.

Land, J. van der. 1967. A new blood fluke (Trematoda) from Chimaera monstrosa L. Koninkl. Nederl. Akad. van Wetenschappen. Proceedings, Ser. C: Zoology, 70 (1):110-120.

Lang, A. 1880. Untersuchungen zur vergleichenden Anatomie und Histologie des Nervensystems der Plathelminthen. II. Ueber das Nervensystem der Trematoden. Mitt. Zool. Sta. Neapel 2 (1):28-52.

Laurie, J. S. 1961. Carbohydrate absorption in cestodes from elasmobranch fishes. Comp. Biochem. and Physiol. 4 (1):63-71.

Layman, E. M. 1930. Parasitic worms from the fishes of Peter the Great Bay. [in Russian, Ger. sum.] Izv. Tikhookean. Nauchno-Prom. Sta. Vladivostok 3 (6):1-120.

Lebedev, B. I. 1967. Two new species of monogeneans of the genus Encotyllabe Diesing, 1850 from Percomorphi of the New Zealand-Australian Shelf. [in Russian, Engl. sum.] Akad. Nauk SSSR, Parazitologiia 1 (6):529-534.

*Lebour, M. V. 1908. Fish trematodes of the Northumberland coast. Rep. Scient. Invest. Northumberland Sea Fish. Comm. (1907), p. 23-67.

Leidy, J. 1887. Notice of some parasitic worms. Proc. Acad. Natur. Sci. Phila. 39, 3rd Ser., 17 (1):20-24.

Leidy, J. 1890. Parasites of Mola rotunda. (Abstr.) Proc. Acad. Natur. Sci. Phila. 42, 3 s., 20 (2):281-282.

Leuckart, F. S. 1842. Helminthologische Bietrāge. Zool. Bruchstūke 3, 2 l.:60 p.

*Leuckart, K. G. F. 1863. Die menschlichen Parasiten und die von ihnen herruhrenden Krankheiten. Ein Hand-und Lehrbuch fūr Naturforscher und Aerzte. Leipzig u. Heidelberg. 1:766 p.

Linstow, O. F. von. 1878. Compendium der Helminthologie. Ein Verzeichniss der bekannten Helminthen, die frei oder in thierischen Körpern leben, geordnet nach ihren Wohnthieren, unter Angabe der Organe, in denen sie gefunden sind, und mit Beifügung der Litteraturquellen. Hannover. 382 p.

Linstow, O. F. von. 1889a. Beitrag zur Anatomie von Phylline hendorffi. Arch. Mikrosk. Anat. 33:163-180.

Linstow, O. F. von. 1889b. Compendium der Helminthologie. Nachtrag. die Litteratur der Jahre 1878-1889, Hannover. 151 p.

Linstow, O. F. von. 1893. Bericht über die wissenschaftlichen Leistungen in der Naturgeschichte der Helminthen im Jahre 1889. Arch. Naturg. (1890), 56 J., 2 (3):57-96.

Linstow, O. F. von. 1901. Entozoa des zoologischen Museums der Kaiserlichen Akademie der Wissenschaften zu St. Petersburg. 1. Bull. Acad. Imp. Sci. St. Petersb., 5 Ser., 15 (3):271-292.

Linstow, O. F. von. 1903a. Neue Helminthen. Zentbl. Bakt. ParasitKde., 1 Abt., Orig., 35 (3):352-357.

*Linstow, O. F. von. 1903b. Entozoa des zoologischen Museums der Kaiserlichen Akademie der Wissenschaften zu St. Petersburg. 2. [Presented 6 Nov. 1902] Ezhegodnik Zool. Muz. Imp. Akad. Nauk, Petrograd., 8 (3-4):265-294.

Linstow, O. F. von. 1904. Neue Helminthen. Zentbl. Bakt. ParasitKde., 1 Abt., Orig., 37 (5):678-683.

Linstow, O. F. von. 1906. Helminths from the collection of the Columbo Museum. Spolia Zeylan. 3 (Pt. 11):163-188.

Linton, E. 1898. Notes on trematode parasites of fishes. Proc. U. S. Natn. Mus. 20 (1133):507-548.

Linton, E. 1900. Fish parasites collected at Woods Hole in 1898. Bull. U. S. Fish. Comm. (1899), 19:267-304.

Linton, E. 1901. Parasites of fishes of the Woods Hole region. Bull. U. S. Fish. Comm. (1899), 19:405-492.

Linton, E. 1907. Notes on parasites of Bermuda fishes. Proc. U. S. Natn. Mus. 33 (1560):85-126.

Linton, E. 1908. The process of egg-making in a trematode. Biol. Bull. 15 (1):19-26.

Linton, E. 1940. Trematodes from fishes mainly from the Woods Hole region, Massachusetts. Proc. U. S. Natn. Mus. 88:1-172.

Little, P. A. 1929a. The trematode parasites of Irish marine fishes. Parasitology 21 (1/2):22-30.

Little, P. A. 1929b. Trochopus gaillimhe n. sp., an ectoparasitic trematode of Trigla hirundo or Trigla lucerna. Parasitology 21 (1/2):107-119.

Little, P. A. 1929c. The anatomy and histology of Phyllonella soleae Ben. & Hesse, an ectoparasitic trematode of the sole Solea vulgaris Quensel. Parasitology 21 (3):324-337.

Llewellyn, J. 1954. Observations on the food and the gut pigment of the Polyopisthocotylea (Trematoda: Monogenea). Parasitology 44 (3/4):428-437.

Llewellyn, J. 1957a. Host-specificity in monogenetic trematodes, p. 199-212. In Premier symposium sur la specificite parasitaire des parasites de vertebres. Union Int. Sci. Biol., Ser. B, 32.

Llewellyn, J. 1957b. The larvae of some monogenetic trematode parasites of Plymouth fishes. J. Mar. Biol. Ass. U. K. 36 (2):243-259.

Llewellyn, J. 1959. Relationship between Dictyocotyle and Calicotyle. Nature, Lond., 183 (4664):835-836.

Llewellyn, J. 1963. Larvae and larval development of monogeneans. Adv. Parasitol. 1:287-326.

Llewellyn, J. 1965. The evolution of parasitic platyhelminths, p. 47-78. In Evolution of parasites, Third Symp. Bri. Soc. Parasitol., Blackwell Scient. Publ., Oxford.

Llewellyn, J., and L. Euzet. 1963. The production of spermatophores in Entobdella diadema. Parasitology 53 (3/4):14P.

Llewellyn, J., and L. Euzet. 1964. Spermatophores in the monogenean Entobdella diadema Monticelli from the skin of sting-rays, with a note on the taxonomy of the parasite. Parasitology 54 (2):337-344.

Llewellyn, J., and J. E. Green. 1957. The occurrence at Plymouth of Dictyocotyle coeliaca Nybelin, 1941 (Trematoda: Monogenea). J. Mar. Biol. Ass. U. K. 36 (1):77-79.

*Lo Bianco, S. 1909. Notizie biologiche riguardanti specialmente il periodo di maturita sessuale degli animali del golfo di Napoli. Mitth. Zool. Sta. Neapel 19 (4):513-761.

*Loennberg, E. 1891. Mittelungen über einige Helminthen aus dem zool. Museum der Universitat zu Kristiania. Biol. Fören. Förhandl., Verhandl. Biol. Ver. Stockholm, 3 (4/6): 64-78.

*Looss, A. 1885. Beiträge zur Kenntnis der Trematoden Distomum palliatum nov. spec. und Distomum reticulatum nov. spec. (Diss., Leipzig. 59 p.) Z. Wiss. Zool. 41 (3): 390-446.

*Looss, A. 1894. Die Distomen unserer Fische und Frösche. Neue Untersuchungen über Bau und Entwickelung des Distomekörpers. 1 p. l., 296 p. Stuttgart. (Biblioth. Zool., Heft 16.)

Looss, A. 1902. Ueber neue und bekannte Trematoden aus Seerschildkroten. Nebst Erorterungen zur Systematik und Nomenclatur. Zool. Jb., Abt. Syst., 16 (3-6): 411-894.

Lorenz, L. 1878. Ueber die Organisation der Gattungen Axine und Microcotyle. Arb. Zool. Inst. Univ. Wien 1: 405-436.

Lühe, M. 1906. Report on the trematode parasites from the marine fishes of Ceylon. Rep. Govt. Ceylon Pearl Oyster Fish. Gulf Manaar, Pt. 5: 97-108.

Lühe, M. 1909. Parasitische Plattwürmer. I. Trematodes. Süsswasserfauna Deutschlands, Heft 17: 217 p. [Monogenea section: p. 1-19]

*Lütken, C. F. 1875. A revised catalogue of the Entozoa of Greenland. Manual Natur. Hist., Geol., and Phys. Greenland (Jones), p. 179-183.

*Lutta, A. S. 1937. The influence of acclimatization of fishes on their parasitofauna. [in Russian] Priroda (5): 45-51.

*Lutta, A. S. 1940. On infection of the Aral sturgeon Acipenser nudiventris by the gill trematode Nitzschia sturionis Abildg. [in Russian] Trudy Leningr. Obshch. Estest. 68 (4): 40-60.

*Lutta, A. S. 1941. Gill inflammation in Acipenser nudiventris caused by the monogenetic trematode Nitzschia sturionis Abildg. [in Russian] Zool. Zh. 20 (4/5): 520-527.

Lyons, K. M. 1966. The chemical nature and evolutionary significance of monogenean attachment sclerites. Parasitology 56: 63-100. (Abstract. 1964. Parasitology 54(4): 12P.)

MacCallum, G. A. 1913. Notes on four trematode parasites of marine fishes. Zentbl. Bakt. ParasitKde., 1 Abt., Orig., 70 (7): 407-416.

MacCallum, G. A. 1916. Some new species of parasitic trematodes from marine fishes. Zoopathologica 1 (1): 3-38.

MacCallum, G. A. 1917. Some new forms of parasitic worms. Zoopathologica 1 (2): 43-75.

MacCallum, G. A. 1921. Studies in helminthology. Zoopathologica 1 (6): [135]-284.

MacCallum, G. A. 1926a. Deux nouveaux trematodes parasites de Carcharhinus commersonii: Philura orata et Dermophthirius carcharhini. Annls. Parasitol. Hum. Comp. 4 (2): 162-171.

MacCallum, G. A. 1926b. Dermophagus squali n. g., n. sp. Annls. Parasitol. Hum. Comp. 4 (4): 330-332.

MacCallum, G. A. 1926c. A propos de genres Philura et Dermophthirius MacCallum 1926. Annls. Parasitol. Hum. Comp. 4 (4): 386.

MacCallum, G. A. 1927a. Rectification de nomenclature. Annls. Parasitol. Hum. Comp. 5 (4): 382.

MacCallum, G. A. 1927b. A new ectoparasitic trematode Epibdella melleni, sp. nov. Zoopathologica 1 (8): 291-300.

MacGinitie, G. E. 1935. Ecological aspects of a California marine estuary. Amer. Midl. Natur. 16 (5): 629-765.

Maclaren, N. H. W. 1903. Occupation of a table at the zoological station at Naples. Report of the committee. Appendix b. On trematodes and cestodes parasitic in fishes. Rep. Brit. Ass. Adv. Sci. (72 Meet., Belfast, Sept. 1902), p. 260-262.

Maclaren, N. H. W. 1904. Beiträge zur Kenntnis einiger Trematoden (Diplectanum aequans Wagener und Nemathobothrium molae n. sp.). Jena Z. Naturw. 38, n. F., 31 (3): 573-618.

Maghraby, A. M. el, and E. J. Perkins. 1956. Additions to the marine fauna of Whitstable (England). Ann. Mag. Natur. Hist., Ser. 12, 9: 481-496.

*Malard, A. 1889. L'Orthagoriscus mola (poisson lune) et ses parasites. Naturaliste, Paris, 11, 2 Ser., (46): 29-31.

*Malard, A. 1889-90. Catalogue des poissons des cotes de la Manche dans les environs de Saint Vaast. Bull. Soc. Philom. Paris 2 (8): p. 100.

+Malmberg, G. 1964. Taxonomical and ecological problems in Gyrodactylus (Trematoda, Monogenea), p. 203-230. In R. Ergens and B. Rysavy (ed.), Parasitic worms and aquatic conditions, Proc. Symp. held in Prague, Oct.-Nov., 1962. Publ. House Czech. Acad. Sci.

Mamaev, Yu. L. 1965. Helminths of fish of the Bering Sea, p. 168-188. [in Russian] In Parasitic worms of domestic and wild animals. Akad. Nauk SSSR, Biol.-Pochven. Inst. 2 Fil. AN SSSR Dal'nevost. Gos. Univ. Vladivostok.

Mamaev, Yu. L. 1968. Helminths of tunas of the South China Sea, p. 5-27. [in Russian] In Helminths of the Pacific Ocean. Izd. "Nauka", Akad. Nauk SSSR.

Manter, H. W. 1938. Two new monogenetic trematodes from Beaufort, North Carolina. Livro Jub. Prof. L. Travassos, p. 293-298.

Manter, H. W. 1940. Digenetic trematodes of fishes from the Galapagos Islands and the neighboring Pacific. Rep. Allan Hancock Pacific Exped. (1932-1938), 2 (14): 325-497.

Manter, H. W. 1944. Notes on the trematode subfamily Loimoinae (Monogenea), with a description of a new genus. J. Wash. Acad. Sci. 34 (3): 86-89.

Manter, H. W. 1954. Trematoda of the Gulf of Mexico. U. S. Fish Wildl. Serv. 55, Fish. Bull. (89): 335-350.

+Manter, H. W. 1955a. The zoogeography of trematodes of marine fishes. Exp. Parasitol. 4 (1): 62-86.

Manter, H. W. 1955b. Two new monogenetic trematodes from elephant fishes (Callorhynchus) from South Africa and New Zealand, p. 211-220. In Essays in the natural sciences in honor of Captain Allan Hancock on the occasion of his birthday, July 26, 1955. Univ. S. Calif. Press, Los Angeles.

+Manter, H. W. 1957. Host specificity and other host relationships among the digenetic trematodes of marine fishes, p. 185-198. In Premier symposium sur la specificite parasitaire des parasites de vertebrates. Union Int. Sci. Biol., Ser. B, 32.

+Manter, H. W. 1963. The zoogeographical affinities of trematodes of South American freshwater fishes. Syst. Zool. 12 (2): 45-70.

+Manter, H. W. 1966. Parasites of fishes as biological indicators of recent and ancient conditions, p. 59-71. In J. E. McCauley (ed.), Host parasite relationships, Proc. 26 Annu. Biol. Colloquium, April 1965. Oregon St. Univ. Press.

+Manter, H. W. 1967. Some aspects of the geographical distribution of parasites. J. Parasitol. 53 (1): 3-9.

*Margolis, L. 1952. Studies on parasites and diseases of marine and anadromous fish from the Canadian Pacific coast. Thesis, McGill University, Montreal, Quebec.

+Margolis, L. 1956. Report on parasite studies of sockeye and pink salmon collected in 1955, with special reference to the utilization of parasites as a means of distinguishing between Asiatic and American stocks of salmon on the high seas - a progress report on work being carried out as part of F.R.B.'s commitments to INPFC. Fish. Res. Bd. Can., MS Repts. Biol. Sta., No. 624: 36 p.

+Margolis, L. 1963. Parasites as indicators of the geographical origin of sockeye salmon, Oncorhynchus nerka (Walbaum), occurring in the North Pacific Ocean and adjacent seas. Int. North Pacific Fish. Comm., Bull. (11): 101-156.

+Margolis, L. 1965. Parasites as an auxiliary source of information about the biology of Pacific salmons (genus Oncorhynchus). J. Fish. Res. Bd. Can. 22: 1387-1395.

*Markevich, A. P. 1934. Parasitic diseases of fish and their control (according to data from parasitic investigations of fish in reservoirs of Leningrad region). [in Russian] Publ. KOIZ, Leningr., 100 p.

Markevich, A. P. 1951. Parasitic fauna of fresh water fish of the Ukrainian SSR. [in Russian] Kiev. 388 p. Engl. transl. by N. Rafael, O.T.S. No. 63-11130 (1963).

Markov, G. S., V. Z. Trusov, and A. V. Reshetnikova. 1963. The influence of spawning migrations on the parasite fauna of Acipenser stellatus Pallas, p. 115-188. [in Russian] In Helminths of man, animals and plants and their control: Papers on helminthology presented to Academician K. I. Skryabin on his 85th birthday. Moscow: Izd. Akad. Nauk SSSR.

Massa, D. 1903. Contributo allo studio del genère Trochopus. Monitore Zool. Ital. 14 (10): 252-255.

Massa, D. 1906. Materiali per una revisione del genere Trochopus. Arch. Zool. Ital 3 (1): 43-71.

*Mawson, D. 1915. The home of the blizzard. Vol. 2. (Chapters 25-27 relating to Macquarie Island, by G. F. Ainsworth)

+Mayr, E. 1957. Evolutionary aspects of host specificity among parasites of vertebrates, p. 7-14. In Premier symposium sur la specificite parasitaire des parasites de vertebres. Union Int. Sci. Biol., Ser. B, 32.

McMahon, J. W. 1963. Monogenetic trematodes from some Chesapeake Bay fishes. I. The superfamilies Capsaloidea Price, 1936 and Diclidophoroidea Price, 1926. Chesapeake Sci. 4 (4):151-160.

Menzies, R. J. 1946. Benedenia noblei, a new monogenetic trematode of the Pacific coast rock fish. J. Parasitol. 32 (4):428-430.

Merriman, D. 1941. Studies on the striped bass (Roccus saxatilis) of the Atlantic coast. U. S. Fish Wildl. Serv. 50, Fish. Bull. (35):77 p.

Meserve, F. G. 1938. Some monogenetic trematodes from the Galapagos Islands and the neighboring Pacific. Rep. Allan Hancock Pacific Exped. (1932-1937), 2 (5):31-89.

+Metcalf, M. M. 1929. Parasites and the aid they give in problems of taxonomy, geographical distribution, and paleogeography. Smithson. Misc. Collect. (Publ. 3010) 81 (8):1-36.

+Metcalf, M. M. 1940. Further studies on the opalinid ciliate infusorians and their hosts. Proc. U. S. Natn. Mus. 87: 465-634.

*Mikailov, T. K. 1959. Study of the parasite fauna of sturgeons of the Kura River. [in Azerbaidzhani, Russ. sum.] Izv. Akad. Nauk Azerb. SSR, Ser. Biol. Sel'-Khoz. Nauk (2):79-83.

Mikailov, T. K. 1963. Parasites of commercial fish of the Kura River. [in Russian] Mater. Nauch. Sess. Gel'mintol. Respublik Zakavkaz. Vopr. Gel'mintofauna i Bor'by Gel'mintoz. Cheloveka, Sel'skokhoz. Zhivotnykh i Rastenii (Tbilisi, Oct. 28-30, 1961), p. 147-154.

Mizelle, J. D. 1938. Comparative studies on trematodes (Gyrodactyloidea) from the gills of North American fresh-water fishes. Illinois Biol. Monogr. 17 (1):81 p. (Univ. Ill. Bull. 36 (8).)

Möbius, K. A. 1874. Mollusken, Würmer, Echinoderm und Coelenteraten. 2 Deutsche Nordpolarfahrt (1869-1870). Karl Koldewey, 2, Wiss. Ergeb., 1 Abt.:246-261.

*Mobius, K. A. 1875. The molluscs, worms, echinoderms and coelenterates. (Extract from 1874) Manual Natur. Hist., Geol. & Phys. Greenland (Jones), p. 556-561.

Mola, P. 1912. Die Parasiten des Cottus gobio Linn. Zentbl. Bakt. ParasitKde., 1 Abt., Orig., 65 (6/7):491-504.

*Mola, P. 1928. Vermi parassiti dell' ittiofauna italiana. Contributo alla patologia ittica. Boll. Pesca, Piscic. e Idrobiol. 4 (4):395-[443].

Monticelli, F. S. 1888. Saggio de una morfologia dei trematodi. Diss., Univ. Napoli, 131 p. [Abstract [in German]. 1889. Zentbl. Baket. ParasitKde. 6 (4):120-122.]

Monticelli, F. S. 1889. Tristomum uncinatum n. sp. Boll. Soc. Nat. Napoli, 1 Ser., 3 (2):117-119.

Monticelli, F. S. 1890a. Elenco degli elminti studiati a Wimereux nella primavera del 1889. Bull. Scient. Fr. Belg. 22, 4 Ser., 1:417-444.

Monticelli, F. S. 1890b. Note elmintologiche. Boll. Soc. Nat. Napoli, 1 Ser., 4 (2):189-208.

Monticelli, F. S. 1892a. Di alcuni organi di tatto nei tristomidi. -Contributo allo studio dei trematodi monogenetici. Parte I. Boll. Soc. Nat. Napoli (1891), 1 Ser., 5 (2):99-134.

Monticelli, F. S. 1892b. Cotylogaster michoelis n. g., n. sp., e revisione degli Aspidobothridae. Festschr. 70 Geburtst. R. Leuckart's 7 Oct., p. 168-214.

*Monticelli, F. S. 1892c. Ricerche sulla spermatogenesi nei trematodi. Internat. Monatschr. Anat. u. Physiol. 9 (3): 112-118; (4):121-149.

Monticelli, F. S. 1893a. Intorno ad alcuni elminti della collezione del Museo Zoologico della r. Universita di Palermo. Naturalista Sicil. (1892-93) 12 (7-8):167-180; (9):208-216.

*Monticelli, F. S. 1893b. Studii sui trematodi endoparassiti: Primo contributo di osservazioni sui distomidi. Zool. Jb., Suppl.-Heft (3):229 p.

Monticelli, F. S. 1899a. Il genere Acanthocotyle. Archs. Parasitol. 2 (1):75-120.

Monticelli, F. S. 1899b. Sulla Temnocephala brevicornis Montic. [1899] e sulle temnocefale in generale. Boll. Soc. Nat. Napoli (1898), 1 Ser., 12 (1):72-127.

Monticelli, F. S. 1902. A proposito di una nuova specie del genere Epibdella. Boll. Soc. Nat. Napoli (1901), 1 Ser., 15:137-145.

Monticelli, F. S. 1904. Il genere Lintonia Montic. Archo. Zool. Ital. 2 (1):117-123.

Monticelli, F. S. 1905. Osservazione intorno ad alcune specie di Heterocotylea. Boll. Soc. Nat. Napoli (1904), 1 Ser., 18: 65-80.

Monticelli, F. S. 1907. Il genere Encotyllabe Diesing. Ann. Mus. Zool. R. Univ. Napoli, n. s., 2 (20):3-15. [Also in: 1908. Atti. R. Inst. Incorag. Napoli (1907), Ser. 6, 59: 23-35. (Repr. has Vol. 4).]

Monticelli, F. S. 1908. Il genere Nitzschia von Baer. Ann. Mus. Zool. R. Univ. Napoli, n. s., 2 (27):19 p. [Also in: 1909. Atti. R. Inst. Incorag. Napoli (1908), Ser. 6, 60:139-162. (Repr. has Vol. 5).]

Monticelli, F. S. 1909. Identificazione di una n. sp. del genere Encotyllabe (lintoni Montic.). Boll. Soc. Nat. Napoli (1908), 22, n. s., 2:86-88.

*Moquin-Tandon, C. H. 1846. Monographie de la famille des hirudinees. Nouvelle edition revue et augmentee. Paris. 448 p.

Mordvilko, A. K. 1908. Origine des hotes intermediaires chez les parasites des animaux. [in Russian] Ezhegodnik Zool. Muz. Imp. Akad. Nauk, Petrogr., 13 (1-2):129-220.

Muehling, P. 1898. Die Helminthen-Fauna der Wirbeltiere Ostpreussens. Arch. Naturg., Berl., 64 J., 1 (1):1-118.

+Mueller, J. F. 1937. The Gyrodactylidae of North American fresh-water fishes. Fish Culture 3 (1):1-14.

+Mueller, J. F. 1965. Helminth life cycles. Amer. Zool. 5 (1): 131-139.

*Müller, O. F. 1776. Zoologiae Danicae prodromus, seu animalium Daniae et Norvegiae indigenarum characteres, nomina, et synonyma imprimis popularium. Havniae. 282 p.

*Müller, O. F. 1780. Zoologiae Danicae seu animalium Daniae et Norvegiae rariorum ac minus notorum icones. Havniae. Fasc. 2, p. (3)-4, pls. 41-80.

*Müller, O. F. 1784. Zoologia Danica, seu animalium Daniae et Norvegiae rariorum ac minus notorum descriptiones et historia. Volumen secundum. Explicationi iconum fasciculi secundi eiusdem operis inserviens. Lipsiae. 124 p.

*Müller, O. F. 1788. Idem. Havniae. 56 p., pls. 41-80. [Same as 1784]

Nicoll, W. 1914. The trematode parasites of fishes from the English Channel. J. Mar. Biol. Ass. U. K., n. s., 10 (3): 466-505.

Nicoll, W. 1915. A list of the trematode parasites of British marine fishes. Parasitology 7 (4): 339-378.

*Niemiec, J. 1885. Recherches morphologiques sur les ventouses dans le regne animal. Rec. Zool. Suisse, 1 Ser., 2 (1): 1-147.

Nigrelli, R. F. 1932. The life history and control of a destructive fish parasite at the New York aquarium. Bull. N. Y. Zool. Soc. 35 (4): 123-129.

Nigrelli, R. F. 1935a. Experiments on the control of Epibdella melleni MacCallum, a monogenetic trematode of marine fishes. (Abstr.) J. Parasitol. 21 (6): 438.

Nigrelli, R. F. 1935b. On the effect of fish mucus on Epibdella melleni, a monogenetic trematode of marine fishes. J. Parasitol. 21 (6): 438.

Nigrelli, R. F. 1935c. Studies on the acquired immunity of the pompano, Trachinotus carolinus, to Epibdella melleni. (Abstr.) J. Parasitol. 21 (6): 438-439.

Nigrelli, R. F. 1937. Further studies on the susceptibility and acquired immunity of marine fishes to Epibdella melleni, a monogenetic trematoda. Zoologica, N. Y., 22 (2): 185-192.

Nigrelli, R. F. 1938. Parasites of the swordfish, Xiphias gladius Linn. Amer. Mus. Novitates (996): 1-16.

Nigrelli, R. F. 1939. Health of the specimens [aquarium animals]. 43 Annu. Rep. New York Zool. Soc. (1938), p. 41-43.

Nigrelli, R. F. 1940. Mortality statistics for specimens in the New York aquarium, 1939. Zoologica, N. Y., 25 (4): 525-552.

Nigrelli, R. F. 1943. Causes of diseases and death of fishes in captivity. Zoologica, N. Y., 28 (4): 203-216.

Nigrelli, R. F. 1947. Susceptibility and immunity of marine fishes to Benedenia (=Epibdella) melleni (MacCallum), a monogenetic trematode. III. Natural hosts in the West Indies. (Abstr.) J. Parasitol. 33 (6, Sect. 2): 25.

Nigrelli, R. F., and C. M. Breder, Jr. 1933. The susceptibility and immunity of certain marine fishes to Epibdella melleni, a monogenetic trematode. (Abstr.) J. Parasitol. 20 (2):136.

Nigrelli, R. F., and C. M. Breder, Jr. 1934. The susceptibility and immunity of certain marine fishes to Epibdella melleni, a monogenetic trematode. J. Parasitol. 20 (5):259-269.

*Nitzsch, C. L. 1826. Capsala. Allg. Encycl. Wiss. Künste (Ersch u. Gruber) 15:150-151.

+Noble, E. R. 1957. Seasonal variations in host-parasite relationships between fish and their protozoa. J. Mar. Biol. Ass. U. K. 36 (1):143-155.

+Noble, E. R. 1960. Fishes and their parasite-mix as objects for ecological studies. Ecology 41 (3):593-596.

+Noble, E. R., and G. A. Noble. 1964. Parasitology. Lea & Febiger, Philadelphia. 724 p.

Nordmann, A. von. 1832. Mikrographische Beiträge zur Naturgeschichte der wirbellosen Thiere. 1 Heft. G. Reimer, Berlin, 118 p.

Nordmann, A. von. 1840. Les vers (vermes), p. 542-686. In J.-B. de Lamarck, Histoire naturelle des animaux sans vertebres [etc.]. Paris. 2nd Ed., 3.

Nybelin, O. 1941. Dictyocotyle coeliaca n. g. n. sp. ein Leibeshöhlebewohnender monogenetischer Trematode. Göteborgs K. Vetensk.-o. VitterhSamh. Handl., Ser. B, 1 (3):1-19.

*Odhner, T. 1905. Die Trematoden des arktischen Gebietes, p. 291-372. In Römer and Schaudinn, Fauna Arctica, 4 (2 L.).

*Odhner, T. 1906. Der wahre Bau des "Synaptobothrium copulans" v. Linst., 1904, einer von ihrem Autor verkannten Distomide. Zool. Anz., Leipzig, 30 (3-4):59-66.

*Oken, L. 1815. Lehrbuch der Naturgeschichte. 3 Theil: Zoologie. 1 Abt.: Fleischlose Thiere. 1 p.l., 842 + xviii p.; Atlas, iv p., 40 pl. Leipzig and Jena.

Olsson, P. (1867)-1868. Entozoa, iakttagna hos Skandinaviska hafsfiskar. I. Platyhelminthes. (Continued) Lunds Univ. Arsskr. Math. o. Nat.-Vetensk (1867), 4 (Art. 8):64 p.

*Olsson, P. 1869a. Om entozoernas geografiska utbredning och förekomst hos olika djur. [Read 6 Juli 1868] Forh. Skand. Naturf. (10. Møde, 4-10 Juli 1868), p. 481-515.

Olsson, P. 1869b-(1870). Nova genera parasitantia copepodorum et plathelminthium. Lunds Univ. Arsskr., Afd. Math. o. Naturv. (1869), 6:6 p.

Olsson, P. 1876. Bidrag till skandinaviens helminthfauna. I. K. Svenska Vetensk.-Akad. Handl. (1875), n. F., 14 (1), Art 1:35 p.

Örley, L. 1885. A czapaknak es Rajaknak belfergei. Termeszet. Füzetek. 9 (2):97-126.

Osmanov, S. O. 1959. Parasitofauna and parasitic diseases of fish of the Aral Sea, p. 192-197. [in Russian] In Proceedings of the conference on fish diseases, Conf. Proc. No. 9, Ichthyol. Comm. & Zool. Inst. Acad. Sci. USSR, Leningr., 1957. Engl. transl. O.T.S. No. 61-31058 (1963), p. 203-209.

*Otto, H. R. 1896. Beiträge zur Anatomie und Histologie der Amphistomeen. Gastrothylax gregarius Looss, Gastrothylax crumenifer Creplin, Amphistomum conicum Rudolphi, Amphistomum bothriophoron Braun, Amphistomum gigantocotyle Brandes, Amphistomum subtriquetrum Rudolphi, Gastrodiscus polymastos Leuckart. (Diss., Leipzig, 78 p.)· Deut. Z. Thiermed. 22 (2-3):85-141, (4):275-296.

+Paling, J. E. 1965. The population dynamics of the monogenean gill parasite Discocotyle sagittata Leuckart on Windermere trout, Salmo trutta L. .Parasitology 55:667-694.

Paling, J. E. 1966a. The functional morphology of the genitalia of the spermatophore-producing monogenean parasite Diplectanum aequans (Wagener) Diesing, with a note on the copulation of the parasite. Parasitology 56:367-383.

Paling, J. E. 1966b. The attachment of the monogenean Diplectanum aequans (Wagener) Diesing to the gills of Morone labrax L. Parasitology 56 (3):493-503.

Palombi, A. 1942a. Notizie elmintologiche. I. Monocotyle myliobatis Taschenberg. Caratteri della specie e rilievi sul genere. Annu. Mus. Zool. R. Univ. Napoli, n. s., 7 (12):1-5.

Palombi, A. 1942b. Notizie elmintologiche. II. Ancyrocotyle bartschi Price 1934 =Ancyrocotyle vallei (Parona e Perugia, 1897). Nuova diagnosi del genere e sua posizione sistematica. Annu. Mus. Zool. R. Univ. Napoli, n. s., 7 (13):1-3.

Palombi. A. 1943a. Notizie elmintologiche. III. Una specie del genere Merizocotyle Cerf. probabilmente nuova. Posizione sistematica del genere. Annu. Mus. Zool. R. Univ. Napoli, n. s., 7 (14):1-3.

Palombi, A. 1943b. Notizie elmintologiche. IV. Anoplodiscus richiardii Sonsino e Anoplocotyle australis (Harvey Johnston) nom. nov.; loro posizione sistematica. Annu. Mus. Zool. R. Univ. Napoli, n. s., 7 (15):1-3.

Palombi, A. 1947. Notizie elmintologiche. IX. Nuovo rinvenimento di Benedenia monticellii (Parona e Perugia 1895) su Mugil capito Cuv. del lago Fusaro (Napoli). Annu. Mus. Zool. R. Univ. Napoli, n. s., 7 (20):1-6.

Palombi, A. 1949. I trematodi d'Italia. Parte 1. Trematodi monogenetici. Arch. Zool. Ital. 34:203-408.

Paperna, I., and A. Kohn. 1964. Report on monogenetic trematodes collected from East Mediterranean. Rev. Brasil. Biol. 24 (3):243-248.

*Parona, C. 1887a. Elmintologia sarda. Contribuzione allo studio dei vermi parassiti in animali di Sardegna. Ann. Mus. Civ. Storia Nat. Genova (1886-1887), 24, Ser. 2, 4: 275-384.

*Parona, C. 1887b. Vermi parassiti in animali della Liguria. Nota preventiva a contributo di una elmintologia ligure. Ann. Mus. Civ. Storia Nat. Genova (1886-1887), 24, Ser. 2, 4:483-501.

*Parona, C. 1894. L'elmintologia italiana da'suoi primi tempi all'anno 1890. Storia, sistematica, corologia e bibliografia. Atti R. Univ. Genova 13:1-733.

Parona, C. 1896. Helminthum ex Conradi Paronae Museo Catalogus. Sect. I. Trematodes. 4 p.

Parona, C. 1899. Catalogo di elminti raccolti in vertebrati dell'Isola d'Elba dal dott. Giacomo Damiani. Boll. Mus. Zool. Anat. Comp. R. Univ. Genova (77):1-16.

Parona, C. 1902. Catalogo di elminti raccolti in vertebrati dell'Isola d'Elba. Boll. Mus. Zool. Anat. Comp. R. Univ. Genova (113):1-20.

Parona, C. 1912. L'elmintologia italiana da'suoi primi tempi all'anno 1910. Bibliografia, sistematica, corologia, storia. Vol. 2: Sistematica, corologia, storia. Novara. 540 p. [Monogenea, p. 9-13]

Parona, C., and F. S. Monticelli. 1902. Sui generi Placunella e Trochopus. Monitore Zool. Ital., anno 13 (Suppl.):46-48. (1905. Abstract. Arch. Naturg., Berlin (1898), 2 (3):65.)

Parona, C., and F. S. Monticelli. 1903. Sul genere Ancyrocotyle (n. g.). Arch. Parasitol. 7 (1):117-121.

Parona, C., and A. Perugia. 1889. Di alcuni trematodi ecto-parassiti di pesci marini. Nota preventiva. (Res. ligusticae. VIII.) Ann. Mus. Civ. Storia Nat. Genova, 27, Ser. 2, 7: 740-747.

Parona, C., and A. Perugia. 1890a. Dei trematodi delle branchie di pesci italiani. Atti Soc. Ligust. Sci. Nat. Geogr. 1 (1): 59-70. [Also in: Tipografia di Angelo Ciminago, Genova, 7 (5-6):14 p.]

Parona, C., and A. Perugia. 1890b. Contribuzione per una monografia del genere Microcotyle. (Res. ligusticae. XIV.) Ann. Mus. Civ. Storia Nat. Genova (1890-1891), 30, Ser. 2, 10:173-220.

Parona, C., and A. Perugia. 1890c. Intorno ad alcune Polystomeae e considerazioni sulla sistematica di questa famiglia. Atti Soc. Ligust. Sci. Nat. Geogr. 1 (3):225-242.

Parona, C., and A. Perugia. 1892. Note sopra trematodi ecto-parassiti. (Res. ligusticae. XVII.) Ann. Mus. Civ. Storia Nat. Genova (1891-1892), 32, Ser. 2, 12:86-102.

Parona, C., and A. Perugia. 1895. Sopra due nuove di Trematodi ectoparassiti di pesci marini (Phylline monticelli e Placunella vallei). Boll. Mus. Zool. Anat. Comp. R. Univ. Genova (31): 1-4. [Also in: Atti Soc. Ligust. Sci. Nat. Geogr. 6 (1): 84-87.]

Paul, A. A. 1938. Life history studies of North American fresh-water polystomes. J. Parasitol. 24 (6):489-507.

Paulson, O. 1862. Zur Anatomie von Diplozoon paradoxum. Mem. Acad. Imp. Sci. St. Petersbourg, 7 Ser., 4 (5):16 p.

Pearse, A. S. 1949. Observations on flatworms and nemerteans collected at Beaufort, N. C. Proc. U. S. Natn. Mus. 100 (3255):25-38.

Perez-Vigueras, I. P. 1935. Tristomum poeyi n. sp. (Trematoda), parasito de Makaira ampla Poey (Pisces). Mem. Soc. Cubana Hist. Nat. 9 (1):43-44.

Perez-Vigueras, I. P. 1936. Notas sobre la fauna parasitologica de Cuba (Part 1: Vermes). Mem. Soc. Cubana Hist. Nat. 9: 45-49; 59-66; 10:53-86.

Perez-Vigueras, I. P. 1940. Notas sobre algunas especies nuevas de trematodos y sobre otras poco conocidas. Univ. Habana 5 (28-29):217-242.

Perez-Vigueras, I. P. 1955. Contribucion al conocimiento de la fauna helmintologica cubana. Mem. Soc. Cubana Hist. Nat. 22 (1):21-71.

*Perrier, E. 1897. Traite de zoologie. [2me partie] Fasc. 4. Vers (suite) - mollusques - tuniciers, p. 1345-2140. Paris.

Perugia, A., and C. Parona. 1890. Di alcuni trematodi ecto-parassiti di pesci adriatici. Ann. Mus. Civ. Storia Nat. Genova (1889-90), 29, Ser. 2, 9:16-32.

Petrushevskii, G. K. 1954. Changes in parasite fauna of fish during their acclimatization. [in Russian] Trudy Probl. Temat. Soveshch. Zool. Inst. Akad. Nauk SSSR (4):29-38.

Pintner, T. 1930. Wenigbekanntes und Unbekanntes von Rüsselbandwürmern. Sitzungsber. Akad. Wiss. Wien, Math.-Naturw. Kl., Abt. 1, 139 (7):445-537.

+Pippy, J. H. 1969. Preliminary report on parasites as biological tags in Atlantic salmon (Salmo salar). I. Investigations 1966-68. Fish. Res. Bd. Can., Tech. Rept. No. 134:1-44.

*Plymouth Marine Fauna. 1931. 2nd Ed. Mar. Biol. Ass. U. K. [Records of Monogenea, p. 100]

*Poirier, J. 1885. Contribution a l'histoire des trematodes. Paris. 160 p.

Polyanskii, Yu. I. 1955. Materials on parasites of fish of northern seas of USSR. Parasites of fish of Barents Sea. [in Russian] Sb. Rab. Parasitol., Trudy Zool. Inst. Akad. Nauk SSSR 19:5-170.

Porter, A. 1954. Report of the honorary parasitologist for the year 1953. Proc. Zool. Soc. Lond. 124 (2):313-316.

Pratt, H. S. 1900. Synopses of North-American invertebrates. XII. The trematodes. Part I. -The Heterocotylea or monogenetic forms. Amer. Natur. 34 (404):645-662.

Pratt, H. S. 1909. The cuticula and subcuticula of trematodes and cestodes. Amer. Natur. 43 (516):705-729.

Pratt, H. S. 1910. Monocotyle floridana, a new monogenetic trematode. Pap. Tortugas Lab. 4, Carnegie Inst. Wash. Publ. (133):1-9.

Pratt, H. S. 1916. A manual of the common invertebrate animals (exclusive of insects). 737 p. Chicago. (1935. Rev. ed. 854 p. The Blakiston Company, Philadelphia and Toronto.)

Pratt, I., and L. E. Aldrich, Jr. 1953. Megalocotyle trituba n. sp. (Trematoda: Monogenea). J. Parasitol. 39 (5):535-537.

Pratt, I., and R. Herrmann. 1962. Nitzschia quadritestes sp. n. (Monogenea: Capsalidae) from the Columbia River sturgeon. J. Parasitol. 48 (2):291-292.

Pratt, I., and J. E. McCauley. 1961. Trematodes of the Pacific Northwest. An annotated catalog. Oregon State Monographs Studies in Zoology (11):118 p.

+Price, C. E. 1966. Host-specificity in the sub-order Monopisthocotylea (Trematoda: Monogenea). Ass. SEast Biol. Bull. 13 (2):44.

Price, C. E. 1967. The phylum Platyhelminthes: a revised classification. Riv. Parassitol. 28 (4):249-260.

Price, E. W. 1934. New monogenetic trematodes from marine fishes. Smithsonian Misc. Coll. 91 (18):1-3.

Price, E. W. 1935. North American monogenetic trematodes. Ph.D. Diss., George Washington Univ.

Price, E. W. 1936. North American monogenetic trematodes. George Washington Univ. Bull., Summaries Doct. Theses (1934-36), p. 10-13.

Price, E. W. 1937a. Redescription of two exotic species of monogenetic trematodes of the family Capsalidae Baird from the MacCallum collection. Proc. Helminth. Soc. Wash. 4 (1): 25-27.

Price, E. W. 1937b. North American monogenetic trematodes. I. The superfamily Gyrodactyloidea. J. Washington Acad. Sci. 27 (3):114-130.

Price, E. W. 1938a. North American monogenetic trematodes. II. The families Monocotylidae, Microbothriidae, Acanthocotylidae, and Udonellidae (Capsaloidea). J. Washington Acad. Sci. 28 (3):109-126.

Price, E. W. 1938b. North American monogenetic trematodes. II. The families Monocotylidae, Microbothriidae, Acanthocotylidae, and Udonellidae (Capsaloidea) (continued). J. Washington Acad. Sci. 28 (4):183-198.

Price, E. W. 1938c. The monogenetic trematodes of Latin America. Livro Jub. Prof. L. Travassos, Brazil, 3:407-413.

Price, E. W. 1939. North American monogenetic trematodes. III. The family Capsalidae (Capsaloidea). J. Washington Acad. Sci. 29 (2):63-92.

Price, E. W. 1951. A new North American monogenetic trematode, Capsala manteri, n. sp. Proc. Helminth. Soc. Wash. 18 (1): 24-25.

Price, E. W. 1960. The giant marlin, Makiara marlina Jordan and Evermann, a new host for Capsala pricei Hidalgo, 1959, with a review of the subfamily Capsalinae. Libro Homenaje al Dr. E. Caballero y Caballero, Mex., p. 237-244.

Price, E. W. 1962a. A description of Tricotyla molae (Blanchard), with a discussion of the monogenetic trematodes of the sunfish (Mola mola L.). J. Parasitol. 48 (5):748-751.

Price, E. W. 1962b. What is Capsala martinieri Bosc 1811? Zool. Soc. India, Proc. 1st All-India Congr. Zool., 1959, Part 2, Sci. Pap., p. 440-445. [1959. Part 1, Abstract.]

Price, E. W. 1963a. Redescriptions of some species of Caballerocotyla Price (Monogenea: Capsalidae). Proc. Helminth. Soc. Wash. 30 (1):149-154.

Price, E. W. 1963b. A new genus and species of monogenetic trematode from a shark, with a review of the family Microbothriidae Price, 1936. Proc. Helminth. Soc. Wash. 30 (2):213-218.

Price, E. W. 1964. Errata. Proc. Helminth. Soc. Wash. 31 (1): 128.

Pritchard, M. H. 1961. Notes on two species of Tristomella Guiart, 1938 (Monogenea: Capsalidae), from a South African black marlin. J. Parasitol. 47 (6):976-977.

Randall, J. E. 1961. A contribution to the biology of the convict surgeonfish of the Hawaiian Islands, Acanthurus triostegus sandvicensis. Pacific Sci. 15 (2):215-272.

Rao, K. H., and R. Madhavi. 1967. A record of Dionchus agassizi Goto, 1899 (Monogenea: Capsaloidea) from the suckerfish Echeneis naucrates Linnaeus from Bay of Bengal. Curr. Sci. 36 (18):490-491.

*Rathke, H. 1843. Beiträge zur Fauna Norwegens. Nova Acta Acad. Nat. Curios 20 (1):1-264.

Rees, G., and J. Llewellyn. 1941. A record of the trematode and cestode parasites of fishes from the Porcupine Bank, Irish Atlantic Slope and Irish Sea. Parasitology 33:390-396.

Reichenbach-Klinke, H. H. 1957. Vorläufige Mitteilung über die Parasiten der Fische des Golfs von Neapel. Pubbl. Sta. Zool. Napoli 30:115-126.

Reichenbach-Klinke, H. H. 1966. Krankheiten und Schadigungen der Fische. Gustav Fischer Verlag - Stuttgart. 389 p.

Remley, L. W. 1942. Morphology and life history studies of Microcotyle spinicirrus MacCallum 1918, a monogenetic trematode parasitic on the gills of Aplodinotus grunniens. Trans. Amer. Microsc. Soc. 61 (2):141-155.

*Risso, A. 1826a. Histoire naturelle des principales productions de l'Europe meridionale et particulierment de celles des environs de Nice et des Alpes - Maritimes. Paris. 5:402 p.

*Risso, A. 1826b. Catalogue de vers intestinaux trouves dans les animaux des Alpes - Maritimes, et observations relatives a plusiers d'entre eux. Paris. [Reprint of 1826a, p. 259-265]

Robinson, E. S. 1961. Some monogenetic trematodes from marine fishes of the Pacific. Trans. Amer. Microsc. Soc. 80 (3): 235-266.

Robinson, V. C. 1934. A new species of accacoeliid trematode (Accacladocoelium alveolatum n. sp.) from the intestine of a sun-fish (Orthagoriscus mola Bloch). Parasitology 26 (3): 346-351.

+Rogers, W. P. 1957. An alternative approach to the study of host-parasite specificity, p. 309-311. In Premier symposium sur la specificite parasitaire des parasites de vertebres. Union Int. Sci. Biol., Ser. B, 32.

Rogers, W. P. 1962. The nature of parasitism. Academic Press, New York and London. 287 p.

*Rolleston, G. 1888. Forms of animal life. A manual of comparative anatomy with descriptions of selected types. 2 ed., revised and enlarged by W. Hatchett Jackson. Oxford. 937 p.

*Roman, E. 1960. Clasa Monogenoidea. Fauna Republ. Pop. Rom., Plathelminthes, 2 (1):149 p.

Ronald, K. 1957. The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. II. Entobdella curvunca sp. nov. (Trematoda: Capsalidae). Can. J. Zool. 35 (6):747-750.

Ronald, K. 1960. The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. V. Monogenea. Can. J. Zool. 38 (2):243-247.

Rossignol, M., and R. Repelin. 1962. Note sur Neothunnus albacora Lowe and Parathunnus obesus. Differenciation des jeunes - Presence d'un trematode parasite des sacs nasaux chez N. albacora Lowe. Travaux Centre Oceanogr. Pointe-Noire, Office Recherche Scient. Tech. Outre-Mer, Centre Oceanogr. Pointe-Noire 2:175-178.

*Rudolphi, C. A. 1819. Entozoorum synopsis cui accedunt mantissa duplex et indices locupletissimi. Berolini. 811 p.

Ruszkowski, J. S. 1934. Sur les vers parasites des chimeres. Annls. Parasitol. Hum. Comp. 12 (6):482-491.

*Saemundsson, B. 1908. Oversigt over Islands Fiske. Skr. udgivne af Komm. Havunders. Kbh. no. 5.

*Saemundsson, B. 1926. Fiskarnir (Isledsk dyr 1). Reykjavik. "Fiskarnir" (Pisces Islandiae) i serien Islensk Dyr I.

Saint-Loup, R. 1895. Vers. Paris. 248 p. (Histoire naturelle de la France. 16e partie.)

Saint-Remy, G. 1891a. Recherches sur la structure de l'appareil genital dans le genre Microbothrium Olsson. Rev. Biol. Nord. Fr. 3 (6):213-223.

Saint-Remy, G. 1891b. Sur les organes genitaux des Tristomiens. C. R. Acad. Sci. Paris 112 (19):1072-1074.

Saint-Remy, G. 1891c. Synopsis des trematodes monogeneses. Rev. Biol. Nord. Fr. 3 (12):449-457.

Saint-Remy, G. 1891d. Synopsis des trematodes monogeneses. Rev. Biol. Nord. Fr. 4:1-21.

Saint-Remy, G. 1891e. Sur le systeme nerveux des monocotylides. C. R. Acad. Sci. Paris 113 (4):225-227. Engl. transl. in Ann. Mag. Natur. Hist., Ser. 6 (48), 8:480-481.

Saint-Remy, G. 1892a. Genital apparatus of Tristomatidae. (Abstr.) J. Roy. Microsc. Soc. (5):615-616.

Saint-Remy, G. 1892b. Synopsis des trematodes monogeneses. Rev. Biol. Nord. Fr. 4:224-230.

Saint-Remy, G. 1892c. Synopsis des trematodes monogeneses. Rev. Biol. Nord. Fr. 4:253-265.

Saint-Remy, G. 1892d. Contribution a l'etude de l'appareil genital chez les Tristomiens. Arch. Biol. 12:1-55.

Saint-Remy, G. 1892e. Materiaux pour l'anatomie des monocotylides. Rev. Biol. Nord. Fr. 5:45-52.

Saint-Remy, G. 1898. Complement du synopsis des trematodes monogeneses. Arch. Parasitol. 1 (4):521-571.

*Schoett, H. 1896. *Einige Bemerkungen über den Bau von* Epibdella hippoglossi O. F. Müller. Zool. Stud. Festskr. Wilhelm Lilljeborg, Upsala, p. 253-265.

*Schweigger, A. F. 1820. Hanbuch der Naturgeschichte der skelettlosen ungegliederten Thiere. Leipzig. 776 p.

Scott, A. 1901a. Trematoda. Fifteenth Annual Report of the L.M.B.C., and their Biol. Station at Port Erin (Isle of Man), Dec., 1901. Trans. Liverpool Biol. Soc. xvii:13.

Scott, A. 1901b. Some additions to the fauna of Liverpool Bay, collected May 1st, 1900, to April 30th, 1901. Proc. and Trans. Liverpool Biol. Soc. (1900-01), p. 342-353.

Scott, A. 1904. Some parasites found on fishes in the Irish Sea. Trans. Biol. Soc. Liverpool 18:113-125. [Also in: Rep. Lancashire Sea-Fish. Lab. (1903), (12):35-45.]

Scott, A. 1906. Faunistic notes. Trans. Biol. Soc. Liverpool 20:191-201. [Also in: Rep. Lancashire Sea-Fish. Lab. (1905), p. 47-57.]

Scott, T. 1901. Notes on some parasites of fishes. 19 Annu. Rep. Fish. Bd. Scotland (1900), Pt. 3:120-153.

Scott, T. 1902. Notes on some parasites of fishes. 20 Annu. Rep. Fish. Bd. Scotland (1901), 20, Pt. 3:288-303. (1905. Abstract. Arch. Naturg., Berlin, (1898) 2 (3):66.)

Scott, T. 1904. On some parasites of fishes new to the Scottish marine fauna. 22 Annu. Rep. Fish. Bd. Scotland (1903), Pt. 3:275-280.

Scott, T. 1905. Observations on some parasites of fishes new or rare in Scottish waters. 23 Annu. Rep. Fish. Bd. Scotland (1904), Pt. 3:108-119.

Scott, T. 1911a. Notes on some trematode parasites of fishes. 28 Annu. Rep. Fish. Bd. Scotland (1909), Pt. 3:68-72.

Scott, T. 1911b. Some trematodes parasitic on British fishes. Trans. Edinburgh Field Nat. & Micr. Soc. (1910-1911), 6 (4):344-353.

Senadhira, M. A. 1967. The parasites of Ceylon. II. Trematoda. A host check list. Ceylon Vet. J. 15 (2):33-41.

Setti, E. 1898. Tristomum perugiai n. sp., sulle branchie del Tetrapturus belone Raf. Arch. Parasitol. 1 (2):308-313.

Setti, E. 1899a. Contributo per una revisione dei Tristomi. Boll. Mus. Zool. Anat. Comp. R. Univ. Genova 76:1-5.

*Setti, E. 1899aa. Idem. Atti Soc. Ligust. Sci. Nat. Geogr. 10:71-84.

Setti, E. 1899b. Secondo contributo per una revisione dei Tristomi e descrizione di una nuova specie. Atti Soc. Ligust. Sci. Nat. Geogr. 10:117-125.

Shipley, A. E. 1898. Note on a new host of Tristomum papillosum Diesing. Arch. Parasitol., Parts, 1 (2):354.

*Shul'man, S. S. 1954. Parasitofauna review of Acipenseridae fish of the USSR. [in Russian] Trudy Leningr. Obshch. Estest. 72 (4):190-254.

+Sindermann, C. J. 1961. Parasite tags for marine fish. J. Wildl. Manage. 25 (1):41-47.

Sindermann, C. J. 1966. Diseases of marine fishes. Adv. Mar. Biol. 4:1-89.

*Skorikov, A. S. 1903. On the parasitology of sturgeons. [in Russian] Vest. Rybopromysh. 19 (1):63-83.

Smyth, J. D. 1966. The physiology of trematodes. W. H. Freeman & Co., San Francisco. 256 p.

*Sonsino, P. 1890a. Studi e notizie elmintologiche. Atti Soc. Tosc. Sci. Nat., Proc. Verb., 7:99-114.

Sonsino, P. [1890]b. Notizie di trematodi e nematodi della collezione del Museo di Pisa. Atti Soc. Tosc. Sci. Nat., Proc. Verb., 7:173-178.

Sonsino, P. [1891]. Parassiti animali del Mugil cephalus e di altri pesci della collezione del Museo di Pisa. Atti Soc. Tosc. Sci. Nat., Proc. Verb., 7:253-265.

Southern, R. 1912. Clare Island Survey. - Pt. 56. Platyhelmia: Trematoda. Proc. Roy. Irish Acad. 31 (Sect. 3): 18 p.

Sprehn, C. [1930]. Microcotyle baumi n. sp. als gefährlicher Kiemenparasit bei Seefischen im Aquarium, p. 353-360. In Baum-Festschrift, Hannover (1929).

Sprehn, C. 1933. Trematoda, p. 1-60. In G. Grimpe, and E. Wagler, Die Tierwelt der Nord - und Ostsee. Lief. 24, Teil 4, c. 1.

+Sprent, J. F. A. 1969. Evolutionary aspects of immunity in zooparasitic infections, p. 3-62. In G. J. Jackson, R. Herman, and I. Singer (ed.). Immunity to parasitic animals. Vol. 1. Appleton-Century-Crofts, New York.

Sproston, N. G. 1938. Notes sur la faune parasitaire des poissons a Roscoff. Trav. Sta. Biol. Roscoff (16): 33-58.

Sproston, N. G. 1946. A synopsis of the monogenetic trematodes. Trans. Zool. Soc. Lond. 25 (4): 185-600.

+Stafford, J. 1900. Some undescribed trematodes. Zool. Jb., Abt. Syst., 13 (5): 399-414.

+Stafford, J. 1902. Notes on worms. Zool. Anz. 25 (673-674): 481-483.

Stafford, J. 1904. Trematodes from Canadian fishes. Zool. Anz. 27 (16/17): 481-495.

+Stafford, J. 1905. Trematodes from Canadian vertebrates. Zool. Anz. 28 (21/22): 681-694.

Stafford, J. 1907. Preliminary report on the trematodes of Canadian marine fishes. 39 Annu. Rep. Dep. Marine and Fisheries, Fish. Branch, Further Contrib. Can. Biol. (1902-1905), Sessional Pap. 22a: 91-94.

*Stiles, C. W., and A. Hassall. 1894. A preliminary catalog of the parasites contained in the collections of the U. S. Bureau of Animal Industry, U. S. Army Medical Museum, Biology Dept. Univ. Pennsylvania and collections of Stiles and Hassall. Vet. Mag. 1: 245-253; 331-354.

Stiles, C. W., and A. Hassall. 1908. Trematoda and trematode diseases. Index catalogue of medical and veterinary zoology. U. S. Public Health & Marine Hosp. Serv., Hygienic Lab., Bull. (37).

*Stossich, M. 1885. Brani di elmintologia tergestina. Serie secunda. Boll. Soc. Adriat. Sci. Nat. Trieste 9:156-164.

*Stossich, M. 1891. Elminti veneti raccolti dal Dott. Alessandro Conte de Ninni. Boll. Soc. Adriat. Sci. Nat. Trieste 13:109-116.

Stossich, M. 1896. Elminti trovati in un Orthagoriscus mola. Boll. Soc. Adriat. Sci. Nat. Trieste 17:189-191.

*Stossich, M. 1898. Saggio di una fauna elmintologica di Trieste e province contermini. Program. Civ. Scuola R. Sup. Trieste (Estratto, 162 p.)

Stunkard, H. W. 1937. The physiology, life-cycles, and phylogeny of the parasitic flatworms. Amer. Mus. Novit. (908):27 p.

Stunkard, H. W. 1957a. Intraspecific variation in parasitic flatworms. Syst. Zool. 6 (1):7-18.

+Stunkard, H. W. 1957b. Host-specificity and parallel evolution of parasitic flatworms. Z. Tropenmed. Parasit. 8 (1/2): 254-263.

Stunkard, H. W. 1962. Caballerocotyla klawei sp. n., a monogenetic trematode from the nasal capsule of Neothunnus macropterus. J. Parasitol. 48 (6):883-890.

+Stunkard, H. W. 1970. Trematode parasites of insular and relict vertebrates. J. Parasitol. 56 (6):1041-1054.

Sumner, F. B., R. C. Osburn, and L. J. Cole. 1913. A biological survey of the waters of Woods Hole and vicinity. Section 3. A catalogue of the marine fauna of Woods Hole and vicinity. Washington, D. C., Dep. Comm. Lab. Bull. Bur. Fish. (1911), 31 (Pt. 2):549-794.

+Szidat, L. 1961. Versuch einer Zoogeographie des Süd-Atlantik mit Hilfe von Leitparasiten der Meeresfische. Parasitol. SchrReihe (13):98 p.

Tagliani, G. 1912. Enoplocotyle minima nov. gen., nov. sp., trematode monogenetico, parassita sulla cute di Muraena helena L. Ricerche anatomiche e sistematiche. Arch. Zool. Napoli 5:281-319.

Taschenberg, E. O. 1878a. Ueber die Geschlechtsorgane ectoparasitischen mariner Trematoden. Vorläufige Mittheilung. Zool. Anz. 1 (8):176.

Taschenberg, E. O. 1878b. Helminthologisches. Z. Ges. Naturw. 51, 3 F., 3:562-577.

*Taschenberg, E. O. 1878c. Ueber die Geschlechtsorgane der Trematoden. (Abstr. report before Naturw. Ver. Sachs. u. Thüring., Halle) Z. Ges. Naturw. 51, 3 F., 3:701.

Taschenberg, E. O. 1879a. Beiträge zur Kenntniss ectoparasitischer mariner Trematoden. Abh. Naturg. Ges. Halle 14 (3):293-343.

Taschenberg, E. O. 1879b. Weitere Beiträge zur Kenntniss ectoparasitischer mariner Trematoden. Festschr. Feier 100 jähr. Besteh. Naturf. Ges. Halle, a. S., p. 25-76.

*Taschenberg, E. O. 1879c. Ueber Tristomum molae. (Abstr. report before Naturw. Ver. Prov. Sachsen u. Thüringen, Halle, 18 Dec.) Z. Ges. Naturw. 52, 3 F., 4:886-887.

Taschenberg, E. O. 1880. Ueber Tristomum molae Blanch. Zool. Anz. 3 (46):17-18.

Tendeiro, J., and V. Valdez. 1955. Helmintologia ictiologica. III. Helmintes de alguns peixes da costa Oeste-Africana. Bol. Cult. Guine Portuguesa 10 (37):129-163.

Thatcher, V. E. 1959. A report of some monogenetic trematode parasites of Louisiana marine fishes. Proc. La. Acad. Sci. 22:78-82.

Thompson, W. 1847. Additions to the fauna of Ireland. Ann. Mag. Natur. Hist., 1 Ser., 20 (132):169-176; 20 (133):237-250.

*Thoss, E. 1897. Ueber den Bau von Holostomum cucullus, nov. spec. Ein Beitrag zur Kenntnis der Trematoden. Diss., Leipzig. 66 p.

Threlfall, W. 1967. Some parasites recovered from the ocean sunfish, Mola mola (L.), in Newfoundland. Can. Field-Natur. 81 (3):168-172.

Tripathi, Y. R. 1959. Monogenetic trematodes from fishes of India. Indian J. Helminth. (1957), 9 (1/2):1-149.

*VanHöffen. 1897. Die Würmer. Grönland-Expedition der Gesellschaft für Erdkunde zu Berlin 1891-93. Berlin.

+Vanzolini, P. E., and L. R. Guimaraes. 1955. Lice and the history of South American land mammals. Rev. Brasil. Ent. 3:13-46.

*Vatova, A. 1928. Compendio della flora e fauna del Mare Adriatico presso Rovigno con la distribuzione geografica delle specie bentoniche. Venezia. 614 p. (Memoria CXLIII, R. Inst. Biol. Mar. Adriatico, R. Comitato Talassofrafico Ital.)

Verrill, A. E. 1875. Brief contributions to zoology from the museum of Yale College. 33. Results of dredging expeditions off the New England coast in 1874. Amer. J. Sci. & Arts 110, 3 Ser., 10 (55): 36-43.

Verrill, A. E. 1885. Results of explorations made by the steamer "Albatross," off the northern coast of the United States, in 1883. Rep. U. S. Comm. Fish & Fish. (1883), Pt. 11: 503-699. [Monogenea, Plate 43, p. 688-689.]

Vlasenko, N. M. 1928. Ankyrocotyle baikalense n. g., n. sp. [in Russian, Fr. sum.] Russk. Gidrobiol. Zh. 7 (10-12): 229-248.

Vogt, C. 1878. Ueber die Fortpflanzungsorgane einiger ectoparasitischer mariner Trematoden. Z. Wiss. Zool. 30 (2), Suppl.: 306-342. (1879. Fr. Transl. Arch. Zool. Exp. Gen. 6: 363-376.)

Wagener, G. R. 1857. Helminthologischen Bemerkungen aus einem Sendschreiben an C. Th. von Siebold. Z. Wiss. Zool. 9: 73-90.

Wagner, E. D., and C. E. Carter. 1967. Caballerocotyla gregalis sp. n. (Trematoda: Monogenea) from the gills of Sarda lineolata (Girard). J. Parasitol. 53 (2): 277-279.

*Waite, E. R. 1909. Vertebrata. Subantarctic Islands of New Zealand, Vol. 2: 542-600.

*Waite, E. R. 1916. Fishes. Australas. Antarc. Exped. (1911-14), Scient. Rep., Ser. C: Zool. and Bot., 3 (1): 92 p.

*Walter, E. 1893. Untersuchungen über den Bau der Trematoden. Monostomum trigonocephalus Rud., reticulare van Beneden, proteus Brandes. Diss., Halle. 51 p.

Ward, H. B. 1918. Parasitic flatworms, p. 365-453. In H. B. Ward and G. C. Whipple, Fresh water biology (1st ed.), New York.

Wegener, G. (1909) 1910. Die Ektoparasiten der Fische Ostpreussens. (Diss., Konigsberg, 96 p.) Schr. Phys.-Okon. Ges. Königs. i Pr. 50 (3): 195-286.

*Westwood, J. O. 1851. The articulated animals, p. 387-660, 673-690. In G. Cuvier, The animal kingdom, arranged after its organization... Translated ... new ed. London.

Wierzejski, A. 1877. Zur Kenntniss des Baues von Calicotyle kröyeri Diesing. Z. Wiss. Zool. 29 (4):550-561.

Williams, H. H. 1958. The anatomy of the trematode Dictyocotyle coeliaca Nybelin, 1941, with a discussion of its relationships with species of the genus Calicotyle Diesing, 1850. Ann. Mag. Natur. Hist., Ser. 13, 1:465-478.

Williams, H. H. 1960. A list of parasitic worms, including 22 new records, from marine fishes caught off the British Isles. Ann. Mag. Natur. Hist., Ser. 13, 2:705-715.

Williams, H. H. 1964. Observations on the helminths of Raja. Parasitology 54 (4):5P.

Williams, H. H. 1965. Observations on the occurrence of Dictyocotyle coeliaca and Calicotyle kroyeri (Trematoda: Monogenea). Parasitology 55 (2):201-207.

Williams, H. H. 1967. Helminth diseases of fish. Helminth. Abstr. 36 (Pt. 3- Review Art.):261-295.

Winter, H. A. 1955. Capsala caballeroi sp. n., parasito de Sarda orientalis, con un catalogo de los trematodos monogeneos de los peces del oceano Pacifico de las Americas. Rev. Brasil. Biol. 15 (1):9-32.

Winter, H. A. 1958. Some trematodes from fishes of the Mexican and adjoining California Pacific, with notes on the distribution of eastern Pacific trematodes. Dissertation, Univ. South. Calif.

*Wolf, H. T. 1908. Goldfish breeds and other aquarium fishes. Their care and propagation. A guide to freshwater and marine aquaria, their fauna, flora and management. Philadelphia. 385 p.

Woolcock, V. 1936. Monogenetic trematodes from some Australian fishes. Parasitology 28 (1):79-91.

Wright, R. R. 1879. Contributions to American helminthology. I. Proc. Canadian Inst., n. s., 1:54-75.

Yamaguti, S. 1934. Studies on the helminth fauna of Japan. Part 2. Trematodes of fishes, I. Jap. J. Zool. 5 (3): 249-541.

Yamaguti, S. 1937. Studies on the helminth fauna of Japan. Part 19. Fourteen new ectoparasitic trematodes of fishes. Published by author, 28 p.

Yamaguti, S. 1939. Studies on the helminth fauna of Japan. Part 26. Trematodes of fishes. VI. Jap. J. Zool. 8 (2): 211-230.

Yamaguti, S. 1940. Studies on the helminth fauna of Japan. Part 31. Trematodes of fishes, VII. Jap. J. Zool. 9 (1): 35-108.

Yamaguti, S. 1942. Studies on the helminth fauna of Japan. Part 37. Trematodes of fishes. VIII. Jap. J. Med. Sci., VI, Bact. & Parasitol., 2 (3):105-129.

Yamaguti, S. 1943a. Verzeichnis der ektoparasitischen Trematoden der japanischen Fische. 3 p. Private publ. distributed to members of Japanese Parasitol. Soc.

*Yamaguti, S. 1943b. Synopsis of monogenetic trematodes from the fishes of Japan. [in Japanese] Suisan-Kenkiushi 38 (7): 113-124.

Yamaguti, S. 1953. Parasitic worms mainly from Celebes. Part 2. Monogenetic trematodes of fishes. Acta Med. Okayama 8 (3): 203-256.

Yamaguti, S. 1958. Studies on the helminth fauna of Japan. Part 53. Trematodes of fishes, XII. Publ. Seto Mar. Biol. Lab. 7 (1):53-88.

Yamaguti, S. 1963. Systema Helminthum. Vol. IV. Monogenea and Aspidocotylea. Interscience Div., John Wiley & Sons, Inc., New York. 699 p.

Yamaguti, S. 1965. New monogenetic trematodes from Hawaiian fishes, I. Pacific Sci. 19 (1):55-95.

Yamaguti, S. 1966. New monogenetic trematodes from Hawaiian fishes, II. Pacific Sci. 20 (4):419-434.

*Yarrell, W. 1859. A history of British fishes. 2:670 p. London.

Young, P. C. 1967a. New Monogenoidea from Australian brackish water and reef fishes. J. Parasitol. 53 (5):1008-1015.

Young, P. C. 1967b. A taxonomic revision of the subfamilies Monocotylinae Gamble, 1896 and Dendromonocotylinae Hargis, 1955 (Monogenoidea: Monocotylidae). J. Zool., Lond., 153 (3):381-422.

*Ziegler, H. E. 1883. Bucephalus and Gasterostomum. Z. Wiss. Zool. 39 (4):537-571.

*Zschokke, F. 1887. Helminthologische Bemerkungen. Mitth. Zool. Sta. Neapel (1886-87), 7 (2):264-271.

ICHTHYOLOGICAL LITERATURE

References examined while determining distributions of the fishes, but not cited, are indicated by a plus (+).

Alverson, D. L., A. T. Pruter, and L. L. Ronholt. 1964. A study of demersal fishes and fisheries of the northeastern Pacific Ocean. H. R. MacMillan Lectures in Fisheries. Inst. Fish., Univ. British Columbia, Vancouver. 190 p.

+ Anderson, W. D., Jr. 1967. Field guide to the snappers (Lutjanidae) of the western Atlantic. U. S. Fish Wildl. Serv., Circ. 252:1-14.

+ Bailey, R. M. [Chairman] 1960. A list of common and scientific names of fishes from the United States and Canada (Second Edition). Amer. Fish. Soc. Spec. Publ. 2:102 p.

Bailey, R. M. [Chairman] 1970. A list of common and scientific names of fishes from the United States and Canada (Third Edition). Amer. Fish. Soc. Spec. Publ. 6:150 p.

Barnhart, P. S. 1936. Marine fishes of Southern California. Univ. California Press, Berkeley, California. 209 p.

Baughman, J. L., and S. Springer. 1950. Biological and economic notes on the sharks of the Gulf of Mexico, with especial reference to those of Texas, and with a key for their identification. Amer. Midl. Natur. 44(1):96-152.

+ Bean, B. A., and A. C. Weed. 1912. Notes on a collection of fishes from Java, made by Owen Bryant and William Palmer in 1909, with description of a new species. Proc. U. S. Nat. Mus. 42(1919):587-611.

Beebe, W., and J. Tee-Van. 1933 (1970). Field book of the shore fishes of Bermuda and the West Indies. Dover Publications, Inc., New York. 337 p.

+ Ben-Tuvia, A. 1953. Fishes caught off Caesarea, on the Mediterranean coast of Israel. Bull. Res. Coun. Israel 2:439-440.

Ben-Tuvia, A. 1966. Red Sea fishes recently found in the Mediterranean. Copeia 1966 (2):254-275.

Berdegue, J. A. 1956. Peces de importancia comercial en la costa nor-occidental de México. Secretaria de Marina. Direccion General de Pesca e Industrias Conexas. Comision para el Fomento de la Piscultura Rural, Mexico. 345 p.

Berg, L. S. 1947. Classification of fishes both recent and fossil. [English and Russian] J. W. Edwards, Ann Arbor, Mich. p. 88-517.

Berg, L. S. 1948. Freshwater fishes of the U.S.S.R. and adjacent countries. Vol. I [in Russian]. Academy of Sciences of the U.S. S.R. Zool. Inst., Moskva-Leningrad, 465 p. English trans. by O. Ronen, O.T.S. 61-31218 (1962). 504 p.

Berg, L. S. 1949. Freshwater fishes of the U.S.S.R. and adjacent countries. Vol. II [in Russian]. Academy of Sciences of the U.S.S.R. Zool. Inst., Moskva-Leningrad. p. 477-924. English trans. by O. Ronen, O.T.S. 63-11056 (1964). 496 p.

Bigelow, H. B., and W. C. Schroeder. 1953a. Fishes of the Gulf of Maine. U. S. Fish Wildl. Serv., Fish. Bull. 74, v. 53:577 p.

Bigelow, H. B., and W. C. Schroeder. 1953b. Fishes of the western North Atlantic. Part 2. Sawfishes, guitarfishes, skates and rays, chimaeroids. Mem. Sears Found. Mar. Res., Yale Univ., New Haven. 588 p.

+ Bigelow, H. B., and W. C. Schroeder. 1954. Deep water elasmobranchs and chimaeroids from the northwestern Atlantic slope. Bull. Mus. Comp. Zool., Harvard Univ., 112(2):37-87.

Bigelow, H. B., and W. C. Schroeder. 1962. New and little known batoid fishes from the western Atlantic. Bull. Mus. Comp. Zool., Harvard Univ., 128(4):159-244.

Bigelow, H. B., W. C. Schroeder, and I. P. Farfante. 1948. Fishes of the western North Atlantic. Part 1. Lancets, cyclostomes, sharks. Mem. Sears Found. Mar. Res., Yale Univ., New Haven. 576 p.

+ Blache, J., J. Cadenat, and A. Stauch. 1970. Faune Tropicale. XVIII. Clés de détermination des poissons de mer signalés dans l'atlantique oriental entre le 20e parallele nord et le 15e parallele sud. Office de la recherche scientifique et technique outre mer. Paris. 479 p.

Böhlke, J. E., and C. C. G. Chaplin. 1968. Fishes of the Bahamas and adjacent tropical waters. Livingston Publishing Co., Wynnewood, Pa. 771 p.

+ Breder, C. M., Jr. 1936. Hetersomata to Pediculati from Panama to Lower California. Bull. Bingham Oceanogr. Coll. 2(3):1-56.

+ Breder, C. M., Jr. 1948. Field book of marine fishes of the Atlantic coast. G. P. Putnam's Sons, New York and London. 332 p.

Breder, C. M., Jr. 1951. Studies on the structure of the fish school. Bull. Amer. Mus. Natur. Hist. 98(1):27 p.

Briggs, J. C. 1958. A list of Florida fishes and their distribution. Bull. Florida State Mus. 2(8):223-318.

Cadenat, J. 1950. Poissons de mer du Senegal. Institut Francais d'Afrique Noire. Initiations Africaines. III. Dakar. 345 p.

Carvallo, A. H. 1967. Observations on the hammerhead sharks (Sphyrna) in waters near Mazatlan, Sinaloa, Mexico, p. 79-83. In P. W. Gilbert, R. F. Mathewson, and D. P. Rall (ed.). Sharks, skates, and rays. The Johns Hopkins Press, Baltimore, Maryland.

Casey, J. G. 1964. Angler's guide to sharks of the northeastern United States: Maine to Chesapeake Bay. U. S. Fish Wildl. Serv., Bur. Sport Fish. Wildl., Circ. 179:32 p.

+ Cervigon M., F. 1966. Los peces marinos de Venezuela. Tomo I. Estacion de Investigaciones Marinas de Margarita, Fundacion la Salle de Ciencias Naturales, Caracas. 436 p.

+ Cervigon M., F. 1966. Los peces marions de Venezuela. Tomo II. Estacion de Investigaciones Marinas de Margarita, Fundacion la Salle de Ciencias Naturales, Caracas. p. 449-951.

Collette, B. B., and R. H. Gibbs, Jr. 1963. A preliminary review of the fishes of the family Scombridae. FAO Fish. Rep. 6, 1:23-32.

Daget, J., and A. Iltis. 1965. Poisson de cote d'Ivoire (eaux douces et saumatres). Memoires de l'Institut Francais d'Afrique Noire, No. 74:385 p. (Ifan-Dakar).

+ De Beaufort, L. F. 1940. The fishes of the Indo-Australian Archipelago. VIII. Percomorphi (continued): Cirrhitoidea, Labriformes, Pomacentriformes. E. J. Brill, Leiden. 508 p.

De Beaufort, L. F., and W. M. Chapman. 1951. The fishes of the Indo-Australian Archipelago. IX. Percomorphi (concluded), Blennoidea. E. J. Brill, Leiden. 484 p.

De Sylva, D. P., and W. R. Rathjen. 1961. Life history notes on the little tuna, Euthynnus alletteratus, from the southeastern United States. Bull. Mar. Sci. Gulf Caribb. 11(2):161-190.

DeWitt, H. H. 1970. A revision of the fishes of the genus Notothenia from the New Zealand region, including Macquarie Island. Proc. Calif. Acad. Sci. 38(16):299-340.

Eschmeyer, W. N. 1969. A systematic review of the scorpionfishes of the Atlantic Ocean (Pisces: Scorpaenidae). Occ. Pap. Calif. Acad. Sci., No. 79:143 p.

Evermann, B. W., and W. C. Kendall. 1906. Notes on a collection of fishes from Argentina, South America, with descriptions of three new species. Proc. U. S. Nat. Mus. 31(1482):67-108.

+ Evermann, B. W., and L. Radcliffe. 1917. The fishes of the west coast of Peru and the Titicaca Basin. U. S. Nat. Mus. Bull. 95:166 p.

+ Evermann, B. W., and A. Seale. 1906. Fishes collected in the Philippine Islands by Maj. Edgar A. Mearns, Surgeon, U. S. Army. Proc. U. S. Nat. Mus. 31(1491):505-512.

Feddern, H. A. 1968. Hybridization between the western Atlantic angelfishes, Holacanthus isabelita and H. ciliaris. Bull. Mar. Sci. 18(2):351-382.

+ Fowler, H. W. 1919. The fishes of the United States Eclipse expedition to West Africa. Proc. U. S. Nat. Mus. 56(2294): 195-292.

Fowler, H. W. 1928 (1967). The fishes of Oceania. Mem. Bernice P. Bishop Mus. 10:3-540.

+ Fowler, H. W. 1931 (1967). The fishes of Oceania. Suppl. 1. Mem. Bernice P. Bishop Mus. 11(5):313-381.

Fowler, H. W. 1933. Contributions to the biology of the Philippine Archipelago and adjacent regions. The fishes of the families Banjosidae, Lethrinidae, Sparidae, Girellidae, Kyphosidae, Oplegnathidae, Gerridae, Mullidae, Emmelichthyidae, Sciaenidae, Sillaginidae, Arripidae, and Enoplosidae collected by the United States Bureau of Fisheries steamer "Albatross," chiefly in Philippine seas and adjacent waters. U. S. Nat. Mus. Bull. 100, 12:465 p.

+ Fowler, H. W. 1934 (1967). The fishes of Oceania. Suppl. 2. Mem. Bernice P. Bishop Mus. 11(6):385-466.

Fowler, H. W. 1936. The marine fishes of West Africa. Based on the collection of the American Museum Congo Expedition, 1909-1915. Bull. Amer. Mus. Natur. Hist. 70(1-2):1493 p.

+ Fowler, H. W. 1938. The fishes of the George Vanderbilt South Pacific Expedition, 1937. Acad. Natur. Sci. Phila. Monogr. 2:349 p.

Fowler, H. W. 1941. Contributions to the biology of the Philippine Archipelago and adjacent regions. The fishes of the groups Elasmobranchii, Holocephali, Isospondyli, and Ostarophysi obtained by the United States Bureau of Fisheries steamer "Albatross" in 1907 to 1910, chiefly in the Philippine Islands and adjacent seas. U. S. Nat. Mus. Bull. 100, 13:879 p.

+ Fowler, H. W. 1949 (1967). The fishes of Oceania. Suppl. 3. Mem. Bernice P. Bishop Mus. 12(2):37-186.

Fowler, H. W. 1956. Fishes of the Red Sea and southern Arabia. Vol. I. Branchiostomida to Polynemida. The Weizmann Science Press of Israel, Jerusalem. 240 p.

+ Fowler, H. W., and B. A. Bean. 1922. Fishes from Formosa and the Philippine Islands. Proc. U. S. Nat. Mus. 62(2448, art. 2): 1-73.

+ Fowler, H. W., and B. A. Bean. 1929. Contributions to the biology of the Philippine Archipelago and adjacent regions. The fishes of the series Capriformes, Ephippiformes, and Squamipennes, collected by the United States Bureau of Fisheries steamer "Albatross," chiefly in Philippine seas and adjacent waters. U. S. Nat. Mus. Bull. 100, 8:352 p.

+ Fowler, H. W., and B. A. Bean. 1930. Contributions to the biology of the Philippine Archipelago and adjacent regions. The fishes of the families Amiidae, Chandidae, Duleidae, and Serranidae, obtained by the United States Bureau of Fisheries steamer "Albatross" in 1907 to 1910, chiefly in the Philippine Islands and adjacent seas. U. S. Nat. Mus. Bull. 100, 10: 334 p.

Garrick, J. A. F. 1967. A broad view of <u>Carcharhinus</u> species, their systematics and distribution, p. 85-91. <u>In</u> P. W. Gilbert, R. F. Mathewson, and D. P. Rall (ed.). Sharks, skates and rays. The Johns Hopkins Press, Baltimore, Maryland.

Gibbs, R. H., Jr., and B. B. Collette. 1967. Comparative anatomy and systematics of the tunas, genus <u>Thunnus</u>. U. S. Fish Wildl. Serv., Fish. Bull. 66(1):65-130.

+ Gilbert, C. H. 1915. Fishes collected by the United States Fisheries steamer "Albatross" in Southern California in 1904. Proc. U. S. Nat. Mus. 48(2075):305-380.

Gilbert, C. R. 1967. A taxonomic synopsis of the hammerhead sharks (family Sphyrnidae), p. 69-77. In P. W. Gilbert, R. F. Mathewson, and D. P. Rall (ed.). Sharks, skates, and rays. The Johns Hopkins Press, Baltimore, Maryland.

+ Ginsburg, I. 1952a. Fishes of the family Carangidae of the northern Gulf of Mexico and three related species. Publ. Inst. Mar. Sci. Univ. Texas 2(2): 48-117.

Ginsburg, I. 1952b. Flounders of the genus Paralichthys and related genera in American waters. U. S. Fish Wildl. Serv., Fish. Bull. 71: 267-351.

Gordon, B. L. 1960. The marine fishes of Rhode Island. The Book and Tackle Shop, Watch Hill, Rhode Island. 136 p.

Gosline, W. A., and V. E. Brock. 1965. Handbook of Hawaiian fishes. Univ. Hawaii Press, Honolulu, Hawaii. 372 p.

Graham, D. H. 1956. A treasury of the New Zealand fishes. A. H. & A. W. Reed, Wellington. 424 p.

+ Graham, M. (ed.). 1956. Sea fisheries, their investigation in the United Kingdom. Edward Arnold Ltd., London. 487 p.

Greenwood, P. H., D. E. Rosen, S. H. Weitzman, and G. S. Myers. 1966. Phyletic studies of teleostean fishes, with a provisional classification of living forms. Bull. Amer. Mus. Natur. Hist. 131(art. 4): 339-456.

Halstead, B. W. 1967. Poisonous and venomous marine animals of the world. Volume Two - Vertebrates. U. S. Government Printing Office, Washington, D. C. 1070 p.

Halstead, B. W. 1970. Poisonous and venomous marine animals of the world. Volume Three - Vertebrates (continued). U. S. Government Printing Office, Washington, D. C. 1006 p.

+ Herre, A. W. 1936. Fishes of the Crane Pacific Expedition. Field Mus. Natur. Hist. 21: 5-472.

Herre, A. W. 1953. Check list of Philippine fishes. U. S. Fish Wildl. Serv. Res. Rep. 20: 977 p.

Hildebrand, S. F., and W. C. Schroeder. 1928. Fishes of the Chesapeake Bay. Bull. U. S. Bur. Fish. XLIII, 1927, Part I, Doc. 1024: 388 p.

+ Hubbs, C. L. 1915. Flounders and soles from Japan collected by the United States Bureau of Fisheries steamer "Albatross" in 1906. Proc. U. S. Nat. Mus. 48(2082): 449-496.

Hvass, H. 1965. Fishes of the World in color. Translated by Gwynne Vevers. E. P. Dutton and Co., Inc., New York. 156 p.

Irvine, F. R. 1947. The fishes and fisheries of the Gold Coast. The Crown Agents for the Colonies, London. 352 p.

+ Jordan, D. S. 1891. A review of the labroid fishes of America and Europe. U. S. Comm. of Fish and Fish. Part XV. Rep. of the Commissioner for 1887:599-718.

+ Jordan, D. S. 1907. A review of the fishes of the family Histiopteridae, found in the waters of Japan: with a note on Tephritis Gunther. Proc. U. S. Nat. Mus. 32(1523):235-239.

+ Jordan, D. S. 1907. A review of the fishes of the family Gerridae found in waters of Japan. Proc. U. S. Nat. Mus. 32(1525):245-248.

+ Jordan, D. S., and M. C. Dickerson. 1908a. Notes on a collection of fishes from the Gulf of Mexico at Vera Cruz and Tampico. Proc. U. S. Nat. Mus. 34(1592):11-22.

+ Jordan, D. S., and M. C. Dickerson. 1908b. On a collection of fishes from Fiji, with notes on certain Hawaiian fishes. Proc. U. S. Nat. Mus. 34(1625):603-617.

Jordan, D. S., and B. W. Evermann. 1902 (1969). American food and game fishes. Dover Publications, Inc., New York. 574 p.

+ Jordan, D. S., and B. W. Evermann. 1926. A review of the giant mackerel-like fishes, tunnies, spearfishes, and swordfishes. Occ. Pap. Calif. Acad. Sci. XII:113 p.

+ Jordan, D. S., and A. C. Herre. 1906. A review of the herring-like fishes of Japan. Proc. U. S. Nat. Mus. 31(1499):613-645.

+ Jordan, D. S., and A. C. Herre. 1907. A review of the cirrhitoid fishes of Japan. Proc. U. S. Nat. Mus. 33(1562):157-167.

+ Jordan, D. S., and R. E. Richardson. 1910. A review of the Serranidae or sea bass of Japan. Proc. U. S. Nat. Mus. 37(1714):421-474.

+ Jordan, D. S., and E. C. Starks. 1906a. A review of the flounders and soles of Japan. Proc. U. S. Nat. Mus. 31(1484):161-246.

+ Jordan, D. S., and E. C. Starks. 1906b. Notes on a collection of fishes from Port Arthur, Manchuria, obtained by James Francis Abbott. Proc. U. S. Nat. Mus. 31(1493):515-526.

+ Jordan, D. S., and E. C. Starks. 1907. Notes on fishes from the island of Santa Catalina, Southern California. Proc. U. S. Nat. Mus. 32(1510):67-77.

+ Jordan, D. S., and W. F. Thompson. 1911a. A review of the sciaenoid fishes of Japan. Proc. U. S. Nat. Mus. 39(1787): 241-261.

+ Jordan, D. S., and W. F. Thompson. 1911b. A review of the fishes of the families Lobotidae and Lutianidae, found in the waters of Japan. Proc. U. S. Nat. Mus. 39(1792):435-471.

+ Jordan, D. S., and W. F. Thompson. 1913. Notes on a collection of fishes from the Island of Shikoku in Japan, with a description of a new species, Gnathypops iyonis. Proc. U. S. Nat. Mus. 46(2011):65-72.

Joubin, L. M. A. O. E. (ed.). 1929-38. Faune ichthyologique de l'Atlantic nord, publiee sous la direction de M. le professeur Joubin. Paris, Impressions Blondel La Rougery, 1929-38. Conseil permanent international pour l'exploration de la mer.

+ June, F. C. 1952. Observations on a specimen of bluefin tuna (Thunnus thynnus) taken in Hawaiian waters. Pacif. Sci. 6(1):75-76.

Kamohara, T. 1954. A list of fishes from the Tokara Islands, Kagoshima Prefecture, Japan. Publ. Seto Mar. Biol. Lab. III(3):265-299.

Katayama, M. 1960. Fauna Japonica. Serranidae (Pisces). Biogeographical Society of Japan, Tokyo. 189 p.

+ Kendall, W. C. 1910. Report on the fishes collected by Mr. Owen Bryant on a trip to Labrador in the summer of 1908. Proc. U. S. Nat. Mus. 38(1763):503-510.

+ Khalaf, K. T. 1961. *The marine and fresh water fishes of Iraq.* Ar-Rabitta Press, Baghdad. 164 p.

Lagler, K. F., J. E. Bardach, and R. R. Miller. 1962. Ichthyology. John Wiley and Sons, Inc., New York. 545 p.

+ Le Gall, J. 1956. Inventaire de la faune marine de Roscoff. Poissons. Trav. Sta. Biol. Roscoff, n. s. 7(34), Supp. 8:1-67.

Lindberg, G. U., and M. I. Legeza. 1959 (1967). Fishes of the Sea of Japan and the adjacent areas of the Sea of Okhotsk and the Yellow Sea. Part 1. Amphioxi, Petromyzones, Myxini, Elasmobranchii, Holocephali. Akad. Nauk S.S.S.R. Israel Program for Scientific Translations, Jerusalem. TT 67-51392. 198 p.

Longley, W. H., and S. F. Hildebrand. 1941. Systematic catalogue of the fishes of Tortugas, Florida. Carnegie Inst. Wash. Publ. 535, Pap. Tortugas Lab. xxiv: 331 p.

+ Markevich, A. P. 1951 (1963). Parasitic fauna of fresh water fish of the Ukrainian SSR. [in Russian] Kiev. English transl. by N. Rafael, O.T.S. No. 63-11130. 388 p.

Marshall, N. B. 1957. Evolutionary aspects of fish classification, p. 173-184. In Premier symposium sur la specificite parasitaire des parasites de vertebres. Union Int. Sci. Biol., Ser. B, 32.

Marshall, T. C. 1965. Fishes of the Great Barrier Reef and coastal waters of Queensland. Livingston Publishing Co., Narberth, Pennsylvania. 566 p.

Marshall, T. C. 1966. Tropical fishes of the Great Barrier Reef. Angus and Robertson Ltd., Sydney, Melbourne, and London. 239 p.

Mather, F. J., III. 1958. A preliminary review of the amberjacks, genus Seriola, of the western Atlantic. In: mimeographed report of the proceedings of the International Game Fish Conference at Miami Beach, Florida, 19 Nov. 1958: 1-13.

+ McAllister, D. E. 1960. List of the marine fishes of Canada. Nat. Mus. Canada, Bull. 168, Biol. Ser. No. 62. 76 p.

Meek, S. E., and S. F. Hildebrand. 1928. The marine fishes of Panama. Part III. Field Mus. Natur. Hist. Publ. 249, Zool. Ser., 15: 709-1045.

Metzelaar, J. 1919 (1967). Report on the fishes collected by Dr. J. Boeke in the Dutch West Indies 1904-1905. With comparative notes on marine fishes of Tropical West Africa. Reprinted by A. Asher & Co., Amsterdam. 314 p.

Migdalski, E. C. 1958. Angler's guide to the salt water game fishes Atlantic and Pacific. The Ronald Press Co., New York. 506 p.

Miller, R. R. 1966. Geographical distribution of Central American freshwater fishes. Copeia 1966 (4): 773-802.

Moore, D. 1967. Triggerfishes (Balistidae) of the western Atlantic. Bull. Mar. Sci. 17(3): 689-722.

+ Morgan, R. 1956. World sea fisheries. Methuen & Co. Ltd., London. 307 p.

+ Mori, T. 1928. A catalogue of the fishes of Korea. J. Pan-Pacif. Res. Inst. 3(3):3-8.

Morrow, J. E., and S. J. Harbo. 1969. A revision of the sailfish genus Istiophorus. Copeia 1969 (1):34-44.

Munro, I. S. R. 1955. The marine and freshwater fishes of Ceylon. Halstead Press, Sydney. 351 p.

Munro, I. S. R. 1958. The fishes of the New Guinea region. Papua and New Guinea Agr. J. 10(4):97-369.

Nelson, G. J. 1969. Gill arches and the phylogeny of fishes, with notes on the classification of vertebrates. Bull. Amer. Mus. Natur. Hist. 141 (art. 4):477-552.

Nichols, J. T., and P. Bartsch. 1945. Fishes and shells of the Pacific World. The MacMillan Co., New York. 201 p.

Nichols, J. T., and C. M. Breder, Jr. 1927. The marine fishes of New York and Southern New England. Zoologica 9(1):1-192.

Norman, J. R. 1934. A systematic monograph of the flatfishes (Heterosomata). Vol. 1. Psettodidae, Bothidae, Pleuronectidae. Johnson Reprint Corporation, New York and London. 459 p.

Norman, J. R. 1966. A draft synopsis of the orders, families and genera of recent fishes and fish-like vertebrates. Unwin Brothers Ltd., Woking and London. 649 p.

+ Ochiai, A. 1963. Fauna Japonica. Soleina (Pisces). Biogeographical Society of Japan, Tokyo. 114 p.

Okada, Y. 1955. Fishes of Japan. Maruzen Col., Ltd., Tokyo. 462 p.

O'Rourke, F. J. 1961. Presence of blood antigens in fish mucus and its possible parasitological significance. Nature 189:943.

Parrott, A. W. 1957. Sea anglers' fishes of New Zealand. Hodder and Stoughton, London. 176 p.

Parrott, A. W. 1958. Big game fishes and sharks of New Zealand. Hodder and Stoughton, London. 127 p.

Parrott, A. W. 1959. Sea anglers' fishes of Australia. Hodder and Stoughton, Melbourne. 208 p.

Perlmutter, A. 1961. Guide to marine fishes. New York Univ. Press. 431 p.

Phillipps, W. J. 1927. Bibliography of New Zealand fishes. New Zealand Mar. Dep., Fish. Bull. 1: 68 p.

Phillips, J. B. 1957. A review of the rockfishes of California (Family Scorpaenidae). State of Calif., Dep. Fish Game, Mar. Fish. Br., Fish Bull. 104: 158 p.

Randall, J. E. 1956. A revision of the surgeonfish genus Acanthurus. Pacif. Sci. 10(2): 159-235.

Randall, J. E. 1961. A contribution to the biology of the convict surgeonfish of the Hawaiian Islands, Acanthurus triostegus sandvicensis. Pacif. Sci. 15(2): 215-272.

+ Randall, J. E. 1965. A review of the razorfish genus Hemipteronotus (Labridae) of the Atlantic Ocean. Copeia 1965 (4): 487-501.

Randall, J. E. 1968. Caribbean Reef fishes. T. F. H. Publications, Inc., Jersey City, N. J. 318 p.

+ Randall, J. E., and J. E. Böhlke. 1965. Review of the Atlantic labrid fishes of the genus Halichoeres. Proc. Acad. Natur. Sci. Phila. 117(7): 235-259.

Richards, W. J. 1968. Eastern Atlantic Triglidae (Pisces, Scorpaeniformes). Scientific Results of the Danish Expedition to the Coasts of Tropical West Africa 1945-1946. Atlantide Rep. 10: 77-114.

+ Rivas, L. R. 1949. A record of lutjanid fish (Lutjanus cyanopterus) for the Atlantic coast of the United States, with note on related species of the genus. Copeia 1949 (2): 150-152.

+ Rivas, L. R. 1964. Western Atlantic serranid fishes (groupers) of the genus Epinephelus. Quart. J. Fla. Acad. Sci. 27(1): 17-30.

Robins, C. R., and D. P. De Sylva. 1960. Description and relationships of the longbill spearfish, Tetrapturus belone, based on western North Atlantic specimens. Bull. Mar. Sci. Gulf Caribb. 10(4): 383-413.

Roedel, P. M. 1948. Common marine fishes of California. State of Calif., Dep. Natur. Resour., Div. Fish Game, Bur. Mar. Fish., Fish Bull. 68: 153 p.

Roedel, P. M., and W. E. Ripley. 1950. California sharks and rays. State of Calif., Dep. Natur. Resour., Div. Fish Game, Bur. Mar. Fish., Fish Bull. 75: 88 p.

Rosen, D. E., and C. Patterson. 1969. The structure and relationships of the Paracanthopterygian fishes. Bull. Amer. Mus. Natur. Hist. 141 (art. 3):359-474.

+ Roughley, T. G. 1953. Fish and fisheries of Australia. Angus and Robertson, Sydney and London. 343 p.

Schultz, L. P. 1936. Keys to the fishes of Washington, Oregon and closely adjoining regions. Univ. Wash. Publ., Biol. 2(4):103-228.

Schultz, L. P. 1958. Review of the parrotfishes family Scaridae. U. S. Nat. Mus. Bull. 214:143 p.

Scott, T. D. 1962. The marine and freshwater fishes of South Australia. W. L. Hawes. Government Printer. Adelaide. 338 p.

Shmidt, P. Yu. 1950 (1965). Fishes of the Sea of Okhotsk. Acad. of Sci. USSR, Trans. Pacific Comm., Vol. VI. Translated from Russian by Omry Ronen, edited by P. V. Ushakov, Israel Program for Scientific Translations, Jerusalem, No. TT 65-50022, 392 p.

+ Smith, H. M., and T. E. B. Pope. 1906. List of fishes collected in Japan in 1903, with descriptions of new genera and species. Proc. U. S. Nat. Mus. 31(1489):459-499.

Smith, J. L. B. 1950. The sea fishes of southern Africa. Central News Agency, Ltd., South Africa. 550 p. (1965. Fifth Edition. 580 p.)

Smith, J. L. B., and M. M. Smith. 1963. The fishes of Seychelles. The Department of Ichthyology, Rhodes Univ., Grahamstown. 215 p.

Snodgrass, R. E., and E. Heller. 1905. Papers from the Hopkins-Stanford Galapagos Expedition, 1898-1899. XVII. Shore fishes of the Revillagigedo, Clipperton, Cocos and Galapagos Islands. Proc. Wash. Acad. Sci. VI:333-427.

+ Snyder, J. O. 1911. Descriptions of new genera and species of fishes from Japan and the Riu Kiu Islands. Proc. U. S. Nat. Mus. 40(1836):525-549.

+ Snyder, J. O. 1912a. Japanese shore fishes collected by the United States Bureau of Fisheries steamer "Albatross" expedition of 1906. Proc. U. S. Nat. Mus. 42(1909):399-450.

+ Snyder, J. O. 1912b. The fishes of Okinawa, one of the Riu Kiu Islands. Proc. U. S. Nat. Mus. 42(1913):487-519.

Soljan, T. 1948. Fishes of the Adriatic (Ribe Jadrana). Fauna et Flora Adriatica, Vol. 1, Pisces. (Translated by Marija Hayer) Institut za Oceanografiju I Ribarstvo Fnr Jugoslavije (Split). 437 p.

Springer, V. G. 1964. A revision of the carcharhinid shark genera Scolidon, Loxodon, and Rhizoprionodon. Proc. U. S. Nat. Mus. 115(3493):559-632.

Stead, D. G. 1964. Sharks and rays of Australian seas. Angus and Robertson Ltd., London, Sydney, Melbourne, and Wellington. 211 p.

Sterba, G. 1966. Freshwater fishes of the World. Translated and revised by Denys W. Tucker. Studio Vista Ltd., London. 877 p.

Taranetz, A. J. 1937. Handbook for identification of fishes of Soviet far east and adjacent waters. Bull. Pacif. Scient. Inst. Fish. Oceanogr. 11:1-200.

+ Tortonese, E. 1964. The main biogeographical features and problems of the Mediterranean fish fauna. Copeia 1964 (1): 98-107.

Tyler, J. C. 1965. The trunkfish genus Acanthostracion (Ostraciontidae, Plectognathi) in the western Atlantic: two species rather than one. Proc. Acad. Natur. Sci. Phila. 117 (1):1-18.

Vladykov, V. D., and J. R. Greeley. 1963. Order Acipenseroidei. p. 24-60. In Bigelow et al. Fishes of the western North Atlantic. Part 3. Soft-rayed bony fishes. Mem. Sears Found. Mar. Res., Yale Univ., New Haven.

Waite, E. R. 1923. The fishes of South Australia. R. E. E. Rogers, Government Printer, Adelaide. 243 p.

+ Weber, M., and L. F. De Beaufort. 1931. The fishes of the Indo-Australian Archipelago. VI. Perciformes (continued) Families: Serranidae, Theraponidae, Sillaginidae, Emmelichthyidae, Bathyclupeidae, Coryphaenidae, Carangidae, Rachycentridae, Pomatomidae, Lactariidae, Menidae, Leiognathidae, Mullidae. E. J. Brill, Ltd., Leiden, Holland. 448 p.

Weber, M., and L. F. De Beaufort. 1936. The fishes of the Indo-Australian Archipelago. VII. Perciformes (continued), Families: Chaetodontidae, Toxotidae, Monodactylidae, Pempheridae, Kyphosidae, Lutjanidae, Lobotidae, Sparidae, Nandidae, Sciaenidae, Malacanthidae, Cepolidae. E. J. Brill, Leiden. 607 p.

Wheeler, A. 1969. The fishes of the British Isles and North-west Europe. Macmillan, London, Melbourne, Toronto. 613 p.

+ Whitley, G. P. 1962a. Marine fishes of Australia. Vol. 1. The Jacaranda Press, Brisbane. p. 1-142.

+ Whitley, G. P. 1962b. Marine fishes of Australia. Vol. 2. The Jacaranda Press, Brisbane. p. 148-286.

Wilson, P. C., and J. S. Beckett. 1970. Atlantic Ocean distribution of the pelagic stingray, Dasyatis violacea. Copeia 1970 (4):696-707.

OTHER LITERATURE

Darlington, P. J., Jr. 1959. Darwin and zoogeography. Proc. Amer. Phil. Soc. 103 (2):307-319.

Ekman, S. 1953. Zoogeography of the sea. Sidgwick and Jackson Limited, London. 417 p.

Hedgpeth, J. W. 1957. Marine biogeography. p. 359-382. In J. W. Hedgpeth (ed.). Treatise on marine ecology and paleoecology. Vol. 1. Ecology. Geol. Soc. Amer., Mem. 67.

The Times of London. 1967. The Times atlas of the world. Comprehensive ed. Houghton Mifflin Company, Boston. 272 p., 123 pl.

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