A check list of the biota of lower Chesapeake Bay: with inclusions from the upper bay and the Virginian Sea

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Virginia Institute of Marine Science
A CHECK LIST
OF THE BIOTA OF LOWER CHESAPEAKE BAY

Compiled by
MARVIN L. WASS
et al

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Compiled by Marvin L. Wass
with the assistance of several
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William J. Hargis, Jr.
Director

October 1972
Effective management of the marine areas of the world is an increasing necessity. Of all such areas, the world's Coastal Zones are under greatest pressure from many sources and for a multitude of reasons. Many and complex demands are being imposed upon the environments and useful resources of coastal regions, especially in the technologically advanced countries and developing coastal nations.

Complexity in use and demands is equalled by that in natural features. The physical, chemical, and geological activities in this zone - where sea, sea bottoms, intertidal zones and highland meet the growing hordes of men, are myriad, producing interactions which are difficult to understand and predict. Biological phenomena also are many and varied, involving numerous ecosystems, communities, species, and individuals.

In the waters, bottoms, shallows, wetlands, and on the beaches of the coastal zone comingle species from truly marine waters, fresh water, and brackish waters and from land and air. Natural and man-made chemicals from land, sea, and air also enter in confusing complexity and, at times, to the detriment of the biota.

Demands for access to and use of the environments and resources of the coastal areas multiply and, since uses are wholly or partially incompatible, conflicts grow. Often two users seek access to the same plot of shoreline, bottom, or water surface. Additionally, the impacts of the larger projects and the numberless smaller ones grow and interact and complement, magnify, or diminish each other.

To cope effectively, improved planning and management is required. Enhancement of decision-making abilities demands increasingly detailed data and knowledge of the natural and the human activities comprising the Nature-Man (or Man-Nature - depending upon personal orientations or preference) systems in the coastal zone. Improved and new techniques of study, evaluation, decision-making, and of manipulation and control of the natural and human segments of coastal areas are needed.

To the aid of the managers in sympathetic, oriented, and disciplined fashion must come the natural and human scientists and their engineering companions bearing gifts of knowledge, technical capability, and relevant and timely advice and assistance.

A necessary tool of managers and their scientific advisors is assimilated and integrated knowledge of natural systems presented in abbreviated and useful form.

Baseline knowledge of the complex biota may be presented in several forms. Perhaps the most abbreviated and yet comprehensive is the annotated checklist such as that presented herein.
This improved, ecologically-annotated checklist, intended to provide a baseline against which to measure the present and future distribution, abundance, and conditions of species and communities, was begun at my request in 1970-71 during the NSF Sea Grant-IRRPOS-supported study of research needs for Chesapeake Bay. Activity continued under support of the Corps of Engineers and the NSF RANN programs for 1971-72 as part of the activities which VIMS continued in concert with the other members of the Chesapeake Research Consortium. Hopefully, it will assist us to evaluate the current status of the biota and provide a baseline against which future developmental projects and research activities can be developed and judged.

It is our hope that it will be useful to managers and scientists, and we will welcome constructive criticism of this effort. For future editions, we would appreciate suggestions for improvements and participation in addition of new taxa and ecological data.

William J. Hargis, Jr. Ph.D.
Program Director and Director
Virginia Institute of Marine Science
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This list is a sequel to the "Check-list of Marine Invertebrates of Virginia" last revised in 1965. The biota of Chesapeake Bay seems generally less known than that of New England and much of our West Coast. The present work attempts to mollify this discrepancy. The compilation has been revised and expanded to include plants and vertebrates. Inclusion of creatures not strictly aquatic but which may occasionally find their areas flooded by tidal waters has necessitated subjective decisions of limitation. Thorough study will be needed to decide which plants and animals of freshwater creeks, marshes, swamps and saline beaches justify inclusion in future works, which should include more physical data.

The only major groups excluded from this list are the insects and spiders. Minor groups ignored, or as yet not known to occur, include the lichens, bryophytes, rotifers, gnathostomulids and kinorhynchs. Unfortunately, coverage of the often ecologically underrated protists is scant. These deficiencies will hopefully be reduced in a future work which it is hoped will also give much better coverage to the upper Bay. Fishes, invertebrates and algae are reasonably covered for Maryland, but higher plants, birds and mammals are not. Oceanic shelf data is provided for decapod crustacea.

In general, large animals are better known than small ones, especially if they are eaten by man. Vertebrates have established common names which are often widely used and usually more stable than scientific names; for example the striped bass, hard clam, Virginia oyster and ribbed mussel are abundant species which have had their generic names obscured by recent décades. Birds are the most conspicuous and easily censused vertebrates; however, among birds and fish a "curiosity phenomenon" operates and rare species often receive more attention than common ones of greater economic import.

Chesapeake Bay is famous for its production of seafood. The great harvests of croakers in the 1950's is an oft-recounted memory. The menhaden fluctuates in a slow decline while still making up two-thirds of the total tonnage. Far behind are alewives and other clupeids obviously affected now by oceanic fishing pressure. But all is not gloom, the summer of 1970 brought banner catches of spot and trout. Striped bass seem most successful and once ignored fish receive increasing catch effort. Eels are air-freighted live to Holland; catfish trucked north and west. Difficult to estimate is the poundage of all those species of finfish and shellfish taken by sport fishermen or the value of the bull minnows, clams, worms, squid and other invertebrates they use for bait.

Blue crabs reach their acme in the Chesapeake Bay and catching is most proficient. Oysters are taken in less volume but are of great value. Oyster culture in lowered salinities promises a continuing supply of this gourmet bivalve. Hydraulic dredging has put Maryland ahead in soft clams. Long lived but poorly recruited hard clams sustain a sizable fishery in the lower Bay. In the face of continued coastal urbanization, some edible seafoods may be of most value for the recreation provided in their catching and pleasuresome eating.

Sampling has been conducted most intensively near research centers, in the most accessible sites and in the milder seasons. Thus, angiosperms of wetlands are quite well known near the coast, poorly so between the York and Potomac rivers. Some plankters, including scyphozoans, ctenophores, the Acartia copepods, Neomysis, the diatom, Skeletonema costatum, and the flagellate, Prorocentrum micans, have been reasonably studied, but hundreds of other holoplankters are little understood. The meroplankton have been taxonomically studied for most decapod crustaceans but vast knowledge gaps exist for polychaetes and other groups. The macrobenthos is taxonomically known in general but our awareness of distribution, life history and ethology of most species is inadequate. Some groups, e.g. the organisms from 0.1-1.0 mm have barely been touched in the Bay, for some communities it is already too late to study the effects of disturbance.
An early list of plankton was provided by Wolfe et al in 1926 (see p. 72). Hildebrand and Schroeder (1928) compiled the broadest work on bay biota in their "Fishes of Chesapeake Bay". Cowles (1930) provided the most ecologically comprehensive treatment in his "Biological Survey of the Offshore Waters of Chesapeake Bay", a study based largely on collections made by the "Fish Hawk" from 1915 to 1922. He listed 250 organisms by at least generic names, however coverage of some groups was sketchy or wanting. The only plants listed were 42 diatoms, only five protozoans were included, pericaridan coverage was meager, and no mollusks were reported. Dr. Willis G. Hewatt produced the first check-list of marine invertebrates at VIMS, in 1959, although Dr. Jay D. Andrews had compiled one for mollusks earlier.

The Chesapeake Bay is the largest of the hundreds of estuaries found in North America. It is subjected to broad ranges of temperature, wind, turbulence, and dissolved oxygen. Salinities range from rather constant at the mouth to an ecotone, or area of change-over, with fresh water that may move over a distance of 90 river miles in a year. Gradient zones, points of greatest salinity change, occur in each tributary river and the Upper Bay at about the 10-12 ppt. isohalines. These tend to delimit the lower boundaries of nursery grounds, or critical zones. Turbidity increases up-estuary and a somewhat controversial flocculation zone occurs near the head of salinity.

Organisms range from specialists, largely biologically controlled by predation and competition, near the Bay mouth, to generalists, or fugitive species, which accommodate to physical factors, in the upper reaches. Diversity is high in the lower bay, often greater in the lower James and York than near the Bridge-Tunnel at the mouth, perhaps a result of greater sediment variations. In the Chesapeake system, faunistic break points seem more likely to occur near 10 and 25 ppt. than at the "Venice system" levels of 5 and 18 ppt. Seasonal variations in salinity, with lows typically in April and highs in October, may be considerable in the tributary rivers. Superimposed on these are longer cycles, as in the dry years of the late 1960's.

Motile species, such as amphipods, are able to move with the salinity change however sessile forms may establish colonies in summer, only to be wiped out in winter. A very few species, usually abundant ones such as the menhaden and some amphipods, reproduce all year. Others, such as barnacles, Mysa, and Mulinia exhibit bimodal spawning behavior; the fall reproduction of some bivalves often seems more successful than the spring set, presumably because of blue crab and demersal fish depredations in late spring. The most striking vernal phenomena are the spawning of Polydora ligni and the attendant mud accretions by newly set worms in March and April, closely followed by the mating gyrations of the ubiquitous Nereis succinea. The blue mussel, highly prized by epicures, usually survives the summer at the bay mouth and has occasionally produced large sets at VIMS in winter. In January and February, 1959, this mussel became a pest by setting on blue crabs so heavily that extra hands were hired to remove them. At this time W. A. Van Engel found 196 mussels on a single female crab.

The oligo- and low-mesohaline sectors have become known as "nursery grounds" because of the larval and juvenile fishes transported there from the ocean or fresh water by currents and self-propulsion. In these murky waters the detritus food-chain is maximized and young fishes grow large enough to cope with increasing biotic hazards down-estuary and in the ocean. Biomass per unit of area, particularly of marsh plants and fishes, is vastly greater on these nursery grounds than it is seaward. Three resident fishes, the white catfish, white perch and hogchoker compose over 95% of the fish volume here. Mysids, amphipods and wedge clam, Rangia cuneata, predominate in the biomass of invertebrates. The large
marshes bordering the nursery waters are rich in angiosperm species, including some rare ones, but support only a few species of birds and fishes, in contrast to the Eastern Shore seaside with its great variety of ichthyo- and avifanua seen against vast cordgrass marshes and mudflats.

Sediments typically become coarser toward the sea. Although deep holes and channels may bear gravel, deeper areas usually contain silts and clays. Fresh and oligohaline shallows may support valued Potamogeton or Vallisneria waterweeds or be choked by Ceratophyllum, Zannichellia or Myriophyllum spicatum (Eurasian water milfoil). In saltier water, Zostera marina (eel grass) beds support an amazing epifauna, abundant infauna and shelter for many species of juvenile fishes in summer.

Communities or organisms are often dominated by a single species in low salinities (e.g., Macoma balthica) while those in the lower Bay may lack dominants. A similar event seems to occur from channels to the outlying shoals, where cirratulids may predominate in channels and diverse psammofauna may exist in the sandy sublittoral region. Sand beaches are most barren, although giant amphipods may torment the nocturnal stroller. Oyster "rocks" are species-rich habitats worthy of more study.

The oligohaline marshes have changed rather precipitously from being dominated by giant cordgrass to producing mostly succulent forbs which often begin dying back in summer and are laid low by killing frosts. Wild rice also seems to have been reduced. The reason for this change is unknown, but the 13-inch rise of sea level locally in the last 50 years may have been a contributing factor if sediment aggradation is inadequate.

Brackish and freshwater zones exhibit varies seasonal phenomena including "red tides", the sensory manifestations of a few species of opportunistic dinoflagellates. Silt-laden flood waters following Hurricane Camille destroyed thousands of bushels of oysters, but fattened the survivors. More sinister are the cyanophycean blooms which reduce ecosystem stability and complexity in the upper tidal James and Potomac rivers, often raising the photosynthetic compensation point to the surface. Low summer DO's plague blue crabs in 1971, after summer rains. Perhaps attracting most concern among the public is that bane of bathers, the stinging nettle Chrysaora, a species possibly benefited by the increasing practice of culturing oysters in low salinity areas. Polyps of this pest occur typically on oyster shells, although man's litter also provides increasing durable surfaces which serve as substrates.

Several species seem to have been reduced, either in numbers or range, in the last 20 years. Examples include the sand dollar Mellita, the starfish Asterias, the shrimp Ogyrides and most notably, the increasingly restricted areas in which oysters can be grown commercially. Most mourned is the croakers decrease in abundance. Record of great numbers of sturgeon and some shorebirds before our time seem legendary.

Introduced species are more prominent: Rangia, in all major rivers except the York, contributes most to the biomass. Minchinia nelsoni, presumed by some to be exotic, is the more economically important by its impact on oyster culture. Loxothylacus panopeae from the Gulf of Mexico markedly reduced Eurypanopeus and possibly Rhithropanopeus; a doubtful benefit to oyster culture and decreasing a food source for diving ducks. Ecteinascidia, if still present, should be welcomed by teachers because of its see-through test. Among vertebrates, the cattle egret, glossy ibis and nutria are highly successful newcomers, with an ecological impact yet to be assessed. Eurasian watermilfoil tops the plant introductions although it has inexplicably become reduced in speed and density recently. The Asiatic Aneilema keisak dominates some swamp floors. Russian thistle does a bit to retard barrier beach erosion and Carex kobimugi may ultimately be the best defense of back dunes.
The Corps of Engineers' study of the Chesapeake Bay is obviously hastening censuses of biotic information by providing support to this and coordinated projects. Identification of material is paramount in any study. To this end, many keys have been constructed by VIMS scientists and some have been reasonably tested but all suffer from lack of illustrations. Of course, keys are often available from other areas but Chesapeake Bay merits its own.

The length of the list has made it advisable to divide it into chapters which could be issued separately to those with specific interests. Each chapter has an index and one or more lists of references. Common names are provided for some higher plants and all vertebrates. Salinity categories are those of the "Venice system". Sediment preferences for invertebrates are generalizations.

Corrections and additions for this list have accrued during this compilation, not all of which could be included. The compiler would appreciate knowledge of new records and name changes, particularly those appearing in journal papers and theses. We also seek criticism of the format and discovery of errata. Since several chapters have been contributed by others, format varies somewhat. New Chesapeake Bay records are included in some chapters, particularly that on Parasites. Without the participation of the individuals listed below, compilation time would have been extended immeasurably.

Macrocgale: Franklyn D. Ott, VIMS
Marine Fungi: Fred Kazama, VIMS
Ciliata: Jesse C. Thompson, Roanoke College, Roanoke, Va.
Disease Organisms: Frank G. Perkins, VIMS
Bacteria: Rita R. Colwell, University of Maryland
Parasites: David E. Zwerner and Adrian R. Lawler, VIMS
Cnidaria: Dale R. Calder, VIMS
Pycnogonida: Willard A. Van Engel, VIMS
Crustacea (Copepoda): Victor G. Burrell, Jr., Marine Research Division, South Carolina
Crustacea (Cephalocarida, Branchiopoda, Cirripedia, Cumacea, Decapoda): Willard A. Van Engel, VIMS
Fishes: John A. Musick, VIMS
Amphibians: John A. Musick, VIMS
Reptiles: John A. Musick, VIMS

The information in this list has been gathered over many years, much of that on benthic invertebrates by my students. Other scientists and students at VIMS, the Chesapeake Biological Laboratory, the National Museum of Natural History, and elsewhere have contributed significantly. Finally, there was the exhausting task of data compilation and typing: Pamela Townsend and Mary Dudley gathered data on diatoms, flagellates and higher plants and birds during the summer. Mrs. Mary Emory typed the lower plants and drafts of other sections. Most of the final typing and the compilation of indices has been by Mrs. Marion Hart, with Mrs. Donna Farmer doing fishes and birds. Funding was provided in early 1971 by NOAA (Sea Grant No. 1-36032) and NSF (IREPOS #GI-27323) and ran mid 1971 through completion by NSF RANN (#29909) and U. S. Army Corps of Engineers through the Chesapeake Research Consortium. To all who have labored and to the funding agencies, I am most grateful for the opportunity to synthesize this knowledge of the great Bay ecosystem.

Marvin L. Wass, Editor
DIVISION CHRYSOPHYTA

Several works involving long lists of species have been published on Chesapeake Bay phytoplankton. Probably much other work has been done but never published. The amount of ecological information available remains meager, except on the dominant forms. Many misidentifications may have accumulated in the several lists but considerable future expertise will be needed to determine this—assuming that pollution has not altered basic compositions.

Information is mainly from Mulford (RAM); Patten (1961), and Patten, Mulford and Warinner (1963), the latter two papers cited as BCP. Other information comes from Morse (DCM), Marshall (HGM), Gibson (VG), Griffith (REG), and Wolfe et al (JW).

Class Xanthophyceae
Order Heterochloridales
Family Heterochloridaceae
Nephrochloris sp. Elizabeth River, HGM.
Olisthodiscus carterae Hulbert. Elizabeth River, HGM.
Olisthodiscus luteus Carter. Elizabeth River, HGM.
Olisthodiscus magnus Hulbert. Elizabeth River, HGM.

Order Vaucheriales
Family Vaucheriaceae

Class Chrysophyceae
Order Ochromonadales
Family Dinobryaceae
Dinobryon sertularia Ehrenberg. Polyhaline, lower CB, Y-7, 19-XII-60, rare, BCP.

Order Dictyochales
Family Dictyochaceae
Dictyocha fibula Ehrenberg. CB, JJW.
Dictyocha pons CB, JJW.
Distephanus rotundus CB, JJW.
Distephanus speculum Baeck. CB, JJW.

Class Haptophyceae
Order Prymnesiales
Family Prymnesiaceae
Prymnesium sp. Polyhaline, CB (York Spit Light – Y-7), 14-XI-60, rare, BCP.

Class Cryptophyceae
Order Cryptomonadales
Family Cryptomonadaceae
Cryptomonas salina (Wislouch) Butcher. Elizabeth R., HGM.
Cryptomonas vectensis N. Carter. JR (HR), HGM.
Cryptomonas stigmatica Wislouch. Elizabeth R., HGM.
Species of uncertain relationships (Butcher, 1967)
Rhodomonas amphioxeia Conrad. Elizabeth R., HGM.
Rhodomonas minuta Skuja. Elizabeth R., HGM.
Rhodomonas sp. Polyhaline. Y-7, 3-VI-60, rare, BCP.

Class Prasinophyceae
Order Pyramimonadales
Family Pyramimonadaceae
Pyramimonas sp. Polyhaline, VG. Summer (dominant).

Class Bacillariophyceae
Order Bacillariatales
Suborder Discineae
Family Coscinodiscaceae
Actinocyclus alienus Rattray. CB, REG.
Coscinodiscus asteromphalus Ehrenberg. Euryhaline (2-31 ppt), lower CB - Y-20, I-XII, abundant late IV-VI, 2-29C, BCP. Patuxent River, autumn, DCM.

Coscinodiscus centralis Ehrenberg. Meso- and polyhaline (8-24 ppt), lower CB - P-30, VIII-XII, 5-28C, common, RAM. Patuxent R., rare, DCM.

Coscinodiscus concinnus (W. Smith). Meso- to euhaline (7-31 ppt), lower CB, Y-0, IX-XII, 8-27C, rare, RAM. CB, REG.

Coscinodiscus curvatulus Grunow and Schmidt. CB, REG.

Coscinodiscus decoratus Brun. CB, REG.

Coscinodiscus decresens Grunow. Polyhaline (19 ppt), Y-10, P-30, IV-VI, abundant IV & V), 10-29C, RAM. CB, REG.

Coscinodiscus excentricus Ehrenberg. Meso- and polyhaline (14-21 ppt), lower CB - Y-0, III-X, 8-27C, rare, RAM. GP, 12-XII-69, VG.

Patuxent R., rare, DCM.

Coscinodiscus rranii Gough. Oligo- and mesohaline (2-17 ppt), Y-10 - P-30, IV-VI abundant IV & V), 10-29C, RAM. CB, REG.

Coscinodiscus lineatus Ehrenberg. Meso- to euhaline (15-31 ppt), CB-10- Y-7, IV-VIII, 8-29C, RAM. CB, REG.

Coscinodiscus marginatus Ehrenberg. Oligo- to polyhaline (0-19 ppt), Y-0 - P-30, II, VI, VII, 6-26C, RAM. CB, REG.

Coscinodiscus nitidulus Grunow. CB, REG.

Coscinodiscus nitidus Gregory. CB, REG.

Coscinodiscus nobilis Grunow. CB, REG.

Coscinodiscus oculus iridis Ehrenberg. Oligo- to polyhaline (0-21 ppt), CB - Y-20, P-30, I-V, VIII, X, 3-29C, RAM. Patuxent R., autumn, DCM.

Coscinodiscus perforatus Ehrenberg. Oligo- to polyhaline (0-25 ppt), CB - P-30, I-VII-XI (dominant in VI & IX) 2-28C, RAM. Patuxent R., DCM.

Coscinodiscus radiatus Ehrenberg. Meso- and polyhaline (13-23 ppt), CB-10 - P-30, I, IV, VI, IX, XI, 4-29C, RAM. Lower CB, Bridge Tunnel, 29-IX-69, GP, 12-XII-69, VG. Patuxent R., DCM.

Coscinodiscus rothii (Ehrenberg) Grunow. CB, REG.

Coscinodiscus senarius A. Schmidt. CB, REG.

Coscinodiscus subconcavus Grunow. CB, REG. Patuxent R., rare, DCM.

Coscinodiscus subtilis Ehrenberg. Oligo- to polyhaline (0-24 ppt), CB - P-30, V-VII, XII, 4-26C, rare, RAM. CB, REG.

Coscinodiscus wailesii Gran. Meso- and polyhaline (12-22 ppt), Y-0 - Y-14, IV-XI, 10-29C, RAM. CB, REG.

Coscinosira polychorda Gran. Mesohaline (16-18 ppt), Y-0, III, 8-12C, RAM. Patuxent R., rare, DCM.

Cyclotella kutzingina Thwaites. Oligo- and mesohaline (0-19 ppt); P-30, P-40, I, VI, XII, 3-25C, RAM. CB, REG.

Cyclotella lineata Bailey. CB, REG.

Hyalodiscus stelliger Bailey. CB, REG.


Melosira granulata (Ehrenberg) Ralfs. Oligo- and mesohaline (0-8 ppt), P-30, P-40, I, VI-VIII (abundant VI, VII), 3-28C, RAM.

Melosira hyperborea (Grunow) Schutt. CB, REG.

Melosira islandica Muller. Polyhaline (19-20 ppt), CB - Y-20, I-XII, 2-29C, RAM. CB, REG. HR and WB, HGM.

Melosira jurgensii Agardh. Meso- and polyhaline (8-30 ppt), CB - Y-20, I-XII, 2-29C, RAM. CB, REG. HR and WB, HGM.
Melosira nummuloides (Dillwyn) Agardh. Polyhaline (20 ppt), Y-7, IX, 22C, RAM. CB, REG.

Melosira octogona A. Schmidt. CB, REG.

Melosira roeseana Rabenhorst. Oligo- and mesohaline (2-9 ppt), P-30 - P-40, I, 2-4C, RAM.

Melosira setosa Greville. Polyhaline. Lower CB, 21-III-60, BCP.

Melosira solida Eulenstein. Mesohaline. Patuxent R., rare, DCM.

Melosira sulcata (Ehrenberg) Kutzing. Oligo- and polyhaline (4-33 ppt), lower CB, P-30, I-XII, 2-29C, RAM. Patuxent R., rare, DCM.

Melosira undulata (Ehrenberg) Kutzing. Mesohaline. Patuxent R., rare, DCM.

Paralia sulcata (Ehrenberg) Cleve. CB, REG.

Planktoniella sol (Wallich) Schutt. Polyhaline (30 ppt), lower CB, VIII-60, 24C, RAM.

Skeletonema costatum (Greville) Cleve. Oligo- to polyhaline (0-26 ppt), lower CB - P-40, I-III, V-XII, (among 3 dom. diatoms I-X & XII), 2-24C, RAM. Lower CB, I-XII; Y-7, I-IV and VII-XII; Y-0, I-IV, VI-XII; BCP. JR (100), 21,915,000 cells/l. at 1300 hours, 12 m., ebb tide. Most abundant plankter, VIII-XII, VI & VII, VG.

Thalassiosira aestivalis Gran and Angst. Oligo- and polyhaline (4-24 ppt), lower CB - Y-0, Y-7, II-IV, 2-13C, rare, RAM.

Thalassiosira balticus Grunow. Oligo- to polyhaline (0-24 ppt), lower CB, Y-0, Y-7, I-IV, 2-12C, RAM.

Thalassiosira condensata Cleve. Polyhaline (24 ppt), Y-0, X, 18C, RAM. Lower CB, IV, VII, & IX, BCP.

Thalassiosira decipiens (Grunow) Jorgensen. Meso- and polyhaline (7-22 ppt), Y-0, Y-14, III & XII, 2-13C, rare, RAM.


Thalassiosira kryophila (Grunow) Jorgensen. Oligo- and polyhaline (4-24 ppt), lower CB, Y-0, Y-7, I-IV, 2-13C, RAM.

Thalassiosira nana Lohmann. Meso- and polyhaline (16-30 ppt), lower CB - Y-20, II, IX, X, 2C, RAM.

Thalassiosira nordenskioldii Cleve. Polyhaline (19-25 ppt), lower CB, II, III, IV, 2-6C, RAM.

Thalassiosira rotula Meunier. Meso- and polyhaline (11-26 ppt), CB - Y-20, II, IX, X, 2C, RAM.

Thalassiosira spp. Mesohaline. Patuxent R., rare, DCM.

Thalassiosira subtilis (Ostenfeld) Gran. Elizabeth R., HGM.

Family Actinodiscaceae
Actinoptychus splendens (Shadbolt) Ralfs & Pritchard. Oligohaline, (2 ppt), F-30, I, WC, RAM.

Actinoptychus undulatus (Bailey) Ralfs. Oligo- and polyhaline (0-25 ppt), CS-10, F-30, II-III, V-VII, IX, XI-XII, 2-26C, RAM.

Patuxent R., rare, DCM.

Suborder Aulacodiscinae
Family Eupodiscaceae
Aulacodiscus argus (Ehrenberg) A. S. Schmidt. Lower polyhaline (16-23 ppt), lower CB, II, VI & XI, 4-24C, RAM.

Suborder Auliscinae
Family Auliscaceae
Auliscus caelatus Bailey. Meso- and polyhaline, lower CB - Y-0, II, IV, V, VII-XII, 2-8C, RAM.

Auliscus punctatus Schmidt. Upper mesohaline (16 ppt), Y-14, XI, 15C, RAM.
Auliscus radiatus Janisch. CB, REG.
Auliscus sculptus (W. Smith) Ralfs & Pritchard. CB, REG.

Suborder Biddulphiineae

Family Biddulphiaceae

Anaulus scalaris Ehrenberg. CB, REG.
Biddulphia aurea (Lyngbye) Brebisson. CB, REG.

Biddulphia aurita (Lyngbye) Brebisson. CB, REG.
Biddulphia favus (Ehrenberg) V. Heurck. Poly- and euhaline (12-32 ppt), lower CB - Y-7, II through XII, X, 8-27C, RAM.
Biddulphia laevis Ehrenberg. Oligohaline (3 ppt), P-30, VII, 28C, RAM.
Biddulphia pulchella Gray (= biddulphiana (Smith) Boyer). Polyhaline (24 ppt), CB-0, IV, 7C, RAM.
Biddulphia sinensis Greville. Oligo- to polyhaline (2-24 ppt), lower CB - Y-20, I-II, VII-XII, eurythermal, RAM.
Biddulphia turgida Ralfs. Oligo- and mesohaline (4-30 ppt), lower CB-0- P-30, II, IV, V, XI, XII, 3-21C, RAM.

Cerataulina flagrata (Cleve) Hendey (= berginii Peraagallo). Polyhaline (18-24 ppt), CB-0, Y-0, III-IV, VII-IX (abundant), 5-26C, RAM. Lower CB (Bridge Tunnel), 22-IV-70, most abundant plankter; Patuxent R., abundant in spring, DCM. GP, V-VII, VG.
Cerataulus smithii (=Biddulphia smithii). CB, REG.
Cerataulus turgidus Ralfs. CB, REG.


Eucampia cornuta (Cleve) Grunow. Polyhaline (20-30 ppt), lower CB, VIII x IX, 24-27C, RAM.
Hemiaulus sinensis (Greville). Polyhaline (28 ppt), lower CB - Y-7, VIII, 27C, RAM.


Streptotheca thamesis Shrubsole. CB, REG.

Terpsinoe americana (Bailey) Ralfs. Mesohaline (16 ppt), Y-7, VI, 21C, RAM.

Family Chaetoceraceae

Chaetoceros aequatorialis Cleve. Polyhaline (19-21 ppt), lower CB, 19-IV-60, II-12C, BCP.
Chaetoceros affinis willei Hustedt. Polyhaline (20 ppt), Y-7, IX, Y-51, 28C, RAM.
Chaetoceros atlanticus Cleve. Meso- and polyhaline (13-28 ppt), lower CB - P-30, III-V, VII-XII, 5-29C, RAM.
Chaetoceros brevis Schutt. Polyhaline (16-21 ppt), (Y-0 & Y-7) VI, VIII, IX-XI, 10-28C, RAM. Patuxent R., rare, DCM.
Chaetoceros ceratophorus Ostenfeld (= Chaetoceros gracilis Apstein). Mesohaline (11-16 ppt), lower CB - Y-7, 1-IV, 2-12C, RAM.
Chaetoceros compressus Lauder. Meso- and polyhaline (10-24 ppt),
lower CB - Y-20, I, IV-XII, (abundant lower CB, VIII and IX),
3-26C, RAM.
Chaetoceros constrictus Gran. Meso- and polyhaline (14-21 ppt),
lower CB - Y-10, VI, VIII, IX, X, 17-27C, RAM. Patuxent R., rare,
DCM.
Chaetoceros convolutus Castracane. Mesohaline. Patuxent R., summer,
DCM. CB, REG.
Chaetoceros crinitus Schutt. Lower CB (Bridge Tunnel), 22-IV-70
(abundant lower CB, VIII and IX), 3-26C, RAM.
Chaetoceros cr1ophilum Hustedt. Polyhaline (18 ppt), Y-0, VII, 29C,
RAM.
Chaetoceros dadayi (?) Pavillard. Polyhaline (19 ppt), CB-0, VI,
25C, RAM.
Chaetoceros danicus Cleve. Polyhaline (2-26 ppt), lower
CB - F-30, I-III, V-VII, IX-XI, (abundant Y-0, VII; Y-7, XI-61,
3-26C, RAM. Patuxent R., summer, DCM.
Chaetoceros debilis Cleve. Meso- and polyhaline (14-24 ppt), lower
CB - Y-20, XI, XII, 5-13C, RAM. Patuxent R., rare, DCM.
Chaetoceros decipiens Cleve. Oligo- to polyhaline (2-25 ppt), lower
CB - P-30, II-IV, IX, (abundant Y-10 and Y-20, IV - Y-10, X)
3-24C, RAM. Patuxent R., autumn, DCM.
Chaetoceros didymus Ehrenberg. Meso- and polyhaline (10-26 ppt),
lower CB - Y-20, II, IV, V, 2-18C, RAM. Patuxent R., rare, DCM.
Chaetoceros eibenii (Grunow) Meunier. Polyhaline (19-20 ppt), Y-0,
IX, 26-27C, RAM.
Chaetoceros filiformis (?) Meunier. Polyhaline. Lower CB, Y-0,
VIII, X, BCP.
Chaetoceros fragilis (?) Meunier. Polyhaline (20-28 ppt), Y-0 and
lower CB, VIII, 26-27C, BCP.
Chaetoceros laciniatus Granville. Meso- and polyhaline (18-24 ppt),
VI, VII (abundant lower CB, VI), 2-4C, RAM.
Chaetoceros lorenzianus Grunow. Meso- and polyhaline (13-24 ppt),
lower CB - F-30, VI-XI, (abundant lower CB and Y-0, X, XI), 10-26C,
RAM.
Chaetoceros pandulus Karsten. Meso- and polyhaline (10-18 ppt), Y-0,
Y-7, III, IV, XII, 12-15C, RAM, BCP.
Chaetoceros convexicorne Mangin (C. peruvianus). Meso- and polyhaline
(11-24 ppt), lower CB - F-30, II, III, V-VII, IX, XII, 2-26C, RAM.
CB, REG.
Chaetoceros pseudocrinitus Ostenfeld. Mesoaline. Patuxent R., rare,
DCM.
Chaetoceros pseudourvillsetus Mangin. Oligo- to polyhaline (3-26 ppt),
lower CB - F-30, II (abundant), III, X, 2-18C, RAM.
Chaetoceros septentrionalis Oestrup. Meso- and polyhaline (8-21 ppt),
lower CB - Y-14, I-IV, 2-12C, RAM. Abundant Y-7, VI, XI, IX, BCP.
Patuxent R., DCM.
Chaetoceros seriicansus Gran. CB, REG.
Chaetoceros similis Cleve. Meso- and polyhaline (14-31 ppt), lower
CB - Y-14, II-IV, VII, XI, eurythermal, RAM.
Chaetoceros simplex Ostenfeld. CB, VG.
Chaetoceros socialis Lauder. Polyhaline (21-22 ppt), Y-0, Y-7, XII,
I, 5-11C, RAM. Lower CB, VII, BCP. Patuxent R., autumn, abundant,
DCM.
Chaetoceros spp. Mesoaline. Patuxent R., all year (abundant, autumn),
DCM.
Chaetoceros subsecundus (Grunow) Hustedt (= C. ralfsii Schutt). Meso-
and polyhaline (14-24 ppt), CB - Y-10, VI, IX, 21-26C, RAM.
Chaetoceros subtilis Cleve. Oligo- to polyhaline (0-20 ppt), Y-0 -
P-40, I, IV-VII, IX-XII, 3-24C, abundant Y-0, VI - VIII, RAM.
Lower CB (Bridge Tunnel), 22-IV-70, VG. Patuxent R., rare, DCM.
Chaetoceros teres Cleve. Polyhaline (20 ppt), Y-0, VII, 26C, RAM.
Patuxent R., rare, DCM.
Chaetoceros wighami Brightwell. Mesoaline. Patuxent R., rare, DCM.
Family Bacteriostriataceae
Bacteriostrium deliciatum Cleve. Mesophilic and polyhaline (14-32 ppt), lower CB - Y-10, II, VII-X (dominant VII, VIII) 6-29C, RAM.
Bacteriostrium hyalinum Lauder. Polyhaline (24 ppt), Y-9, X, 18C, RAM.
Bacteriostrium varians (Lauder). CB, REG.

Suborder Soleniineae
Family Corethronaceae

Family Leptocylindraceae
Dentonula confervacea (Cleve) Gran. ( = · cystifera Gran). Patuxent R., rare, DCM.

Family Rhizosoleniaceae
Guinardia flaccida (Castracane) Peragallo. Oligo- and polyhaline (2-24 ppt), lower CB - Y-10, IV-VI, IX-X (dominant V, VI), 10-20C, RAM. Lower CB (Bridge Tunnel), 22-IV-70, 3rd most abundant plankter, VG.
Rhizosolenia calcar avis Schultze. Oligo- and polyhaline (3-26 ppt), lower CB - Y-20, II, VI, XII, (among 3 dominant diatoms II-IV 1960), 5-26C, RAM. Patuxent R., spring, autumn, winter, DCM.
Rhizosolenia delicatula Cleve. Mesohaline (11-18 ppt), Y-0 and Y-7, III & IV, 8-12C, RAM.
Rhizosolenia faeroense Ostenfeld. GP, 1-VI-70, 17-IX-70, (most abundant plankter), VG.
Rhizosolenia fragilissima Bergon (= R. faeroense Ostenfeld). Meso- and polyhaline (14-25 ppt), CB-0, Y-0, II, III, VI, XII, III & IV (dominant III), 2-26C, RAM. Lower CB (Bridge Tunnel), 22-IV-70, 2nd most abundant plankter, VG.
Rhizosolenia hebeta (Bailey). Mesohaline. Patuxent R., rare, DCM.
Rhizosolenia imbricata Brightwell. Meso- and polyhaline (9-25 ppt), lower CB - Y-20, I-IV (abundant lower CB & Y-0, IX, X, XI at Y-10) 5-20C, RAM.
Rhizosolenia imbricata shrubsolei Cleve. Meso- and polyhaline (16-27 ppt), lower CB - Y-7, I-IV, 2-6C, RAM.
Rhizosolenia obtusa Hensen. CB, REG.
Rhizosolenia semispina Hensen. CB, REG.
Rhizosolenia setigera Brightwell. Oligo- and polyhaline (2-26 ppt), lower CB - P-30, V-IV, V-II, lower CB - Y-14, I-IV & X-XII), RAM. Patuxent R., rare, DCM.
Rhizosolenia shrubsolei Cleve. CB, REG.
Rhizosolenia stolterfothii Peragallo. Meso- and polyhaline (17-28 ppt), lower CB - Y-10, II, VII-XI, eurythermal, RAM. CB, REG, HR & WB, a dominant, 24-IX-64, HGM.
Rhizosolenia stricta Karsten. CB, REG.
Rhizosolenia styliformis Brightwell. Lower CB - Y-7, I-III, V, IX, RAM. Patuxent R., rare, DCM.

Suborder Araphidineae
Family Fragilariaceae
Asterionella formosa Hassall. Fresh water (0-3 ppt), P-30, P-40, II, VI, 3-26C, RAM. Y-7, VIII, BCP.
Asterionella japonica Cleve and Muller & Gran. Meso- and polyhaline (10-25 ppt), lower CB - P-30, I-V, VII, X-XII (abundant II-III), RAM.

Elizabeth R., winter, abundant, DCM.

Diatoma hiemale (Lyngbye) Heiberg. Oligo- to polyhaline (4-21 ppt), lower CB - Y-14, I-III, 1960-61, 2-15C, RAM.

Campylodiscus cymbelliformis (Schmidt) Grunow and Van Heurck. Meso- and polyhaline (11-21 ppt), lower CB - Y-0, II, V, X, and XI, 2-22C, RAM.

Elizabeth H., abundant, XI-II, HGM. GP, abundant, 28-VII-70, VG.

Patuxent R., winter, abundant, DCM.

Diatoma hiemale (Lyngbye) Heiberg. Oligo- to polyhaline (4-21 ppt), lower CB - Y-14, I-III, 1960-61, 2-15C, RAM.

Campylodiscus cymbelliformis (Schmidt) Grunow and Van Heurck. Meso- and polyhaline (11-21 ppt), lower CB - Y-0, II, V, X, and XI, 2-22C, RAM.

Fragilaria crotonensis (Edward) Kitton. CB, REG.

Fragilaria pinnata Ehrenberg. Mesohaline (18 ppt), Y-0, III, RAM.

Opephora marinina (Greg) Petitt. CB, REG.

Plagio~ramma sp. CB, REG.

Plagio~ramma vanheurckii Grunow. Oligo- and polyhaline (4-21 ppt), YR, Y-0 - Y-14, II, III, IV, & VI, 2-28C, RAM.

Rhaphoneis amphiceros Ehrenberg. Meso- and polyhaline (16-30 ppt), I-V & VIII-XII, X, 2-17C, RAM.

Rhaphoneis belgica Grunow. Oligo- and polyhaline (16-28 ppt), lower CB, II, VI, VIII, X, XI, XII, 2-17C, RAM.

Rhaphoneis sp. Patuxent R., rare, DCM.

Family Tabellariaceae


Grammatophora oceanica var. macilenta (W. Smith) Grunow. CB, REG.

Grammatophora serpentina Ehrenberg. CB, REG.

Grammatophora subtilissima (Bailey) De Toni. CB, REG.

Licmophora abbreviata Agardh. Oligo- and polyhaline (4-22 ppt), Y-O - Y-14, II-VIII, 2-29C, RAM.

Licmophora ehrenbergii (Kutzing) Grunow. CB, REG.

Licmophora flabellata (Carmichael) Agardh. Fresh water (0 ppt), P-40, VI, 26C, RAM.

Thalassiothrix frauenfeldii (Grunow) Cleve & Grunow. Meso- and polyhaline (10-25 ppt), CB-0 - P-30, (abundant VI-VIII), 2-23C, RAM. GP, all year, abundant 17-IX-70, VG.

Thalassiothrix mediterranea Pavillard. Polyhaline (20-28 ppt), lower CB, VII, 26-27C, BCF.

Suborder Monoraphidineae

Family Achnanthaceae

Achnanthes brevipes Agardh. Mesohaline (16 ppt), YR, (Y-7), III, 9C, RAM.

Achnanthes clevei Grunow. Oligo- and mesohaline (0-18 ppt), Y-0 - P-40, I, III-VI, X-XII, 2-26C, RAM.

Achnanthes curvirostrum Brum. Polyaline (18 ppt), (Y-7), II, 4C, RAM.

Achnanthes danica? (Flogel) Grunow. Oligohaline (2 ppt), P-30, II, 24C, RAM.


Achnanthes longipes Agardh. Mesohaline. Patuxent R., rare, DCM.
Achnanthes sp. Oligohaline (0-3 ppt), P-30, P-40, I, X-XII, 2-23C, RAM.

Cocconeis costata Gregory. Mesohaline (16 ppt), Y-0, IV, 10C, RAM.
Cocconeis disculoides Hustedt. Meso- and polyhaline (12-25 ppt), CB-0 & Y-20, IV, X, 10-19C, RAM.
Cocconeis scutellum Ehrenberg. Euryhaline (0-32 ppt), Y-0 - P-30, I-VIII, X-XII, eurythermal, RAM. GP, I-VI - 70, abundant, Vg.

Cocconeis thomasianna Brun. Mesohaline (7 ppt), Y-14, III, 12C, RAM.

Suborder Biraphidineae

Family Naviculaceae

Amphiplura ruitans (Trentepohl) Cleve. CB, REG.

Amphiprora alata (Ehrenberg) Kutzing. Oligo- and polyhaline (1-23 ppt), CB, REG.

Amphiprora crabo Ehrenberg. CB, REG.

Amphiprora gigantea (O'Meara) Cleve. Oligo- to polyhaline (3-21 ppt), CB, REG.

Amphiprora sulcata O'Meara. Polyhaline (19 ppt), Y-0, VIII, 26C, RAM.

Diploneis bombus minor Cleve. Oligo- and polyhaline (1-23 ppt), Y-0 - P-40, V, VII, X-XII, 11-28C, RAM.

Diploneis puella (Schumann) Cleve. Oligo- to polyhaline (0-24 ppt), CB - P-40, II, IV-VI, IX, XI, RAM.

Diploneis sejuncta (A. Schmidt) Jorgensen. Polyhaline (19-21 ppt), lower CB, 19-IV-60, 11-12C, BCP.

Diploneis suborbicularis intermedia Cleve-Euler. Meso- and polyhaline (19-22 ppt), Y-0 & Y-14, VIII & XII, 8-27C, RAM.

Donkinia carinata (Donkin) Ralfs. Polyhaline. CB, VG.

Donkinia recta Grunow. CB, JJW.

Frustulia vulgaris (Thwaites) De Toni. Mesohaline (17 ppt), Y-9, VI, 20C, RAM.

Gyrosigma balticum (Ehrenberg) Cleve. CB, REG.

Gyrosigma diaphanum Cleve. Mesohaline (15-17 ppt), Y-0, Y-7, IV-VI, 10-24C, RAM.

Gyrosigma fasciola (Ehrenberg) Cleve. Oligo- and polyhaline (0-22 ppt), Y-0 - P-40, II-XII, 2-29C, RAM.

Gyrosigma gracile (Donkin) Cleve. CB, REG.

Gyrosigma humerosa Brebisson. CB, REG.

Gyrosigma infausta (Donkin) Cleve. Mesohaline (15-22 ppt), lower CB, 19-IV-60, 11-12C, BCP.

Mastogloia brauni Grunow. Polyhaline. Lower CB, 23-IV-60, BCP.

Mastogloia lanceolata Thwaites. Polyhaline (19 ppt), Y-0, VII, 26C, RAM.

Navicula arenaria Donkin. CB, REG.

Navicula brevis Gregory. CB, REG.

Navicula bombus (Ehrenberg) Kutzing. Mesohaline. Patuxent R., rare, DCM.
Navicula lyra dilatata A. Schmidt. Meso- and polyhaline (17-30 ppt), lower CB, V, VIII, X, 14-27C, RAM.
Navicula maculata (Bailey) Cleve. Polyhaline. Lower CB, 23-IV-60, BCP.
Navicula punctata W. Smith. Upper meso- and polyhaline (17-21 ppt), lower CB, 21-IV-60, 3C, BCP.
Navicula salinarum Grunow. CB, REG.
Navicula smithii Brebisson. Meso- and polyhaline (17-30 ppt), lower CB, V, VIII, X, 14-27C, RAM.
Navicula maculata (Bailey) Cleve. Polyhaline. Lower CB, 23-IV-60, BCP.
Navicula punctata W. Smith. Upper meso- and polyhaline (17-21 ppt), lower CB, 21-IV-60, 3C, BCP.
Navicula salinarum Grunow. CB, REG.
Navicula smithii Brebisson. Meso- and polyhaline (17-30 ppt), lower CB, V, VIII, X, 14-27C, RAM.
Navicula maculata (Bailey) Cleve. Polyhaline. Lower CB, 23-IV-60, BCP.
Navicula punctata W. Smith. Upper meso- and polyhaline (17-21 ppt), lower CB, 21-IV-60, 3C, BCP.
Navicula salinarum Grunow. CB, REG.
Navicula smithii Brebisson. Meso- and polyhaline (17-30 ppt), lower CB, V, VIII, X, 14-27C, RAM.
Navicula maculata (Bailey) Cleve. Polyhaline. Lower CB, 23-IV-60, BCP.
Navicula punctata W. Smith. Upper meso- and polyhaline (17-21 ppt), lower CB, 21-IV-60, 3C, BCP.
Navicula salinarum Grunow. CB, REG.
Navicula smithii Brebisson. Meso- and polyhaline (17-30 ppt), lower CB, V, VIII, X, 14-27C, RAM.
Navicula maculata (Bailey) Cleve. Polyhaline. Lower CB, 23-IV-60, BCP.
Navicula punctata W. Smith. Upper meso- and polyhaline (17-21 ppt), lower CB, 21-IV-60, 3C, BCP.
Navicula salinarum Grunow. CB, REG.
Navicula smithii Brebisson. Meso- and polyhaline (17-30 ppt), lower CB, V, VIII, X, 14-27C, RAM.
Navicula maculata (Bailey) Cleve. Polyhaline. Lower CB, 23-IV-60, BCP.
Navicula punctata W. Smith. Upper meso- and polyhaline (17-21 ppt), lower CB, 21-IV-60, 3C, BCP.
Denticula subtiles Grunow. CB, REG.

Family Eunotiaceae

Eunotia sp. CB, REG.

Family Achnanthaceae

Hantzschia amphioxys (Ehrenberg) Grunow. Oligo- and mesohaline (0-13 ppt), P-30, P-40, I, II, X, XII, 3-29C, RAM.

Hantzschia marina (Donkin) Grunow. CB, REG.

Nitzschia acicularia (Kutzing) W. Smith. Oligo- and mesohaline (0-32 ppt), CB - P-40, I-VI, VIII-XII, eurythermal, RAM. GP, 29-VII-69, abundant, VG. Patuxent R., rare, DCM.

Nitzschia acuminata (W. Smith) Grunow. CB, REG.

Nitzschia adducta Hustedt. Polyhaline (20 ppt), Y-7, II, 4C, RAM.

Lower CB, 23-IV-69, BCP.

Nitzschia apiculata (Gregory) Grunow. CB, REG.

Nitzschia circumsuta (Bailey) Grunow. Oligo- and polyhaline (0-22 ppt), Y-0 - P-40, I-III, X-XII, 2-10C, RAM.

Nitzschia closterium (Ehrenberg) W. Smith. Oligo- and euhaline (0-32 ppt), CB - P-40, I-VI, VIII-XII, eurythermal, RAM. GP, 29-VII-69, 17-IX-70, abundant, VG. Patuxent R., rare, DCM.

Nitzschia constrictria (Gregory) Grunow. CB, REG.

Nitzschia linearis (Agardh) W. Smith. Oligohaline (0-3 ppt), P-30, II, 3C, RAM.

Nitzschia leuteris Grunow. CB, REG.

Nitzschia linearis (Agardh) W. Smith. Oligohaline (3 ppt), P-30, II, 3C, RAM.

Nitzschia litoralis Grunow. CB, REG.

Nitzschia litoralis delawarensis Grunow. Oligo- and polyhaline (4-21 ppt), lower CB - P-30, II, VII-VIII, 2-10C, RAM.


Nitzschia macilenta Gregory. CB, REG.

Nitzschia panduriformis Gregory. Mesohaline (12-13 ppt), Y-7 - P-30, II, VII, X, 7-29C, RAM.

Nitzschia paradoxa Gmelin. Oligo- and polyhaline (0-30 ppt), CB - I-30, I-XII, 2-29C, RAM.

Nitzschia paxillifera (F. Muller) Heibaud. Oligo- and euhaline (0-4 ppt), P-30, P-40, VII-VIII, 27-28C, RAM.

Nitzschia plana W. Smith. CB, REG.

Nitzschia punctata (W. Smith) Grunow. Polyhaline (22 ppt), Y-0, XII, 3C, RAM.

Nitzschia pungens atlantica Cleve. Oligo- and polyhaline (0-26 ppt), lower CB - P-40, I-VII, IX-XII, (abundant II, VI), eurythermal, RAM. HR, all year except X, (abundant XII, VI), HGM. CB (Bridge Tunnel), 25-IX-69, abundant. Elizabeth R., abundant, DCM.

Nitzschia reversa W. Smith. Fresh Water (0 ppt), P-40, II, 3C, RAM.

Nitzschia schweinfurthii Grunow. Mesohaline. Patuxent R., rare, DCM.

Nitzschia seriata (Cleve) Peragallo. Meso- and polyhaline (13-22 ppt), lower CB - P-30, IX, X, XII, 5-21C, RAM. Patuxent R., abundant all year except autumn, DCM. HR, abundant XI-VI, HGM.

Nitzschia sigma (Kutzing) W. Smith. Meso- and polyhaline (9-24 ppt), lower CB - Y-20, I-IV, 2-25C, RAM.

Nitzschia sigma curvula (Ehrenberg) Grunow. Mesohaline. Patuxent R., rare, DCM.

Nitzschia sigmontellae Gregory. CB, REG.

Nitzschia sigmoidea (Ehrenberg). Oligo- and polyhaline (4-22 ppt), Y-0 - P-40, Y-14, XI-IV, 2-7C, RAM.

Nitzschia sp. Mesohaline. Patuxent R., abundant all year except autumn, DCM.

Nitzschia spectabillis var. americana Grunow. Oligohaline (3 ppt), P-30, II, 3C, RAM.

Nitzschia tryblionella Hantzsch. CB, REG.

Nitzschia valida Cleve and Grunow. CB, REG.

Nitzschia vermicularis Hantzsch. Mesohaline. Patuxent R., rare, DCM.

Suborder Surirella

Family Surirellaceae

Campylodiscus echeneis Ehrenberg. Oligo- and mesohaline (0-21 ppt), lower CB - P-40, I-III, V, VII, IX, XII, eurythermal, RAM.

Surirella anceps Lewis. Mesohaline. Patuxent R., rare, DCM.

Surirella elegans Ehrenberg. Oligohaline (0-4 ppt), P-30, P-40, II, III, V-VII (abundant VI), eurythermal, RAM.
Surirella fatuosa Ehrenberg. Mesohaline. Patuxent R., rare, DCM.

Surirella fluminensis Grunow. Mesohaline. Patuxent R., rare, DCM.


Surirella gracilis Grunow. Freshwater (0-2 ppt), P-30, P-40, I, 2-4C, RAM.

Surirella guatimalensis Ehrenberg. Oligo- to polyhaline (0-18 ppt), Y-10 - P-40, II, IX, XI, XII, 3-25C, RAM.

Surirella inducta A. Schmidt. Oligo- and mesohaline (3-11 ppt), Y-20, Y-30, II, 3C, RAM.

Surirella intermedia Lewis. CB, REG.

Surirella litoralis Hustedt. Mesohaline (8-16 ppt), Y-0, Y-7, II, III, 2-6C, RAM.

Surirella ovalis Brebisson. Oligohaline (0-3 ppt), P-30, P-40, II, VI, VII, XI, eurythermal, RAM.

Surirella robusta Ehrenberg. Oligohaline (3 ppt), P-30, II, 30C, RAM.

Surirella robusta marginata (Ehrenberg) Cleve. Oligo- and mesohaline (4-16 ppt), Y-7 - Y-14, II, III, IV, 3-10C, RAM.

Surirella sp. Turpin. Patuxent R., rare, DCM.

DIVISION EUGLENOPHYTA

Class Euglenophyceae G. M. Smith
Order Euglenales Engler
Family Euglenaceae Stein orth. mut. Klebs
Eutreptia sp.
Fide:
VIRGINIA: Patten, Mulford and Warinner (1963), lower CB.

Phacus sp.
Fide:
VIRGINIA: Patten, Mulford and Warinner (1963), lower CB.

Eutreptia marina da Cunha
Fide:
MARYLAND: Morse (1947), mouth of Patuxent River.
DIVISION PYRROPHYTA

Data for this phylum were taken mainly from the thesis done by Mackiernan and these are prefaced by GP (Gloucester Point). The great diversity, as well as the lack of our knowledge, of this group is exemplified by the 115 taxa found by Mackiernan, only 84 of which could be placed to species. The remaining 34 were assigned to the following genera: Gymnodinium (10), Gyrodinium (8), Cochlodinium (2), Glenodinium (3), Peridinium (8), and Gonyaulax (3). Further information is from the works of Patten, Mulford, and Warriner (BCP), Mulford (RAM), Morse (DCM), Gibson (VG), Griffith (REG), Marshall (HGM), and Wolfe, Cunningham, Wilkerson and Barnes (JW). Taxa identified only to genus were not included unless significant ecological data were given.

Class Dinophyceae
Subclass Desmophycidae
Order Prorocentrales
Family Prorocentraceae
Exuviella apora Schiller. Mesohaline. Patuxent R., rare, DCM.
Exuviella compressa (Bailey and Ostenfeld). Polyhaline. GP, rare.
Exuviella lima (Ehrenberg) Butschli. Polyhaline. GP, common, VI-67, 20-26C.
Exuviella marina Cienkowski. Polyhaline. Lower CB, 23-II - 19-IV, scarce, BCP.
Exuviella perforata Gran. CB, REG.
Oxyrrhis marina Dumardin. Polyhaline (18 ppt), Y-0, 14-XI-60, 12C, RAM, GP, rare.
Prorocentrum carteri Schiller. Mesohaline. Patuxent R., rare, DCM.
Prorocentrum micans Ehrenberg. Meso- and polyhaline (14-24 ppt), lower CB, Y-0, Y-7, I-XII, abundant 5-VII, 7-27C, RAM, BCP. GP, dominant in most samples, especially in cooler months, eurythermal. Patuxent R., autumn, frequent, DCM.
Prorocentrum minimum (Pavillard). Polyhaline. GP, often a dominant, eurythermal.
Prorocentrum redfieldi Bursa. YR, (mouth), 27-IX-63, dominant (Sarah Creek red-water bloom), 7-IX-66. Lower CB (Bridge Tunnel), 25-IX-69, VG.
Prorocentrum triangulatum Martin. Meso- and polyhaline (15-30 ppt), lower CB, Y-0, Y-7, I-IX (abundant IX), RAM, BCP.

Subclass Dinophycidae
Order Gymnodiniales
Family Gymnodinaceae
Amphidinium carteri Polyhaline. GP, rare.
Amphidinium flexum C. Herdman. Mesohaline and polyhaline. GP, rare. Patuxent R., autumn, DCM.
Amphidinium fusiforme Martin. Polyhaline (19-30 ppt), lower CB - Y-7, 3-VI (abundant) - 14-XI, XII, 16-26C, RAM, BCP.
Amphidinium operculatum Claparede and Lachmann. Polyhaline. GP, rare. CB, REG.
Amphidinium ovum C. Herdman. Polyhaline. GP, rare.
Amphidinium pellucidum C. Herdman. Polyhaline. GP, rare.
Amphidinium scissoides Lebour. CB, REG.
Amphidinium sphenoides Wulff. Polyhaline (22-24 ppt), lower CB, 19-IV (rare), I-61, RAM, BCP.
Cochlodinium chromaticum Lebour. Polyhaline. GP, rare.
Cochlodinium heterobalatum Sousa e Silva. Polyhaline. GP, Y-7-67, most abundant phytoplankter, 25-27C.
Cochlodinium schuetti Kofold and Swezy. Mesohaline. Patuxent R., rare, DCM.
Cochlodinium vincutum Kofold and Swezy. Mesohaline (14-16 ppt), lower CB 0 Y-7, 3-VI, rare, 23-25C, RAM, BCP.
Gymnodinium lunula Schutt. Mesohaline. Patuxent R., rare, DCM.
Gymnodinium punctatum Pouchet. CB, REG.

Gymnodinium pygmaeum Lebour. Polyhaline. GP, rare.


Gymnodinium subrufescens Martin. CB, REG.

Gymnodinium variabile C. Herdman. Polyhaline. GP, rare.

Gyrodinium aureolum Polyhaline. GP, rare.

Gyrodinium aureum (?)(Conrad) Schiller. Meso- and polyhaline (16-30 ppt), lower CB, 5-VII - 1-VIII (abundant), 24-27C, RAM, BCP.


Gyrodinium capsulatum Kofoid and Swezy. Polyhaline. GP, rare.


Gyrodinium lebourae Chatton. Polyhaline. GP, rare.

Gyrodinium pellucidum (Wulff). Polyhaline. GP, rare.

Gyrodinium pingue (Schutt) Kofoid and Swezy. Polyhaline. GP, a dominant in redwater, 20-25C.

Gyrodinium spirale Bergh. Meso- and polyhaline (16-24 ppt), lower CB, 26-I - 23-V, common, 21C, RAM, BCP.

Gyrodinium stratissimum Polyhaline. GP, rare.

Katodinium glaucum (Lebour). Polyhaline. GP, frequent in autumn, 4-18C.

Katodinium rotundatum (Lohman). Polyhaline. GP, 3 - 5-VI-68, cause of extensive red water, 5-27C, BCP.

Massartia (?) asymmetrica (Mass.) Schiller. Mesohaline (19 ppt), Y-7, 23-V, rare, 210C, RAM, BCP.


Family Polykrikaceae


Family Noctilucaceae

Noctiluca miliaria Suriray. CB, JJW.

Noctiluca scintillans Macartney. Polyhaline. GP, prominent, fall of 68.

Family Warnowiaceae

Nematodinium armatum (Dogiel) Kofoid and Swezy. Polyhaline. GP, present V - IX-67, 16-27C.

Warnowia panamensis Polyhaline. GP, rare.

Warnowia parva (Lohman). Polyhaline. GP, frequent, 6-26C.

Order Dinophysiales

Family Dinophysiaceae


Dinophysis acuta Ehrenberg. Polyhaline. GP, rare.

Dinophysis caudata Saville-Kent. Mesohaline. Patuxent R., rare, DCM.

Dinophysis homunculus Stein. CB, JJW.

Dinophysis lenticula Pavillard. Mesohaline. Patuxent R., rare, DCM.

Dinophysis ovoid Schutt. Mesohaline. Patuxent R., rare, DCM.

Phalachrom kofoidi C. Herdman. Polyhaline. GP, rare.

Phalachrom rotundatum (Claparede and Lachmann). CB, JJW, REG.

Order Peridiniales

Family Pyrophacaceae

Pyrophacus horologicum Stein. CB, JJW.

Pyrophacus noctiluca. CB, JJW.

Family Glenodiniaceae

Glenodinium daniculum Paulsen. Polyhaline. GP, rare.
Glenodinium foliaceum Stein. Polyhaline. GP, cause of intense local bloom, mid VIII-67, 20-26C.
Glenodinium gymnodinium Penard. Polyhaline. GP, rare.
Glenodinium spp. Polyhaline. GP, a dominant VI - VIII; most numerous form in red water, 27-VI-67, 17-26C.

Family Peridiniaceae

Diplosalis asymmetrica (Mangin). CB, rare, REG.
Diplosalis lenticula Bergh. Mesohaline. Patuxent R., rare, DCM.
Diplosalis rotundata (Lebour). Polyhaline. GP, often numerous in red water, feeds on other dinoflagellates.
Diplosalopsis orbicularis Paulsen. Polyhaline. GP, frequent, autumn 66, 2-19C.
Peridinium achromaticum Levander. Polyhaline. GP, present mid IV -11-V-67 (abundant 3rd week-IV), 12-16C.
Peridinium brevipes Paulsen. Meso- and polyhaline. Lower CB, 19-XII, rare, BCP. Patuxent R., rare, DCM.
Peridinium bulla Meunier. Mesohaline. Patuxent R., rare, DCM.
Peridinium cerasus Paulsen. CB, REG.
Peridinium conicum (Gran) Ostenfeld and Schmidt. Polyhaline. GP, 4-X - XII-66 (important mid X) late VI to 3-X-67, 8-24C.
Peridinium curvipes Jorgensen. Polyhaline. GP, 14-IX-66 to late XI-66, local dominant 4-X-66, unrecorded in 67, 7-26C.
Peridinium deficiens Meunier. Polyhaline. GP, common, VIII-IX-67, 5-25C.
Peridinium depressum Bailey. Upper CB, 26-I - 4-IV, common, BCP.
Peridinium diversicatum Meunier. Meso- and polyhaline (17-28 ppt), lower CB, 7-III and 26-VIII, rare, 2-27C, RAM, BCP.
Peridinium excentricum Paulsen. Polyhaline. GP, 8-XI-66 - 8-XII-66; abundant late XI-66, not seen in 67, 7-14C.
Peridinium faeroense Paulsen. Mesohaline. Patuxent R., rare, DCM.
Peridinium monospinum Paulsen. Polyhaline. GP, rare.
Peridinium oblongum (Aurivillius) (var. "A"). Polyhaline. GP, scarce early X to early XII, 12-20C. CB, REG.
Peridinium oblongum (Aurivillius) (var. "B"). Polyhaline. GP, present early I to early IV, abundant late I, early II-67, 3-13C.
Peridinium obtusum Karsten. Mesohaline. Patuxent R., rare, DCM.
Peridinium oceanicum Vanhoffen. Polyhaline. Lower CB, 23-V, rare, BCP.
Peridinium pallescens Ostenfeld. Polyhaline. GP, rare.
Peridinium pellucidum (Bergh) Schutt. Polyhaline. GP, frequent 12-X to early XII-66; 5-IX - early X-67, abundant 19-IX), 8-14C.
Peridinium pentagonum Gran. Meso- and polyhaline, GP, autumn 66, 67, abundant late X, 7-20C. Patuxent R., rare, DCM.
Peridinium pentagonum v. latissimum (Kofoid). Polyhaline. GP, dominant, autumn 66, 7-26C.
Peridinium perbreve Balech and Soares. Polyhaline. GP, occasional early autumn, 17-22C.
Peridinium punctulatum Paulsen. Polyhaline. GP, rare.
Peridinium pyriforme Paulsen. Mesohaline (15 ppt), Y-0, 7-III, rare, 9C, RAM.
Peridinium quinquelocorne Abe. Polyhaline. GP, in red water X-66, scarce late summer 67, 20C.
Peridinium tetranium Jorgensen. Polyhaline. GP, rare.
Peridinium subinerme Paulsen. Polyhaline. GP, mid IX - end of V (peak IV - early V), 1-2°C. CB, REG.


Peridinium tripolium (Stein). Polyhaline. Lower CB, 28-XI - 17-VI abundant 21-III - 19-IV), BCP. GP, cool months, a dominant mid XII to mid III; JR, major water bloom component 65, 66, 67, GM.


Peridinium willei Huitfeld-Daas. Mesohaline. Patuxent R., rare, DCM.

Family Gonyaulaceae

Gonyaulax alaskensis. Polyhaline. GP, rare.

Gonyaulax catenella Whedon-Kofoid. Mesohaline. Patuxent R., rare, DCM.

Gonyaulax diacantha (Meunier). Polyhaline. GP, 7-II - early VII (peak in early V), 6-25°C.

Gonyaulax "diegensis-digitale". Polyhaline. GP, most numerous encountered, peaked early XI, 12-27°C. 28-VII-70, abundant, VG.

Gonyaulax digitale (Pouchet) Kofoid. Mesohaline. Patuxent R., autumn, DCM.

Gonyaulax monocantha Pavillard. Polyhaline. GP, a dominant late V, abundant 1-VIII-67, 19-27C.


Gonyaulax polyzona Stein. Meso- and polyhaline. GP, abundant mid IV-X, early V, by Ware River, dominant in red water bloom, 66, 23-26°C. Patuxent R., rare, DCM.

Gonyaulax Scrippsae Kofoid. Mesohaline. Patuxent R., rare, DCM.

Gonyaulax spinifera (Claparede de and Lachmann). Meso- and polyhaline. GP, scarce, eurythermal. Lower CB, 26-I - 7-III, scarce, BCP. 10-III-64, common, HGM. Patuxent R., rare, DCM.

Gonyaulax triacantha Jorgensen. Polyhaline. GP, rare.

Gonyaulax unicorns Lesueur. Mesohaline. Patuxent R., rare, DCM.

Family Protoceratiaceae


Family Ceratiaceae

Ceratium arcticum (Ehrenberg) Cleve. Meso- to euhaline (16-35 ppt), lower CB, 3-27°C, RAM.

Ceratium furca (Ehrenberg) Cleve. Meso- to euhaline (16-35 ppt), lower CB, a dominant in fall blooms, eurythermal, RAM. GP, present all year, often important. Most abundant at mouth of Potomac, VII-16, RPC. Patuxent R., abundant summer, DCM.

Ceratium fusus (Ehrenberg) Dujardin. Meso- to euhaline (14-35 ppt), lower CB, abundant III - V-60, eurythermal, RAM. Patuxent R., rare, DCM.

Ceratium hirundinella (O. F. Muller) Bergh. CB, REG.

Ceratium hirundinella (O. F. Muller) Bergh. CB, REG.

Ceratium lineatum (Ehrenberg) Cleve. Polyhaline (16-35 ppt). GP, abundant mid IV-67, 14-17°C.


Ceratium massilense (Gourret) Jorgensen. Meso- to euhaline (16-33 ppt), lower CB, 16-27°C, RAM.

Ceratium trioceros (Ehrenberg) Kofoid. Meso- to euhaline (21-33 ppt), lower CB, 16-27°C, RAM.

References Cited


General References


Plant Divisions Chlorophyta

Phaeophyta, Rhodophyta, and Cyanophyta

Franklyn D. Ott

In the compilation which follows the names of the above plant divisions have been taken from Bold (1967). Other taxa, down to and including family, have been drawn, with a single minor exception, from Papenfuss (1955). In the division Cyanophycophyta no attempt has been made to relegate to synonymy the algal names as determined by the classical, standard works with those names recently proposed by Drouet and Daily (1965) and Drouet (1968), nor does it seem desirable to do so in view of the fact that these authors have not given detailed opinions for their reduction of literally thousands of taxa to less than 20 genera. By not attempting to relegate to synonymy taxa which have been determined by two completely different points of view, several algae have been entered into this compilation under two different names. This situation is, however, compatible with the basic aim of this compilation, namely a summation of the algal taxa reported for the area. A monograph on these algae is being prepared by Dr. Harold J. Humm and this should clarify some of the taxonomy.

With few exceptions, in the present state of our knowledge there is insufficient information to cogently indicate, for the area under study, the seasonal periodicity of the algal flora. Where the periodicity is known with some degree of assurance, it is indicated in parentheses following the geographical distribution citations.

The following abbreviations are used: CB-Chesapeake Bay, ES-Eastern Shore, GP-Gloucester Point, and YR-York River. Since an attempt has been made to avoid duplication, many literature records are not included.

DIVISION CHLOROPHYTA

Class Chlorophyceae Kützing

Order Zygmematales Borge et Pascher

Family Zygmemataceae (Meneghini) Kützing orth. mut. Engler

Spirogyra sp.

Fide: Griffith (1961), CB, sine locus, Leg. R. C. Whaley. (A typical fresh-water alga, no active dividing populations will be found in the higher salinities; it should be encountered only in slightly brackish areas.)

Family Desmidiaeae Kützing ex Halja orth. mut. Stizenberger

Closterium gracile Brébisson

Fide: GENERAL: As for Spirogyra sp.

Staurastrum sp.

Fide: GENERAL: As for Spirogyra sp.

Order Ulotrichales Borzi

Family Ulotrichaceae Kützing orth. mut. Rabenhorst

Ulothrix sp.


Ulothrix flaccida (Dillwyn) Thuret

Fide: VIRGINIA: VIMS in Herbarium: Leg. H. J. Humm, York River (GP) and throughout the immediate general area.

Ulothrix flaccida (Dillwyn) Thuret


Ulothrix subflaccida Wille

Fide:

Family Chaetophoraceae Harvey orth. mut. Stizenberger

Entocladia viridis Reinke

Fide:
VIRGINIA: VIMS in Herbarium: Leg. H. J. Humm, on Grinnellia americana from the northern end of Willoughby Spit near Hampton Roads.

Entocladia wittrockii Wille

Fide:
VIRGINIA: VIMS in Herbarium: Leg. J. Vogel et H. J. Humm, on Fucus vesiculosus from salt marshes along Hummock Channel, Wachapreague, ES.

Protodermia marinum Reinke

Fide:

Pseudodendroclonium marinum (Reinke) Aleem et Schulz

Fide:
MARYLAND: Mathieson and Fuller (1969), abandoned Cedar Point Light House, beach between Cedar Point and Point No Point south of Patuxent River mouth.

Family Monostromaceae Kunieda ex Suneson

Monostroma leptodermum Kjellman

Fide:
(abundant summer and autumn)

Monostroma oxyaspernum (Kützing) Doty

Fide:

MARYLAND: Mathieson and Fuller (1969), shore of Patuxent River on rocks of retaining wall of Naval Base Property. (abundant summer and autumn)

Monostroma sp.

Fide:
VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague, ES.

Family Ulvaceae Lamouroux orth. mut. Dumortier

Enteromorpha clathrata (Roth) J. Agardh

Fide:

Enteromorpha compressa (Linnaeus) Greville

Fide:
VIRGINIA: VIMS in Herbarium: Leg. M. Lynch, YR (GP); Leg. B. L. Wulff, YR (Yorktown). Mangum, Santos and Rhodes (1968), YR (Sandy Point).


Enteromorpha erecta (Lyngbye) J. Agardh

Fide:
VIRGINIA: Wulff (1967), YR (GP). Mangum, Santos and Rhodes (1968), YR (Sandy Point).

Enteromorpha intestinalis (Linnaeus) Link

Fide:

MARYLAND: Wulff et al (1968), jetty, Ocean City; Mathieson and Fuller (1969), 13 locations in Patuxent River, and CB. (perennial).

Enteromorpha lingulata J. G. Agardh

Fide:

Enteromorpha linza (Linnaeus) J. Agardh

Fide:
MARYLAND: Wulff et al (1968), jetty, Ocean City. (perennial)

Enteromorpha marginata J. Agardh

Fide:


Enteromorpha micrococca Kützing

Fide:


Enteromorpha minima Nägeli

Fide:


Enteromorpha plumosa Kützing

Fide:

VIRGINIA: Marsh (1970), YR (Mumford Is.); Rhodes (1970), Burton's Bay near Wachapreague, ES.

Enteromorpha prolifera (Müller) J. Agardh

Fide:


MARYLAND: Wulff et al (1968), jetty at Ocean City, Mathieson and Fuller (1969), Patuxent R., mouth at Drum Point, shore at Naval Base. (probably perennial)

Percursaria percurسا (C. Agardh) J. Agardh

Fide:


Ulva lactuca Linnaeus

Fide:


Ulva lactuca Linnaeus var. latissima (Linnaeus) de Candolle

Fide:


Ulva lactuca Linnaeus var. rigida (C. Agardh) Le Jolis

Fide:


Order Chlorococcales Marchand orth. mut. et emend. Pascher

Family Clorococcales (Wille) Brunnthaler

Chlorella sp.

Fide:

MARYLAND: Morse (1957), mouth of Patuxent R.

Family Gonontiaceae Bornet et Flahault ex De Toni

Gomontia polyrhiza (Lagerheim) Bornet et Flahault

Fide:


Family Hydrodictyaceae (S. F. Gray) Dumortier orth. mut. Cohn

Pediastrum boryanum (Turpin) Meneghini (Genus mainly freshwater). Daniel (1961), CB, sine locus, Leg. R. C. Whaley. (as with Spirogyra)

Pediastrum duplex Meyen

Fide:

GENERAL: Griffith (1961), CB, sine locus, Leg. R. C. Whaley. (as above).

Pediastrum simplex Meyen

Fide:

GENERAL: Griffith (1961), CB, sine locus, Leg. R. C. Whaley. (as above).
Family Scenedesmaceae Oltmanns (Members mainly freshwater).

Actinastrum sp.
Fide: Griffith (1951), CB, sine locus, Leg. R. C. Whaley. (as above)

Scenedesmus acuminatus (Lagerheim) Chodat
Fide: Griffith (1951), CB, sine locus, Leg. R. C. Whaley. (as above)

Scenedesmus opaliensis P. Richter
Fide: Griffith (1951), CB, sine locus, Leg. R. C. Whaley. (as above)


Order Cladophorales West

Family Cladophoraceae (Hassell) Cohn

Chaetomorpha aerea (Dillwyn) Kützing
Fide: Wulff et al (1968), jetty, Ocean City.

Chaetomorpha linum (Müller) Kützing
Fide: VIMS in Herbarium: Leg. H. J. Humm, YR (Guinea Marshes);
Leg. B. L. Wulff, YR (off Wormley Creek), Marsh (1970);
YR (Mumfort Is.)

Cladophora albida (Hudson) Kützing
Fide: VIMS in Herbarium: Leg. H. J. Humm, YR (Guinea Marshes);
Leg. B. L. Wulff, YR (off Wormley Creek), Marsh (1970);
YR (Mumfort Is.)

Cladophora gracilis (Griffith ex Harvey) Kützing
Fide: VIMS in Herbarium: Leg. H. J. Humm, Hampton Roads, Norfolk;
Leg. M. Wass, YR (GP)

Cladophora flexuosa (Dillwyn) Harvey
Fide: VIMS in Herbarium: Leg. H. J. Humm, Hampton Roads, Norfolk;
Leg. M. Wass, YR (GP)

Rhizoclonium kockianum Kützing

Rhizoclonium riparium (Roth) Harvey
MARYLAND: Mathieson and Fuller (1969), pilings at Ches. Biol. Lab. boathouse
Rhizoclonium tortuosum Kützing

Fide: VIRGINIA: VIMS in Herbarium: Leg. H. J. Humm, Hummock Channel at Wachapreague

Order Siphonales Wille in Warming orth. mut. Blackman et Tansley
Family Bryopsidaceae Bory de Saint-Vincent orth. mut. De Toni

Bryopsis hypnoides Lamouroux

Fide: VIRGINIA: Zaneveld and Barnes (1965), lower CB. Zaneveld (1966-67), sine locus. Mangum, Santos and Rhodes (1968), YR (Sandy Point.)
MARYLAND: Zaneveld (1966-67), sine locus. (reported abundant in summer but also abundant in winter)

Bryopsis plumosa (Hudson) C. Agardh

MARYLAND: Zaneveld (1966-67), sine locus, (perennial)

DIVISION PHAEOPHYTA

Class Phaeophyceae De Bary
Order Ectocarpales Setchell et Gardner
Family Ectocarpaceae (C. Agardh) Kützing orth. mut. Harvey

Ectocarpus confervoides (Roth) Le Jolis

MARYLAND: Zaneveld (1966-67), sine locus. (abundant during colder months)

Ectocarpus elachistaeformis Heydrich


Ectocarpus penicillus (C. Agardh) Kjellman

Fide: VIRGINIA: Mangum, Santos and Rhodes (1968), YR (Sandy Point)

Ectocarpus siliculosus (Dillwyn) Lyngbye

Fide: VIRGINIA: VIMS in Herbarium: Leg. M. Wass, YR (Sandy Point). Rhodes (1970), Burton's Bay near Wachapreague, ES. (very abundant during colder months)

Giffordia duchassaigniana (Grunow) Taylor


Pylaiella littoralis (Linnaeus) Kjellman

Fide: VIRGINIA: Zaneveld (1966-67), sine locus; Mangum, Santos and Rhodes (1968), YR, (Sandy Point).

Order Sphacelariales Oltmanns
Family Sphacelariaceae J. Agardh orth. mut. Cohn

Sphacelaria fusca (Hudson) C. Agardh

Fide: MARYLAND: Mathieson and Fuller (1969), Patuxent R. 200 yards west of Broomes Island.

Order Dictyotales Kjellman
Family Dictyotaceae Lamouroux orth. mut. Dumortier

Dictyota dichotoma (Hudson) Lamouroux

Wachapreague, ES. (abundant during warmer months)

Order Chordariales Setchell et Gardner
Family Myrionemataceae (Nägeli) Poslue orth. mut. Skottsberg
Ascococcus orbicularis Magnus
Fide:
Mangum, Santos and Rhodes (1968), YR (Sandy Point).

Myrionema stragulans Greville
Fide:
VIRGINIA: Mangum, Santos and Rhodes (1968), YR (Sandy Point).

Family Elachistaceae Kjellman
Elachistea facicola (Velley) Areschoug
Fide:
VIRGINIA: VIMS in Herbarium: Leg. J. L. Wood, on Fucus vesiculosus, collected ca. 60 miles offshore from the mouth of the CB.

Elachistea sp.
Fide:
VIRGINIA: Marsh (1970), YR (Mumfort Is.).

Family Corynophlaeaceae Oltmanns
Leathesia difformis (Linnaeus) Areschoug
Fide:
VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague, ES. (abundant late spring and early summer on Atlantic Coast)

Family Spermatochnaceae Kjellman
Stilophora rhizodes (Ehrhart) J. Agardh
Fide:

Order Dictyosiphonales Setchell et Gardner
Family Striariaceae Kjellman
Striaria attenuata (C. Agardh) Greville
Fide:
VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague. (abundant during spring)

Family Myriotrichiaceae Kjellman
Myriotrichia subcorymbosa (Farlow emend. Holden) Blomquist
Fide:

Family Punctariaceae (Thuret) Kjellman
Desmotrichum undulatum (J. Agardh) Reinke
Fide:
VIRGINIA: Mangum, Santos and Rhodes (1968), YR (Sandy Point). Rhodes (1970), Burton's Bay near Wachapreague. (abundant during the colder months)

Petalaniona fascia (G. F. Müller) Kuntze
Fide:
MARYLAND: Wulff et al (1968), jetty, Ocean City. (abundant during colder months on Atlantic Coast)

Punctaria latifolia Greville
Fide:
VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague. (very abundant during winter months)

Punctaria plantaginacea (Roth) Greville
Fide:
VIRGINIA: Zaneveld and Barnes (1965), lower CB.
MARYLAND: Zaneveld (1966-67), sine locus. (abundant during warmer months)

Family Scytosiphonaceae (Thuret) Hauck
Scytosiphon lomenatarius (Lyngbye) C. Agardh
Fide:
MARYLAND: Wulff et al (1968), jetty, Ocean City. (very abundant during colder months)
Family Dictyosiphonaceae Kützing orth. mut. Kjellman

Dictyosiphon foeniculaceus (Hudson) Greville

Fide:

VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague, ES.

Order Fucales Kylin
Family Fucales Lamouroux orth. mut. Dumortier

Fucus vesiculosus Linnaeus

Fide:

VIRGINIA: VIMS in Herbarium: Leg. J. Vogel, Haven Beach, just south of Milford Haven facing CB. Rhodes (1970), Burton's Bay near Wachapreague, ES.

MARYLAND: Wulff et al (1968), jetty, Ocean City. (perennial)

Fucus vesiculosus Linnaeus var. sphaerocarpus J. Agardh

Fide:


Ascophyllum nodosum (Linnaeus) Le Jollis

Fide:

MARYLAND: VIMS in Herbarium: Leg. J. K. Lowry and B. H. Robison, found attached to the north jetty, Ocean City.

Family Sargassaceae (Decaisne) Kützing orth. mut. De Toni

Sargassum natans (Linnaeus) J. Meyen

Fide:


Sargassum hystrix J. Agardh var. buxifolium (Chauvin) J. Agardh

Fide:


DIVISION RHODOPHYTA

Class Rhodophyceae Ruprecht

Order Goniotrichales Skuja

Family Goniotrichaceae Skuja

Goniotrichum alsidii (Zanardini) Howe

Fide:

VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague, ES.

MARYLAND: Wulff et al (1968), jetty, Ocean City. (summer)

Order Bangiales Engler

Family Erythropeltidaceae Skuja

Erythrocladia subintegra Rosenvinge

Fide:


Erythrotrichia rhizoides Cleland

Fide:

VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague, ES. (summer)

Family Bangiaceae (S. F. Gray) Någeli

Bangia ciliaris Carmichael

Fide:


Bangia fuscopurpurea (Dillwyn) Lyngbye

Fide:

VIRGINIA: Zaneveld and Barnes (1965), lower CB. Wulff (1967), YR (GP)

MARYLAND: Wulff et al (1968), jetty, Ocean City. (most abundant in spring and autumn)

Porphyra leucostricta Thuret

Fide:


MARYLAND: Wulff et al (1968), jetty, Ocean City. (abundant colder months)
Porphyra miniata (Lyngbye) C. Agardh
Fide:
VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague, ES.

Porphyra umbilicalis (Linnaeus) J. Agardh
Fide:

Order Nemalionales Schmitz in Engler
Family Acrochaetiacaeae Fritsch
Acrochaetium alyconidii Jao
Fide:
VIRGINIA: VIMS in Herbarium: Leg. K. M. S. Aziz, YR (GP)

Acrochaetium dasyae Collins
Fide:

Acrochaetium flexuosum Vickers
Fide:
MARYLAND: Mathieson and Fuller (1969), Patuxent R., west of Broomes Island.

Acrochaetium radiatum Jao
Fide:

Acrochaetium trifilium (Buffham) Batters emend. Aziz
Fide:
MARYLAND: Wulff et al (1968), jetty, Ocean City.

Acrochaetium virgatum (Harvey) J. Agardh
Fide:

Acrochaetium virgatum (Harvey) J. Agardh forma luxurians (J. Agardh) Collins
Fide:

Acrochaetium spp.
Fide:
MARYLAND: Wulff et al (1968), jetty, Ocean City

Family Helminthocladiaceae
Nemalion multifidum (Weber et Mohr) J. Agardh
Fide:

Family Bonnemaisonlcaeae
Asparagopsis hamifera (Harlot) Okamura
Fide:
It has been established that the two independently described algae, Asparagopsis hamifera and Trailliella intricata, are respectively the gametophytic and tetrasporophytic plants of an alga having a heteromorphic alternation of generations. While the gametophytic Asparagopsis hamifera has not been recorded for the geographical area under study, the tetrasporophytic Trailliella intricata has been found. This plant has been entered in this compilation under the Ceramiaceae where it was assigned prior to the establishment of its relationship with Asparagopsis hamifera.

Order Gelidiales Kylin
Family Gelidiaceae
Gelidium crinale (Turner) Lamoureux
Fide:

Order CRYPTONEMIALES SCHMITZ IN ENGIER
Family Corallinacea (Lamouroux) Harvey
Fosliella farinosa (Lamoureux) Howe
Fide:

Fosliella lejolisi (Rosanoff) Howe
Fide:
VIRGINIA: Marsh (1970), YR (Mumfort Is.)

Order Gigartiniales Schmitz in Engler
Family Solieriaceae (Harvey) Hauck
Agardhiella tenera (J. Agardh) Schmitz
Fide:
MARYLAND: Zaneveld (1966-67), sine locus. (abundant, especially in winter)

Family Hypneaceae J. Agardh
Hypnea musciformis (Wulfen) Lamoureux
Fide:
VIRGINIA: VIMS in Herbarium: Leg. H. J. Humm, YR (Yorktown), Rhodes (1970), Burton's Bay near Wachapreague, ES.
MARYLAND: Zaneveld (1966-67), sine locus. (summer)

Family Gracilariaceae (Nägell) Kylin
Gracilaria foliifera (Forskal) Særgesen
Fide:
VIRGINIA: Zaneveld and Barnes (1965), lower CB. Mangum, Santos and Rhodes (1968), YR (Sandy Point). Rhodes (1970), Burton's Bay near Wachapreague, ES.
MARYLAND: Wulff et al (1958), Jetty, Ocean City. (perennial)
Gracilaria verrucosa (Hudson) Papenfuss
Fide:
VIRGINIA: Zaneveld and Barnes (1965), lower CB; Zaneveld (1966-67), sine locus; Mathieson and Fuller (1969), Mobjack Bay off Guinea Marsh, Gwynn Is. 300 yards inshore of #1 beacon; Rhodes (1970), Burton's Bay near Wachapreague, ES.
MARYLAND: Zaneveld (1966-67), sine locus; Mathieson and Fuller (1969), 16 locations in Patuxent R., and CB. (perennial)

Family Gigartinaceae Bory de Saint-Vincent orth. mut. Cohn
Chondrus crispus Stackhouse
Fide:

Order Rhodymeniales Schmitz in Engler
Family Champiaceae Kützing orth. mut. Bliding
Champia parvula (C. Agardh) Harvey
Fide:
MARYLAND: Mathieson and Fuller (1969), 5 locations in Patuxent R. and CB. (abundant during the warmer months)
Lomentaria baileyana (Harvey) Parlow
Fide: VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague. (abundant during warmer months)

Order Ceramiales Oltmanns
Family Ceramiaceae (S. F. Gray) Harvey orth. mut. Rabenhorst
Antithamnion cruciatum (C. Agardh) Nageli
Fide: VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague, ES.

Callithamnion baileyi Arnott

Callithamnion byssoides Arnott

Callithamnion corymbosum (Smith) C. Agardh

Ceramium diaphanum (Lightfoot) Roth

Ceramium fastigiatum (Roth) Harvey

Ceramium rubriforme C. Agardh

Ceramium rubrum (Hudson) C. Agardh

Ceramium strictum (Kützing) Harvey

Griffithsia tenuis C. Agardh

Spyridia filamentososa (Wulfen) Harvey

MARYLAND: Mathieson and Fuller (1969), 7 locations in mid-CB area. (spring and summer)

Trailliella intricata (J. Agardh) Batters
Fide: MARYLAND: Mathieson and Fuller (1969), 6 locations in the mid-CB area.
Family Dasyaceae Kützing orth. mut. Rosenberg  
Dasya pedicellata (C. Agardh) C. Agardh  
Fide:  
MARYLAND: Mathieson and Fuller (1969), 7 locations in mid-CB area. (most abundant early spring)

Family Delesseriaceae Bory de Saint-Vincent orth. mut. Nägeli  
Caloglossa leprieurii (Montagne) J. Agardh  
Fide:  
MARYLAND: Post (1968), at eastern shore of mouth of St. Leonard Creek near Solomon's Is., Leg. G. Papenfuss. (perennial)

Grinnellia americana (C. Agardh) Harvey  
Fide:  

Family Rhodomelaceae (J. Agardh) Harvey  
Bostrychia radicans Montagne  
Fide:  
VIRGINIA: Post (1968), James R. on shore of Mulberry Is. above Nells Creek, Leg. R. Patrick (as Bostrychia rivularis); on the sea wall ca. 1/4 mile above the YR Bridge at Yorktown, Leg. H. J. Humm; James R. at Cobham's Wharf, Leg. J. C. Strickland; Old Plantation Creek ca. 2 miles south of Cape Charles, Leg. H. G. Richards.  
MARYLAND: Post (1968), at Eastern Shore of mouth of St. Leonard Creek, near Solomon's Is., Leg. G. Papenfuss (as Bostrychia radicans forma moniliforme); at Patuxent R. opposite Solomon's Is. Bridge, Leg. G. Papenfuss. (perennial but well developed in late spring)

Bostrychia rivularis Harvey  
Fide:  
VIRGINIA: VIMS in Herbarium: Leg. H. J. Humm; YR (Guinea Marshes). Rhodes (1970), Burton's Bay near Wachapreague

Chondria baileyana (Montagne) Harvey  
Fide:  
VIRGINIA: VIMS in Herbarium: Leg. H. J. Humm, YR (Guinea Marshes). (late spring and summer)

Chondria sedifolia Harvey  
Fide:  
VIRGINIA: Rhodes (1970), Burton's Bay near Wachapreague. (late spring and summer)

Chondria tenuissima (Goodenough et Woodward) C. Agardh  
Fide:  

Polysiphonia denudata (Dillwyn) Kützing  
Fide:  
MARYLAND: Wulff et al (1968), jetty, Ocean City. (abundant during warmer months)

Polysiphonia harveyi Bailey  
Fide:  
Polysiphonia nigrescens (Hudson) Greville

Polysiphonia novae-angliae Taylor

Polysiphonia subtilissima Montagne

Class Cyanophyceae Sachs
Order Chroococcales Wettstein
Family Chroococcaceae Nägeli
Agmenellum quadruplicatum (Meneghini) Brébisson

Agmenellum thermale (Kützing) Drouet et Daily

Anacystis cyanea Drouet et Daily

Anacystis dimidiata (Kützing) Drouet et Daily

Anacystis marina Drouet et Daily

Anacystis montana (Lightfoot) Drouet et Daily forma montana (Lightfoot)

Chroococcus turgidus (Kützing) Nägeli

Chroococcus sp.

Fide:
MARYLAND: Morse (1947), mouth of Patuxent R.

Coccolithus elabens (Brébisson) Drouet et Daily

Fide:

Coccolithus peniocystis (Kützing) Drouet et Daily

Fide:
GENERAL: Griffith (1961), CB, sine locus.

Coccolithus stagnina Sprengel

Fide:

MARYLAND: Zaneveld (1966), sine locue.

Gomphosphaeria aponina Kützing

Fide:
MARYLAND: Drouet (1939), in brackish water; marsh pool between Chance and Dames Quarter.

Gomphosphaeria lacustris Chodat

Fide:
GENERAL: Griffith (1961), CB, sine locus.

Johannesbaptisia pellucida (Dickie) Taylor et Drouet

Fide:
MARYLAND: Drouet (1939), brackish waters: marsh pool west of Ewell on Smiths Is., marsh pool between Chance and Dames Quarter, Leg. P. W. Wolle.

Merismopedia glauca (Ehrenburg) Nägeli

Fide:
MARYLAND: Morse (1947), mouth of Patuxent R.

Family Entophysalidaceae Geitler

Entophysalis conferta Drouet et Daily

Fide:
VIRGINIA: VIMS in Herbarium: Leg. M. Wess, YR (GP). Mangum, Santos and Rhodes (1968), YR, (Sandy Point)

MARYLAND: Wulff et al (1968), jetty, Ocean City.

Entophysalis deusta (Meneghini) Drouet et Daily

Fide:


Order Hormogonales (Thuret) Marchand orth. mut. Atkinson

Family Oscillatoriaceae (S. F. Gray) Dumortier ex Kirchner

Arthospira brevis (Kützing) Drouet

Fide:
VIRGINIA: Drouet (1968), culture from YR (Yorktown), Leg. J. C. Strickland.


Hydrocoleum holdenii Tilden

Fide:

**Lyngbya aerugineo-coerulea** (Kützing) Gomont

*Fide:*

**GENERAL:** Griffith (1961), **CB**, *sine locus*.

**Lyngbya aestuarii** (Mertens) Lyngbye *in Liebm.*

*Fide:*


**Lyngbya confervoides** C. Agardh *ex* Gomont

*Fide:*

**VIRGINIA:** Zaneveld (1966), *sine locus*.


**Lyngbya gracilis** Gomont

*Fide:*

**VIRGINIA:** VIMS in Herbarium: Leg. H. J. Humm, YR (Guinea Marshes).

**Lyngbya lutea** (C. Agardh) Gomont *ex* Gomont

*Fide:*

**VIRGINIA:** Strickland (1940), in brackish and salt water habitats; from pilings of West Norfolk Bridge in Portsmouth, on stump in James R. at Cobham's Wharf. Zaneveld (1966), Leg. J. C. Strickland, on stump in James R. at Cobham's Wharf, YR (Seaford), Leg. R. W. Menzel and J. C. Strickland.

**MARYLAND:** Drouet (1939), on rocks and wet soil on shores; on banks of Nanticoke R. opposite Sand Hill Beach at Tyaskin.

**General:** Griffith (1961), CB, *sine locus*, Leg. F. Drouet. Other sites for *L. lutea* are given under Drouet's proposed name of *Oscillatoria lutea*.

**Lyngbya semiplena** (C. Agardh) J. Agardh

*Fide:*

**VIRGINIA:** Zaneveld (1966), from sites at Chincoteague Is., Wachapreague Va. Beach, Norfolk, Chesapeake, Cape Charles, and YR (Queens Creek and 5 miles above bridge).

**MARYLAND:** Drouet (1939), in marine and brackish waters. Wulff *et al* (1968), jetty, Ocean City.

**Microcoleus chthonoplastes** (Mertens) Zanardini *ex* Gomont

*Fide:*

**VIRGINIA:** VIMS in Herbarium, Leg. K. M. S. Aziz, Mobjack Bay.

**MARYLAND:** Zaneveld (1966), Rattlesnake Landing in Chincoteague Bay, Leg. J. Zaneveld, W. D. Barnes, and H. W. West.

**Microcoleus lyngbyaceus** (Kützing) Crouan

*Fide:*

**VIRGINIA:** Wulff (1967), YR (GP). Drouet (1968), Mulberry Is. in James River, Leg. R. Patrick.


**Microcoleus tenerrimus** Gomont

*Fide:*

**VIRGINIA:** VIMS in Herbarium; Leg. K. M. S. Aziz. YR (between YR Bridge and Naval Weapons Station).

**MARYLAND:** Drouet (1939), in brackish and marine waters; on pilings...
Microcoleus vaginatus (Vaucher) Gomont

**VIRGINIA:** Drouet (1968), James R. downstream from Jamestown, Leg. R. Patrick.

**MARYLAND:** Drouet (1968), Patuxent R. at Benedict, Leg. F. Drouet and C. W. Reimer, Plummers Is. in Potomac R. west of Cabin John, Leg. Drouet et al.

Oscillatoria

**VIRGINIA:** Drouet (1968), in brackish and almost fresh water; marsh pool between Chance and Dames Quarter.

**MARYLAND:** Drouet (1939), in brackish and semi-marine waters; on pilings at Wenona, puddle at old wharf at Shelltown, Leg. P. W. Wolle.

Oscillatoria laetevirens Crouan ex Gomont

**VIRGINIA:** Zaneveld (1966), west of Quee Sound, Leg. E. S. Luttrell and J. C. Strickland.

Oscillatoria lutea C. Agardh

**VIRGINIA:** Drouet (1968), on shells in James R. 4.5 miles downstream from Jamestown Is., Leg. R. Patrick, Leg. J. C. Strickland et al.

Oscillatoria margaritifera Kützing ex Gomont

**VIRGINIA:** Zaneveld (1966), west of Queens Sound, YR (Seaford), Leg. J. C. Strickland.

Oscillatoria nigro-viridis Thwaites in Harvey ex Gomont


**MARYLAND:** Drouet (1939), in marine and semi-marine waters; on pilings at Wenona.

Oscillatoria princeps Vaucher ex Gomont


**MARYLAND:** Zaneveld (1966), sine locus.

Oscillatoria retzii C. Agardh

**VIRGINIA:** Drouet (1968), on logs in James R. north of the Fort Eustis Dock, Leg. R. Patrick. (This alga is reported by Drouet to be a freshwater alga, but the above site given is definitely brackish and, thus, is here included)

Oscillatoria salinarum Collins in Collins, Holden and Setchell

**VIRGINIA:** Zaneveld (1966), west of Queen Sound, Leg. L. C. Goldstein, E. S. Luttrell and J. C. Strickland.


Oscillatoria splendida Greville ex Gomont

**VIRGINIA:** Zaneveld (1966), Portsmouth west of Great Bridge, Leg. C. M. Wilson.

**MARYLAND:** Zaneveld (1966), sine locus.
Oscillatoria submembranacea Ardissone & Strafforello
Fide:
VIRGINIA: Drouet (1968), on barnacles on a pier at Seaford, Leg. J. C. Strickland.

Oscillatoria subuliformis Thwaites in Kützing ex Gomont
Fide:

Phormidium persicinum (Reinke) Gomont
Fide:
VIRGINIA: Strickland (1940), from marine aquaria at West Point, Leg. J. W. Bailey and J. Strickland.

Phormidium retzii (C. Agardh) Gomont
Fide:
VIRGINIA: Strickland (1940), James R. at Cobham's Wharf.

Phormidium submembranaceum Gomont
Fide:

Phormidium uncinatum Gomont
Fide:

Phormidium weissi Drouet
Fide:
MARYLAND: Drouet (1939), in a brackish pool at Wenona, on Ruppia in a marsh pool between Ewell and Rhodes Point on Smiths Is., road puddle at old wharf at Shelltown, Leg. P. W. Wolle.

Porphyrosiphon notarissi (Meneghini) Kützing
Fide:

Porphyrosiphon splendidus (Greville) Drouet
Fide:
MARYLAND: Drouet (1968), Potomac R. 3 miles below mouth of Monocacy R., Leg. M. H. Hohn, Waterloo Marsh at Monte Creek, Leg. P. W. Wolle. (Drouet reports this alga as a freshwater alga, but the above given sites are probably slightly brackish)

Schizothrix arenaria (Berkeley) Gomont
Fide:

Schizothrix calicola (C. Agardh) Gomont
Fide:
Schizothrix tenerrima (Gomont) Drouet

Fide:


Spirulina major Kützing ex Gomont

Fide:

MARYLAND: Drouet (1939), brackish pool at Wenona, Cove Point, Leg. H. C. Bold.

Spirulina subsalsa Oersted ex Gomont

Fide:

VIRGINIA: Wulff (1967), YR (GP)

Spirulina subsalsa Oersted forma oceanica (Drouan) Gomont

Fide:

VIRGINIA: VIMS in Herbarium: Leg. H. J. Humm, on barnacles from a bouy in Sarah's Creek.

Spirulina tenerrima Kützing ex Gomont

Fide:

MARYLAND: Drouet (1939), in brackish and marine waters; marsh pool between Ewell and Rhodes Point on Smith Is.

Symploca atlantica Gomont

Fide:


Trichodesmium thiebautii Gomont

Fide:

VIRGINIA: VIMS in Herbarium: Leg. F. D. Ott, very abundant in the phytoplankton during August and September in the lower CB, 1970.

Family Nostocaceae Dumortier ex Engler

Anabaena inaequalis (Kützing) Bornet et Flahault

Fide:


Anabaena sphaerica Bornet et Flahault

Fide:

MARYLAND: Drouet (1939), in a brackish ditch between Wenona and Deal Is.

Anabaena torulosa (Carmichael) Lagerheim ex Bornet et Flahault

Fide:

VIRGINIA: Zaneveld (1966), south border of YR near York River Bridge.

Family Microchaetaceae Lemmermann

Nodularia harveyana (Thwaites) Thuret

Fide:

VIRGINIA: VIMS in Herbarium, Leg. K. M. S. Aziz, YR (Yorktown) MARYLAND: Drouet (1939), floating in a brackish pond at Rhodes Point on Smiths Is.

Family Rivulariaceae Kützing ex Bornet et Flahault

Dichothrix penicillata Zanardini ex Bornet et Flahault

Fide:

VIRGINIA: Zaneveld (1966), YR 15 miles downstream from the YR Bridge.

Calothrix confervicola (Roth) C. Agardh

Fide:

Calothrix crustaceae Schousboe et Thuret ex Bornet et Thuret
_Fide:_
**VIRGINIA:** Zaneveld (1966), on oyster shells on the west side of Lynnhaven Inlet, _Leg._ W. D. Barnes and H. W. West. Wulff (1967), *YR (GP).*

Calothrix pulvinata (Mertnes) C. Agardh
_Fide:_
**MARYLAND:** Drouet (1939), in marine and brackish waters; on pilings in Nanticoke R. at Sandy Hill Beach in Tyaskin, on pilings of old wharf at Shelltown, _Leg._ P. W. Wolle.

Rivularia nitida C. Agardh
_Fide:_
**MARYLAND:** Drouet (1939), in wet brackish places; on cedar stumps at head of Pocomoke Sound below Shelltown, _Leg._ P. W. Wolle.

Family Scytonemataceae Kützing ex Bornet et Flahault

Freymyella grisea (Bornet et Flahault) J. de Toni
_Fide:_
**MARYLAND:** Drouet (1939), in marine and brackish waters; on pilings of old wharf at Shelltown, _Leg._ P. W. Wolle.

Plectonema calothrichoides Gomont
_Fide:_
**VIRGINIA:** VIMS in Herbarium: _Leg._ K. M. S. Aziz, *YR (above the YR Bridge)*

Plectonema golenkinianum Gomont
_Fide:_
**MARYLAND:** Drouet (1939), in marine and brackish waters; on pilings of old wharf at Shelltown, _Leg._ P. W. Wolle.

Plectonema terebrans Bornet et Flahault
_Fide:_
**VIRGINIA:** VIMS in Herbarium: _Leg._ K. M. S. Aziz, *YR (near Yorktown)*

Family Stigeonemataceae Kirchner

Mastigocoleus testarum Bornet et Flahault
_Fide:_
**VIRGINIA:** VIMS in Herbarium: _Leg._ H. J. Humm, *YR (GP).*
References Cited


An adequate study of the fungi present in the Chesapeake Bay and its associated bodies of water has not been conducted. Scott (1962), using techniques for collecting and isolating terrestrial fungi, has made a brief survey of the phycomycetous fungi in the vicinity of Gloucester Point, Virginia. In his study, Scott (1962) apparently utilized gross cultures rather than pure cultures for the identification of the chytrids and other fungi. Several studies (Emerson, 1950; Miller, 1968; Barr, 1969; 1970) show that pure cultures of fungi, especially the chytrids, are necessary to show the range of variability before positive identifications can be made. Frequently, cultural conditions modify the morphology of fungi to the point where positive identification from prior descriptions of the organisms becomes difficult (Miller, 1968; Kazama, 1971, in press). Since the morphology of fungi may vary with cultural conditions, determinative keys designed for terrestrial fungi must be used with care. Adequate laboratory studies should be conducted before positive identifications are made, especially at the specific level.

This section does not constitute a publication and the information is subject to correction and/or revision.

DIVISION MYCOTA

Subdivision Eumycotina
Class Phycomycetes
Order Chytridiales

Family Phlyctidiaceae
Subfamily Phlyctidioideae
Rhizophydium carpophilum (Zopf) Fischer
Rhizophydium globosum (Braun) Rabenhorst
Rhizophydium pollinis-pini (Braun) Zopf
Rhizophydium sp.
Podochytrium sp.
Phlyctochytrium sp.

Subfamily Entophlyctidioideae
Diplophyctis intestina (Schenk) Schroeter

Family Rhizidiaceae
Subfamily Rhizidioideae
Rhizophlyctis hyalina (Karling) Sparrow

Family Cladochytriaceae
Cladochytrium tenue (Nowakowski) Conn
Cladochytrium crassum Hillegas

Order Saprolegniales
Family Thraustochytriaceae
Thraustochytrium globosum Kobayshi and Ookubo
Thraustochytrium motivum Goldstein

Family Saprolegniaceae
Achlya racemosa Hildebrand
Achlya sp. #1
Achlya sp. #2
Aphanomyces laevis de Bary
Aphanomyces sp.
Leptolegnia caudata de Bary

Order Lagenidiales
Family Lagenidiaceae
Lagenidium pygmaeum Zopf
Lagenidium callinectes Couch
Lagenidium sp.

Order Peronosporales
Family Pythiaceae
Pythium aferile Kanouse and Humphrey
Pythium gracile Schenk
Pythium aquatile Hohnk
Pythium sp.
Order Mucorales
  Family Mucoraceae
    Mucor sp.

Class Deuteromycetes
Order Moniliales
  Family Dematiaceae
    Alternaria maritima Suth.
    Helminthosporium halodes Drechsler
    Hormiscium sp.
    Cladosporium sp.
    Hormodendrum sp.
  Family Moniliaceae
    Monosporium maritimum Suth.
    Cephalosporium sp.
    Aspergillus sp.
    Penicillium restrictum Gilman and Abbott

Subdivision Myxomycotina
Order Labyrinthulales
  Labyrinthula vitellina Cienkowski
  Labyrinthula sp.

LIST OF SUBSTRATA AND THE FUNGI FOUND ON EACH

Achlya sp.
  Rhizophydiwm carpophillum
Nitella sp.
  Rhizophydiwm globosum
  Pythium gracile
  Diplophysctis intestina
Pine pollen
  Rhizophydiwm pollinis-pini
  Rhizophydiwm sp.
  Thraustochytrium motivum
  Pythium aflatile
  Lagenidium pygmaeum
Coscinodiscus asteromphalus and C. concinnus
  Podochytrium sp.
Cellophane bait
  Rhizophydiwm hyalina
  Pythium aquatile
  Pythium sp.
  Cladochytrium tenue
  Cladochytrium crassum
Elodea sp.
  Cladochytrium tenue
Hemp seed bait
  Achlya sp.
Snake skin bait
  Aphanomyces laevis
  Aphanomyces sp.
  Leptolegnia candata
Surirellaa splendidia
  Thraustochytrium globosum
Callinectes sapidus
  Lagenidium callinextes
Spartina alterniflora
  Phytochytium sp.
  Lagenidium sp.
  Pythium gracile
  Alternaria maritima
  Helminthosporium halodes
  Hormiscium sp.
  Cladosporium sp.
  Hormodendrum sp.
Monosporium maritimum
Cephalosporium sp.
Aspergillus sp.
Penicillium restrictum
Mucor sp.
Zostera marina
Labyrinthula vitellina
Labyrinthula sp.

REFERENCES


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This list is intended to cover only tidal waters, ponds built on tidal creeks, floodplains of tidal tributaries, the barrier islands and shores subjected to frequent storm wave flowage. Except for the Patuxent River records of Anderson (1968), it is restricted to Virginia.

This has not permitted a more comprehensive coverage and many Virginia records are not included. Of the 30 coastal counties included, 1-26 and 35-38 in Virginia Flora (Massey, 1961), most are poorly known floristically, especially in regard to wetland plants, e.g. Zostera is listed only as "Virginia in range". Massey's county records are given as the number of counties in which a species is found, e.g., 5c, unless only a few counties are included.

The flora of Virginia is now being intensively studied by the state's botanists interested in the systematics of higher plants, with the goal of producing a monograph. A great deal more field work will be needed, particularly in the middle and upper peninsulas, if the coastal area is to be covered as well as it was in the Carolinas by Radford, Ahles and Bell (1968).

The nomenclature used follows that of Radford et al (1968), which places many names listed by Massey in synonymy. For each species, the records of Massey (1961) are given first, followed by those selected from VIMS records and the works of Erlanson (1922), Harvill (1965, 1967), Anderson et al (1968), Clovis (1968), Gillespie (1970), Loetterle (1970), and Davis (1971). Arrangement is alphabetical within families. Common names have been partially coined for some species.

Numerous other papers and theses would need to be checked to compile a complete record. More important is the acquisition of precise environmental data, such as that supplied by Anderson et al (1968) for the Patuxent River marshes.

The meager, but growing involvement of VIMS in this area has been assisted by three people, most particularly by Dr. Ashton M. Harvill, Jr., of Longwood College and also by two former students of William and Mary College, Allene Barans and G. Alex Marsh. Initials preceding a reference refer to location and those following refer to the collector. The letters "pac" mean probably all counties. The numbers following a location refer to county number of Massey (1961).

Locations:  
AI - Assateague Island  
CB - Chesapeake Bay  
CI - Cedar Island  
CR - Chickahominy River  
JI - Jamestown Island  
MR - Mattaponi River  
PI - Parramore Island  
PR - Pamunkey River  
RR - Rappahannock River  
SI - Smith Island, Va.  
YR - York River  
Wm. - Williamsburg, Va.

Collectors and Authorities:  
AB - Allene Barans  
AH - A. M. Harvill, Jr.  
AM - A. B. Massey  
EE - Eileen Erlanson  
GM - G. Alex Marsh  
JC - Jesse F. Clovis  
JK - James Kerwin  
KM - Kenneth Marcellus  
LL - Lynn Loetterle  
MG - Mary Gillespie  
OD - Ole Davis  
RA - Richard Anderson
DIVISION ARTHROPHYTA

Order Equisetales
Family Equisetaceae (horsetails)
Equisetum arvense L., Common horsetail. Wet soil of marshes, stream banks and ditches, 8c, AM. Streambank, Toe Ink Wayside, common 20, MG.
Equisetum hyemale L. Scouring rush. Stream banks, limy soil. Be (as E. predealum), AM, FR, edge, Chestnut Grove Farm, 20, MG.

DIVISION PTEROPHYTA

Order Ophioglossales
Family Ophioglossaceae
Botrychium dissectum var. obliquum. (Muhl.) Clute. Grape fern. Moist soil of flood plains, 10c, AM. Chisel's Run, AM.
Botrychium virginianum (L) SW. Rattlesnake Fern. Swamps, frequent 10c, AM. Floodplain of Queens Creek drainage, 6, EE.

Order Filicales (true ferns)
Family Osmundaceae
Osmunda cinnamomea L. Cinnamon fern. Frequent in damp glens and swamps "over the state". JI, rare, L.L. PR, 20, Causiac M., scarce; CR, edge, MG. RR, 25, Drake M., scarce; pac, MW.
Osmunda regalis (Willd.) A Gray. Royal Fern. Common, freshwater marsh, damp shores and swamps, 7c, AM. JI, 19, brackish margins, common, LL. FR, common to abundant, Causiac M, 20, Sweet Hall M., 22; Hoskins C., 23, scarce; Drake M., 25, abundant; pac, MW.

Family Pteridaceae
Pteridium aquilinum (L.) Kuhn. Bracken. Smith Is., 2, swale, rare, JC; pac, MW.

Family Aspidiaceae
Athyrium filix-femina (L) Roth. Lady Fern. Swamps, wet meadows, 1, 2, AM. JI, 19, low areas near brackwater, common, LL. Moist soil, Toe Ink Wayside, 20, MG.
Theleptopteris palustris Schott. Marsh Fern. Freshwater marshes and swamps, 8c, AM. JI, 19, common near brackwater, forming beds in wet woods, LL; Longhill, 19, open swamps, EE. FR, Causiac M., 20, common; Sweet Hall M., 22, abundant; MR, 22, below Indian reservation; Hoskins C., 23, Drake M., 25; Aquia C., 35; pac except 1-3, MW.
Onoclea sensibilis L. Sensitive Fern. Marshes and swamps, 7c, AM. JI, 19, moist woods, common, LL. FR, 20, Causiac M.; GM, Sweet Hall M., 22, common, KM. Drake Marsh, 25, frequent, MW, GM.

Family Blechnaceae
Woodwardia areolata (L) Moore. Netted Chain-Fern. Moist to wet woods and swamps, 18c, AM. JI, common, LL. Wet woods near Rumley M., 20, MG.
Woodwardia virginica (L.) Smith. Virginia Chain-Fern. Bogs and swamps, 7c, AM. JI, 19, moist woods, occasional, LL.

Family Polypodiaceae
Polyopodium polypodioides (L.) Walt. Resurrection Fern. Occasional in tree crotches and on mossy banks, 5c, AM. On trunk of Platanus, floodplain of Queen's Lake, EE. FR, 20, trunk of Acer over creek, West Island Swamp, pac, rare, MW.

DIVISION CONIFEROPHYTA

Order Coniferae
Family Taxodiaceae
Taxodium distichum (L.) Richard. Bald Cypress. Swamps and shores, 10c, AM. Abundant in Dismal Swamp, James R., Chickahominy R. Dragon Run, Seashore State Park. Scarce on E. Shore, York R. PR, one tree ca 45 ft. tall in West Island Swamp, 20, few below Sweet Hall M., 22. Decreasing in most places, old trees in water indicate sea level rise or erosion.
Family Cupressaceae
Juniperus virginiana L. Red Cedar. Abundant pioneer tree. Quite salt tolerant; on all larger coastal islands and wooded "marsh islands"; fruit important to birds in winter.

DIVISION ANTHROPHYTA

Order Pandanales
Family Typhaceae
Typha angustifolia L. Narrow-leaved Cat-tail. Freshwater and oligohaline. Shallow water, often with marl. 1-4, 19, AM. Parramore I.; Starvation Pt., Cow C., 7; Croaker Landing, 19; Hoskins C., 23, Causiac M., 20, MW. JI, 19, abundant, brackish marshes. LL. Commonly found where marsh adjoins high land and freshwater seeps occur, pac MW. Md.: (Upper Patuxent R), Holland Cliffs, Magruder Landing, Lower Marlboro, RA.

Typha latifolia L. Common Cat-tail. Freshwater. JI, 19, LL. Croaker Landing, 20, Aquia Creek, 35, MW.

Family Sparganiaceae
Sparganium americanum L. Broad-fruited Bur-reed. 1, 2, as S. eurycaeruleum, AM. Mouth of Chisel's Run at Longhill Swamp, 19, EE. Upper Patuxent: Lyon's Creek, Mt. Calvert and Hill's Bridge, RA.

Family Zosteraceae
Zostera marina L. Eelgrass. Upper meso- to euhaline. Massey gave no records, but Zostera occupies perhaps 50,000 acres in subtidal shallows of Chesapeake Bay. This area is much less than formerly, since it disappeared completely ca 40 years ago from the mouth of the Eastern Shore of Va., except at Chincoteague, and is recolonizing southward only very slowly.

Family Potamogetonaceae

Potamogeton crispus L. Curly Pondweed. Limy or brackish water 15, 1937, AM. Jones' Mill Pond, 19, EE; Cheatham Annex pond, 19, MW, GAM.

Potamogeton foliosus Raf. Leafy Pondweed. Fresh, limy or brackish water, 37, AM.

Potamogeton nodosus Poiret. Longleaf Pondweed. Piscataway Creek, 23, MW, GAM.

Potamogeton perfoliatus var. bupleuroides (Fernald) Farwell. Redhead Grass. Limy or brackish water, 1, 3, 37, AM. Back Bay, 3, 1962, rare, JK.

Potamogeton pectinatus L. Sago. Pondweed. Limy or brackish water. 1-3, 38, AM. Back Bay, 3, abundant, 1962, JK.

Potamogeton pulcher Tuckerman. In muddy shores, 3, 4, AM. Causiac Marsh, 20, MW, GAM.

Family Ruppiaceae
Ruppia maritima L. Widgeon grass. Fresh to euhaline. 1-3, AM.

Parramore Is. lake, abundant, MW. Back Bay, 3, abundant, 1962, YR, 6, 7, 19, 20, 21, common upriver, MW.

Family Zannichelliaceae
Zannichellia palustris L. Horned Pondweed. Fresh or brackish water, 38, AM. Running water, Queen's Creek, 6, EE. Fox Mill Run, often most abundant aquatic plant in brackish water, MW.

Family Najadaceae
Najas flexilis (Willd.) Rosk. and Schmidt. Slender Water Nymph. Fresh or brackish water, 38, AM.

Najas guadalupensis (Speng.) Morong. Common Water Nymph. Coastal waters, 2, 19, AM. In Jones' Mill Pond, EE.

Najas sp. Back Bay, abundant, 1960-69, JK.

Order Alismales
Family Juncaginaceae
Triglochin striata R. and P. Arrow Grass. Brackish to saline, 3, AM.
Family Alismataceae


Sagittaria falcata Pursh. Falcate Arrowhead, Duck-potato. Wet shores and swamps, 3, 12, 19, AM. Beaverdam Swamp, 7, rare, MW. JI, 19, shallow brackish marshes, occasional, LL. Queen's C. tidal marshes, EE. PR, Chandlers I., 20, rare, Sweet Hall M., 22, shallow, below marsh, common; Hoskins C., 23, rare, NW.


Sagittaria latifolia Willd. Broad-leaved Arrowhead. Shallow water and peaty mud, 1, 2, 31, 38, AM. Cr, tidal swamp near Lanexa, 19, EE.

Sagittaria falcata var. pubescens (Muhl.) J. G. Smith. Sphagnum swamp, 19, EE.

Sagittaria subulata (Michx) Small. Awl-leaved Arrowhead. Fresh to brackish marshes, 8c, AM. CR, tidal swamp near Lanexa, 19, EE.

Order Hydrocharitales

Family Hydrocharitaceae

Elodea canadensis Michaux. Water-weed. Ponds and sluggish streams, 12, 19, 38, AM. Jones' Mill Pond, 19, EE. CR, Dillon's Lnds., 20, MG.

Vallisneria americana Michaux. Tapegrass. Quiet and slow moving waters, 1-3, 38, AM.

Order Graminales

Family Poaceae

Agrostis alba L. Redtop. Widely naturalized, AM. PI, 1, along trail, MW, AH.

Ammophila breviligulata Fernald. American Beach Grass. Coastal dunes and sandy beaches, 1, 2, 3, AM. New Point I, 8, MW. Extensively planted on Assateague I.

Andropogon scoparius Michaux. Little Blue Stem. AI, AH.

Cenchrus tribuloides L. Thorny sandspur. Coastal sand and dunes, 8c, AM. CI, 1; New Point Is., 7, MW. JI, 19, low dunes, occasional, LL.

Cinna arundinacea L. Stout Woodreed. Swampy areas, 9c, AM. JI, 19, open pine woods, LL; JR, and Queen's Creek, 6, tidal marshes and wooded flood plain, EE. FR, Chandler's I. 20; MR, 21, 3rd marsh on right, MW.

Arundinaria gigantea (Walter) Muhl. Giant Cane. Stream banks, swamps, seepage areas, 7c, AM. JI, 19, fairly common, thickets along edges of brackish marshes, LL. Cypress swamps south of Five Ponds, 19, EE.

Calamagrostis cinnoides (Muhl.) Barton. Sphagnum-magnolia swamps, 19, EE. Moist to wet areas, 10c, AM.

Distichlis spicata (L.) Greene. Saltgrass. Saline sands of the seashore, 2, 3, 4, 7, 10, AM. Tidal salt marshes, 19, EE. Mesic (10 ppt) to euhaline marshes near high tide level, CI.

Echinochloa crus-galli (L) Beauvios. Barnyard Grass. Weed from Europe, waste places, 11, 19, 38, AM. AL, AH, JI, 19, margins of brackish marshes, LL.

Echinochloa crus-galli (L) Beauvios. Barnyard Grass. Weed from Europe, waste places, 11, 19, 38, AM. AL, AH, JI, 19, margins of brackish marshes, LL.

Elymus virginicus L. Virginia Wild Rye. Moist soil, stream banks, 11c, AM. TI, 19, marshes, moist roadside, 6, 19, EE. JI, 19, LL. PI, 1; VIMS beach, 7; MR, 3rd marsh on right, 21, MW, AH. Md. (Patuspent R.) 5 sites, RA.

Elymus virginicus L. Virginia Wild Rye. Moist soil, stream banks, 11c, AM. TI, 19, marshes, moist roadside, 6, 19, EE. JI, 19, LL. PI, 1; VIMS beach, 7; MR, 3rd marsh on right, 21, MW, AH. Md. (Patuspent R.) 5 sites, RA.

Eragrostis spectabilis (Pursh) Steud. Purple Lovegrass. Weed in light soil, 1-3, 17, 36, 38, AM. New Point I., 8, MW, AH.

Eriophorum trianthus contortus Baldwin ex. Eil. Twisted-awn Plume Grass, Moist waste places, 7c, AM. St. Peter's Swamp, 20, MG.
Erianthus giganteus (Walter) Muhl. Giant Plume Grass. Moist soil, 2-4, 19, 37, AM. JI, 19, low marshy ground, LL. SE of Ewell, 19, sphagnum-magnolia swamp, EE.

Festuca myuros L. Mouse-tail Fescue. Introd. from Europe. Dry fields, 7c, AM. SI, 2, JC.

Festuca rubra L. Red Fescue. Moist to wet places, 3, 5, 12, 38, AM. Cedar Is., 1, New Point, 8, MW, AH.

Glyceria striata (Lam.) Hitchcock. Stipate Manna Grass. Moist soil, 1, 2, 37, AM. Beaverdam Swamp, 7, rare, MW, AH.

Hystrix patula Poiret. Bottlebrush Grass. Moist woods, 5c, AM. Beaverdam Swamp, 7, MW, AH.

Leersia oryzoides (L) Swartz. Rice Cutgrass. Wet waste places, 1-4, 18, 19, 36, AM. Chandlers Is., 20, Aquia Creek, 35, abundant in oligohaline marshes, frequent in swamps, MW.

Panicum amarulum Hitchcock and Chase. Tall Dune Grass. Sandy shores, 1-3, 16, AM. Goodwin I., 6, outer beach, rare; New Point I., 8, frequent, MW, AH.

Panicum amarum Ell. Short Dune Grass. Sand dunes and shores, 10c, AM. JI, 19, sandy field, LL. Cedar Is., 1, common; Goodwin I., 6; VIMS beach, 7, common; New Point I., abundant, MW, AH.

Panicum virgatum L. Moist ground, brackish marshes, 2, AM. ES, CI, 100,000 acres of polyhaline marsh in Va., producing up to 6 tons/acre/yr. ES, probably comprises 95% of seaside marsh vegetation. On outer side of Myrtle I. (2), in wet accreted sand; VIMS, 7, colonized much of shore sand beach; Poropotank R., dominant at mouth, frequent on banks up to freshwater; New Point I., 8, luxuriant on exposed shore behind sand drift, MW. MD: (Patuxent R.) four sites, 3-17 ppt, RA.

Phragmites communis Trin. Commonreed. This sturdy grass, rather worthless for wildlife, is slowly increasing in Va., although it is not nearly as common as in MD. Marshes, shores and seeps, 3, 4, 38, AM. ES, CI, healthy plant on sand dune; Harper's Creek, 8, small stand along ditch; Tappahannock, 23, south edge, dominates spoiled marsh, VIII-71, MW. MD: (Patuxent R.), 6 sites, RA.

Spartina alterniflora Loisel. Saltmarsh Cordgrass. Coastal plain, salt marshes, 12c, AM. May dominate 100,000 acres of polyhaline marsh in VA., producing up to 6 tons/acre/yr. ES, probably comprises 95% of seaside marsh vegetation. On outer side of Myrtle I. (2), in wet accreted sand; VIMS, 7, colonized much of shore sand beach; Poropotank R., dominant at mouth, frequent on banks up to freshwater; New Point I., 8, luxuriant on exposed shore behind sand drift, MW. MD: (Patuxent R.) four sites, 3-17 ppt, RA.

Spartina cynosuroides (L.) Roth. Big Cordgrass. Forming dense stands in shallow marshes. Usually below 10 ppt and at MHW level. Decreased greatly in recent decades in nursery grounds sectors of rivers. Goodwin I., 6, rare, YR above bridge, some lush stands. Fox Mill Run, Beaverdam Swamp, 7, dense growth in oligohaline sectors. JI, 19, abundant, LL. Hoskins C., Piscataway C., 23, luxuriant growth in lower ends, much destroyed by recent fill in Hoskins C., MW. MD: (Patuxent R.) same sites as for S. alterniflora, 3-17 ppt, RA.
Spartina patens (M. A. Curtis) Fern. Saltmeadow Hay. Salt marshes, 10, AM. Dominant plant of high salt marsh, also on sandy shores, low dunes and swales of islands. ES, 1, 2, abundant on leeside of barrier islands, creek shores and in the Saxis marshes. Slows shore erosion of many counties bordering lower CB. Md.: (Patuxent R.), Benedict and Holland Cliffs, 10-17 ppt, RA.

Trisetum pennsylvanicum (L) Beauvois ex. R. & S. Three-bristle. Swamps, 4, 6, 36, AM. Open swamps, 6, common, EE. Beaverdam Swamp, 7, common; Causiac M., 20, MW, AH. Lanexa, 20, moist meadow, LL.

Zizania aquatica L. Wild Rice. Shallow water along streams and marshes, 7c, AM. Wild rice is now largely harvested by blackbirds in midsummer. Poropotank R., 7, 21, common; Whiterose, lake 2½ m. N., 10; Blackstump C., 19; PR, 22, Sweet Hall M.; MW, 22, below reservation; Hoskins Creek, 23, common, MW. Jl.1, 19, shallow brackish marsh, LL. Md.: (Upper Patuxent R.), 3 sites, freshwater, much decreased, RA.


Family Cyperaceae

Carex alata Torrey. Winged Sedge. Marshes and lowgrounds, 1-3 19, AM. Jl.1, 19, brackish marshes, LL; flood plains, EE.


Carex Baileyi Britton. Bailey's Sedge. Swamps, 4, 13, 19, 38, AM. Beaverdam Swamp, 7, rare, MW, AH.

Carex Blanda Dewey. Smooth Sedge. Lowgrounds, 13, 36-38, AM.

Lanexa, 20, moist meadow, MG.

Carex Bromoides Schkuhr. Oat Sedge. Swamps, moist woods, 15, 19 38, AM. Five Forks, 19, south in wooded floodplain, EE.

CR, 20, moist edge, MG.

Carex comosa Boott. Long-haired Sedge. Swamps, 4, 19, 38, AM.

Md.: (Upper Patuxent R.), Lyons C., Mt. Calvert, RA.

Carex Crinita Lam. Bearded Sedge. Lowground, swamps, 19, AM.

Wmgb., 19, sphagnum swamps, EE. Lanexa 20, moist meadow, MG. Lnexa, 20, Hoskins Creek. LM. MD, 20; Hoskins Creek, 23, MW, AH.

Carex decomposita Muhl. Swamp along College Creek, EE. Swamps, 13, 14, 19, AM.

Carex festucacea Schkuhr. Stalked Sedge. Wet woods, 4, 5, 19, AM. Beaverdam Swamp, 7, MW, AH.

Carex Glaucesens Ell. Sedge. Wet soil and shallow water, 3, 4, 13, 16, AM.

Carex granularis Muhl ex Schkuhr. Lowgrounds, 38, AM.

Beaverdam Swamp, 7, MW, AH.

Carex howei Mackenzie. Howe's Sedge. Swamps and wet thickets (no record). AM. Chisol's Run, 19, wooded swamp, EE: Ware Creek, southside, MG.

Carex hyalinolepis Steudel. Clear-scale Sedge. Shores and swamps, 15, AM. Beaverdam Swamp, 7; Drake Marsh, 25, MW, AH.

Carex inconspersa Bicknell. Bog Sedge. Swamps, pesty places, 19, AM. PR, 20, south of Cook landing, edge of lake, MG.

Carex Intumescens Rudge. Wet soil, 19, 38, AM. SE of Ewell, 19, sphagnum swamp, EE.

Carex *lacustris* Willd. Lake Sedge. Shallow water, swamps, 3, 38, AM. JI, 19, brackish margins, LL.


*Carex longii* Mackenzie. Long's Sedge. Wet soil, 1-3, AM. JI, 19, Roadside gully, MG.


*Carex lurida* Wahlenberg. Pale Sedge. Swamps, 2, 4, 13, 19, 30, AM. Beaverdam Swamp, 7, MW, AH. Wmbg. 19, along streams, common, EE; JI, wet pond bank, LL. Lanexa, 20, moist meadow, MG. Hoskins C., 23, MW, AH. Md.: (upper Patuxent), 3 sites, RA.

*Carex mitchelliana* (M. A. Curtis) Gleason. Wet soil, low-grounds and swamps, 6, 14, 19, AM.


*Carex projecta* Mackenzie. Wet places, 36, AM. Beaverdam Swamp, 7, MW, AH.

*Carex reniformis* (Bailey) Small. Swamps, 13, AM. Beaverdam Swamp, MW, AH.

*Carex rosea* Schkuhr. Hoary Sedge. Woodlands, 3, 19, 36-38, AM. Beaverdam Swamp, 7, MW, AH. Lanexa, 20, moist meadow, MG.

*Carex scoparia* Schkuhr. Dry soil (all other authors say swamps, etc.), 12, 19, 36, 38, AM. Wmbg., open swamps, common, EE.

*Carex seorsa* Howe. Wet woods, 3, 13, 38, AM. Beaverdam Swamp, 7, MW, AH.


*Carex stricta* Lam. Bunch Sedge. Wet soil and swamps, 1, 2, 36, 38, AM. Lanexa 20, moist meadow, MG.

*Carex typhina* Michaux. Cattail Sedge. Low grounds 13, 17, 38, AM. JI, 19, shallow water in woods, MG.

*Carex venusta* Dew. Charming Sedge. Boggy places, 13, 17, AM. CR, 20, edge, MG.

*Carex vulpinoidea* Michaux. Fox Sedge. Moist low grounds, 12, 13, 38, AM. CI, 1; PI, 2; Beaverdam Swamp, 7, MW, AH. Wmbg., open swamps, EE.

*Cladium jamaicense* Grantz. Saw Grass. Shallow water, low wet soil, 1-4, AM.

*Cyperus dentatus* Torrey. Nutgrass. Wet shores and depressions, 3, AM.

*Cyperus engelmanni* Steudel. Moist low grounds, 2, AM. Aqua C., 35, marsh by creek mouth, MW, AH.


*Cyperus esculentus* L. Edible Nutgrass. Noxious weed, AM. Hoskins C., 23, on dike, MW, AH.

*Cyperus filicinus* Vahl. Coastal marshes, wet sand, 1-3, 5, 7, 19, AM.

*Cyperus filiculmis* Vahl. Dry soil, 3, 9, 13, 20, 38, AM. New Point I., 8, MW, AH.

*Cyperus flavescens* L. Pale-yellow Sedge. 1-3, 9, 19, 38, AM. Wmbg., 19, railway ditch, EE.

*Cyperus grayii* Torrey. Dry sandy places, 1-3, 12-14, AM. New Point I., 8, MW, AH. JI, 19, on sandy bank with *Opuntia humifusa*, LL.
Cyperus lancastriensis Porter. Moist woods, 2, 4, 37, 38, AM. CR, 20, edge, Rte. 609 crossing, MG.
Cyperus odoratus L. Scented Sedge. Moist wet soil, 3, AM. CR (Carter's Creek), 6, swamp; Jones' Mill Pond, EE (as C. perax). Rte. 627 railway crossing, 20, MG.
Cyperus ovularis (Michaux) Torrey. Oval Sedge. Moist woods, 5c, AM. JI, 19, wet clay, LL.

Cyperus pseudoejectus Steudel. Green Sedge. Wet soil, 1, 2, 19, 38, AM (as E. virens). Wmg., 19, moist roadside, EE.

Cyperus retrorsus Chapman. Reflexed Sedge. In clearings, 1-4, 13, 19, 38, AM. New Point I., 8, Hoskins C., 23, dredge spoil, common, MW, AH.

Cyperus rivularis Kunth. Brook Sedge. Wet Places, 1-3, AM. Wmbg., 19, railway ditch, EE.

Cyperus rotundus L. Round Sedge. Fields and waysides, 4, 5, 38, AM. CI, 1; New Point I., 8, MW, AH.

Cyperus striatus L. Skinny Sedge. Common weed in wet areas. Hoskins C., 23, peat dike, MW, AH.

Dichromena colorata (L.) Hitchcock. White-topped Rush. Shores and marshes, 3, 7, 19, AM. College Creek, 19, swamp, EE.


Eleocharis albida Torrey. White Spike-rush. Moist soil, 2, 3, 15, 23, AM. AI, 1, AH.

Eleocharis compressa Sullivan. Shores and marshes. NE Virginia, AM. Chandler's I., 20, MW, AH.

Eleocharis engelmanni Steudel. Marshes, 6, 15, 19, 38, AM. JI, standing water along road, LL.

Eleocharis fallax Weatherby. Wet shores and marshes, 3, 4, AM (E. ambiguens). JH, 19, brackish marshes and shores, LL.

Eleocharis obtusa (Willd.) Schultes. Blunt Spike-rush. Wet soil, 1, 10, 13, 19, 36-38, AM. Lake shore, 20, MG.


Eleocharis parvula (K. & S.) Link. Dwarf Spike-rush. Saline shores, 1-3, 12, AM. Starvation Pt., Beaverdam Swamp (lower end), 7, common; Megges Bay, mud flat, 9, MW, AB. VA, 6, Carters Creek, mud of salt marsh, EE.


Eleocharis tuberculosa (Michaux) R. & S. Swamps, wet places, 2-4, 19, 38, AM.

Fimbristylis spadicea (L.) Vahl. Brown Fringe-sedge. Brackish shores, 1-3, 6, 23, AM. High marsh, esp. poor sandy areas, common; CI, 1; Goodwin I., 6; Poropotank R., Jenkins Neck, 7; Bethel Beach, New Pt. 1, 8, MW.

Fimbristylis spadicea (L.) Vahl. Brown Fringe-sedge. Brackish shores, 1-3, 6, 23, AM. High marsh, esp. poor sandy areas, common; CI, 1; Goodwin I., 6; Poropotank R., Jenkins Neck, 7; Bethel Beach, New Pt. 1, 8, MW.

Fimbristylis spadicea (L.) Vahl. Brown Fringe-sedge. Brackish shores, 1-3, 6, 23, AM. High marsh, esp. poor sandy areas, common; CI, 1; Goodwin I., 6; Poropotank R., Jenkins Neck, 7; Bethel Beach, New Pt. 1, 8, MW.

Fimbristylis spadicea (L.) Vahl. Brown Fringe-sedge. Brackish shores, 1-3, 6, 23, AM. High marsh, esp. poor sandy areas, common; CI, 1; Goodwin I., 6; Poropotank R., Jenkins Neck, 7; Bethel Beach, New Pt. 1, 8, MW.

Fimbristylis spadicea (L.) Vahl. Brown Fringe-sedge. Brackish shores, 1-3, 6, 23, AM. High marsh, esp. poor sandy areas, common; CI, 1; Goodwin I., 6; Poropotank R., Jenkins Neck, 7; Bethel Beach, New Pt. 1, 8, MW.

Fimbristylis spadicea (L.) Vahl. Brown Fringe-sedge. Brackish shores, 1-3, 6, 23, AM. High marsh, esp. poor sandy areas, common; CI, 1; Goodwin I., 6; Poropotank R., Jenkins Neck, 7; Bethel Beach, New Pt. 1, 8, MW.

Fimbristylis spadicea (L.) Vahl. Brown Fringe-sedge. Brackish shores, 1-3, 6, 23, AM. High marsh, esp. poor sandy areas, common; CI, 1; Goodwin I., 6; Poropotank R., Jenkins Neck, 7; Bethel Beach, New Pt. 1, 8, MW.
Rhynchospora macrostachya Torrey. Wet, peaty places, 4, 17, 20. AM. CR (Lanexa), 20, swamp, EE.

Scirpus americanus Persoon. Common threesquare. Fresh to saline marshes, 1-3, 9, 12, 19, AM. CI, 1; Beaverdam Swamp (lower end), 7; New Pt. campground, 8; Chandler's I., 20, Occupic Creek, 25; Aquia Creek, 34, MW, AB, AH. Queen's Creek, 6, tidal marshes, EE. JI, 19, brackish marshes and tidal shores, common, Ly. Eltham Marsh, 20, AB. Md. Md.: (Patuxent R.), Benedict, Holland Cliffs, lower marsh, L.

Scirpus atrovirens Willd. Black Bulrush. Bogs, wet places, 13, 19, 36, 38, AM. Beaverdam Swamp, 7, MW, AH.


Scirpus etuberculatus (Steud.) Kuntze. Swamp Bulrush. Bogs, 3, 19, 38, AM. Beaverdam Swamp, 7, MW, AH.


Scirpus fontinalis Harper. Wet lowgrounds and seepage, 15, 19, AH. Beaverdam Swamp, 7, frequent at edge over disturbed marl, MW, AH.

Scirpus lineatus Michaux. Bulrush. Wet low areas, 6, 19, AM. Beaverdam Swamp, 7, MW, AH.

Scirpus olneyi Gray. Olney threesquare. Coastal, saline marshes, 1-3, 6, 19, AM. Starvation Pt., 7; Sweet Hall M., 22; Aquia Creek, 35; MW, AB. Tidal marsh, 19, Carter's Creek, EE. PR, 30, Chestnut Grove Farm, wet soil river's edge, MG. Md.: (Upper Patuxent R.) 6 sites, RA.

Scirpus robustus Pursh. Saltmarsh Bulrush. Coastal marshes, 3, 6, 14, 15, 38, AM. Md.: (Patuxent R.), Benedict, Holland Cliffs, RA. JI, 19, standing water of brackish marshes, LL. Hoskins Creek, 23; Beaverdam Swamp, 7, Carter's Creek, Tanyard Landing, Miller's Landing; YR, 6, Queen's Creek; Carter's Creek, EE.

Scirpus rubricosus Fern. Woolgrass. JI, 19, wet lowground of brackish marshes, LL. Wet lowgrounds, swamps 3, 9, 19, 38, AM.

Scirpus validus Vahl. Great Bulrush. Shallown water, 1-3, 12, 19, 38, AM. Beaverdam Swamp, Miller's Landing, 7; Chandler's I., 20; Sweet Hall M, 22; frequent to abundant, MW, AB. College Creek, 19, swamp, EE. PR (Eltham M.), 20, MG. Md.: (Upper Patuxent) 4 sites, RA.

Family Araceae

Acorus calamus L. Sweet Flag. Marshes, 5, 8, 17, 36, AM. Md.: (Upper Patuxent), Hills Bridge, RA. Drake M., 25, MW, GM. Moist meadow, 20, MG.

Arisaema triphyllum (L) Schott. Jack-in-the-Pulpit. Moist, peaty soil in low woods, 3, 13, 17, 19, 38, AM. Beaverdam Swamp, 7, largest plants in low areas, MW. Moist soil in rich deciduous woods, 20, MG. JI, 19, one colony in damp depression of deciduous woods, LL.

Orobius aquaticus L. Golden Club. Wet soil along flood plains, bogs, l, 2, 17, 19, 20, AM. PR, (White Landing), 22, common, MW. Moist floodplain, north side of Ware Creek, 20, MG. Md.: (Upper Patuxent), Hills Bridge, RA.

Peltandra virginica (L) Kunth. Arrow-arium. Poropotank M., 7, common, MW. JI, 19, shallow brackish marsh, LL. CR, 20, marsh, MG. PR, 22, Lee and Sweet Hall M's., common to abundant, probably increasing, Hoskins Creek, 23, MW.

Seeds of arrow-arium, known as "wampee duck-corn" float about in great quantities in fall and winter, but are apparently eaten frequently only by wood ducks.
Symlocarpus foetidus (L) Nutt. Skunk Cabbage. Marshes, moist meadows, 15, 18, 19, 31, AM. Beaverdam Swamp, 7, rare, MW.

Family Lemnaceae


Spirodela oligorrhiza (Kurtz) Hegelm. CR, 20, still water surface, MG. (Not listed by AM).

Spirodela polyrrhiza (L) Schleid. Greater Duckweed. Surface of still water and wet peat, 1-3, 10, 15, AM. JI, still water, brackish marsh, common, LL. CR, edge of Diascund Dam, MG.


Wolffia punctata Griseb. Still water, 2, 14, 15, 19, 22, AM. CR, 20, MG.

Wolffiella floridana (J. D. Smith) Thompson. Surface of still water, 2, 3, 15, AM. CR, still water at edge, MG.

Family Eriocaulaceae

Eriocaulon parkeri Robinson. Pipewort. Marsh mud, tidal flood plains, 1, 2, 12, 18-23, 36, AM. Chickahominy, EE.

Lachnocaulon anceps (Walt) Morong. Bogs, wet woods, 12, 14, 17, 19, AM. Chisel's Run, 19, sphagnum swamp, EE.

Family Commelinaceae

Anelilema keisak Hasskarl. On saline marshes, 15, 17, 18, 22-24, 25, AM. In low soggy ground bordering brackish marshes, rare, JI, 19, LL. Marsh on Diascund Creek, 20, MG. PR (West Island Swamp), 20, abundant, MW, GM. (Massey's habitat designation is likely in error.

Family Pontederiaceae

Heteranthera reniformis R. and P. Mud Plantain. Mud, Chickahominy; Jones' Mill Pond, EE. Shallow water, mud, 17, 19, 38, AM.

Pontederia cordata L. Pickerel-weed. Shallow water, muddy shores, 75, AM. Abundant, especially in oligohaline and fresh marshes; Poropotank Creek, 7; Sweet Hall M., 22; Hoskins Creek, 23; Aquia Creek, 35, MW. Wmbg., College Creek, common, EE. MD: (Upper Patuxent) 5 sites, RA.

Family Juncaceae

Juncus acuminatus Michaux. Wet soil near streams, 1-3, 17, 19, 38, AM. Wmbg., 19, moist ground, EE. JI, 19, wet, often flooded area, LL. Hoskins Creek, 23, MW, AH.


Juncus biflorus Ell. Wet meadows, swamp edges, 1-3, 13, 17, 19, AM. Assateague I., 1, AH. Cedar I., 1, MW, AH. JI, 19, moist lowground in pines; brackish margin, LL.

Juncus bufonius L. Toad Rush. Wet situations, 3, 19, 38, AM. Assateague I., 1, AH. Parramore I., 1, near old Coast Guard station, MW, AB. Wmbg. 19, wet roadsides, EE.

Juncus canadensis J. Gay ex. La Harpe. Canada Rush. Swampy places, 3, 4, 19. Assateague I., 1, AH. West of Wmbg, 19, swamps, EE.

Juncus corruciatus Mackenzie. Juncus debilis Gray. Wet peaty open woods, 1, 2, 4, 19, AM. West of Wmbg., 19, wet soil, EE.

Juncus effusus L. Soft-rush. Meadows, wet places, 3, 4, 12, 19, AM. Locustville, 1, Beaverdam Swamp, 7; Poropotank M., 7, AB; JI, 19, brackish marsh, LL. Moist meadow, 20, MG. Hoskins Creek, 23, MW, AH. Nomini Creek, 3rd bridge, 25, MW, AH.

Juncus Elliottii Chapman. Wet shores, low places, 3, 17, AM. Near Wmbg., 19, swamp, EE. Moist ravine, 20, MG.
Juncus gerardi Loisel. Black Grass. Saline marshes, 1-3, 38, AM. Parramore I., 1, Croaker Landing, 19; Poropotank C., 7; MW, AH. PR (Eltham Marsh), 20, MG. MD: (Patuxent R.) Benedict, RA.

Juncus griscomi Fernald. Wet woods, 3, 19, AM. Beaverdam Swamp, 7, MW, AH.

Juncus roemerianus Scheele. Black Needle-rush. Saline marshes, 2, 3, 15, AM. Parramore I., 1, large enclaves in marshes, AH. Hampton, Grandview Park, abundant; Poropotank R., Tanyard Land., 7, abundant; Bethel M., 8, New Point I; Piscataway Creek, 25, MW, AB.

Family Lilaceae

Asparagus officinalis L. Frequent in mesohaline marshes; burning of which is said to facilitate gathering of asparagus.

Lilium superbum L. Turks-cap Lily. Woods and wayside, 7c, AM. Long Hill, 19, wooded swamp; CR, Lanexa, 20, swamp, flood plain, EE. Rare, seen in only one creek marsh, MW.

Smilax bona-nox L. 1-8, 17, 19, AM. Parramore I., common in thickets, MW, AB. Smith I., 2, JC, GM.

Smilax glauca Walter. Waste places, common, AM. MR, shore below reservation, MW, GM.

Smilax rotundifolia L. Common Greenbriar. Moist thickets, common, AM. Parramore I., 1, MW, AB. JI, 19, moist areas, common, LL. Edge of Diascund Dam, 20, MG.

Family Dioscoreaceae

Dioscorea villosa L. Wild Yam. Moist woods, wet places, 6c, AM, (incl. D. hirticaulis and quaternata). Longhill, 19, sphagnum swamp, EE. Hoskins Creek, 23, tussock in freshwater marsh, MW.

Family Iridaceae

Iris prismaticas Pursh. Slender Blue Flag. JI, 19, lowground, rare, LL. Swamps, boggy areas, 37, 38, AM.

Iris pseudacorus L. Yellow Flag. Wet peaty soil; shallow water, 6, 37, 38. Beaverdam Swamps, 7, few large clumps, tidal fresh sector, MW. CR (Dillon's Lndg.), 20, MG.

Iris versicolor L. Blue Flag. Ditches, marshes, shallow pools, 1, 2, 19, 37, 38, AM. Open swamps, 19, common, EE.

Iris virginica L. Southern Blue Flag. Wet soil, shallow pools, 1-9, 12-14, 19, AM. Beaverdam Swamp, 7, lower end, frequent clumps; PR (Chandler's I.), scarce; RR (Drake M.), 25, MW. JI, 19, wet brackish marsh, low swamps, LL.

Sisyrinchium angustifolium Miller. Blue-eyed Grass. 8c, AM. Parramore I., MW, AB. JI, 19, common, LL. Lanexa, 20, moist meadow, MG.

Sisyrinchium mucronatum Michaux. Meadows, 6c, AM (including S. atlanticum). SY, 2, JC (as S. atlanticum).

Family Orchidaceae

Habenaria ciliaris (L.)R. Brown. Yellow Fringed-orchid. Moist places, 12, 16, 17, 19, AM. West of Wmbg., 19 sphagnum swamps, EE.

Habenaria cristata Gaudin. Crested Fringed-orchid. Chisel's Run, Sphagnum, magnolia swamp, EE.

Habenaria lacera (Michaux) R. Brown. Green Fringed-orchid. Open swamps, marshes, 3, 19, 31, 37, AM. Longhill, 19, swamp, EE. PR (Causiac M.) 20, rare, MW.

Habenaria repens Nuttall. Water-spider Orchid. CR, 19, wooded swamp, EE. (Not listed by Massey or Gleason).
Pogonia ophioGLOSSOides (L) Ker. Rose Pogonia. Meadows, swamps, 3, 4, 17, 19, 20, AM. Chisel's Run, 19, sphagnum swamp.

Spiranthes cernua var. odorata (Nuttall) Correll. Marsh Ladies' Tresses. Wet soil at margin of brackish marshes, 19, rare, LL.

Family Saururaceae
Saururus cernuus L. Lizard's Tail. Swamps, seepage areas, 9 c, AM. Poropotank M., 7, JK. Beaverdam Swamp, 7, abundant, MW. PR (West I. Swamp), 20, abundant, MW. 19, shaded swampy areas, abundant, EE.

Family Salicaceae
Salix nigra Marshall. Black Willow. Shores and wet lowgrounds, frequent, AM. Beaverdam Swamp, 7, abundant, MW. New Point, 8, MW. JI, 19, marsh borders, LL. CR (Dillon's Landing), 20, MG. Likely in all counties, MW.

Family Myricaceae
Gale palustris (Lam.) Chev. Sweet Gale. Wet situations, Va. in range, AM. Md. (Upper Patuxent), 3 sites, RA, (as Myrica gale). Myrica cerifera L. Wax Myrtle. Moist to wet soil, 1-3, 19, 21, AM. ES, probably all barrier islands: Assateague I., 1, stable dunes, AH. Cedar I., 1, MW. Parramore I., 1, Pinus juniperus community, AH. Hog I., 2, GM. Smith I., 2, JC. Grandview, 5, abundant, OD. Ware Pt., 7, abundant, New Point I., 8, Hoakins Creek 23, MW. JI, 19, along brackish marshes, abundant, LL. Now widely used as an ornamental.
Myrica pensylvanica Loisel. Bayberry. Infertile coastal sands, 1-3, AM. Cedar I., 1; Assateague I., 1, stable dunes, AH.

Family Betulaceae
Alnus serrulata (Aiton) Willd. Tag Alder. Stream banks, brushy swamps, probably all counties, MW. Beaverdam Swamp, 7, common, MW. JI, 19, sandy shore, rare, LL. CR, 20, wet bank, MG. PR (West I. Swamp), common, MW.
Betula nigra L. River Birch. Along streams, 37, AM. Beaverdam Swamp, 7, common, decreasing, MW. Queen's Creek, Jones' Mill Pond, 19, rare (two trees), EE.
Carpinus caroliniana Walter. Ironwood, Musclewood. Streams, low woods, 3, 19, AM. Beaverdam Swamp, 7, abundant, MW.

Family Fagaceae
Quercus michauxii Nuttall. Swamp Chestnut Oak. Swamps, AM. PR (West I. Swamp), 20, frequent near edge, MW. CR (edge), 20, MG.
Quercus nigra L. Water Oak. Lowgrounds, 1-3, 13, 17, 20, AM.
Beaverdam Swamp, 7, common, MW. Diascund Creek, 20, marsh edge, MG.
Quercus palustris Muenchh. Pin Oak. Moist to wet woods, 1, 2, 18, AM. Swampy flood plain, 18, EE. JI, 19, occasional near marshes, LL. Mesic woods, 20, MG.
Quercus phellos L. Willow Oak. Lowgrounds, 1-3, 12, 17, 19, AM.
Beaverdam Swamp, 7, common, largest tree in swamp. JI, 19, moist areas bordering marsh, common, LL. JI, 19, moist areas bordering marsh, common, LL. PR, edge of Eltham M., 20, lowground, MG.
Quercus virginiana Miller. Live Oak. Light soil along the coast 2, 3, 5, 19, AM. New Point, 8, campground and island, MW. The disjunct population in Mathews Co. is the northern limit. Record for Northampton was probably a waif (fide AH). Record for James City Co. was a large tree on Wm. & Mary campus. Species now widely planted in coastal Va.

Family Ulmaceae
Ulmus americana L. White or American Elm. Along streams, 1-3, 14, 19, 20, AM. Beaverdam Swamp, 7, common, MW. JI, 19, fairly common, lowground bordering marshes, LL. CR, edge of river, 20, MG.
Ulmus rubra Muhl. Slippery Elm. Mesic soil, 3, 14, 15, 17, 19, AM. Beaverdam Swamp, rare, MW. JI, 19, low woods bordering marsh, scarce, LL.

Family Urticaceae
Boehmeria cylindrica (L) Swartz. False Nettle. Moist soil, 1, 2, 13, 19, 37, AM. Cedar I., 1, swale, MW. Yorktown Creek M., 6, MW, GM. JI, 19, marsh border common, LL. MR, below reservation, 22; Hoskins Creek, 23, MW, GM. Md:(Upper Patuxent), 6 sites, RA.
Pilea pumilla (L) Gray. Clearweed. Moist woods, thickets, 1, 2, 19, AM. Wmbg., 19, shaded lowground, EE. Md:(Upper Patuxent), 3 sites, RA.

Family Urticaceae
Phoradendron serotinum (Raf.) M. C. Johnston. Mistletoe. Parasite of deciduous trees, 1-3, 12, 19, AM (as P. flavescens). Causiac M., 23, rare, MW.

Family Loranthaceae
Phoradendron serotinum (Raf.) M. C. Johnston. Mistletoe. Parasite of deciduous trees, 1-3, 12, 19, AM (as P. flavescens). Causiac M., 23, rare, MW.

Family Polygonaceae
Polygonum arifolium L. Halberg-leaved Tearthumb. Marshes, 1, 2, 17, 20, 36, AM. JI, 19, marsh margins, occasional, LL. Blackstump Creek, 19; Chandler's I., 20, frequent, Causiac M., 20, common; Sweet Hall M., 22, abundant; below Mattaponi Reservation, 22; Hoskins Creek, 23, common; Aquia Creek, 35, MW. Md:(Upper Patuxent), 5 sites, RA.

Family Chenopodiaceae
Atriplex patula L. Spearscale. Coastal marshes, rich soil, 7c, AM. CI, swale, GAM. Grandview 5, rare, OD; Goodwin I., Yorktown C., 6, abundant, MW. Wate's Pt., 7, marsh, AH. New Point, 8, Hoskins C., 23, MW. Md:(Upper Patuxent), 2 sites, RA.

Family Chenopodiaceae
Atriplex patula L. Spearscale. Coastal marshes, rich soil, 7c, AM. CI, swale, GAM. Grandview 5, rare, OD; Goodwin I., Yorktown C., 6, abundant, MW. Wate's Pt., 7, marsh, AH. New Point, 8, Hoskins C., 23, MW. Md:(Upper Patuxent), 2 sites, RA.
Salicornia europaea L. Glasswort. Salt marshes and flats, 1-3, 9, 19, 20, AM. PI, 1, AH. SI, 2, JC. Hog I., 2; Goodwin I., 2; Quanah Outlett I., 7; New Point, 8; Croaker Lndg., 19, MW, GAM.

Salicornia virginica L. Saltwort. Salt marshes, 1, 2, AM. AI, 1; PI, 1, AH. Hog I., 2; Goodwin I., 6; Robin's Neck, 7; MW, GAM.

Salsola kali L. Russian Thistle. Sandy shores, 7c, AM. PI, 1, AH. CI, 1; Hog I., 2, GAM. SI, 2, JC. New Point, 8, MW.

Suaeda linearis (Ell.) Mog. Sea Blite. Coastal sand, Va. in range, AM. AI, 1; Bailey's Beach, 7; MW, GAM.

Suaeda maritima (L.) Dum. Sea Blite. Coastal salt marshes, AM.

Grandview Preserve, 5, rare, OD.

Family Amaranthaceae

Amaranthus cannabinus (L.) J. D. Sauer. Water Hemp. Salt marshes, 9 c, AM (as A. canabina). Poropotank M., 7; Blackstump C., 19, Hoskins C., 23, MW, GAM.

Family Phytolaccaceae

Phytolacca americana L. Pokeberry. Common weed, AM. SI, 2, JC.

Common on dikes and spoil banks, MW.

Family Aizoaceae

Mollugo verticillata L. Carpet-weed. Common weed, AM. AI, 1, AH. Grandview Preserve, 5, rare, OD.

Sesuvium maritimum (Walter) BSP. Sea Purslane. Moist sand near coast, 3, AM. AI, 1, AH. New Point, 8, MW, GAM.

Family Caryophyllaceae

Spergularia marina (L.) Grisebach. Sand Spurrey. Saline soil, ~', 19, AM. AI, 1, AH. PI, 1, GAM.

Family Ceratophyllaceae

Ceratophyllum demersum L. Coontail. Ponds, quiet water, 3, 28, 37, 38, AM. Beaverdam Swamp, abundant in sunlit creek, MW. CR, 19, shallow water at Dillon's Lndg. Piscataway Creek, 23, MW.

Family Nymphaeaceae

Nuphar luteum (L) Sibthorp & Smith. Spatterdock, Yellow Pond Lily. Swamps, ponds and along shores, 6c, AM (as N. advena). CR, 20, Discund C., MG. PR, 20, Chandler's I.; MR, 22, below reservation; Hoskins C., Piscataway C., 23; Aquia C., 35; perhaps most abundant emergent plant in tidal fresh water, MW.

Family Nelumbonaceae

Nelumbo lutea (Willd.) Persoon. Lotus Lily. Quiet water, 3, AM. Occoquan C., 36, Conrad I., one colony X-71, MW.

Family Cabombaceae

Brasenia schreberi Gmelin. Water Shield. Quiet water; sluggish streams, 17, 37, AM. Roadside pond below Kilnarnock, 10, MW. CR, 20, shallow water Dillon's Landing, MG.

Family Ranunculaceae

Ranunculus abortivus L. Kidney Leaf Buttercup. Weed, 6c, AM. Beaverdam Swamp, 7, scarce, MW, AH. JI, 19, moist soil in woods, rare, LL. Wmbg., 19, wooded flood plain, EE.

Ranunculus pusillus Poir. Low Spearwort. Swamps, wet waysides, 3-5, 37, AM. Beaverdam Swamp, 7, common, MW, AB. Lanexa, 20, moist meadow, MG. JI, 19, wet ground of often flooded meadow, occasional, LL.

Ranunculus scleratus L. Curled Crowfoot. Wet soil or shallow water, 1, 2, 4, 19, 37, AM. PI, 1, roadside, MW, AB. JI, 19, in wet soil or standing water, occasional, LL. PR, Eltham M., 19, wet edge, MG.

Ranunculus septentrionalis Poir. Northern Buttercup. Moist soil near streams, 5, 19, 37, AM. Cohoke Swamp, 22, in flower, IV-69, scarce, MW.

Thalictrum polygamum Muhl. Meadow Rue. Moist meadows, swamps, 15, 19, 20, 37, AM. Beaverdam Swamp, 7; below Mattaponi Reservation, 22, MW, GAM.

Thalictrum revolutum DC. Woods and thickets, 3, 15, 19, 38, AM. Wmbg., 19, shell marl banks, EE. Hoskins C., 23, marsh, MW, GAM.
Magnolia virginiana L. Sweet Bay. Moist to wet places, general in Coastal Plain, AM. Swampy ground west of Wmbg., 19, and near YR, EE. Diascund Creek, woodland border, MG.

Family Lauraceae
Lindera benzoin (L.) Blume. Spicebush. Lowgrounds and along streams, 1, 2, 19, 38, AM. Beaverdam Swamp, 7, common, MW. Poropotank R., 7, 21, JK. JI, 19, moist shady woods, rare, LL.
Persea borbonia (L.) Sprengel. Red Bay. Moist woods along shores, 2-4, 12, 19, AM. Edge of brackish marshes, common, LL. PI, 1, common in low woods, MW, AH. SI, 2, JC.

Family Brassicaceae
Cakile edentula (Bigelow) Hooker. Sea Rocket. Coastal sand, 1, 2, 3, 7, AM. ES, outermost plant of barrier island beaches in summer; only plant numerous on new island at Dawson Shoals. VIMS beach, 7, occasional; New Point I., 8, common, MW.
Cardamine bulbosa (Schreb.) BSP. Swamp Bittercress. Wet meadows and woods, 6, 13, 19, 36, 37, AM. Swampy floodplains, Drake M., 25, MW, AB.
Cardamine pensylvanica Muhl. Bittercress. Dry situations, 16, 19, 37, AM. Wet soil of stream bottom in mesic woods, 20, MG.
Lepidium virginicum L. Poor-man's pepper. Common weed, AM. Smith I., 2, JC.

Family Sarraceniaceae
Sarracenia purpurea L. Bogs, wet peaty places, 3, 17, 19, AM. Chisel's Run, 19, swampy woods, rare, EE.

Family Saxifragaceae
Itrea virginica L. Virginia Willow. Swamps, along brooks, 11c, AM. Sphagnum swamps, 19, EE. CR, 20, wet soil of bank, MG.
Parnassia asarifolia Vent. Wmbg., marsh at Elko, 19, EE. (Coastal record not accepted by Massey).
Saxifraga pensylvanica L. Wmbg., swampy flood-plains, 19, EE. (Only coastal record).

Family Hamamelidaceae
Liquidambar styraciflua L. Sweet Gum. Lowground woods, Common swamp and upland trees. Most sought, and often girdled, by beavers; hence decreasing along tidal fresh creeks. Abundant in all coastal counties.

Family Platanaceae
Platanus occidentalis L. Sycamore. Lowgrounds, near streams. Scarcie to common in flood plain swamps. Decreasing, large trees sought by lumbermen; many killed by flooding from beaver dams. Probably swamp tree most used by great blue herons, wood ducks, and piliated woodpeckers for nest sites and by raccoons for den sites. Wmbg., 19, occasional, EE.

Family Rosaceae
Crataegus viridis L. Hawthorne. Low wet woods, 1-3, AM. PR, 20, low wet edges of woods, MG.
Geum canadense Jacquin. Avens. Open woods, borders, 6c, AM. Beaverdam Swamp, 7, MW, wooded floodplains, 19, EE. Md.:(Patuxent), Lyon's Creek, Mt. Calvert, RA.
Prunus americana Marshall. Wild Plum. Woodland borders, 12, 19, 36, 37, AM. Dragon Run Swamp, (lower end), 7, 9, frequent on banks; West I. Swamp, 20, occasional, MW.
Rosa palustris Marshall. Swamp Rose. Wet thickets, meadows, widespread, 12c, AM. Poropotank M., 7; JI, 19, common in brackish marshes along shores of Back River, Cohoke Swamp, 22, LL. Hoskins Creek, 23, MW. Md.:(Upper Patuxent), RA.

Family Fabaceae
Aeschynomene virginica (L) BSP. Coastal flood-plain marshes, shores of fresh to brackish water, 15, 17, 20, 22, 23, AM. 21, 3rd marsh on right, MR.
Amphicarpa bracteata (L.) Fernald. Hog Peanut. Damp thickets, 7c, AM. CI, 1, south end, swale, MW, GAM.
Cassia fasciculata Michaux. Partridge Pea. Lighter soils, 15c, AM. AI, 1, AH. Grandview Preserve, 5, rare, OD. Moist soil near Rumley Marsh, 20, MG. Chanders I., 20, MW.

Centrosera virginianum (L.) Bentham. Butterfly Pea. Dry sandy thickets, 9c, AM. AI, 1, AH; JI, 19, sandy banks of JR, LL. Melilotus officinalis (L) Lam. Yellow Sweet Clover. Roadside, 5c, AM. CI, 1, abundant at old Coast Guard Station.

Strophostyles helvola (L.) Ell. Dune Bean. Sand of high or inner beaches, 6c, AM. CI, 1, GAM. Grandview Preserve, 5, rare, OD. Strophostyles umbellata var paludigena Fern. Marsh Bean. Hog I, 2, GAM. SI, 2, JC. Fresh to brackish tidal marsh 18-20, AM. PR(Chanders I.), 20, MW, GAM.

Trifolium dubium Sibth. Dry places, 3, AM. SI, 2, JC.

Trifolium repens L. Wide spread, 3, 6, 18, 19, AM. PI, 1, GAM. Vicia angustifolia Reichard. Roadsides, 3, 19, 36, 38, AM. SI, 2, JC.

Family Linaceae

Linum virginianum var. medium Planchon. Low places, 6c, AM. CI, 1, swale at south end, GAM.

Family Geraniaceae

Geranium carolinianum L. Waste places, 3, 4, 19, 25, 38, AM. SI, 2, JC.

Family Rutaceae

Xanthoxylum clava-herculis L. Hercules'-club. Woods and thickets, 7c, AM. SI, 1, JC.

Family Polygalaceae

Polygala mariana Mill. Moist situations, 1-4, 19, AM. JI, 19, rare, LL. Edge of Diascund Dam, 20, MG.

Family Euphorbiaceae

Euphorbia maculata L. Wartweed. Weed in waste places, 5c, AM. Grandview Preserve, 5, rare, OD. Euphorbia polygonifolia L. Spurge. Moist coastal beaches, dunes, 7c, AM. CI, 1; New Point, 8, GAM.

Family Callitrichaceae

Callitriche heterophylla Pursh. Water Starwort. Shallow, quiet water, margin of sluggish streams, 1-4, 19, 31, AM.

Family Anacardiaceae

Rhus copallina L. Dwarf Sumac. Throughout, AM. SI, 2, JC. Grandview Preserve, 5, rare, OD. Rhus radicans L. Poison Ivy. Throughout, AM. Beaverdam Swamp, 7, abundant, forming vines to near 3 in. diam. and 50 ft. long. Common in all freshwater marshes transitional to swamps. Greatest development in ash, birch and gum swamps, where its berries are preferred by birds. Adventitious mass of rootlets appressing vines to trees is perhaps as toxic as the leaves are. Rhus vernix L. Poison Sumac. Wet swampy places, along streams, 17, 19, AM. Longhill, 19, sphagnum swamp, locally abundant, EE.

Family Aquifoliaceae

Ilex opaca Aiton. Holly. Moist woods and open lowground, 10c, AM. SI, 2, JC.

Ilex verticillata (L) Gray. Winterberry. Along margin of streams; swamp places, 3, 19, 20, AM. Poropotank M, Beaverdam Swamp, frequent, MW.

Ilex vomitoria Aiton. Yaupon. Sandy soil near coast, 2, 3, AM. SI, JC.

Family Staphyleaceae

Staphylea trifolia L. Moist woodland borders and thickets, 15, 19, 36, 37, AM. Wmbs., Jones' Mill Pond, 19, EE.

Family Aceraceae

Acer rubrum L. Red or Swamp Maple. Moist woods, swamps; common over entire state, AM. Md:(Upper Patuxent), Lyon's Creek, Mt. Calvert, RA. JI, 19, low moist ground along marshes, common, LL. Hoskins Creek, 23, MW. The red maple is the most water tolerant and often most abundant of the deciduous swamp trees.
Family Balsaminaceae

**Impatiens capensis** Meerb. Spotted Touch-Me-Not, Jewelweed.
Swamps, wet soil, 8c, AM. Beaverdam Swamp, 7, abundant, MW.
JI, 19, common, LL. Edge of Diascund Dam, 20, MD. Hoskins Creek, 23.
Md.: (Upper Patuxent), 3 sites, RA. Likely in all counties, wherever freshwater surfaces.

Family Rhamnaceae

**Berchemia scandens** (Hill) K. Koch. Supple-Jack, Rattan Vine. Wet to swampy situations, climbing into trees, 1-4, 15, AM. AI, 1, "maple-water oak-black gum" swamp, AH. CI, FI, MW, AH. JI, 19, occasional near marsh edges, LL.

Family Vitaceae

**Parthenocissus quinquefolia** (L.) Virginia Creeper. CI, 1, MW.
Less common in swamps than is poison ivy.
**Vitis aestivalis** Michaux. Summer Grape. Low woods & stream banks.
MR, 22, below Mattaponi Res., GAM.
**Vitis rotundifolia** Michaux. Muscadine. SI, 2, JC, CR, 20, MG.
**Vitis vulpina** L. Frost Grape. Lowground thickets and stream banks.
lc (none bordering CB or seacoast ), AM. SI, 2, JC.

Family Malvaceae

**Hibiscus moscheutos** L. (Incl. ssp. palustris) Marsh Hibiscus.
Marshes, 1-3, 17, 19, AM. Carter's Creek, 7; Croaker Lndg., 19, EE. JI, 19, brackish marshes, common, LL. Chandlers I., 20.
**Kosteletskyia virginica** (L) Presl. Seashore Mallow. Saline to brackish marshes and shores, 1-4, 6, 10, 18, 19, AM. CI, 1, rare; Tidyard Landing, 7; Piankatank R, 9; Croaker Lndg. 19, MW. JI, 19, fairly common, brackish marshes, LL. PR (Sweet Hall M), 22, common, MW.

Family Hypericaceae

**Hypericum dissimulatum** Bickn. Moist sand, 1-4, 17, 19, AM. Md.: (Patuxent R.), fresh marsh, RA.
**Hypericum gentianoides** (L.) BSP. Waste places, 3, 16, 17, 19, AM.
**Hypericum mutilum** L. St. John's Wort. Moist situations, 3, 16, 19, AM.
**Hypericum virginicum** L. Marsh St. John's Wort. Bogs, swamps, 3, 19, 35, AM. AI, 1, AH. Yorktown Creek M., 6, GAM.

Family Tamaricaceae

**Tamarix gallica** L. Tamarisk. Not in Massey. Gloucester Pt., one tree by bridge, GAM. Jenkins' Neck, large stand along YR shore on sand beach, 7, MW. This salt tolerant shrub seems to have an obvious potential for controlling beach erosion.

Family Cistaceae

**Helianthemum canadense** (L) Michaux. Frostweed. Sand dunes, 1, 3, 4, AM. AI, 1, AH.
**Hudsonia tomentosa** Nuttall. Beach Heather. Coastal sand and dunes, 1-4, AM. AI, 1, AH. JI, 19, low dunes, shores of James, occasional, LL.

Family Cactaceae

**Opuntia compressa** (Salisbury) Macbride. Prickly Pear. CI, 1, north end, small patches among back dunes, MW. PI, 1, frequent but isolated plants, apparently heavily cropped by deer, MW. Myrtle I, 2, north end, one large clump in swale, MW. Smith I., 2, JC.

Family Lythraceae

**Decodon verticillatus** (L) Ell. Water Willow. Swamps, along streams, 1-3, 6, 9, 38, AM. JI, 19, shallow water of marshy area, rare, LL.
Wmbg., Jones' Mill Pond, EE. Md.: (Upper Patuxent), fresh marsh, RA.
**Lythrum lineare** L. Loosestrife. Coastal marshes, 3, 6, 15, 19, 24, AM. JI, 19, 24, AM. JI, 19, edge of brackish marsh, rare, LL. YR, salt marshes, 19, EE. Piscataway Creek, 23, 2 miles from mouth, MW, GAM.
Md.: (Patuxent R.), Benedict, to 14 ppt, RA.
Lythrum salicaria L. Purple Loosestrife. Wet meadows, floodplains, 30, AM. Edge of Diacsund Dam, 20, MG. Md. (Patuxent R.) fresh marsh, 1 site, RA.

Family Melastomataceae

Rhedia mariana L. Meadow Beauty. Moist coastal sand, 1, 3, 4, 19, AM. Moist soil on roadside, 20, MG.

Rhedia virginica L. Meadow Beauty. Wet to moist places, 9c, AM. Al, 1, AH. Sandy swamps throughout Peninsula, EE.

Family Onagraceae

Ludwigia alternifolia L. Seedbox. Moist situations, 10c, AM. Ji, 19, occasional, Wmbg., 19, wet woods, EE. Diascund Creek M., 20, MG. Md.: (Patuxent), fresh marsh, RA.

Ludwigia palustris (L) Ell. Water Purslane. Ji, 19, wet soil of low meadow, rare, LL. Wmbg. mud flat around pond, 19, EE. Diascund Creek M., 20, MG. Md.: (Patuxent), fresh marsh, RA.

Oenothera humifusa Nuttall. Evening Primrose. Coastal sands, 3, 13, AM. Ci, 1, low dunes, common, in bloom 6-VI-69, MW, AB.

Oenothera laciniata Hill. Sandy soil, common 4c, AM. Si, 2, JC.

Oenothera perennis L. Sundrops. Open ground, 19, AM. Ci, 1, wet swale, partly shaded, rare (1 clump), in full bloom, 6-VI-69, MW, AH.

Family Haloragaceae

Myriophyllum brasiliense Camb. Parrot-feather. Aquarium plant which escapes to ponds, 19, AM. CR, 20, shallow water, MG.

Myriophyllum spicatum L. Eurasian Water Milfoil. Not in Massey. This aquatic weed became a major pest in tidal tributaries of the Potomac R. in the early 60's (Haven, 1964). Within the last five years it has become the dominant plant in Back Bay. It's waterfowl value is debatable, but it seems to have some value in controlling turbidity in Back Bay (Fairfax Settle, pers. comm.).

Family Apiaceae

Cicuta maculata L. Spotted Cowbane, Beaver Poison. Wet meadows, floodplains, 6c, AM. Ji, 19, edge of brackish marsh, common, LL. Along streams, 19, common, EE. Below Mattaponi Res., 22. Hoskins Creek, 23.

Cryptotaenia canadensis (L) DC. Honewort. Thickets, 15, 19, 36, AM. Beaverdam Swamp, 7, frequent, MW, AB.

Daucus carota L. Queen Anne's Lace. Widespread weed, AM. Hog I., 2, GAM.

Eryngium aquaticum L. Marshes and along shores, 1-3, 15, 35, AM. Ji, 19, low wet ground adjacent to Spartina marsh, rare, LL.

Hydrocotyle ranunculoides L. 3, 15, 19, 37, AM. Small stream, EE.

Hydrocotyle umbellata L. Water Pennywort. Wet soil along shores, 3, 4, 19, AM. Edges of ponds and streams, 19, EE. CR, 20, wet shoreline, MG.

Hydrocotyle verticillata Thunberg. Water Pennywort. Wet soil in marshes; open swamps, 3, 9, 20, AM. Ci, 1, swale one mile from south end, MW, GAM. Ji, 19, wet edge of marshes, common, LL. CR, 19, swampy floodplain, EE.

Lilaepsis chinesis (L) Kize. Coastal marshes, 3, 15, 18, 20, AM. Ji, 19, occasional dense colonies below high water line of JR, LL.

Tanyard Landing, 7; Hull Creek, 11, mud-tidal marshes of Queen's Creek, EE.

Oxypolis rigidior (L) Cootl. and Rose. Swamps, wet places, 1, 17, 19, 36, AM. Queen's Creek marsh, 19, Wmbg., EE.

Ptilimnium capillaceum (Michaux) Raf. Mock Bishop's-weed. Coastal marshes, 8c, AM. Ji, 19, low wet ground adjacent to Spartina marsh, occasional, LL. Chandlers I., 20. Edge or Eltham M., 20, MG. Md.: (Patuxent R.), freshwater, 3 sites, RA.

Family Cornaceae
Cornus amomum Mill. Dogwood. Moist to wet soil near streams and ponds, 15, 17, 31, AM. Beaverdam Swamp, 7, common, in bloom 17-VI-69, MW, AB. Md: (Patuxent R.), freshwater, 3 sites, RA.
Cornus foemina Mill. Dogwood. Wet woods and swamps, 3, 13, 19, AM. Poropotank M., 7, freshwater, MW, AB.

Family Nyssaceae

Family Clethraceae
Clethra alnifolia L. Sweet Pepperbush. Swamps and borders of marshes, 1-3, 16, 17, 19, 24, AM. Hoskins Creek, 23, lower end, MW, AH. Edge of Diascund Dam, 20, MG. Wooded floodplains throughout Peninsula, EE.

Family Ericaceae
Leucothoe racemosa (L) Gray. Petter-bush. Moist soil, 8c, AM. Edge of Diascund Dam, 20, MG.
Vaccinium atrococcum (Gray) Heller. Black High-bush Blueberry. Wet woods, swamps, 19, 36, AM. JI, 19, in moist soil bordering marshes, occasional, LL. North side of Ware Creek, wet woods, 20, MG.
Vaccinium corymbosum L. Highbush Blueberry. Moist woods, swamps, 2, 4, 19, 30, AM. Poropotank M., 7, MW, AB. Edge of Diascund Dam, 20, MG.

Family Primulaceae
Lysimachia ciliata L. CI, 1, swale 1 mile from south end, in bloom 10-VI-69, rare, MW, GAM.
Lysimachia terrestris (L) BSP. Swamp Loosestrife. Moist soil on roadside, 20, MG.
Samolus parviflorus Raf. Water Pimpernel. Wet soil or shallow water, 9c, AM. Beaverdam Swamp, 7, MW, AB. JI, 19, brackish mudflats, occasional, LL. PR (Eltham Farm), 20, MG.

Family Plumbaginaceae
Limonium carolinianum (Walt) Britt. Sea Lavender. Salt marshes, 1-3, 5, 8, 9, AM. YR, 6, tidal marshes, EE. Starvation Pt., 7, GAM. Bethel Beach 8, marsh, AH.
Limonium naslil Small. Sea Lavender. PI, 1, AH. Smith I., 2, JC. Goodwin I., 6. Mob Jack Bay, end of Rte. 600, 8, MW, GAM.

Family Oleaceae
Fraxinus tomentosa Michaux. Pumpkin Ash. Swamps, 6c, AM. CR, 20 rivers edge, MG.

Family Gentianaceae
Sabatia brachyta Ell. Dry fields, 3, 17, AM. CI, south end, in bloom 9-VI-69, frequent, MW, GAM.
Sabatia dodecandra (L) BSP. Large Marsh Pink. Coastal marshes, 6c, AM. JI, 19, low soggy ground, rare, LL. JR, YR, edge of tidal marsh edges, 19, EE.
Sabatia stellaris Pursh. Sea Pink. Coastal marshes; sandy shores, 6c, AM. CI, 1; Achilles, 7. Tidal marsh, Capitol landing, Queens Creek, 6, EE. Starvation Pt. 7, in bloom, 6-IX-65, AH. New Point, 8, Hog Is. 2. JI, 19, low soggy ground adjacent to Spartina marsh, rare, LL. Piscataway C., 23, in bloom 23-VI-69, scarce, MW, GAM.

Family Asclepiadaceae
Asclepias incarnata L. Swamp Milkweed. Wet soils, 6c, AM. JI, 19, low soggy ground adjacent to Spartina, rare, LL. Eltham M., 20, MG. MR, below Reservation, 22, Hoskins Creek, 23. Md: (Patuxent R.), 4 sites to 12 ppt, RA.
Asclepias lanceolata Walter. Milkweed. Coastal marshes, 3, 4, AM. JI, 19, low soggy ground adjacent to Spartina, rare, LL.
Family Convolvulaceae


_Cuscuta gronovii_ Willd ex R & S. On a variety of plants in lowgrounds, 1, 2, 4, 19, 38, AM. Aquia C., 35, MW, GAM.

_Cuscuta rostrata_ Shuttlew ex. Engel M. Beaked Dodder. Not in Massey. Mt. Landing Creek, 23, MW, GAM. (Needs confirmation)

Family Polemoniaceae

_Phlox drummondii_ Hooker. Not in Massey. Smith I., 2, GAM.

_Polemonium reptans_ L. Lowgrounds, 19, AM. Beaverdam Swamp, 7, very rare, MW. St. Peter's Swamp, 20, stream edge, MG.

Family Boraginaceae

_Heliotropium curassavicum_ L. Coastal sands, 1-3, AM. AI, 1, AH.

_Myosotis laxa_ Lehmann. Forget-me-not; Scorpion grass. In water, 20, 37, AM. Lanexa, 20, meadow, MG. In shallow water of ponds and streams throughout, EE. Md: (Patuxent R), Mt. Calvert, freshwater, RA.

Family Verbenaceae

_Lippia lanceolata_ Michaux. Fog-fruit. Sandy or light soil, 1-4, 15, 37, AM. AI, 1, AH. JI, 19, mud of brackish marshes, occasional, LL.

Family Lamiaceae

_Lycopus americanus_ Muhl. ex. Barton. Moist to wet lowgrounds, 12, 17, 19, 31, AM. CI, swale at south end, MW, GAM. Md: (Patuxent R), Magruder Landing, Hills Bridge, to 6 ppt, RA.

_Lycopus virginicus_ L. Moist to wet soils of floodplains and seepage, 1-3, 19, AM. Eltham M., 20, MG. Md: (Patuxent R), Hills Bridge, freshwater, RA.

_Monarda punctata_ L. Dry coastal sands, 6c, AM. AI, 1, AH. SI, 2, JC.

_Feuirea canadense_ L. Moist soil, thickets, waysides, 3, 4, 19, 37, AM. CI, 1, MW, GAM. Goodwin I, 6, Croaker Landing, 19. JI, 19, along roadcuts, occasional, LL. Caustac M. 20, Hoskins C., common, 23. Md: (Patuxent R) 3 sites to 14 ppt., RA.

Family Scrophulariaceae

_Agalinis purpurea_ L. Purple Gerardia. Moist, acid, soil, 10c, AM, (as _Gerardia purpurea_). PR, Sweet Hall M., 22, scarce, MW. Abundant in tidal marshes of Va., EE.

_Bacopa monnieri_ (L) Pennell. Water Hyssop. Coastal sands, 2, 3, AM. AI, 1, AH. JI, 19, low wet ground, rare, LL.

_Cheilea glabra_ L. Wet soil near streams, 11c, AM. Beaverdam Swamp, 7, abundant, MW.

_Gratiola virginiana_ L. Hedge Hyssop. In shallow water in pools; stream margins, 12c, AM. Hampstead sluggish stream, 20, MG. Md: (Patuxent R), 2 sites, freshwater, RA.

_Linaria canadensis_ (L.) Dumont. Toad-flax. Dry fields, 13c, AM. PI, 1, MW, AB. SI, 2, JC.

_Mimulus alatus_ Alton. Wet woods, low grounds, 10c, AM. Swampy floodplains, 19, EE. Pamunkey, 20, MW, GAM.

_Mimulus ringens_ L. 1, 6, 19, 36, 37, AM. Swampy floodplains; throughout, EE.

_Veronica anagallis-aquatica_ L. Sluggish streams, stream borders, pools, 12, 15, 19, 20, AM. St. Peter's Swamp, shallow water, MG. In small stream, Wmgb., EE.

Family Bignoniaceae

_Campsis radicans_ (L.) Seem. Trumpet Creeper. In thickets, 8c, AM. SI, 2, JC. Grandview Preserve, 5, rare, OD. West Island Swamp, 20, common, MW.

Family Acanthaceae

_Justicia americana_ (L) Wahl. Water-willow. Shallow water in streams and ponds, 1, 4, 18, AM. JI, 19, in shallow water of small sandy cove off Back R., rare, LL.
Family Rubiaceae

Cephalanthus occidentalis L. Button Bush. In wet marshes; along streams, 10c, AM. Beaverdam Swamp, 7; JI, 19, wet ground of low marshy area, occasional; sandy shores of James, LL. Chandlers I., 20, Sweet Hall M., 22, Hoskins Creek, 23, MW. Md: (Patuxent R) 3 sites, to 12 ppt, RA.

Diodia teres Walter. Buttonweed. Sandy field and waste places common weed, AM. New Point I., low dune, scarce, MW, GAM. Grandview Preserve, 5, accumulates sand on dunes, scarce, OD. Diodia virginiana L. Buttonweed. Moist lowgrounds, 10c, AM. AI, 1, AH. Grandview Preserve, 5, rare, OD. JI, 19, fairly common, especially in gullies, LL. Moist soil on roadside, 20, MG.

Galium asprellum Michaux. Moist lowgrounds, 36, 37, AM. PI, 1, MW, AB.

Galium circaezans Michaux. Moist woods, 7, 12, 19, 37, 38, AM. Beaverdam Swamp, 7, common, MW, AH.

Galium hirsutum Michaux. Dry woods, 1-4, AM. AI, 1, AH.

Galium obtusum Bigelow. Bedstraw. Moist to wet woods, 1, AM. AI, 1, AH. CI, 1, MW. Moist woods, 20, Hoskins Creek, 23, MW.

Galium tinctorium L. Bedstraw. Moist to wet soil of woods and swamps, 3, 4, 16, 19, 37, AM. JI, 19, mud flats of brackish marshes, fairly common, LL. Md: (Patuxent R), 2 sites, freshwater, RA.

Family Caprifoliaceae

Viburnum cassicoides L. Moist to wet soil, 4, 6, AM. Wooded swamps along Carter's Creek, 6, EE.

Viburnum dentatum L. In thickets and woods, 3, 4, 20, 38, AM.

Viburnum nudum L. Swamps, wet woods, 19, 37, AM. Wmbg., wooded.

Viburnum prunifolium L. Common, 7c, AM. Beaverdam Swamp, 7, frequent, MW. JI, 19, common, LL. CR, 20, river's edge, MG.

Family Campanulaceae

Lobelia amoena Michaux. Not in Massey. Sphagnum-magnolia swamp, 19, EE.

Lobelia cardinalis L. Cardinal Flower. Moist to wet meadows, 6c, AM. Swampy floodplains, 6, EE. JI, 19, pond bank, rare, LL. Chandlers I., 20, CR, 20, moist soil, MG. Mount Landing C., 23, MW. Md: (Patuxent R), 2 sites, freshwater, RA.

Family Asteraceae

Achillea millefolium L. Yarrow. Common weed, 1-3, AM. SI, 2, JC.

Aster dumosus L. Aster. Moist to wet areas, 3, 16, 19, 27, AM. JI, 19, moist soil, occasional, LL.

Aster puniceus L. Aster. Michaelmas Daisy. Moist situations, 19, 38, AM. Wmbg., 19, swampy floodplains of College Creek, EE. Md: (Patuxent R), Hills Bridge, freshwater, RA.

Aster subulatus Michaux. Wild Aster. Coastal marshes, 1-3, 19, AM. AI, 1, AH. Starvation Pt., 7, AH; beneath Coleman Bridge, 7, common, MW, GAM. JR, YR, 6, 19, EE.

Aster tenuifolius L. Wild Aster. Coastal marshes, along shores, 1-3, 15, 19, AM. AI, 1, AH. Fleets Bay, Placid Harbor, 10, 26-VIII-65, AH. JI, 19, high tide line along shores of James, occasional, LL. YR, (Skimino Creek), 19, EE.

Baccharis halimifolia L. Sea Myrtle. Marsh borders, 1-4, 7, 15, 19, AM. AI, PI, 1, AH. CI, 1, abundant on inner side of island at high tide line, MW, GAM. Goodwin I., 6, MW. SI, 2, JC.

Plankatank R., Megges Bay, 9, AH.

Bidens coronata (L) Britton. Tickseed Sunflower. Moist lowgrounds, 4, 19, AM. JI, 19, low soggy ground by brackish marshes, occasional LL. Tidal marshes, Wmbg., Queens Creek, 19, EE. Aquia Creek, 35, MW, GAM.

Bidens frondosa L. 1-3, 19, 36, AM. Swampy ground, 19, EE. Md: (Patuxent R), Hills Bridge, freshwater, RA.
Bidens laevis (L) BSP. Beggar-ticks. Marshes, pools, ditches, 2, 19, AM. JI, 19, brackish marshes, sandy shores, LL. Black-stump Creek, in water, 19, MW, GAM. Jones' Mill Pond, 19, swampy ground, EE. Mt. Landing Creek, 23, Aquia Creek, 35, MW, GAM. Marsh Preserve, Hills Bridge, freshwater, RA.

Bidens tripartita L. Beggar-ticks. In swamps, 36, AM (As B. comosa and B. connata). AI, 1, AH.

Borrichia frutescens (L.) DC. Sea Ox-eye. Edge of salt marshes, 1-5, 7, 10, 19, AM. AI, PI, 1, Salicornia-Distichlis flats, AH. Hog I., 2, GAM. SI, 2, JC. YR (Pennington), 6, sandy shore, EE.

Carduus spinosissimus Walter. Yellow Thistle. 1-3, 19, AM (as Cirsium horridulum). CI, 1, rare, MW, GAM. SI, 1, JC (as C. horridulum).

Eclipta alba (L) Hassk. Moist places, 1, 2, 19, 36, AM. (As Compositae and B. connata). AI, 1, AH. PI, 1, MW, GAM. CI, 1, frequent, MW. AB.

Erigeron bonariensis L. Waste places, 3, 4, AM. CI, 1, MW, GAM. HI, 2, in bloom 13-VIII-69, GAM.

Erigeron piluliferus Michaux. Robin's Plantain. Moist woods and meadows, 3, 12, 15, 19, 38, AM. CI, 1, MW, AB.

Eupatorium capillifolium Lam.) Small. Dog Fennel. Moist to wet meadows, 1-6, 15-20, AM. CI, 1, frequent, MW, AH.

Eupatorium hyssopifolium L. Thoroughwort. Dry openings, 13, AM.

Grandview Preserve, rare, OD.

Eupatorium serotinum Michaux. Moist waysides, 13, 19, 24, AM.

Grandview Preserve, 5, rare, OD. JI, 19, margins of brackish marshes, rare, LL.

Helenium autumnale L. Lowground weed, 1, 2, 19, 36, AM. Chandler's I., common, MW, GAM.

Iva frutescens L. Marsh Elder. Coastal salt marshes, 8, AM. AI, 1, AH. CI, 1, abundant, MW, GAM. SI, 2, JC. Goodwin I., 6, Achilles, 7, New Point, 8. JI, 19, marsh margins, occasional, LL.

Mikania scandens (L) Willd. Climbing Hempweed. PI, 1, climbs in trees, AH. Grandview Preserve, 5, rare, OD. JI, 19, brackish marshes, often twining in marsh grass, common, LL. Mt. Landing Creek, 23, MW, GAM. Md: (Paxtuxent R.), 3 sites, freshwater to 6 ppt, RA.

Pluchea camphorata (L) DC. Camphorweed. Coastal marshes, wet places, 2-4, 7, 19, AM. YR, and tributaries, 6, tidal marshes, ER. JI, 19, moist places of mixed woods, occasional, LL. Md: (Paxtuxent R.), 3 sites, 6-14 ppt, RA.

Pluchea foetida (L) DC. Marsh Flea-bane. Wet coastal areas, 1-3, AM. AI, 1, AH. JI, 19, fairly common, brackish marsh margins, LL.

Pluchea purpurascens (Swartz) DC. Camphorweed. Coastal salt marshes, 3, AM. AI, 1, AH. PI, 1, Salicornia-Distichlis tidal flats, AH. Hog I., 2, GAM. Grandview Preserve, 5, scarce, OD.

Senecio aureus L. Golden Ragwort. Moist lowgrounds, 1-3, 15-20, 37, AM. Beavardam Swamp, 7, abundant, MW, GAM.

Solidago sempervirens L. Golden Rod. Brackish to fresh coastal areas, 1-3, 16, 19, AM. Grandview Preserve, 5, rare, OD. New Point I., 7, common, MW, GAM. Queen's Creek, 6, salt marshes, EE.

Vernonia glauca (L.) Willd. Moist open woods, 1-3, 15, 38, AM.

Vernonia noveboracensis (L.) Michaux. Wet meadows, and floodplains, 1-3, 19, AM. Chandler's I., 20, MW, GAM.
ADDENDUM
(The following plants were inadvertently omitted.)


Lolium multiflorum Lam. Rye Grass. PI, 1; Locustville, 1, mainland marsh, MW, AB.

Poa pratensis L. Kentucky Blue Grass. Open areas, 1, 2, 3, 36, 38, AM.

Sphenopholis obtusata (Michaux) Scriber. Wedge Grass. Moist soil, 9c, AM.

Triplasis purpurea (Walt.) Chapm. Sand Grass. Dry sand, 3, 5, 13, AM. New Point I, 8, MW, AH.

Uniola latifolia Michaux. Swamp Oats. Moist borders, 7c, AM. PR, West I, 22, creek bank, MW.

Uniola paniculata L. Sea Oats. Coastal dunes, 2, 3, 4, 5. This outer bastion of the dunes has lost ground in Va. I found a single large clump at Kiptopeke and Harvill (personal comment) found some on Hog I., 2, which is still grazed.

Bassia hirsuta (L) E. B. Bartram. Salt marsh borders, 1, AM. PI, 1, AH.

Claytonia virginica L. Moist open woods, 5c, AM. Cohoke Swamp, 22; Beaverdam Swamp, 7, common, MW.

Camelina microcarpa Andrz. False Flax. Wayside weed, 19, 36, AM.

Amorpha fruticosa L. False Indigo. Rich streamside thickets (no coastal counties), AM. Aquia Creek, 35, marsh at mouth, MW.

Solanum carolinense L. Horse Nettle. Waste places, 3, 19, AM. Hog I, 2, GAM. 7, MW, AH.

Utricularia biflora Lam. Shallow pools, 3, 18, 22, AM. White Stone, 10, pond, MW, GAM.

Viburnum recognitum Fernald. Damp alluvial thickets, 1, 2, AM. Drake Marsh, MW, AB.

Ambrosia artemisiafolia L. Ragweed. CI, 1, southend swale, MW, GAM.

Melothria pendula L. Creeping Cucumber. Moist thickets, 3, 4, 5, 19, AM.

Erechtites hieracifolia (L) Raf. Fireweed. Moist lowground and shores, 3, 19, 37, AM. PR, Chamberlayne Pt., 20, MW, GM.

Gnaphalium obtusifolium L. Rabbit Tobacco. Dry waysides, 6c, AM. CI, 1, south tip, MW, AB.

Gnaphalium purpureum L. Dry soil, 7c, AM. CI, swale; PI, 1, near house, MW, AB.
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REFERENCES


CHAPTER III: PHYLUM PROTOZOA

Certain sections of protistans are claimed by both botanists and zoologists. The classification presented is that of the Committee on Taxonomy and Taxonomic Problems of the Society of Protozoologists (Honigberg, et al, 1964). Groups listed elsewhere in the checklist, under algae, disease organisms, or parasites, are noted.

Many protozoan groups remain little known in Chesapeake Bay. Records date from those of Wolfe, et al (1926). Ecological data is sparse or lacking for most records.

Subphylum Sarcomastigophora
Superclass Mastigophora
Class Phytamastigophorea
Order Chrysomonadida (see Chrysophyceae, p. 2)
Order Cryptomonadida (also see Cryptophyceae, p.2)
Halosphaera sp. CB, JJW.
Order Dinoflagellida (see Parasites, p. 78 and Pyrrophyta, p. 12)
Order Ebrida
Ebría sp. Patuxent R., rare, DCM.
Order Euglenida (see Euglenophyceae)

Subphylum Sporozoa (see Disease Organisms and Parasites)

CLASS CILIATA
Subclass Holotrichia
Jesse C. Thompson, Jr., Roanoke College

Order Gymnostomatida
Family Didiniidae
Mesodinium cinctum Calins. CB, JJW.

Family Colepidae
Tiarina sp. CB, JJW: (possibly T. fusus Claparede and Lachmann).

Family Amphileptidae
Lionotus CB, JJW. (Possibly L. fasciola Ehrenberg).

Order Hymenostomatida
Family Tetrahymenidae

Family Uronematidae


Family Pleuronematidae
Pleuronema sp. YR(near GP).
Cyclidium sp. YR(near GP).

Family Cohnilembidae
Cohnilembus verminus YR(near GP).

Family Pseudocohnilembidae
Pseudocohnilembus hargisi Evans and Thompson, 1968. Polyhaline.
GP(near shore).

REFERENCES


Subclass Peritrichia

Order Peritrichida
Family Vorticellidae
Vorticella sp. CB, JWW.
Order Foraminiferida

The following information has been taken from the references listed below.

Order Foraminiferida

Family Astrorhizidae


Family Hormosinidae

_Reophax nana_ Rhumbler, 1911. Mesohaline. RR, estuary, scarce; marsh, rare.

Family Rzehakinidae


_Miliammina fusca_ (Brady, 1870). Oligo- and mesohaline. RR, estuary, frequent; low outer marsh, abundant.

Family Lituolidae

_Ammoastuta salsa_ Cushman et Bronnimann, 1948. Oligo- and lower mesohaline. RR, estuary; inner marsh, abundant.


_Ammobaculites dilatatus_ Cushman and Bronnimann, 1948. Oligo- and mesohaline. RR, estuary and marsh, scarce.

_Ammobaculites exigus_ Cushman et Bronnimann, 1948. Oligo- and mesohaline. RR, estuary and marsh, rare.

_Amplexus hancocki_ Cushman et McCulloch, 1939. Oligo- and lower mesohaline. RR, estuary, rare; marsh, frequent.

_Haplaphragmoides manilaensis_ Andersen, 1952. Oligohaline. RR, estuary, rare; marsh, scarce.

_Haplaphragmoides wilberti_ Andersen, 1952. Oligohaline. RR, estuary, rare; marsh, scarce.

Family Trochamminidae

_Arenoparrella mexicana_ (Kornfeld, 1931). Oligo- and lower mesohaline. RR, estuary, rare, polyhaline.

_Tiphotrocha comprimata_ (Cushman and Bronnimann, 1948). Oligo- and mesohaline. RR, estuary, rare; marsh, abundant.

_Trochammina inflata_ (Montagu, 1808). Oligo- and mesohaline. RR, estuary, rare; marsh, frequent.

_Trochammina macrescens_ (Brady, 1870). Oligo- and lower mesohaline. RR, estuary, rare; marshes, scarce.

_Trochammina squamata_ Parker and Jones, 1860. Oligo- and lower mesohaline. RR, estuary, rare.

Family Spirillinidae

_Ammonia beccarii_ (Linnaeus, 1758) var. A. Mesohaline. RR, abundant on _Zostera_; estuary, frequent.

_Ammonia beccarii tepida_ (Cushman, 1926). Upper mesohaline. JR, 6-23 ppt. RR, estuary, frequent; marsh, rare.

Family Elphidiidae

_Elphidium clavatum_ Cushman, 1930. RR, estuary, abundant; marsh, rare.

_Elphidium galvestonense_ Kornfeld, 1931. Upper mesohaline. RR, estuary, rare.

_Protelphidium tisburyense_ (Butcher). Mesohaline. RR, estuary and marsh, rare.

References


ORDER TINTINNIDA

Wolfe et al (1926) listed 15 species of tintinnids in six genera and Morse (1947) listed seven genera and a family, "Undellidae gen. sp." Her "ssp." is taken to mean that more than one species occurred in a genus. Her promised "publication on the tintinnids of Chesapeake Bay" never materialized.

Family Tintinnidae

Amphorides fistula Duc d'Orleans. CB, JJW. Genus was Formally Amphorella.

"Codicilla sublata" Patuxent R., rare, DCM.

Conocylis helix Duc d'Orleans. CB, JJW. (This species is presumed to be a tintinnid, but could not be traced.)

Cytarocylis gigantea (Brant?). CB, JJW.

Cytarocylis hemisus Duc d'Orleans, CB, JJW.

Eutintinnus sp. Patuxent River, rare, DCM.

Favella sp. Patuxent R., rare, DCM.

Helicostomella sp. Patuxent R., rare, DCM.

Leprotintinnus sp. Patuxent R., rare, DCM.

"Metacylis ssp." Patuxent R., rare, DCM.

Ptychocylis. CB, JJW.

Tintinnopsis acuta Duc d'Orleans.

Tintinnopsis beroidea (Stein?). CB, JJW. JR (mouth), 13-IX-54, very abundant, HGM.

Tintinnopsis davidoffi Daday. CB, JJW, as in T. beroidea

Tintinnopsis fusus Duc d'Orleans. CB, JJW.

Tintinnopsis incurvata Duc d'Orleans. CB, JJW.

Tintinnopsis lata Duc d'Orleans. CB, JJW.

Tintinnopsis major Duc d'Orleans. CB, JJW.

Tintinnopsis urnula Duc d'orleans. CB, JJW.

"Tintinnopsis ssp." Patuxent R., autumn, DCM.

Tintinnus acuminatus Schroeder. CB, JJW.

Tintinnus rapa Duc d'Orleans. CB, JJW.

Tintinnus serratus Kofoid. CB, JJW.

ORDER HYPOTRICHIDA

Family Euplotididae

Euplotes sp. CB, JJW, DCM.

REFERENCES


Wolfe, J. J., B. Cunningham, N. Wilkerson & J. Barnes. 1926. An investigation of the microplankton of Chesapeake Bay. J. Elisha Mitchell Sci. Soc. 42:25-54. The list of protozoans in this report has several misspellings and possible some misidentifications. I have been unable to trace the genera Chitonosperma, Cornutella, Panduroform, Spheropsis and Spongioxiphis.
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CHAPTER IV: DISEASES AND PARASITES

KNOWN AND POSSIBLE DISEASE ORGANISMS PRESENT IN THE CHESAPEAKE BAY (Numbers indicate literature cited)
Frank O. Perkins

Phylum Protozoa
Subphylum Sporozoa
Class Haplosporida
Minchinia nelsoni Haskin, Stauber, and Mackin, 1966. (1, 2).
Urosporidium crescens Deturk, 1940. (5, 6).
Minchinia sp. (7).

Class Telospora
Nematopsis ostrearum Prytherch, 1940. (13).

Subphylum Sarcomastigophora
Class Rhizopodea
Labyrinthula sp. (8).

Subphylum Chilospora
Class Microsporidea
Pleistophora sp. (19).
Glugea weissenbergi Sprague and Vernick, 1968. (15).

Phylum Eumycophyta
Class Phycomycetes
Order Saprolegniales
Dermocystidium sp. (13).

Order Lagenidiales
Lagenidium callinectes Couch, 1942. (14).

Phylum Schizomycophyta
Class Schizomycetes
Pasteurella sp. (17).

Viruses
Lymphocystis virus (18).

Literature Cited


LIST OF KNOWN HOSTS OF DISEASE AND POSSIBLE DISEASE ORGANISMS

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<tr>
<th>Disease Organism</th>
<th>Host</th>
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</thead>
<tbody>
<tr>
<td>Minchinia nelsoni</td>
<td>Crassostrea virginica</td>
</tr>
<tr>
<td>Minchinia costalis</td>
<td>Crassostrea virginica</td>
</tr>
<tr>
<td>Urosporidium crescens</td>
<td>Megalophallus sp. in Callinectes sapidus</td>
</tr>
<tr>
<td>Minchinia sp.</td>
<td>Eurypanopeus depressus</td>
</tr>
<tr>
<td>Nematopsis ostrearum</td>
<td>Crassostrea virginica, Panopeus herbstii</td>
</tr>
<tr>
<td></td>
<td>Eurypanopeus depressus, Neopanopeus texana sayi</td>
</tr>
<tr>
<td>Disease Organism</td>
<td>Host</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Labyrinthula sp.</td>
<td><em>Spartina alterniflora</em></td>
</tr>
<tr>
<td>Paramoeba perniciosa</td>
<td><em>Zostera marina</em></td>
</tr>
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<td>Nosema michaels</td>
<td><em>Callinectes sapidus</em></td>
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<tr>
<td>Nosema dollfusi</td>
<td><em>Callinectes sapidus</em></td>
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<tr>
<td>Pleistophora cargoi</td>
<td><em>Bucephalus cuculus in Crassostrea virginica</em></td>
</tr>
<tr>
<td>Pleistophora sp.</td>
<td><em>Callinectes sapidus</em></td>
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<tr>
<td>Glugea weissenbergi</td>
<td><em>Fundulus heteroclitus</em></td>
</tr>
<tr>
<td>Dermocystidium marinum</td>
<td><em>Apeltes quadracus</em></td>
</tr>
<tr>
<td>Dermocystidium sp.</td>
<td><em>Crassostrea virginica</em></td>
</tr>
<tr>
<td>Lagenidium callinectes</td>
<td><em>Macoma ballica</em></td>
</tr>
<tr>
<td><em>Vibrio parahaemolyticus</em></td>
<td><em>Callinectes sapidus</em></td>
</tr>
<tr>
<td>Pasteurella sp.</td>
<td><em>Callinectes sapidus</em></td>
</tr>
<tr>
<td>Lymphocystis virus</td>
<td><em>Neopanope texana</em></td>
</tr>
<tr>
<td></td>
<td><em>Callinectes sapidus</em></td>
</tr>
<tr>
<td></td>
<td><em>Roccus americanus</em></td>
</tr>
<tr>
<td></td>
<td><em>Roccus saxatilis</em></td>
</tr>
</tbody>
</table>

**SOME BACTERIA OF CHESAPEAKE BAY**

R. R. Colwell

*Vibrio* spp. (including *V. parahaemolyticus*). See also p. 75.

*Pseudomonas* spp. (including *P. fluorescens*).

*Achromobacter* spp.

*Cytophaga* spp.

*Flavobacterium* spp.

*Micrococcus* spp.

*Bacillus* spp.

*Enterobacter* spp.

*Proteus* spp.

*Achromobacter* spp.

*Caulobacter* spp.

*Saprospira* spp.

*Spirillum* spp.

*Azotobacter* spp.

*Nitrosomonas* spp.

*Thiobacillus* spp. (including *T. denitrificans*).

*Desulfovibrio* spp.

**REFERENCES**

Several publications have appeared on bacteria normally found in Chesapeake Bay. The information given above is mainly from the following references.


Some parasites of Chesapeake Bay fauna

by D. E. Zwerner and A. R. Lawler

Parasitology Section

Phylum Protozoa

Subphylum Sarcomastigophora
Superclass Mastigophora
Class Phytamastigophorea
Order Dinoflagellida
Family Blastodiniidae
Oodinium cyprinodontum Lawler, 1967. YR, on gills of Fundulus majalis (Walbaum), F. heteroclitus (Linnaeus), Cyprinodon variegatus Lacepede, Lucania parva (Baird) (Lawler, 1967); ES (Wachapreague), on gills of Fundulus luciae (Baird). (Lawler, 1968).

Subphylum Sporozoa
Class Haplosporea
Order Haplosporida

Subphylum Cnidospora
Class Myxosporidea
Order Myxosporida
Family Sphaerosporidae
Sphaerospora renalis Bond, 1937. CB (Baltimore, Md.) in F. heteroclitus (Linnaeus). (Bond, 1937).

Family Myxidiidae
Myxidium folium Bond, 1937. CB (Baltimore, Md.) in hepatic ducts and gall bladder of F. heteroclitus (Linnaeus). (Bond, 1937).

Family Myxosomatidae

Myxosoma subtecalis Bond, 1937. CB (Baltimore, Md.) in viscera, fat of cranial cavity, and kidney of F. heteroclitus (Linnaeus). (Bond, 1937).

Family Myxobolidae
Myxobolus bilineatum Bond, 1938. CB (Baltimore, Md.) in brain and viscera of F. heteroclitus (Linnaeus). (Bond, 1938).

Myxobolus sp. YR, from F. heteroclitus (Linnaeus). (Owens in Dillon, 1966).

Class Microsporidea
Order Microsporida
Family Nosematidae
Glugea hertwigi Weissenberg, 1911. CB, F. heteroclitus (Linnaeus). (Bond, 1938).


Phylum Platyhelminthes

Class Trematoda
Order Monogenea
Suborder Monopisthocotylea
Superfamily Gyroactylyoidea
Family Gyroactylidae
Subfamily Gyroactylinae
Gyroactylus prolongis Hargis, 1955. YR, 10-IV-64 on skin of C. variegatus Lacepede, new host record, ARL. YR, on skin of F. heteroclitus (Linnaeus) and F. majalis (Walbaum). (Dillon and Lawler in Dillon, 1966).
Gyrodactylus stephanus Mueller, 1937. YR, 10-IV-64, on skin of C. variegatus Lacepede, new host record, ARL. YR, on skin of P. heteroclitus (Linnaeus) and P. majoralis (Walbaum). (Dillon and Lawler in Dillon, 1966).

SuperFamily Dactylogyroidea

Family Dactylogyridae

Subfamily Ancyrocephalinae

Ancyrocephalus parvus Linton, 1940. YR, on gills of Strongyliura marina (Walbaum). (Kingston et al., 1969).


Tetrancistrum longiphalus (MacCallum, 1915) Price, 1937. CB (York Spit), 4-IX-1957, new locality record. On gills of Chaetodipterus faber (Broussonet).

Family Diplectanidae

Diplectanum bilobatum Hargis, 1955. YR, 16-VI-59, on gills of Cynoscion nebulosus (Cuvier), new locality record.

Rhamnocercus Bairdiella Hargis, 1955. YR, on gills of Bairdiella chrysura (Lacepede), (Kingston et al., 1969).

Rhamnocercus stichospinus Seamster and Monaco, 1956. YR, 29-VII-60, on gills of Menticirrhus americanus (Linnaeus), new host and locality record.

SuperFamily Capsaloidea

Family Capsalidae

Subfamily Capsalinae


Subfamily Benedeniinae


Family Dioncidae

Dioncus agassizi Goto, 1900. Lower CB (Buckroe Beach Pier), 25-VI-68, on gills of Echeneis naucrates Linnaeus, new locality record, ARL.

Dioncus remorae (MacCallum, 1916) Price, 1938. Lower CB (Buckroe Beach Pier) 25-VI-68, on gills of E. naucrates Linnaeus, new locality record, ARL.

Family Loimidae


Family Loimopapillosidae

Subfamily Microbothriinae

Microbothrium spiculatum Olsson, 1869. CB, on skin near cloacal region of Squalus acanthias Linnaeus. (Dillon and Hargis, 1965a).

Family Monocotylidae

Subfamily Monocotyldae

Monocotyle diademalis Hargis, 1955. CB, on gills of Dasyatis americana Hildebrand and Schroeder, and on gills of Dasyatis sayi (Lesueur). (McMahon, 1963).


Subfamily Merizocotylinae


SuperFamily Udonelloidae

Family Udonellidae

Udonella caligorum Johnston, 1835. Offshore, 22-VIII-57, on Caligus sp. (parasitic copepod), on gills of Euthynus alletteratus (Rafinesque), new host and locality record; YR, 20-III-67, on Caligus sp. (parasitic copepod), on skin of Cyclopterus lumpus Linnaeus.
Suborder Polyopisthocotylea

Superfamily Diclidophoroidea

Family Diclidophoridae

Subfamily Diclidophorinae


Subfamily Choricotylinae


Choricotyle prionoti (MacCallum, 1917) Llewellyn, 1941. Offshore, 21-III-58, on gills of Priacanthus arenatus (Linnaeus), new host and locality record.

Choricotyle louisianensis Hargis, 1955. Offshore between Cape Hatteras and Washington Canyon, 5-9-V-66, on gills of Menticirrhus saxatilis Bloch & Schneider, new host and locality record, ARL.

Neoheterobothrium cynoscioni (MacCallum, 1917) Price, 1943. CB, YR, on gills of Cynoscion regalis (Bloch & Schneider). (Kingston et al., 1969).

Subfamily Pedocotylinae


Subfamily Bicotylophorinae


Family Discocotylidae

Subfamily Octomacrinae

Octomacrum microconfibula Hargis, 1952. Chickahominy River, 11-IV-60, on gills of Notemigonus crysoleucas (Mitchill).

Family Hexostomatidae

Neohexostoma euthynni (Meserve, 1938) Price, 1961. CB, on gills of Euthynnus alevis (Rafinesque), as Hexostoma sp. (Hargis, 1957), New Point, October 1955.

Family Macrovalvitrematidae


Family Mazocraeidae

Subfamily Clupeocotylinae

Clupeocotyle brevoortia Hargis, 1955. CB, on gills of Brevoortia tyrannus (Latrobe), (McMahon, 1963).

Subfamily Mazocraeoidinae


Superfamily Microcotyloidea

Family Microcotylidae

Subfamily Microcotylinae

Microcotyle macroura MacCallum and MacCallum, 1913. CB Bridge Tunnel, 23-XI-68, on gills of Morone saxatilis (Walbaum), new locality record, ARL.


Microcotyle pomatomi Goto, 1900. CB, on gills of Pomatomus saltatrix (Linnaeus). (McMahon, 1964).


Subfamily Metaricrocotylinae


Family Axinidae

Subfamily Heteraxininae


Subfamily Axinoidinae


Superfamily Gastrocotyloidea

Family Gastrocotylidae

Subfamily Gastrocotylinae

Neothoracocotyle acanthocybii (Meserve, 1938) Hargis, 1956. Offshore, southern edge of Norfolk Canyon, 20-VIII-67, on gills of Acanthocybium solanderi (Cuvier), new locality record, ARL.

Pseudaxine mexicana Meserve, 1938. CB, on gills of Scromberomorus maculatus (Mitchill). (McMahon, 1964).


Subfamily Gotoocotylinae

Gotoocotyla acanthophallus (MacCallum & MacCallum, 1913) Yamaguti, 1963. CB, on gills of Pomatomus saltatrix (Linnaeus), on gills of Scromberomorus maculatus (Mitchill). (McMahon, 1964). YR, 13-VI-68, on gills of Scromberomorus cavalla (Cuvier), new host for CB, ARL.

Subfamily Thoracocotylinae

Thoracocotyle crocea MacCallum, 1913. CB, on gills of S. maculatus (Mitchill). (McMahon, 1964).

Family Protomicrocotylidae

Subfamily Protomicrocotylinae

Protomicrocotyle mirabilis (MacCallum, 1918) Johnston and Tiegs, 1922. CB, Lynnhaven Inlet, 19-IX-58, on gills of Caranx hippos (Linnaeus), new locality record.

Order Digenea

Family Bucephalidae

Bucephalus cuculus McCrady, 1874. CB (Wicomico R.), sporocysts and cercariae in Crassostrea virginica.

Rhipidocotyle lintoni Hopkins, 1954. CB, adults in Strongylura marina (Walbaum); metacercariae in Menidia.

Rhipidocotyle transversale Chandler, 1934. CB, adults in S. marina (Walbaum); metacercariae in Menidia.

Family Fellodistomatidae


Family Heterophyidae

Ascoctyle diminuta Stunkard and Haviland, 1924. Annapolis, Md., metacercariae encysted in gills of Fundulus heteroclitus (Linnaeus). Natural final hosts probably piscivorous birds although adult worms have been recovered from wild rats (Stunkard and Uzmann, 1955).
Family Microphallidae
Megalophallus sp.
ES (Wachapreague), metacercariae in musculature, hepatopancreas, and gills of Callinectes sapidus. (Perkins, 1971).

Class Cestoda
Order Tetraphyllidea
Family Phyllobothriidae
Anthobothrium lacinatum Linton, 1890. CB (New Point Comfort), 30-IX-64, from spiral valve of Carcharhinus milberti (Valenciennes), new locality record, ARL.
Rhinebothrium maccallumi Linton, 1924. CB, in spiral valve of Dasyatis americana, Hildebrand and Schroeder. (Campbell, 1970).

Family Dioecotaeniidae
Dioecotaenia cancellata (Linton, 1890) Schmidt, 1969. CB (Solomons, Md.), in spiral valve of Rhinoptera bonasus (Mitchill). (Schmidt, 1969; Campbell, 1970).

Family Oncobothriidae
Acanthobothrium brevissime Linton, 1908. CB, in spiral valve of Dasyatis americana Hildebrand and Schroeder; in spiral valve of Raja eglanteria Bosco. (Campbell, 1969).
Acanthobothrium paulum Linton, 1890. CB, in spiral valve of Dasyatis americana Hildebrand and Schroeder; in spiral valve of Raja eglanteria Bosco. (Campbell, 1969).

PHYLUM ASCHELMINTHES

Class Nematoda
Order Dioctophymidea
Family Dioctophymidae
Eustrongylides sp. YR, from Fundulus heteroclitus (Linnaeus). (Owens in Dillon, 1966).

Order Ascarididea
Family Heterochelliidae
Subfamily Filocapsulariniae

Order Spiruridea
Family Cucullanidae
Subfamily Daenitoidinae
Dichelyne sp. Solomons, Md., mid-gut of Leiostomus xanthurus Lacepede. (Huizinga and Haley 1962). /D. lintoni (Barreto, 1922) has been reported from this host species. /
Order Philometridae
Family Dracunuculidae
Philometra rubra (Leidy, 1856). YM (mouth), 13-XII-70, in body cavity of Morone saxatilis (Walbaum). (Identified by M. Chitwood.)

PHYLUM ACANTHOCEPHALA

Order Echinorhynchidea
Family Pomphorhynchidae
Pomphorhynchus sp. Solomons, Md., immature specimens from Cynoscion regalis (Bloch and Schneider). (O'Rourk, 1949) P. tereticolle (Hud., 1809) was reported from this host at Woods Hole, Mass. by Linton (1889).

Family Rhadinorhynchidae
Subfamily Illiosentinae
Telosentis tenuicornis (Linton, 1891) Van Cleave, 1947. Solomons, Md., from intestine of following fishes: Anguilla rostrata (Le Sueur), Bairdiella chrysura (Lacepede), Leiostomus xanthurus Lacepede, Menidia menidia (Linnaeus), Micropogon undulatus (Linnaeus), Morone americana (Gmelin), Orthopristis chrysoptera (Linnaeus). (Huizinga and Haley, 1962). O'Rourk (1949) reports immature forms of this species from Cynoscion regalis (Bloch and Schneider) as well as from previously mentioned L. xanthurus and M. undulatus.

Subfamily Serrasentinae
Serrasentis socialis (Leidy, 1851) Van Cleave, 1924. Solomons, Md., immature specimens in intestine of Cynoscion regalis (Bloch and Schneider), Leiostomus xanthurus Lacepede, and Micropogon undulatus (Linnaeus). O'Rourk (1949), all, and Huizinga and Haley (1962) for L. xanthurus.

PHYLUM ANNELIDA (see Hirudinea, p. 120)

PHYLUM ARTHROPODA

Class Crustacea
Subclass Copepoda
Order Cyclopidea
Family Notodelphyidae
Doropygus laticornis Wilson, 1932. GP, abundant in atrium of Molgula, July, MW.

Family Bomolochidae
Bomolochus eminens Wilson, 1911. Point No Point, Md., fish parasite, local host unknown, CBW.

Family Ergasilidae
Ergasilus cerastes Roberts, 1969. PR, 24-IX-58, on gills of Ictalurus catus (Linnaeus). See record for this species in free living Copepoda section.

Ergasilus labracis Krøyer, 1863. CB, on gills of Morone saxatilis (Walbaum). (Roberts, 1970).

Ergasilus lizae Krøyer, 1863. Ware R., MobJack Bay, 16-VIII-58, on gills of Mugil cephalus Linnaeus.

Ergasilus manicatus Wilson, 1911. YR, Sarah's Creek and GP, on gills of Fundulus heteroclitus (Linnaeus) and F. majalis (Walbaum) on 15-VI-70 and 19-X-67 respectively.

Order Caligidea
Superfamily Caligoidea
Family Caligidae
Subfamily Caliginae
Caligus chelifer Wilson, 1905. Oceanic, rare, TEB, ECT.

Caligus schistonyx Wilson, 1905. Lower CB, scarce TEB, ECT; on Brevoortia tyrannus (Latrobe), CBW.
Parapetalus gunteri Pearse, 1952. CB (YR, Seaford, Windmill Point) 18-VII-63, on Rachycentron canadum (Linnaeus), new locality record.

Family Cecropidae
Cecrops latreillii Leach, 1816. Offshore, Virginia Capes, 13-1-67, on Mola mola (Linnaeus), new locality record.

Family Eirgidae
Eirgos anurus Bere, 1936. CB (YR, York Spit) on gills of Chaetodon faber (Broussonet) 4-IX-57, new locality record.

Family Euryphoridae
Subfamily Euryphorinae
Gloiopotes hygmnanus Steenstrup and Lutken, 1861. Offshore, southern edge of Norfolk Canyon, 20-VIII-67, on Acanthocybium solanderi (Cuvier), new locality record.

Gloiopotes ornatus Wilson, 1905. Off Virginia seacoast, on Makaira nigricans Lacepede.

Family Pandaridae
Pandarus smithii Rathbun, 1886. ES (Wachapreague), on skin of Odontaspis taurus (Rafinesque).

Superfamily Dichelesthioidea
Family Anthosomatidae
Lernanthropus brevoortiae Rathbun, 1887. CB (YR, York Spit), 30-VII-57, on gills of Brevoortia tyrannus (Latrobe).

Lernanthropus gisleri v. Beneden, 1852. YR, V and VII on gills of Centropomus undecimalis (Cuvier).

Lernanthropus pomatomi Rathbun, 1887. CB, on gills of Pomatomus saltatrix (Linnaeus).

Lernanthropus pupa Burmeister, 1823. YR, V and VI, on gills of Chaetodontus faber (Broussonet).

Family Dichelesthiidae

Family Eudactylinidae
Eudactylina turgipes Bere, 1936. YR, 22-IX-58, on Gymnura micrura (Bloch & Schneider), new locality record.

Nemesis atlantica Wilson, 1922. ES (Wachapreague), 14-VII-66, on Khizoprionodon terraenovae (Richardson), new locality record.

Family Pseudocycnidae
Pseudocycnus appendiculatus Heller, 1868. ES (Wachapreague and offshore) IX, on gills of Euthynnus aleteratus (Rafinesque).

Pseudocycnopsis buccata (Wilson, 1922). YR, IX-58, on gills of Scomberomorus cavalla (Cuvier) and S. maculatus (Mitchill), new locality record.

Superfamily Lernaeoidea
Family Lernaeidae
Subfamily Lernaeentricinae

Lernaeneicus radiatus (Lesueur, 1824). CB, adult females imbedded in many fishes, among them are Brevoortia tyrannus (Latrobe), Leiostomus xanthurus Lacepede, Fundulus majalis (Walbaum), and others. Copepodid larvae of this parasite, formerly known as Lerneocera centropristis Pearse, 1947, found on gills of Centropristis striata (Linnaeus).
Order Lernaeopodidea
Family Chondracanthidae
Subfamily Chondracanthinae
*Pseudochondracanthus diceraus* Wilson, 1908. CB (York Spit) 30-VII-57, on gills of *Sphaeroides maculatus* (Bloch and Schneider), new locality record.

Family Lernaeopodidae
Subfamily Clavellinae

*Brachiella thynni* Cuvier, 1830. Offshore, southern edge of Norfolk Canyon, 20-VII-67, on *Acanthocybium solandri* (Cuvier), new locality record.

*Clavelissa spinosa* Wilson, 1915. YR, XI-55, on gills of *Brevoortia tyrannus* (Latrobe), new locality record.

Subfamily Lerneopodinae

Subclass Branchiura
Order Argulidea
Family Argulidae
Subfamily Argulininae
*Argulus aiosae* Gould, 1841. Lower YR, 24-X-70, discovered in a bucket containing the scyphozoan medusa *Rhopilema verrilli* (Pewkes, 1887). /Identified by R. F. Cressey./


*Argulus sp.* GP, 12-VII-62, on skin of *Fundulus majalis* (Walbaum). R. F. Cressey is describing this as a new species.

ADDENDUM

Some Parasites of Chesapeake Bay Fauna
/Identifications by Dr. Robin M. Overstreet, Gulf Coast Research Laboratory, Ocean Springs, Mississippi; collections by Dr. A. R. Lawler/

Order Digenea
Family Lepocreadiidae

Family Opecoelidae
*Opecoeloides vitellosus* (Linton, 1900) von Wicklen, 1946. YR, 23-IX-64, adult in *Chasmodes bosquianus* (Lacepede), new host record. YR, 14-VII-63, adult in *Prionotus carolinus* (Linnaeus), new host record. This is a new locality record for this species.

Family Fellodistomatidae
Parahemiurus merus (Linton, 1910) Woolcock, 1935. James River (36°59.'9 N, 76°29.'4 W), 4-IX-64, adult in Menticirrhus americanus (Linnaeus) or (?) M. saxatilis (Bloch & Schneider), new host record. YR, 22-VII-65, adult in Pomatomus saltatrix (Linnaeus), new host record. This is a new locality record for this species.
Literature Cited


General Parasitological References


A well illustrated key to species of parasites of Russian freshwater fishes. Though this book obviously deals with exotic species, the keys and illustrations can be helpful in the identification of local parasite fauna down to the generic level and when intercontinental species are encountered. Book reviewed by G. L. Hoffman (1966, J. Parasit. 52(1):191).


A quarterly abstract journal with an author and subject index.


A good collection of papers illustrating the ecological aspects of the host-parasite relationship in both marine and freshwater environments. Zoogeography, specificity, and parasites as disease-causing organisms are some of the topics covered. This book is not useful in identifying fish parasites but contains excellent background material.


A guide to the collection, preparation, and identification of parasites of North American freshwater fishes. Since some parasites of brackish water fishes and anadromous fishes are also included, this volume is of use in identifying parasito-fauna from the Chesapeake Bay area. Book reviewed by R. M. Cable (1968, J. Parasit. 54(1):149).


Author gives a useful survey of parasitism among marine animals arranged in taxonomic order of parasite.


The Catalogue is a compendium of the world's literature on parasitology and is designed as a working tool for research workers to determine what is known about animal parasites." (Becklund, 1969, J. Parasit. 55(2):381-384.) See this reference for a description of the various sections of the Catalogue and suggestions for its use.

Covers both parasitic and free-living forms. Contains a good discussion of protozoan biology (ecology, morphology, physiology, reproduction, variation, and heredity) together with a systematic section which includes keys to genera.


A relatively easy to follow key to the genera of monogeneids, digeneids, and aspidogastrids known to occur in North America, north of Mexico. Book reviewed by R. M. Cable (1970, J. Parasit. 56(6):1073).


Contains keys to genera of both the Eucestoda and Cestodaria arranged in an easy to follow format. As in other manuals of the "How to know-" series, general biological information and glossary of terms, together with many illustrations, are included.


The book with its companion bibliography covers the biology of certain parasites and diseases of most commercially important saltwater host species and is based on the author's experience in this field and the literature. Book reviewed by R. F. Nigrelli (1971, Trans. Amer. Fish. Soc. 100(1):146).


Contains a comprehensive section on general aspects of cestode biology as well as a descriptive section complete with keys to genera and, in some cases, to species. Book reviewed by J. F. Mueller (1969, J. Parasit. 55(1):103).

Yamaguti, S. 1958-1963. Systema Helminthum. A fairly comprehensive taxonomic treatment, complete with keys to genera, of the parasitic helminths of vertebrates can be found in the seven book series by S. Yamaguti, Systema Helminthum. These works offer a good starting point toward the identification of helminth parasites. The lists of species and bibliographies are fairly complete; several drawbacks include their cost ($45-$80 per book) and lack of a host-parasite listing.


This part contains the text of the systematic treatment of the digeneids and is divided into five parts by host: Fishes, Amphibians, Reptiles, Birds, and Mammals.


Part II includes a systematic survey of the digenea, bibliography, plates, and index.


Divided into similar sections as vol. I, but included in one book.


Contains text of systematic treatment arranged by host: Fishes, Amphibians, Reptiles, Birds, and Mammals.


Contains systematic survey of the nematodes, bibliography, plates and index.

Includes text dealing with the general systematics of Monogenea and Aspidocotylea, systematic survey of each group, bibliography, plates, and index.


Divided into similar sections but included in one book.


This volume follows the same pattern as those in his *Systema Helminthum* series.


Annual bibliography of the world's literature in the field of taxonomic zoology with three indices: Author, subject, and systematic. Sections to check for parasites: 1 (Comprehensive zoology), 2 (Protozoa), 6 (Vermes), 10 (Crustacea), and 15 (Pisces - (as hosts)).
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Chapter V: Free-living Invertebrates (except Protozoa)

Marvin L. Wass

This is the fourth revision of the list of invertebrates done by Dr. Willis G. Hewatt in 1959. The 7-year period since the last list was done has seen the publication of many papers and the accumulation of much data. The assistance of several authorities has also enhanced the list. The 819 species are composed mainly of 297 arthropods, 120 mollusks, 109 polychaetes and 72 cnidarians. Most of these organisms are readily observed but not always easily identified. Among smaller organisms we may still expect some additions to the 96 nematodes, 24 nemertes and 22 flatworms.

Information on life histories and physical tolerances are much needed, although communities and biological interactions likewise merit attention. The insects are omitted from the list and thus are the most needed addition to a future work.

The cnidarians have been done by Dale Calder, the copepods by Victor G. Burrell and David Zwerner, the decapod crustaceans by Willard A. Van Engel and Paul A. Sandifer, and several other arthropod groups also by W. A. Van Engel.

Species data (when known) are given in this order: salinity ("Venice" system), area, abundance, substrate, depth, collector and identifying authority. Authorities are listed alphabetically below by surname. Others are mentioned in the introductions to certain taxa.

JDA Jay D. Andrews, VIMS
DFB Donald F. Boesch, VIMS
TEB Thomas E. Bowman, Smithsonian Institution
VGB Victor G. Burrell, South Carolina Marine Research Division
PC Paul Chanley
HE Herbert Elliott
JBF James B. Feeley
DG Daniel Gibson
GGG George D. Grice, Woods Hole Oceanographic Institute
SH Sewell Hopkins, Texas A. and M. University
WGH Willis G. Hewatt, Texas Christian University
HPJ Harry P. Jeffries, Narragansett Marine Laboratory
FJSM Frank J. S. Maturo, Jr., University of Florida
GAM G. Alex Marsh, III, Florida Atlantic University
JPEM Joseph P. E. Morrison, Smithsonian Institution
RCO Raymond C. Osburn
RC Robert Orth, University of Maryland
MF Marian H. Pettibone, Smithsonian Institution
MR Michael Richardson, Oregon State University
FS Frank J. Schwartz
PAS Paul A. Sandifer
WT Willis L. Tressler
WAVE Willard A. Van Engel, VIMS
CBW Charles Branch Wilson
HW Harry W. Wells
HCY Harry C. Yeatman

The following area abbreviations are used:

CB Chesapeake Bay
SI Solomon's Island
TML Tuck Marshes Light
GP Gloucester Point
MR Mattaponi River
JR James River
PR Pamunkey River
RR Rappahannock River
YR York River
HR Hampton Roads
ES Eastern Shore
YS York Spit
PHYLUM PORIFERA: CLASS DEMOSPONGIAE

Order Haplosclerina
Family Haliclondidae
Haliclona permollis (Bowerbank, 1866). Meso- and polyhaline. GP, abundant, MW.


Order Poecilosclerina
Family Microcionidae
Microciona prolifera (Ellis and Solander, 1786). Meso- to polyhaline. YR, abundant on piling in summer, deeper water in winter, MW.

Family Myxillidae
Lissodendoryx carolinensis Wilson, 1911. Meso- and polyhaline. Stinking sponge, abundant in summer, WH.

Family Ophlitaspongiidae
Mycale sp. GP, 18-VI-68, color differs from Mycale cecilia, DFB, HW. On Zostera blades and forming mass at base of clump, GAM.

Order Halichondrina
Family Halichondridae
Halichondria bowerbanki Burton, 1930. Upper meso- to euhaline. Most conspicuous fouling sponge in summer, MW.

Order Hadromerina
Family Suberitidae
Prosuberites microsclerus de Laubenfels, 1936. Upper meso- and polyhaline. YR?, forms thin encrustations on shells of Urosalpinx in eel grass beds, GAM, HW.

Family Clionidae (See Hopkins, 1962).
Cliona pelata Grant, 1826. ES (Seaside), 14-36 ppt, (Hopkins, 1962).
Cliona lobata Hancock, 1849. Mostly ES (Bayside), 14-27 ppt, SH.
Cliona truitti Old, 1941. ES, 3-27 ppt, SH.
Cliona vastifica Hancock, 1849. ES (Bayside and Seaside), 14-36 ppt, scarce species, SH.

Order Choristida
Family Crainellidae
Craniella crania (Muller, 1776). Polyhaline. CB (Rappahannock Shoals), aggregated on coarse sand, depth 30 feet, rare, summer, MW.

Craniella laminaris (George and Wilson, 1919.) Polyhaline. Abundant at mouth of YR on sand to silty-sand, summer, MW.

REFERENCES


PHYLUM CNIDARIA
by Dale Calder

Class Hydrozoa
Order Anthomedusae (Athecata)
Suborder Capitata

Family Moerisiidae
Moerisia lyonsi Boulenger, 1908. Oligo- and mesohaline.
  Hydroid: JR (Deep Water Shoal to Hog Is.), on plant detritus, Brachidontes recurvus shells.

Family Tubulariidae
Ectopleura dumortieri (van Beneden, 1844). Meso- and polyhaline.
  Hydroid: JR (Deep Water Shoal to Hog Is.), YR (TML to Aberdeen Creek), RR (Urbanna).
  April-January.
  Medusa: YR (GP). April-December, common to abundant in autumn.

Hybocodon prolifer L. Agassiz, 1862. Polyhaline.
  Hydroid: CB (C 00). One specimen, 29-II-68, V. G. Burrell, Jr.
  Tubularia crocea (L. Agassiz, 1862). Polyhaline.
  Hydroid: CB (southeastern region). Abundant late summer on Bridge-Tunnel pilings.

Family Halocordylidae
Halocordyle disticha (Goldfuss, 1820). Meso- and polyhaline.
  Hydroid: CB (Cape Charles), JR (Hampton Roads), YR (Perrin, GP), common on Zostera. June-October.

Family Corynidae
Dipurena strangulata McCrady, 1857. Meso- and polyhaline.
  Hydroid: YR (GP), Pages Rock, only on Microciona prolifera. May-November.
  Medusa: YR (GP). June-October, common to abundant in summer.

Sarsia tubulosa (M. Sars, 1885). Meso- and polyhaline.
  Medusa: YR (GP). December-April.

Linvillea agassizi (McCrady, 1857). Meso- and polyhaline.

Family Zancleidae
Zanclea costata Gegenbaur, 1856. Polyhaline.
  Hydroid: CB (Fisherman's Is.). One record, 29-VIII-67, on Schizoporella errata.
  Medusa: Medusa buds on hydroid.

Suborder Filifera

Family Clavidae
Cordylophora caspia (Pallas, 1771). Limnetic and oligohaline.
  Hydroid: JR (Deep Water Shoal to Jamestown Is.), MR (Indian Reservation), RR (Tappahannock).
  Turritopsis nutricula McCrady, 1856. Meso- and polyhaline.
  Hydroid: CB (Fisherman's Is.), JR (Hampton Roads), YR (Guinea Neck). Common on sponges. May-November.

Family Hydractiniidae
Hydractinia argo (Clarke, 1882). Meso- and polyhaline.
  Hydroid: YR (GP). Lives only a few hours. June-September.

Hydractinia echinata (Fleming, 1828). Polyhaline.
  Hydroid: CB (Fisherman's Is., Kiptopeke, Cape Charles, New Point Comfort), JR (Hampton Roads), YR (Guinea Neck).

Podocoryne minima (Trinci, 1903). Polyhaline.
  Medusa: YR (GP). September-October.

Family Rathkeidae
Rathkea octopunctata (M. Sars, 1835). Meso- and polyhaline.
  Medusa: YR (GP), Severn R. Common to abundant late autumn, early winter. November-December.
Family Bougainvillididae

Bougainvilia carolinensis (McCredy, 1857). Polyhaline.

Medusa: CB (Kiptopeke). In VIMS plankton sample taken 10-X-61.

Bougainvilia rugosa Clarke, 1882. Meso- and polyhaline.

Hydroid: JR (Hampton Roads), YR (Ellen Is., GP). Common to abundant on pilings. April-December.


Garveia cerulea (Clarke, 1882). Polyhaline.

Hydroid: JR (Hampton Roads).

Garveia franciscana (Torrey, 1902). Oligo- and mesohaline.

Hydroid: JR (Hampton Roads). Easily confused for and possibly synonymous with G. cerulea. Either or both species very widespread and abundant in mesohaline.


Hydroid: JR (Hampton Roads), YR (GP). Frequently common at water line of floating objects. October-June, gonophores November-June.


Hydroid: Young stage obtained from planulae in the lab. Not seen in nature.

Medusa: CB (COO to TML), JR (Hampton Roads), YR (TML to West Point), RR (Urbanna). Most conspicuous hydromedusa in lower bay. Common to abundant sporadically throughout the year.

Family Pandeleidae


Hydroid: CB (Fisherman's Is., Cape Charles). Collected twice during August, 1967, on Alcyonidium verrilli.

Medusa: Liberated in lab from hydroids and reared to maturity. One specimen from plankton, GP, August 1970.

Family Proboscidactylidae

Proboscidactyla ornata (McCredy, 1857). Meso- and polyhaline.


Family Eudendriidae

Eudendrium album Nutting, 1898. Meso- and polyhaline.


Eudendrium carneum Clarke, 1882. No data available.

Hydroid: JR (Hampton Roads). Not recorded locally since described by Clarke (1882).

Eudendrium ramosum (Linnaeus, 1758). Polyhaline.

Hydroid: JR (Hampton Roads), YR (off Vepco Yorktown).

Order Leptomedusae (Thecata)

Family Haleciidae

Halecium gracile Verrill, 1874. Polyhaline.


Family Campanulariidae

Clytia cylindrica L. Agassiz, 1862. Polyhaline

Hydroid: JR (Hampton Roads), YR (TML, Ferrin, Vepco Yorktown, GP).

Clytia edwardsi (Nutting, 1901). Meso- and polyhaline.

Hydroid: CB (Bridge-Tunnel, Thimble Shoal, Willoughby Bank), JR (Hampton Roads), YR (GP, Bell Rock). October-July, common in winter and spring.

Medusa: Liberated from hydroid in lab during April, 1966 and 1967.

Clytia hemisphaerica (Linnaeus, 1767). Euryhaline.


Clytia kincaidi (Nutting, 1899). Polyhaline

Hydroid: JR (Hampton Roads), YR (GP). Evidently rare.

Clytia paulensis (Vanhoffen, 1910). Meso- and polyhaline.


Medusa: Obtained in lab from hydroid, summer 1967.
Obelia bicuspidata Clark, 1876. Polyhaline.
Hydroid: JR (Hampton Roads), YR (Vepco Yorktown).
Medusa: Obtained in lab from hydroid, September 1967.

Obelia commissuralis McCrady, 1857. Meso- and polyhaline.
Hydroid: CB (Bridge-Tunnel, mid-bay--37°15'N, 76°10'W),
JR (Hampton Roads), YR (GP).
Medusa: Obtained in lab from hydroid, May, September, 1966.

Obelia dichotoma (Linnaeus, 1758). Meso- and polyhaline.
Hydroid: CB (Kiptopeke, New Point Comfort), YR (TML, GP).
Common near mean low water on pilings during summer at GP.
May-November.
Medusa: Obtained in lab from hydroid, June 1966.

Obelia longisima (Pallas, 1766). Polyhaline.
Hydroid: JR (Bridgewater, Pottawatomie). YR (GP).
Medusa: Obtained in lab from hydroid, March 1968.

Obelia spp. Meso- and polyhaline.
Medusa: YR (GP). The various species of Obelia medusae cannot
be distinguished at present. May-October.

Hydroid: Abundant throughout the lower bay and tributaries.
November-June, gonophores November-June.

Hartlaubella gelatinosa (Pallas, 1766). Meso- and polyhaline.
Hydroid: CB (Bridge-Tunnel, Thimble Shoal, Willoughby Bank),
JR (Hampton Roads), YR (GP, Pages Rock). November-June.

Family Lovenellidae
Eucheliota ventricularis McCrady, 1857. Polyhaline.
Medusa: JR (Hampton Roads), YR (GP). September-October.

Loivenella gracilis Clarke, 1882. Meso- and polyhaline.
Medusa: YR (GP). Also obtained from hydroid and reared in lab.
July-October.

Family Phialellidae
Phialucia carolinae (Mayer, 1900). Polyhaline.

Incertae Sedis
Medusa: JR (Hampton Roads), recorded by Mayer (1910), RPC.
October-November.

"Campanopsis" sp. Polyhaline.
Hydroid: YR (GP).

"Campanula" sp. 1. Polyhaline.

"Campanula" sp. 2. Oligo- and mesohaline.
Hydroid: NR (Newman's Pt.), JR (Pig Pt., Bennett's Creek, Deep Water Shoal, Hog Is.), YR (Pages Rock, Bell Rock), PR (West Point, F-35).
Medusa: Obtained in lab from hydroid, July, August, 1967.

Family Eutimidae
Eutima mira McCrady, 1857. Polyhaline.
Medusa: CB (Kiptopeke). In VIMS plankton sample taken 10-X-61.

Family Sertulariidae
Dynamena cornicina McCrady, 1857. Meso- and polyhaline.
Hydroid: CB (Cape Charles, Little Creek Jetty), JR (Hampton Roads),

Sertularia argentea Linnaeus, 1758. Meso- and polyhaline.
Hydroid: Abundant throughout lower bay and tributaries on sandy
and shelly bottoms. September-June, gonophores November-May.
Family Plumulariidae
Schizotricha tenella (Verrill, 1874). Meso- and polyhaline.
Hydroid: Common to abundant throughout lower bay and tributaries, particularly on pilings, etc. May-December, gonophores May-October.

Order Limnomedusae
Family Olindiidae
Maeotias inexpectata (Ostroumov, 1896). Oligo- and mesohaline.

Order Trachymedusae
Family Geryonidae
Liriope tetraphylla (Chamisso and Eysenhardt, 1821). Polyhaline.

Family Rhopalonematidae
Aglanthe digitale (O. F. Müller, 1776). Polyhaline.
Medusa: CB (COO). In VIMS plankton sample taken 13-III-61.

Order Narcomedusae
Family Cuninidae
Cunina octonaria McCrady, 1857. Polyhaline.

Order Siphonophora
Suborder Cystonectae
Family Rhizophysaliidae
Physalia physalis (L., 1758). Virginia Beach, VIII-62, WGH.

Family Chondrophoridae
Porpita linnaea Lesson. On beach at Sand Bridge, WGH.

Class Scyphozoa
Order Semaeostomeae
Family Pelagiidae
Chrysaora quinquecirrha (Desor, 1848). Meso- and polyhaline. Abundant, lower bay and tributaries. Ephyrae usually appearing late April, early May, medusae disappearing September, rarely lasting into November.

Family Cyaneidae
Cyanea capillata (Linnaeus, 1758). Meso- and polyhaline.
Abundant, lower bay and tributaries. Ephyrae usually appearing late November or early December; medusae disappearing May or June.

Family Ulmaridae
Aurelia aurita (Linnaeus, 1758). Meso- and polyhaline.
Common to abundant in lower bay and tributaries. Ephyrae appearing late May or early June; medusae disappearing November.

Order Rhizostomeae
Family Rhizostomatidae
Rhopilema verrilli (Fowkes, 1887). Polyhaline. Occasionally seen from York River entrance to GP, and along barrier islands, ES, autumn, early winter. Large specimen (45 cm diameter, 12 kg), Chincoteague, Va., 1-I-71.

Class Anthozoa
Subclass Alcyonaria
Order Gorgonacea
Family Gorgoniidae

Subclass Zoantharia (Members of the first two orders have been determined from this area by Charles E. Cutress).
Order Actiniaria

Family Edwardsiidae

**Edwardsia elegans** Verrill, 1869. Mesohaline. Small, abundant in sandy-mud. Y-5, 0-105 feet, to 400/m².

**Nematostella vectensis** Stephenson, 1935. Oligohaline in CB. Common in Machodoc Creek in silt, 1963. Not yet found elsewhere in CB.

Family Ilyanthidae

**Haloclava producta** (Stimpson, 1856). YR (Channel off York-town, one specimen.

Family Actinostolidae

**Paranthus rapiformis** (LeSueur, 1817). Upper poly- and euhaline. West of Cape Charles City, Virginia in sand, MW. C3 (mouth), common, DBF.

Family Diadumenidae

**Diadumene leucolena** (Verrill, 1866). Upper meso- and polyhaline. Common green-brown anemone above low water line on pilings; often pink in deeper water, as on oyster rocks, MW.

Family Aiptasiidae


Family Aiptasiomorphidae

**Aiptasiomorpha luciae** (Verrill, 1898). Upper meso- and polyhaline. Dark, yellow-striped anemone abundant on pilings and shells. YR (Munfort Is.) abundant on Zostera May-December. (See Woods Hole Keys for alternate name of this species.)

Order Cerianthidea

Family Cerianthidae

**Ceriantheopsis americanus** (Verrill, 1864). Polyhaline. In silty-clay at depths of 20-70 feet.

Order Madreporaria

Family Astraeidae

**Astrangia danae** Agassiz, 1847. Euhaline. RPC, mouth of Chesapeake Bay, scarce. ES (Hog Island Bay) common, winter, 1964, PC.

ADDITION

Class Scyphozoa

Order Semaecostomeae

Family Pelagidae

**Pelagia noctiluca** (Forskal, 1775). Euhaline. Wachapreague Inlet, X-71, VGB.

REFERENCES


**PHYLUM Ctenophora**

Class Tentaculata
Order Lobata
Mnemiopsis leidyi A. Agassiz, 1865. Meso- to euhaline. Common to abundant most of the year. CB, less common, apparently because of predation by Beroe, VB.

Class Nuda
Order Beroidea
Beroe ovata Chamisso and Eysenhardt, 1821. Upper meso- and polyhaline. CB, late summer and fall, abundant, VB. Potomac River, III and IV, FS.

**REFERENCES**


information on the Class Turbellaria, except for the triclads and polyclads, is from Ferguson and Jones (1949) unless otherwise indicated. All records are from the Lafayette River, Norfolk, Virginia, brackish shallows, unless otherwise noted. Freshwater rhabdocoels are omitted. The list has numerous errata in other groups, but literature was not available to check the accuracy of this class.

The Turbellaria are obviously one of the most poorly known large groups of meiofauna in the Chesapeake Bay. Interested students should consult the "Woods Hole keys" and Libbie Hyman's works.

**Class Turbellaria**

**Order Acoela**

- **Family Convolutidae**
  - *Chilidia groenlandica* (Levinson, 1879). *C. spinosa* in Ferguson and Jones (1949).
  - *Aphanostoma* sp. Possibly *A. diversicolor* Oersted, 1845.

**Family Monocherus** sp.

**Order Rhabdocoela**

- **Family Microstomidae**
  - *Macrostomum beaufortensis* Ferguson, 1937.
  - *Macrostomum ruebushi* var. *kepneri* Ferguson and Jones, 1940. Tanner's Creek, Norfolk, Virginia (Ferguson and Jones, 1940).

**Family ?**

- *Omaliostomum schultzei* Claparede, 1863.

**Family Graffillidae**

- *Vejdovskya* sp.

**Family Dalyellidae**

- *Jensenia lewisi* Jones and Ferguson, 1948. Mason's Creek, Norfolk, Virginia, 1939.

**Family Proxenetidae**

- *Proxenetes* sp.

**Family Trigonostomidae**

- *Trigonostomum* sp.

**Family ?**


**Family Polycystididae**

- *Phonorhynchus pearsei* Ferguson, Stirewalt, and Kepner, 1940. YR, 12 mi. from Williamsburg, less than 3 ppt; spring, 1939. (Ferguson et al., 1940).

**Order Alloceocoela**

- *Cylindrostomum triste* (Graff).
  - *Enterostomula graffii* (Beauchamp)
  - *Plagiostomum wilsoni* Graff.

**Family Monocelididae**

- *Monocelis* sp.

**Family Bdellouridae**

- *Archiloha wilsoni* Stirewalt, Kepner and Ferguson, 1940.

**Order Tricladida**

**Family Bdellouridae**

- *Bdelloura candida* (Girard, 1850). Euhaline. Commensal on *Limulus*.

**Order Polycladida**

**Family Stylochidae**

- *Coronadena mutabilis* (Verrill, 1873). Poly- and euhaline. YR (VIMS pier), numerous specimens; JR (Pier 12, Norfolk); ES (Cherrystone Creek) (Adrian Lawler, 1969).
  - *Stylochus ellipticus* (Girard, 1850). Upper meso- and polyhaline. To 100 ft., 340/m², preys on oysters and barnacles.

**Family Leptoplanidae**

- *Euplana gracilla* (Girard). Ocean View, Norfolk, Va., algal masses.

  - YR (Mumfort Is.), on *Zostera*, June to Nov.; absent in winter, GAM.
REFERENCES


Ferguson, F. F. and E. R. Jones 1949. A survey of the shoreline fauna of the Norfolk Peninsula. Amer. Midl. Natur. 41:436-446. A faunal list, much more lengthy for some groups, such as flatworms, than for others. Has 28 flatworms, 16 identified only to genus. Contains several errors.


GENERAL REFERENCES


Hyman, 1940 and Probursa veneris Hyman, 1944, bracket Virginia.
PHYLUM RHYNCHOCELA

(Members of this group were determined by William E. McCaul.)

Class Anopla
Order Paleonemertini
Family Tubulanidae
  Tubulanus pellucidus (Coe, 1895). Polyhaline. Lower CB, mud, 16 m; littoral habitats, usually among bryozoans, tunicates and algae; relatively abundant.

Family Carinomidae
  Carinoma tremaphoros Thompson, 1900. Poly- and euhaline. CB (Rapp. Shoals Channel), 0.5mm sieve, silt-clay, abundant (175/m²), MW.
  Carinomella lactea Coe, 1905. Poly- and euhaline. Lower CB and GP, below 8m, mud, scarce.

Order Heteronemertini
Family Lineidae
  Cerebratulus lacteus (Leidy, 1851) Polyhaline. Lower CB and YR to Yl0, occasionally abundant in shallow fine sand; scarce at 10 m.
  Cerebratulus luridus Verrill, 1873. Poly- and euhaline. Lower CB and GP, 8 m, silt clay, rare.
  Lineus bicolor Verrill, 1892. Polyhaline. YR, 13 m, mud, rare.
  Lineus pallidus Verrill, 1879. Euhaline. ES (Burton's Bay), silty-clay, one specimen.
  Lineus socialis (Leidy, 1855) Polyhaline. YR (Yorktown), subtidal sand, rare.
  Micrura leidyi (Verrill, 1892). Upper meso- and polyhaline. YR, Intertidal sand and mud, abundant.
  Micrura rubra Verrill, 1902. Polyhaline. CB, (off RR) one specimen, 15 m, mud.
  Parapodia aurantiaca Coe, 1895. Euhaline. ES (Hog I. Bay), sand-silt, one specimen.
  Zygocypiola rubens (Coe, 1895). Upper poly- and euhaline. ES, Intertidal sand, abundant, lower CB, 18 m, rare.

Class Enopla
Order Hoplonemertini
Family Carcinonemertidae
  Carcinonemertes carcinophila (Kolliker, 1945). Meso-to euhaline. Lower CB and tributaries, juveniles common on gills of blue crabs of all sizes and both sexes; adults common on gills and ripe egg masses of ovigerous crabs and on gills of previously spawned females; adult worms absent from male crabs, SH, WAVE.

Family Prosorchochmidae
  Oerstedia dorsalis (Abildgaard, 1806). Polyhaline. CB (Off RR), 20 m, sandy-silt, rare; GP, on Zostera, occasional.

Family Amphiporidae
  Amphiporus biculatus (McIntosh, 1873). Polyhaline. Lower YR, sandy-silt, 1-30 m, occasionally common.
  Amphiporus caecus Verrill, 1892. Upper meso- and polyhaline. CB (Off RR), coarse sand, 6 m, one specimen. YR (Mumfort I.) 3 specimens on Zostera, GAM.
  Amphiporus ochraceus Verrill, 1873. Upper meso- and polyhaline. GP, common on Zostera. YR (Mumfort I.), most common in June, GAM.
  Amphiporus rubropunctatus McCaul, 1963. Upper meso- to lower polyhaline. YR (Yorktown), one specimen; (Mumfort I.), two specimens; all on Zostera.
Family Tetrastemmatidae
Tetrastemma candidum (Muller, 1774). Lower polyhaline. GP, frequent on Zostera. (Not found by GAM).
Tetrastemma elegans (Girard, 1852). Upper meso- and lower polyhaline. GP, abundant on Zostera. YR (Mumfort I.), second most abundant nemertean on Zostera, GAM.
Tetrastemma jani McCaul, 1963. Upper mesohaline. YR (Mumfort I.), four specimens, WM; two specimens, GAM.
Tetrastemma vermiculus (Quatrefages, 1846). Upper meso- and lower polyhaline. YR, (GP) on Zostera, scarce; Mumfort I., one specimen, GAM.
Zygonemertes virescens (Verrill, 1879). Upper meso- and lower polyhaline. YR, on Zostera, very abundant; Mumfort I., most abundant nemertean, GAM.

Order Bdellonemertini
Family Malacobdellidae
Malacobdella grossa (Muller, 1776). Upper meso- and polyhaline. Commensal in mantle cavity of bivalves: the hard clam, Mercenaria mercenaria; the soft clam, Mya arenaria, and the oyster, Crassostrea virginica; occurrence spotty.

REFERENCES
PHYLUM NEMATODA

The free-living nematodes are included for the first time in this checklist. The records are from the pioneer work of Timm (1952) the later study by Wieser (1959), both in Maryland, Chitwood, 1951 (one species). Apparently no nematodes have been identified from the Chesapeake estuary in over a decade. Nematodes are variously organized by different authorities, the scheme of Wieser (1956-59) being used here. Anyone interested in studying nematodes should consult the recent works of Wieser and Hopper, who are working toward a monograph of the free-living marine nematodes of the eastern coast of North America. Since 96 species were found by Timm and Wieser, mostly in mesohaline areas with low diversity, it seems not unreasonable to expect ca 400 species in the Chesapeake estuary and tidal waters.

Order Enoploidea

Family Rhabditidae
- Rhabditis marina (Bastian, 1865). Chesapeake Beach, Md., eurytopic, frequent, WW.

Family Leptosomatidae
- Anticoma limulis Bastian, 1865. Cambridge, Md., mud, RT.

Family Oxystomidae
- Halalaimus gracilis de Man, 1888. Chesapeake Beach, Md., offshore mud, RT.
- Oxystomina elongata (Butschli, 1874). Annapolis and SI, Md., mud, RT.

Family Enoplidae
- Enoploides brunni Gerlach, 1957. South Beach, Chesapeake Beach, Md., fine sand, rare, WW.
- Enoplolaimus litoralis Schulz, 1936. Chesapeake Beach, Md., coarse sand, abundant, WW.
- Enoplus schulzi Gerlach, 1953. North Beach, Chesapeake Beach, Md., coarse sand, rare, WW.

Family Iroïdidae

Family Dorylaimidae
- Dolicholaimus bene papillosus Schulz, 1935. South Beach, Chesapeake Beach, Md., fine sand, rare, WW.
- Dorylaimus aestuarii Timm, 1952. SI, Md., on sponge and Membranipora, RT.
- Eurytostoma priapulus. Chesapeake Beach, Md., eurytopic, scarce, WW.

Family Oncholaimidae
- Adoncholaimus lopes (de Man, 1889). "Throughout the Bay, but in small numbers", RT.
- Anoplostoma exceptum Schultz, 1935. North Beach, Chesapeake Beach, Md., coarse sand, common, WW.
- Anoplostoma viviparum (Bastian, 1865). Plum Point and SI, Md., very abundant on barnacles and benthic debris, RT.
- Metoncholaimus unguentarius Wieser, 1959 (nomen nudum). South Beach, Chesapeake Beach, Md., fine sand, common, WW.
- Oncholaimus oxyure (Ditlev sen, 1911). Offshore sand and on barnacles throughout CB, but absent in winter, RT. Chesapeake Beach, Md., eurytopic, abundant, WW.
- Oncholaimus priapulus Wieser, 1959 (nomen nudum). North Beach, Chesapeake Beach, Md., coarse sand, rare, WW.
- Oncholaimus nigrocephalatus Cobb, 1930. Ubiquitous, abundant in decaying detritus, RT.
- Visco sia brach y laimoides Chitwood, 1937. SI, Md., mud, RT.
- Visco sia papillata Chitwood, 1951. Kent Narrows, Md., mud, RT.

Family Enchelidiidae
- Eurystomina minuta sc ulae Chitwood, 1951. SI, Md., sponge, RT.

Family Cyatholaimidae

*Ascolaimus elongatus* (Butschli). The family placement of this species could not be determined. North Beach, Chesapeake Beach, Md., coarse sand, rare, WW.


*Paracanthonchus caecus* (Bastian, 1865). CB, "present in every collection, the most abundant species in the Bay". An ovoviparous species, RT. "Most eurytopic of all species, WW."

Family Desmodoridae


*Chromadora quadrilineoides* Chitwood, 1951. Annapolis, Md., sponge and Membranipora, RT.

*Chromadorita crassa* Timm, 1952. Annapolis, Md., mud; Plum Pt., Md., tidepool. In one specimen the "intestinal cells" were filled with brown, vibrating bodies which Timm believed to be the first finding of Zooxanthellae in nematodes.


*Graphonema biserialis* Wieser, 1959 (nomen nudum). North Beach, Chesapeake Beach, Md., coarse sand, common.

*Odontophora axonolaimoides* Timm, 1952. Kent Narrows, Md., mud, RT. South Beach, Chesapeake Beach, Md., fine sand, scarce, WW.

*Odontophora setosa* (Allgen, 1929). Annapolis, Md., mud, RT.


Family Leptolaimidae

Leptolaimus papilliger de Man, 1876. Annapolis, Md., mud, RT.

Family Camacolaimidae

Aphanolaimus pulcher G. Schneider, 1906. Sandy Point, Md., offshore sand, RT.

Camacolaimus propinquus Allgen, 1929. Cambridge, Md., mud, RT.

Nemella occulta Cobb, 1920. Cambridge, Md., mud, RT.

Family Tripylidiidae

Bathytaurus assimilus de Man, 1922. Sandy Point, Md., shore sand, RT.


Tripyloides gracilis (Ditlevsen, 1919). Sandy Point, Md., shore sand, RT. South Beach, Chesapeake Beach, Md., fine sand, frequent, WW.


Order Monhysteroida

Family Linhomeidae


Eleutherolaimus stenosoma (de Man, 1907). Crisfield and SI, Md., mud, RT.

Paralinhomoeus conicaudatus Allgen, 1930. Cambridge, Md., mud, RT.


Terschellingia communis de Man, 1888. Crisfield and SI, Md., mud; one specimen "packed with elliptical sporozoans", RT.

Terschellingia longicaudata de Man, 1907. SI, Md., mud, RT.

Family Sphaerolaimidae

Diploaimella allgeni W. Schneider, 1937. Sandy Point, Md., offshore sand. Kent Narrows and Cambridge, Md., mud, RT.


Monhysteridae

Diploaimella allgeni W. Schneider, 1937. Sandy Point, Md., offshore sand. Kent Narrows and Cambridge, Md., mud, RT.


Monhystera dahli Wieser. North Beach, Chesapeake Beach, Md., coarse sand, seven specimens, all in one sample, WW.


Monhystera elegans Stekhoven, 1935. SI, Md., fine organic detritus, abundant, RT.

Monhystera filicaudata Allgen, 1929. Cambridge, Md., benthic detritus, RT.

Monhystera heteroparva Micoletzky, 1924. Plum Point, Md., decaying algae on shore; Crisfield, Md., mud, RT.

Monhystera laevisae Bresslau and Stekhoven, 1935. Crisfield, Md., mud, RT.

Monhystera microphtalma de Man, 1880. Cambridge, Md., mud, RT.

Monhystera alpinus Wieser, 1956. South Beach, Chesapeake Beach, Md., fine sand, common.


Theristus camelpodialis Wieser, 1959 (nomen nudum). Chesapeake Beach, eurytopic, abundant, WW.

Theristus marylandicus Timm, 1952. Sandy Point, Md., offshore sand, RT.

Theristus normandicus (de Man, 1890). Annapolis, Md., barnacles, RT.

Theristus otoplanobius Gerlach. South Beach, Chesapeake Beach, Md., fine sand, abundant, WW.

Theristus oxycercus (de Man, 1888). Cambridge, Md., mud, RT.

Theristus oxyuroides (Stekhoven, 1931). Cambridge, Md., mud, RT.


REFERENCES

Chitwood, B. G. 1951. North American marine nematodes. Texas Jour. Sci. 3:617-672. Two species listed from Va., the one from "Soil!" is not included here. Interesting comments on the works of Cobb and Allgen are presented.


Timm, Richard W. 1952. A survey of the marine nematodes of Chesapeake Bay, Maryland Ches. Biol. Lab. Publ. No. 95, 70 p. Lists 78 species in 44 genera from mid-Chesapeake Bay, of which one genus and 35 species were new to science and 60 were new to North America.

Wieser, W. 1953-1959. Free-living marine nematodes. Chile reports 10, 17, 26, and 34. Lunds Univ. Arrskr. N. F. Avd. 2. The four reports include 559 pages and are needed by anyone studying nematodes.

Wieser, W. 1959. A note on subterranean nematodes from Chesapeake Bay, Md. Limnol. and Oceanogr. 4:225-227. Lists 23 species, five of which are new to science (nomina nuda) and 17 of which are new to Chesapeake Bay.
Order Cyclostomata
Family Crisiidae
Crisia eburnea (Linnaeus, 1758). Polyhaline. Lower CB, RCO.

Order Ctenostomata
Family Alcyoniidae
Alcyonium parasiticum (Fleming, 1828). Polyhaline. CB (mouth to Potomac R.), rare, RCO. YR, Wormley Rock, WH.
Alcyonium polyurum (Hassall, 1841). Polyhaline. On shells, crab tests and larger algae.
Alcyonium verrilli Osburn, 1912. Upper meso- (13 ppt) and polyhaline, RCO. Lower CB, abundant in winter, especially in crab dredging area, MW.

Family Noeliellidae
Nolella stipata Gosse, 1855. Polyhaline. Single record from Chincoteague Bay, RCO. GP, on Zostera in August, WH.

Victoria spicata Kent, 1870. Oligo- to polyhaline (3-27 ppt, optimum ca 14 ppt), summer, abundant, RCO.
Anguillula palmata Van Beneden, 1844. Upper meso- (13 ppt) and polyhaline, RCO. GP, on Molgula and sponges, WH.

Family Vesiculariidae
Amathia convoluta Lamouroux, 1816. Polyhaline (above 22 ppt), lower CB, RCO. TML, 50 ft., WH.
Amathia vidovici (Heller, 1867). Upper meso- (11 ppt), and polyhaline, RCO. Lower JR (Norfolk), F. J. S. Maturo.

Bowerbankia gracilis Leidy, 1855. Upper meso- and polyhaline, RCO.

Family Valkeriidae
Aeverrillia armata (Verrill, 1874). Upper meso- (12 ppt) and polyhaline, RCO. ES (Hog Island Bay), FJSM. HR, on Libinia dubia, MW.

Family Triticellidae
Triticella elongata (Osburn, 1912). Commensal in gill chambers of crabs and externally on crabs commensal with Chaetopterus, RCO.

Order Chelostomata
Family Aetideae
Aetea anguina (Linnaeus, 1758). Polyhaline. TML, rare, RCO.

Family Membraniporidae
Membranipora membranacea (Linnaeus, 1766). Lower mesohaline (6-13 ppt). Scarcce, only on Ruppia, RCO.
Membranipora tenuis Desor, 1848. Meso- and polyhaline (above 6 ppt), abundant in shallow water, RCO.
Membranipora tuberculata (Bosc, 1802). Euhaline. On Sargassum, RCO.
Conopeum truitti Osburn, 1944. Encrusting Ruppia, RCO.

Family Electricidae
Electra crustulenta (Pallas, 1766). Meso- to euhaline (6-32 ppt).
Most abundant bryozoan in shallow waters of CB, from Baltimore to near mouth; serious oyster competitor, RCO.
Electra hastingsae Marcus, 1938. Polyhaline. Lower CB and Chincoteague Bay, on shells, scarce.
Electra pilosa (Linnaeus, 1766). Upper meso- (11 ppt) and polyhaline, scarce, RCO.

Family Bicellariellidae
Bugula turrita (Desor, 1848). Polyhaline. Lower CB, RCO.

Family Hippothoidae
Hippothoa hyalina (Linnaeus, 1767). Upper meso- (above 11 ppt) and polyhaline. Lower CB, common, to mouth of Patuxent, occasional, RCO.

Family Schizoporellidae
Schizoporella unicornis (Johnston, 1847). Polyhaline. CB (mouth), common, less so at 16 ppt, RCO. GP, on oyster shell, MW.

Family Microporellidae
Microporella ciliata (Pallas, 1766). Polyhaline (above 20 ppt), RCO.
PHYLUM ENTOPROCTA

Family Pedicellinidae

**Pedicellina cernua** (Pallas, 1771). Upper meso- (15 ppt) and polyhaline. Lower CB, scarce; Chincoteague Bay, abundant, RCO. ES (Hog Is. Bay), FJSM. YR, Wormley Rock, abundant, WHS. Barentsia discreta (Busk, 1886). Upper polyhaline. CB (near mouth) RCO. Tentatively assigned to *B. timida* Verrill, 1900 by Maturo and Schopf, (1968).

**Barentsia laxa** (Kirkpatrick, 1890). Polyhaline. Chincoteague Bay, common, RCO.

**Barentsia gracilis** (Sars, 1835). Small colony, doubtfully reported, RCO.

PHYLUM PHORONIDEA

**Phoronis architecta** Andrews. Upper meso- and polyhaline. Common in silty sand and fine sand to 60 feet; numbers to 90/m2 at 15 feet and 18 ppt, MW.

References

Maturo, F. J. S., Jr. 1957. A study of the Bryozoa of Beaufort, N. C. and vicinity. J. Elisha Mitchell Sci. Soc. 73:11-68. The 59 species reported and described include 21 of those reported from Chesapeake Bay. The descriptions and 69 excellent figures make this an invaluable work for the Chesapeake Bay area.


Class Archeannelida

Family Dinophilidae


Dinophilus lagersteni Jones and Ferguson, 1957. Shallow waters of brackish swamps and creeks at Norfolk (Jones and Ferguson, 1957).

Class Polychaeta

Family Ampharetidae

Asabellides oculata (Webster, 1879). Oligo-euhaline. Sandy silt, 20-50 feet; VIMS, 1966, 19-60; CB off RR, 1 mm sieve, 1962; CB off RR, 1400 mm, 10-20 ft., fine sand, 135 mm2, MW.

Lysipiddes gravi (Pettibone, 1953). Oligo- and mesohaline. Frequent in Machodoc Creek. YR (above bridge), rare; Guinea Marsh shore, common, Thomas Duncan. See Day, 1964 for name change.

Melinna maculata Webster, 1879. Upper meso- and polyhaline. Frequent in Zostera bed, Chincoteague, 1970, 120 mm2, mid-III; CB off RR, 96 ft., fine sand, 135 mm2, DFB.

Family Amphinomidae

Pseudeurythoe paucibranchiata Fauvel, 1932. Upper meso- and polyhaline. Widespread, evenly distributed and abundant in silt to 105 ft. Zostera beds, YR, Mouth and Mumfort I, 160 mm2, VI-70, RO. CB off RR, 59 ft., 300 mm2, fine sand, 250 mm2, sand, 135 mm2, MW.

Samythella elongata (Verrill, 1873). Polyhaline. ES (Bayside, Cherry- stone Island, near Cape Charles), V-65, 3, MW.

Family Arabellidae

Arabella iricolor (Montagu, 1804). Upper meso- and polyhaline. Local. Scarcely in mud-shell areas of YR; off VIMS, 14-60, 12 mm2, MW.

Drilonereis filum (Claparede, 1868). Upper meso- and polyhaline. Abundant in intertidal fine sand, MW, HR, 15, DFB.

Drilonereis longa Webster, 1879. Poly-euhaline. CB mouth, DFB; Yorktown, sand, 5 feet, rare, J.K.

Notocirrus spiniferus (Moore, 1906). Polyhaline. Rare; HR, 2, V-69, 38 feet, sand, DFB. Young parasitic in Diopatra cuprea (Pettibone, 1964).

Family Arenicolidae


Family Capitellidae

Capitella capitata (Fabricius, 1780). Meso-polyhaline. Uncommon, GP, 25 feet, 33 mm2, VI-62, MW. Seldom reported, but Orth (1971) reported a capitellid from his YR stations in III at nos. to 190 mm2 at Mumfort I. Further systematic work seems needed on minute capitellids.

Heteromastus filiformis (Claparede, 1864). Oligo-euhaline. Often abundant, esp. in areas enriched thermally or with sewage effluent. HR, V-69; 38 feet, sand, 1325 mm2, DFB. YR, VEPCO nearshore, 23-III, 400 mm2 (this species and Nereis succinea only survivors in VIII at station nearest heated water outfall), MW. YR, Clay Bank, Zostera bed, VII-69, 800 mm2; CB, ES, the Gulf, VII-70, 400 mm2; CB, ES, the Gulf, VII-70, 2000 mm2, RO. Cove Pt., Md., 10-20 ft., fine sand, abun., D.H. Hamilton.

Notomastus latericius Sars, 1851. Oligo-euhaline. HR, 38 ft., sand, 25 mm2, DFB. YR, shallow, common, MW.

Family Chaetopteridae

Chaetopterus variopedatus (Renter, 1804). Meso-euhaline. Lower CB, HR, scarce to common below 25 ft., silty-clay, MW.

Spiochaetopterus costarum oculatus (Gitay, 1969). Oligo-euhaline. Abundant in low intertidal, scarce with depth. YR, Mumfort, Zostera bed, VII-70, 9800 mm2, RO. YR, Willoughby Bay, VII-69, 11 ft., sand, 700 mm2, DFB.

Family Chrysopetalidae

Paleanotus heteroseta Hartman, 1945. Poly-euhaline. Rare to fairly common, HR, 14 ft., sand, 65 mm2, DFB. Rare at GP and Rapp. Shoals.

Family Cirratulidae

Cirratulus grandis Verrill, 1873. Meso-polyhaline. YR, GP, 25 ft., sandy-silt, 225 mm2; 570 mm2, at greater depths; CB off RR, 44 ft., 190 mm2; dominates biomass and sometimes numbers in YR channel.
Cossura sp. York Spit Channel, 21-XI-63, silt, 1; GP, 25-IX-63, 25 ft., 1, MW, MP.

Tharyx setigera Hartman, 1965. Oligo-polyhaline. GP, common, 110/m², 14-VIII-62. HR, sand, 140/m², DFB.

Family Dorvilleidae

Stauroneresis rudolphii (delle Chiaje, 1828). Upper mesohaline. GP, 15 ft., fine sand, 1, MW, MP. Elizabeth R., VIII-62, HR, sand, 110/m², 1; Chincoteague, Zostera bed, 12-VIII-62, 5, MW.

Family Eunicidae

Stauronereis rudolphii (delle Chiaje, 1828). Upper mesohaline. GP, 15 ft., fine sand, 1, MW, MP. Elizabeth R., VIII-62, HR, sand, 110/m², 1; Chincoteague, Zostera bed, 12-VIII-62, 5, MW.

Family Glyceridae

Glycera americana Leidy, 1855. Meso-polyhaline. Zostera bed, V-70, 70, RO. YR, VEPCO, near shore, 2-III-64, 70/m². Fairly common in sandy shallows and in Clymenella community.

Glycera dibranchiata Ehlers, 1868. Oligo-euhaline. CB, Back R., Zostera bed, II-III-63, 25 ft., sandy silt, 85/m² (90% in 1.5 mm screen), MW. HR, V-69, 9 ft., sand, 100/m². Cove Pt., Md., widespread; 2, 40 ft., winter, silt-clay, abundant, D.H. Hamilton.


Glycera dibranchiata Ehlers, 1868. Oligo-euhaline. CB, Back R., Zostera bed, III-70, 100/m², RO. YR, GP, 25-IX-63, 25 ft., 18/m², MW. HR, VIII-69, 23 ft., clayey sand, 220/m², DFB.

Glycera americana Leidy, 1855. Meso-polyhaline. Zostera bed, V-70, 70, RO. YR, VEPCO, near shore, 2-III-64, 70/m². Fairly common in sandy shallows and in Clymenella community.

Glycera dibranchiata Ehlers, 1868. Oligo-euhaline. CB, Back R., Zostera bed, II-III-63, 25 ft., sandy silt, 85/m² (90% in 1.5 mm screen), MW. HR, V-69, 9 ft., sand, 100/m². Cove Pt., Md., widespread; 2, 40 ft., winter, silt-clay, abundant, D.H. Hamilton.

Family Lumnbrineridae

Lumbrineris tenuis (Verrill, 1873). Poly-euhaline. CB, common in intertidal, MW. Zostera beds, scarce in CB, YR; abundant at Chincoteague, 850/m², RO.

Family Lysaretidae

Lyssaretma brasiliense Kinberg, 1865. Euhaline. Habitat unknown, several in wrack at Virginia Beach after Ash Wednesday storm, III-62, Clarence Richards, MP.

Family Magelonidae

Magelona rosea Moore, 1907. Upper polyhaline. CB mouth, DFB.

Family Maldanidae

Clymenella torquata (Leidy, 1855). Meso-euhaline. CB, Rapp. Shoals area, VI-62, 40 ft., sand, 150/m², DFB. YR, Clay Bank, Clymenella bed, V-70, very fine sand, 170/m², RO.

Clymenella zonallis (Verrill, 1874). (Formerly Euclymene collaris, see Mangum, 1962). Meso-euhaline. CB, Rapp. Shoals area, VII-62, 50 ft., sand, 115/m². HR, V-69, 38 ft., sand, 10/m², DFB.

Clymenella zonallis (Verrill, 1874). Meso-euhaline. CB, Rapp. Shoals area, VII-62, 50 ft., sand, 115/m². HR, V-69, 38 ft., sand, 10/m², DFB.

Clymenella zonallis (Verrill, 1874). Meso-euhaline. CB, Rapp. Shoals area, VII-62, 50 ft., sand, 115/m². HR, V-69, 38 ft., sand, 10/m², DFB.


Family Nephtyidae

Aglaophamus verrilli (McIntosh, 1885). Poly-euhaline. CB, off RR, VI-62, 102 ft., clayey silt, 90/m²; YR, 18-VII-62, 25 ft., sandy silt, 27/m², MW. HR, II-69, 9 ft., sand, 20/m², DFB.

Nephtys incisa (Malmgren, 1865). Upper meso-euhaline. 25-105 ft., silt-sand. CB, off RR, VI-62, 9500/m², YR, GP, 23-IV-64, 550/m², MW.

Nephtys magellanica (Augener, 1912). Upper meso-euhaline. CB, off RR, VI-62, 50 ft., silt, 180/m²; YR, GP, 5-IV-65, 20/m², MW. HR, V-69, 22 ft., sand, 35/m², DFB. This species is not yet known elsewhere on this coast. Nephtyids are difficult to identify and further systematic work might be beneficial.

Nephtys picta (Ehlers, 1858). Poly-euhaline. CB, Rapp. Shoals, VI-61, sand, 110/m², MW.

Family Nereididae

Ceratonereis irritabilis (Webster, 1879). Euhaline. ES, Hog I. Bay, common, MW.

Laconereis culveri (Webster, 1879). Oligo-mesohaline. YR, intertidal, mouth to fresh water; sand, abundant, MW.

Lycaenostyla pontica (Bobretzky, 1872). Euryhaline. Norfolk, in drift on beaches (Pettibone, 1963), MW.

Neris arenaceodonta Moore, 1903. Polyhaline. CB, off RR, 37 ft., sand, rare, MW, MP.

Nereis succinea (Frey and Leuckart, 1847). Euryhaline. Ubiquitous estuarine nestler. Abundant on eel grass, sponges, bottom debris and oyster rocks; swarms mainly in May. Probably most widely disposed polychaete in Ches. estuary. CB, Cove Pt., Md., 34 ft., sand, 1000/m², D.H. Hamilton; Rapp. Shoals, 98 ft., clayey silt, 1/m², YR, GP, V-69, 16 ft., clayey sand, 290/m², DFB. YR, Mumfort I., 28-VII-68, 11/g Zostera, GAM.

Platyneres dumerilii (Audouin and Milne Edwards, 1833). Meso-euhaline. Abundant on eel grass, scarce elsewhere. YR, Mumfort I., abundant on Zostera, VI-XII (IV-1 in deeper water), occurs all year, 10/g Zostera, 8-X-68, GAM.

Family Onuphidae

Diopatra cuprea (Bosc, 1802). Upper meso-euhaline. CB, off RR, 90 ft., silt, 1; YR, GP, 25 ft., 27/m², MW. YR, Clay Bank, II-69, 60/m², RO. See Man- gum et al, 1968.

Family Opheliidae

Ophelia bicornis (Savigny, 1818). Poly-euhaline. CB, off RR, sand, taken once, MW.

Travisia carnea (Verrill, 1873). Poly-euhaline. CB, off RR, 28 ft., sand, rare, MW.

Family Orbiniidae

Orbinia ornata (Verrill, 1873). Poly-euhaline. ES, rare, MW.

Scoloplos fragilis (Verrill, 1873). Meso-polyhaline. ES, GP, fairly common, intertidal-15 ft., MW.

Scoloplos robustus Verrill, 1873. Meso-euhaline. HR, V-69, 23 ft., 45/m², DFB. YR mouth, Zostera bed, VII-70, 400/m², RO. ES, bayside creeks and Chincoteague, fairly common, MW.

Family Oweniidae

Owenia fusiformis (Delle Chiaje, 1844). Poly-euhaline. CB, Rapp. Shoals, 40 ft., sand, 80/m², MW.

Family Phalacronidae

Aristaea jeffreysi (McIntosh, 1879). Poly-euhaline. HR, V-69, sand, 20, 23-IV-64, 10/m², YR, VEPCO, 2-III-64, 30/m²; MW. YR, VEPCO, 2-III-64, 30/m²; MW. COve Pt., Md., sporadic in sand and mud, D.H. Hamilton.

Eutheca lactea Claparede, 1868. YR, VEPCO, 2-III-64, 30/m²; MW. COve Pt., Md., sporadic in sand and mud, D.H. Hamilton.

Eutheca heteropoda Hartman, 1951. Meso-polyhaline. CB, Back R.; Zostera bed, III-70, 2000/m²; HR, V-69, sand, 85/m², DFB. CB, Rapp. Shoals, 43 ft., silt, 30/m², MW.
Eumida sanguinea (Oersted, 1843). Meso-polyhaline. CB, Kiptopeke, 1963, 30 ft., sand, scarce; YR, VEPCO, 2-III-64, 2, MW. JR, HR, Middle Ground, sand, scarce, DFB. YR, Mumfort I., VII, X, 2, GAM.

Nereiphylla fragilis (Webster, 1879). Meso-euhaline. Frequent on live oysters, MW. ES (Franklin City), abundant, George Griffith; (Nandua Creek), abundant, MP. TR (Mumfort Is.), scarce on Zostera, VIII-X, GAM.

Paranaitis speciosa (Webster, 1870). Upper meso- and euhaline. YR, Sarah's Creek, mud-detritus, MW, MP.

Phylloides arenae Webster, 1879. Meso-polyhaline. CB, off RR, 35 ft., silt, 21-VI-61, 1 specimen, MW, MP. HR, VIII-69, 24 ft., clayey sand, 1, DFB.


Family Pilargidae (See Pettibone, 1966).

Ancistrosyllis hartmanae Pettibone, 1966. Polyhaline. CB, off RR, 35 ft., silt, 21-VI-61, 1 specimen, MW, MP. HR, VIII-69, 24 ft., clayey sand, 1, DFB.


Cabira incerta Webster, 1879. Poly-euhaline. CB, off RR, 35 ft., silt, 21-VI-61, 3, MW, MP. None found since. Webster collected it on seaside, ES.

Sigambra tentaculata (Treadwell, 1941). Meso-polyhaline. YR (GP), mud, common. CB (off RR), sand, MW, MP. YR & Hampton Roads, mud, common, DFB.

Sigambra wassi Pettibone, 1966. CB, off RR, VI-61, Sand-silt-clay, 2, MW, MP. Large species not taken since.

Family Polynoidae


Harmothoe extenuata (Grube, 1840). Poly-euhaline. HR, V-69, 38 ft., sand, 200/m², DFB. ES, Hog I. Bay, 23-VI-60, 3, SH, MP. GP, 9-XI-60, 25 ft., 90/m². CB, off RR, VI-62, clayey silt, 30/m², MW, MP.

Harmothoe imbricata (Linnaeus, 1767). Polyhaline. Elizabeth R., V-69, oyster reef, 8 ft., clayey sand, 5/m², MR.

Harmothoe sp. Polyhaline. YR, silty sand to silt-clay, to 60/m², color rose. Possibly the only undescribed polychaete in CB.


Lepidonotus variabilis Webster, 1879. Upper meso- and polyhaline. ES, Little Gulf, 23-VI-60, 1, SH, MP. YR, Mumfort Is., 19-VIII-68, 0.5/g Zostera, GAM.

Family Sabellariidae

Sabellaria vulgaris Verrill, 1873. Meso-polyhaline. GP, 18-VI-63, 25 ft., MW. HR, VIII-69, 38 ft., sand, 235/m², DFB. YR, Mumfort Is., 8-X-68, 0.7/g Zostera, GAM. Elizabeth R., oyster reef, V-69, 8 ft., clayey sand, 745/m², MR. CB, Back River, III-70, sand, 42/m², RO.

Family Sabellidae


Sabella microphthalma Verrill, 1873. Polyhaline. Elizabeth R., oyster reef, V-69, 8 ft., clayey sand, 585/m², MR. YR, Mumfort Is., 19-VIII-68, 24/g Zostera, GAM. GP, VEPCO, 23-III-64, 100/m², MW. Rapp. Shoals, VI-62, 28 ft., sand, 2, MW. HR, II-69, 15 ft., clayey sand, 495/m², DFB. YR mouth, Zostera bed, VI-70, 630/m², RO.

Family Serpulidae

Hydroides dianthus (Verrill, 1873). Upper meso-polyhaline. HR, VIII-69, 38 ft., sand, 475/m², DFB. Elizabeth R., oyster reef, 30-VIII-69, 8 ft., clayey sand, 150/m², MR. YR, Mumfort Is., 19-VIII-68, 3/g Zostera, GAM.
Family Sigalionidae


Family Spionidae


Family Syllidae

Autolytus cornutus A. Agassiz, 1863. Poly-euhaline. Lower CB (New Point Comfort), 30 ft., CB (mouth), 25-V-66, 1 taken in meter net, 6.1 m. Autolytus prolifer (Muller, 1783). Meso-euhaline. CB (Barren Is. and mouth), MP.

Brania clavata (Claparede, 1863). Meso-polyhaline. YR, Mumfort Is., 28-VI-68, 13/g Zostera, GAM. GP, 23-IV-64, 6/m², MW. CB, Back R., VI-70, 2, RO.

Brania wellfleetensis Pettibone, 1956. Polyhaline. CB, Rapp. Shoals Channel, XI-69, 0.5 mm screen, 40 ft., rare, MW. Exogone dispar (Webster, 1879). Meso-euhaline. YR, Mumfort Is., 28-VI-68, 0.6/g Zostera, GAM. GP, 25-V-63, 1, MW. ES, Chincoteague, III-70, 1800/m², RO.

Odontosyllis fulgurans Claparede, 1864. YR, 19-VIII-68, 1.1/g Zostera, GAM. ES, Chincoteague, VI-70, 70/m², RO. Parapionosyllis longicirrata (Webster & Benedict, 1884). Meso-euhaline. GP, specimen taken in bottle trap, MW.

Family Terebellidae

Amphitrite ornata (Leidy, 1855). Meso-euhaline. Rapp. Shoals, VI-62, 103 ft., silt, 30/m², MW. CB, Back R., Zostera bed, III-70, 840/m², RO. Enoplobranchus sanguineus (Verrill, 1873). Meso-polyhaline. Apparently confined to Zostera beds (abundant) and intertidal, MW. Not taken by Orth (1971).

Loimia medusa (Savigny, 1818). Meso-euhaline. Elizabeth R., VII-69, 26 ft., clayey sand, 3, MR. Rapp. Shoals, 43 ft., silt, 165/m², MW. GP, 24-V-62, 21/m², MW. HR, VIII-69, 9 ft., sand, DFB. CB, Back R., III-70, 100/m², RO.
Lysilla alba (Webster, 1879). Meso-polyhaline. GP, Zostera bed, rare, MW.
Pista crista (Muller, 1776). Polyhaline. Rapp. Shoals, VI-62, 53 ft., sand, 150/m², rare, MW.
Pista maculata (Dalyell, 1853). Polyhaline. CB, off RR, rare, MW.
Pista palmata (Verrill, 1873). Meso-polyhaline. YR, 19-VIII-68, 0.5/g Zostera, GAM. GP, 18-VI-63, 331m², MW. Rapp. Shoals, VI-62, 50 ft., silt, 1, MW.
Polycirrus eximius (Leidy, 1855). Elizabeth R., VIII-69, 13 ft., clayey sand, 1, MR. Rapp. Shoals, VI-62, 28 ft., sand, 2910/m², MW. GP, 18-VI-63, 3, MW. HR, V-69, 18 ft., sand, 290/m², DFB. YR, Clay Bank, Zostera bed, 70/m², RO.

REFERENCES
Hartman, O. 1945. The marine annelids of North Carolina. Duke Univ. Mar. Lab. Bull. No. 2, 51 p., 10 pl. Lists 104 species from North Carolina, mainly from the Beaufort region, including six new species and subspecies and several new combinations. No key is included and the names of some species have since been changed. Of the included species, 55 are found in this checklist.


Webster, H.E. 1879. On the Annelida Chaetopoda of the Virginia coast. Trans. Albany Inst. 9:202-272. The 55 species (27 new) listed by Webster have not been treated in this checklist. While some have been relegated to synonymy, many may be valid and should be sought in the area.

PHYLUM ANNELIDA

Class Oligochaeta
Family Tubificidae
  Peloscolex gabriellae Marcus, 1950. Upper meso- and polyhaline. Lower CB, common, to Y-20, silty sand, DFB.

Class Hirudinea
Family Piscicolidae
  Myzobdella lugubris Leidy, 1851. Taken from blue crabs at Tangier and York River, rare, WVE. GP, on wet table, 15-VII-62, MW. Sarah's Creek, on blue crab, 8-VIII-69, A.R. Lawler.
  Ichthyobdella funduli Verrill, 1872. GP, found swimming free, MW. I. rapax (Verrill, 1873). GP, collected from Palaemonetes pugio by William McCaul, 1963.
  Peloscolex gabriellae Marcus, 1950. Upper meso- and polyhaline. Lower CB, common, to Y-20, silty sand, DFB.

Family Piscicola
  Piscicola punctata Verrill. CB. JPM in Cowles, 1930.
  Ichthyobdella vividae (Verrill, 1872). One specimen taken swimming free by Robert Black, II-61, GP beach. Lower JR, on lip of Opsanus, 23-IV-66; four in trawl, 20-IV-66, MW.

PHYLUM TARDIGRADA

(See McGinty and Higgins, 1968)

Batillipedidae
  Batillipes mirus Richters, 1909. Most abundant tardigrade found at Sandy Pt., YS, MM.
  Batillipes bullacaudatus McGinty, 1968. With B. mirus, MM.
  Stygarctus bradypus Schulz, 1951. As above.
  Halechiniscus remanei Schulz, 1955. One specimen, as above.

PHYLUM ECHIURIDA

Family Thallasemidae
  Thallasema hartmani Fisher, 1947. Upper meso- and polyhaline. CB, off Rapp. Spit, coll. by "Fish Hawk", 23-VIII-20, 12.8 lbs. Occasional in YR below Clay Bank in depths below 10 feet. Type locality is Beaufort, N. C. and Chesapeake Bay may be the northern limit.
  "White echiurid." This small, white species is common in channel mud of the lower YR. Mary E. Rice, National Museum of Natural History, believes it is undescribed.

PHYLUM SIPUNCULIDA

Phascolopsis gouldi (Pourtales, 1851). Four specimens taken at Virginia Beach after storm tides, March 1962.

REFERENCES


PHYLUM MOLLUSCA

Class Pelecypoda
Subclass Protobranchia
Order Palaeoconcha
Family Solemyidae
Solemya veum Say, 1822. Poly- and euhaline. Scarce to frequent, Zostera beds, sand, JDA. Chincoteague Bay, PC.

Order Nuculacea
Family Nuculidae
Nucula proxima Say, 1822. Polyhaline. CB (off RR), fine to silty sand, scarce to 675/m2; lower YR and JR, scarce, MW.

Family Nuculanidae
Yoldia limatula (Say, 1831). Polyhaline. Lower CB (off RR), aggregated, to 1500/m2; YR (GP), 30 feet; lower JR (HR); usually rare, MW.

Subclass Septibranchia
Order Poromyacea
Family Cuspidariidae
Cardiomya gemma Verrill and Bush, 1896. (Previously listed as f. glypta Bush, a distinctly different species perhaps confined to subtropical waters). Polyhaline. CB (off RR), Wolftrap, silt-clay, rare to 451m2. One specimen, YR (GP), 30 feet, MW.

Subclass Polysyringia
Order Aracea
Family Arcidae
Anadara transversa (Say, 1822). Polyhaline. CB (off RR), to 400/m2 as small epifauna. YR (Mumfort Is.), epifauna, frequent in summer on Zostera, GAM. JR (Hampton Roads), common DFB.

Anadara ovalis (Bruguiere, 1792). Polyhaline. Lower CB, common, YR, rare, (35 feet off Yorktown), JDA. JR (Hampton Roads), common, DFB.

Noetia ponderosa (Say, 1822). ES, common, WGH. Upper polyhaline, YR (36 feet, off Yorktown), rare, JDA.

Order Mytilacea
Family Mytilidae
Arcuatula demissa (Dillwyn, 1817). Poly-euhaline. Associated with Spartina alterniflora on marshy shores.

Brachidontes recurvus (Rafinesque, 1820). Meso- to euhaline. Abundant on oyster rocks, JDA.

Amygdalum papyria (Conrad, 1846). Meso- and polyhaline. Scarce, JDA. Common ES (bayside), PC.

Mytilus edulis Linnaeus, 1785. Polyhaline- to euhaline. Lower CB, sets in winter on bridge tunnel structures, often surviving through summer; "wrap-up" sets have occurred on blue crabs in winter. ES (seaside inlets). YR (rarely to GP in winter, never surviving summer), MW.

Order Pectinacea
Family Pectinidae
Aequipecten irradians (Lamarck, 1819). Upper poly- and euhaline. ES, abundant before demise of Zostera, increasing (Cobham Bay), MC. Chincoteague Bay, MD., FS.

Order Anomiidae
Family Anomidae
Anomia simplex Orbigny, 1845. Upper meso- to euhaline. On oyster shells and other solid substrates, common, JDA.

Order Ostreacea
Family Ostreidae
Crassostrea virginica (Gmelin, 1792). Upper oligo- to euhaline.

Historically, the most valued seafood in CB. Range of commercial production decreased in last decade by the parasite, Minchinia nelsoni (MSX), greatest harvest now in mesohaline waters. Set of larvae and survival of spat very erratic. Amounts of seed oysters produced by mariculture increasing. The Virginia oyster occurs mainly in deeper water, except on seaside of the ES where many are grown intertidally. See Galtsoff (1964), JDA.
Order Cardititacea
Family Carditidae
Venericardia tridentata Say 1826. Euhaline. CB (mouth), rare, JDA.

Family Corbiculiidae
Polymesoda caroliniana Bosc, 1830. Oligo- and lower mesohaline. JR (Jamestown and Mulberry Is. area), intertidal marsh and river bank. May no longer occur, since searchers have failed to find it in the last few years. See Andrews and Cook (1951).

Family Cyrenoididae
Cyrenoida floridana (Dall, 1896). Oligo- to polyhaline. CB, Md.: Grasonville, Queen Anne Co., Dallsville; near Elliott, Dorchester Co., (gullet of black duck, F. M. Uhler); Deal, Anne Arundel Co., Soilers, Calvert Co., (Va.): RR (near mouth of Greensville Creek, Mollusks, Lancaster Co.; 1 mi. east of Saxis. Accomack Co., Bayford, Northampton Co.). Intertidal, under decaying plants; ovoviviparous. JPEM.

Order Dreisseniacea
Family Dreissenidae
Congeria leucophaeta (Conrad, 1831). Oligohaline. On submerged plant stems, oyster shells and other firm substrates, JDA.

Order Lucinacea
Family Lucinidae
Lucina multilineata Tuomey and Holmes, 1857. Polyhaline. CB (off RR), common, to 450/m²; Y55, scarce, 5-30 feet, MW.

Order Erycinacea
Family Montacutidae
Montacuta elevata (Stimpson, 1851). Polyhaline. YR (off VIMS pier), commensal with Clymenella, to 270/m², MW. See Gage (1969), for life history.

Mysella bidentata (Montagu). This European species is conspecific with M. planulata Stimpson (Dr. Charles Jenner, personal communication). Polyhaline. CB (off RR), VI-62, rare, MW.

Order Cardiacea
Family Cardiidae
Laevicardium mortoni (Conrad, 1830). Polyhaline. CB (below Tangier Is.), sand, 30 feet, 90/m²; lower YR, sand near shore, scarce, MW.

Order Veneracea
Family Veneridae
Dosinia discus Reeve, 1850. Polyhaline. CB (York Spit) recent valves; YR, Finley Coates found a 2½ inch specimen near GP, 10-II-70, while digging soft clams, MW.

Cyclineilla tenus Recluz, 1852. Polyhaline. YR (Yorktown and off VIMS) 10-25 feet; CB (Rapp. Shoals), ES (seaside), rare. XB.

Mercenaria mercenaria (Linnaeus, 1758). Polyhaline. Abundant in various sediments, long-lived; juveniles normally rare except on ES (seaside), MW.

Mercenaria campechensis (Gmelin, 1792). Polyhaline. Lower CB, scarce, Dexter Haven.

Pitar morrhuanus (Linsley, 1848). Poly- and euhaline. Lower YR, 20 feet, VII-69, DFS. ES (Hog Island Bay, Kegotank Bay), rare, PC.

Gemma gemma (Totten, 1834). Meso- and polyhaline. YR (TML), 10 feet, common; (Y25), rare; CB (off RR), occasional aggregates to 450/m², MW.

Family Petricolidae
Petricola pholadiformis (Lamarck, 1818). Polyhaline. YR (Goodwin Is.); common in intertidal peat, PC. Shape differs with habitat (Turgeon, 1868).
Order Mactracea

Family Mactridae

Spisula solidissima (Dillwyn, 1817). Euhaline. Offshore, washed in by severe storms. Supports sizeable industry on ES, MC.

Mulinia lateralis (Say, 1822). Upper meso- and polyhaline (above 8 ppt). Peak populations in silt areas but low reservoir populations apparently in nearshore sand, to 22,000/sq. m., Tangier Sound, MW.


Family Donacidae


Donax roemerli protacta Conrad, 1849. Morrison (1970) has substituted this name for the long used Donax variabilis, which he found preoccupied. Euhaline. Occurs intertidally from Virginia Beach south, JPEM.

Family Semelidae

Abra aequalis (Say, 1822). CB (Old Plantation Flats), 30 feet, rare, prob. straggler from ocean, WGH.

Order Tellinacea

Family Tellinidae

Tellina agilis Stimpson, 1858. Polyhaline. Abundant ES, CB (Hampton Bar, York Spit); YR (Yorktown, common), MW, KM.

Macoma balictica (L., 1758). Lower mesohaline. Abundant, intertidal to 80 feet, MW. Y25, to 2000/m², DFB. Apparently suffers in competition with Rangia (Pfitzenmeyer, 1970).

Macoma mitchelli Dall, 1895. (M. phenax is a synonym, fide J. P. E. Morrison, personal communication). Mesohaline. Abundant in brackish creeks, YR (Sarah's Creek), 270/m²; Potomac R., (Machodoc Creek), MW.

Macoma tenta Say, 1834. Polyhaline. Lower CB and rivers, 20-40 feet, silt-clay, habitat not overlapping that of congeners, common, MW.

Family Sanguinolaridae

Tagelus plebeius (Solander, 1786). Upper meso- and lower polyhaline. YR (GP), abundant, 0-5 feet, silty sand, JDA. Tagelus divisus (Spengler, 1794). Polyhaline. CB (mouth), ES (Hog Is. Bay, abundant), YR Yorktown, scarce) JDA.

Order Solenacea

Family Solenidae

Ensis directus Conrad, 1843. Polyhaline. ES, abundant (sea-side), sporadic elsewhere, 2-50 feet, sand JDA, MW. Over 30,000 juveniles/m², CB (off RR), VI-62, identified by Dr. William J. Clench, MCZ.

Solen viridis Say, 1821. Euhaline. ES (Cedar Is.), plentiful in restricted patches, PC.

Order Myacea

Family Myacidae

Mya arenaria (Linnaeus, 1758). Upper meso- and polyhaline. Abundant sand to silty sand, 0-25 feet; breeding spring and fall, but spring set seems usually lost to predators, MW.

Family Corbulidae

Order Adesnacea

Family Pholadidae

Clypeola costata (Linnaeus, 1758). Upper meso- to polyhaline. YR (above bridge, common, soft-sediments near shore), MW.

Barnea truncata (Say, 1822). YR (Goodwin Is., peat, abundant); ES (Cedar Is.), PC.

Diplothyra smithi Tryon, 1862. Polyhaline. Boring in wood, rare, JDA.

Martesia cuneiformis (Say, 1822). Occasional straggler in driftwood (Turgeon, 1968).

Family Terebridae

Bankia gouldi Bartsch, 1908. YR (GP, setting June through September, occasionally last week in May and first in October), abundant. See Scheltema and Truitt, 1954.

Teredo navalis Linnaeus, 1758. ES (seaside, common); euhaline in Va., perhaps because of higher temperatures, PC. Reports from GP by Clapp Laboratories for 4 years undoubtedly erroneous.

Order Pandoracea

Family Lyonsiidae

Lyonsia hyalina Conrad, 1831. CB (off RR, fine sand to sandy silt, to 1200/m²); ES (bayside, abundant), MW.

Family Pandoridae

Pandora trilineata Say, 1822. CB (off RR, sand, rare (patchily distributed), to 100/m², MW.

Class Gastropoda

Subclass Prosobranchia

Order Archaeogastropoda

Family Fissurellidae

Diodora cayenensis (Lamarck, 1822). ES, rare, WGH.

Order Mesogastropoda

Family Littorinidae


Family Vitrinellidae

Cylostrema pentagona (Gabb, 1873). YR (off GP), 30-60 feet, silt-clay, rare, MW, DM.

Solariorbis infracarinata (Gabb, 1881). As above.

Teinostoma cryptospira Verrill, 1884. As above.

Family Caecidae

Caecum pulchellum Stimpson, 1851. Polyhaline. CB (off RR) sand, 30 feet, scarce, 60/m², MW.

Family Epitonidiidae

Epitonium multistriatum (Say, 1826) Polyhaline. CB (mouth), 30 feet, sand, scarce; VI-66, rare, MW.

Epitonium rupicolum (Kurtz, 1860). Upper meso- and polyhaline. Zostera bed to 40 feet, common (to 30/m²).

Family Melanellidae

Melanella intermedia Contraine, 1835. Polyhaline. JR (Navy pier 12), VII-65, 40 feet, mud, 1 specimen, John Kraeuter; (Hampton Roads, rare, 5-II-69), DFB.

Family Rissoidae


Family Hydrobiidae

Hydrobia truncata (Vanatta 1924). Oligo- and lower mesohaline. Type locality: Little Choptank R. Town Point, Dorchester Co., MD. R. W. Jackson, Broome's, Patuxent R., and St. Inigo's, St. Mary's R., MD. JPEM. CB (off Harvey's Creek, Northumberland Co.); RR (Greenvale Creek, Mollusk, Lancaster Co.) JPEM.
Hydrobia jacksoni Bartsch 1953. Oligo- to euhaline. Type locality: Little Choptank River, Town Point, Dorchester Co., Md. R. W. Jackson. NMNH has types, also specimens from Deal, Anne Arundel Co., Md.; Tiduous Creek (on eel grass), Crocheron, Dorchester Co., Md.; Chincoteague, Va. (southwest end, on oysters); Lafayette River and Edgewater District, (salt marsh), Norfolk, Va., JPEM.

Family Cerithiidae

Bittium varium Pfeiffer, 1840. Upper meso- and polyhaline. YR (Mumfort Is., most abundant animal on Zostera), GAM. See E. Wulff, (1970), for taxonomy and zoogeography of this genus.

Cerithiopsis greenii (C. B. Adams, 1839). Upper meso- and polyhaline. YR (Mumfort Is.), abundant on Zostera, July-December, GAM.

Family Triphoridae

Triphora nigrocincta C. B. Adams, 1839. Upper meso- to polyhaline. YR, Mumfort Is., abundant on Zostera, VII-XII, GAM. ES (The Gulf) CB (Back River), RO.

Family Calyptraeidae

Crepidula fornicata (L., 1767). Polyhaline. Oyster rocks, common to abundant, JDA.

Crepidula convexa Say, 1822. Upper meso- to polyhaline. YR (Mumfort Is., abundant on Zostera all year), GAM.

Crepidula acuta H. C. Lea 1842. Mesohaline. RR (near mouth of Greenvale Creek, Mollusk, Lancaster Co., Va.), I-58, numerous specimens with developed gonads, length 3 mm, on eel grass. Possibly a dwarf form of C. convexa. JPEM.

Crepidula plana Say, 1822. Polyhaline. On shells and other solid substrates, JDA.

Family Naticidae

Polinices duplicatus Say, 1822. Euhaline. Lower CB (mouth, common; York Spit, scarce) JDA.

Sinum perspectivum Say, 1831. Euhaline. Along outer beaches, JDA.

Tectonatica pusilla (Say, 1822). Euhaline. CB (mouth), sand, scarce, MW.

Family Synceratidae

Syncera succinea (Pfeiffer, 1840). (S. modesta Johnson) Oligo- to euhaline, NMNH has specimens from Crisfield and Huggins' Pt. (Potomac R.), Md., from RR (Mollusk, Lancaster Co.), Shell Bay, W. of Chincoteague, Accomack Co., Willis Wharf, Bayford, Cherrystone, Oyster, Smith Is. and Fisherman's Is., Northampton Co., Western Branch of the Elizabeth R., 11-III-45; and Willoughby Spit, 15-VIII-43. The last two collections were by Leslie Hubricht, all other Va. collections JPEM from 1935 to 1958. This species has "crawl-away" young and has apparently been transferred by oyster shell traffic, JPEM.

Order Neogastropoda

Family Muricidae

Eupleura caudata (Say, 1822). Polyhaline. Common but less so than Urosalpinx; larger on ES. Zostera beds and oyster rocks, to 30 feet, JDA.

Urosalpinx cinerea (Say, 1822). Upper meso- to euhaline. Common drill above 12-15 ppt, abundant and much larger on ES, JDA.


Family Columbellidae

Anachis avara (Say, 1822). Polyhaline. Rare, JDA.

Anachis transilvata Ravenel, 1861. Polyhaline. CB (off RR to bay mouth, 20-40 feet, common, to 60/m²), MW. JR (Hampton Roads), rare, DBF.

Mitrella lunata (Say, 1826). Upper meso- to polyhaline. YR (Mumfort Is., common all year on Zostera, abundant in deepest beds), GAM.

Family Melongenidae

Busycon carica (Gmelin, 1790). Poly- and euhaline. Lower CB, frequent to abundant, 34 in one crab dredge haul at 37°16'N, 76°08'W, 45 ft., 22-IV-71, Paul Haefner.
Busycan canaliculatum (L., 1758). Poly- and euhaline. Lower CB (mouth, common), 12 in one dredge at 36°07'N, 76°05'W, 12 ft., IV-71, Paul Haefner.  


Family Nassariidae  

Nassarius vibex (Say, 1822). Upper meso- and polyhaline.  

Abundant in Zostera and Clymenella communities, often aggregated to 50 ft.  

Nassarius trivittatus (Say, 1822). Upper meso- and polyhaline.  

CB (mouth), ES (seaside), to 35 feet, sand, common MW.  

Nassarius obsoletus (Say, 1822). Upper meso- to euhaline.  

Abundant, not found beyond Zostera beds, mainly confined to eel grass beds in winter, in shoaler water later, aggregating toward fall (400/m²), ES (seaside), abundant in some marsh creeks. Shells always with longitudinal eroded furrows and epiphytic growth, MW.

Family Neptunetidae  

Colus pygmaeus Gould, 1841. Euhaline. ES (north end of Parramore Is.), 23-II-70, dead specimen, JPEM.

Family Marginellidae  

Marginella denticulata Conrad, 1830. Upper polyhaline. Lower CB, rare, MW.  

Marginella guttata Dillwyn. Upper polyhaline. Lower CB, above Cape Charles, ca. 30 feet, 6-VI-68, common but local, range very small, MW.

Family Terebridae  

Terebra dialocata Say, 1822. Euhaline. Very rare, JDA; no recent records, MW.

Family Turridae  

Mangelia cerina Kurtz and Stimpson, 1851. Polyhaline. Kiptopeke, 30 feet, sand 3 specimens, MW. CB (mouth), common, DFB.  

Mangelia plicosa C.B. Adams, 1840. Polyhaline. Oyster rocks, common, JDA. Zostera and Clymenella communities, common to abundant, MW.

Subclass Opisthobranchia  

Order Pyramidellacea  

Family Pyramidellidae  

Odostomia bisuturalis Say, 1821. Polyhaline, common, esp. in Clymenella communities, 0-30 feet, to 400 m², MW.  

Odostomia impressa Say, 1822. Upper meso- to polyhaline.  

Ectoparasite on oysters and other bivalves, common on oyster and Zostera beds, JDA. Upper CB, J. M. Odell.  

Odostomia dux Dall and Bartsch, 1906. Polyhaline. YR (Vepco area). Sporadic, scarce, MW, Harry Wells.  

Odostomia trifida Totten, 1834. Polyhaline. Oxford, Maryland. (See Hanks, 1968). O. impressa may be mistaken for this species, MW.  

Pyramidella candida Morch, 1875. Polyhaline. CB (off RR); GP, rare, MW.  

Pyramidella fusca C. B. Adams, 1839. ("of fusca"), Joseph Rosewater. Polyhaline. Lower CB, YR (Yorktown), MW.  

Turbonilla interrupta Totten, 1835. Polyhaline. Fine sand, abundant in Clymenella community, 150/m², 5-30 feet, MW.  

Turbonilla stricta Verrill, 1874. Polyhaline. CB (off RR), YR, rare to common, silt, MW.

Order Cephalaspidea  

Family Acteonidae  

Family Atyidae

*Haminoea solitaria* (Say, 1822). Polyhaline. Lower YR, sand, to 15 feet, 300/m², MW.

Family Retusidae

*Aetocina canaliculata* (Say, 1822). Polyhaline. CB (off RR), abundant in silty-sand, 5-15 feet, decreasing with depth, to 100 feet, Y06, to 3000/m².

Family Scaphandridae

*Cyllina alba* Brown, 1827. Polyhaline. YR (mouth) and off Wolftrap, 40-75 feet, rare, MW.

Order Sacoglossa (All sacoglossans and nudibranchs were determined by Dr. David R. Franz, U. of Conn., unless otherwise noted).

Family Hermaeidae

*Hermaea cruciata* Gould, 1870. Upper meso- lower polyhaline. Two specimens found by G. Alex Marsh at Mumfort Is. have been tentatively identified as this species. (See Vogel, 1971).


Family Elysidae

*Elysia catula* Gould, 1870. Lower polyhaline. Only seen on Zostera, except for two on surface film, X-61, MW. YR (Mumfort Is.) abundant on Zostera, except in winter, GAM.

*Elysia chlorotica* Gould, 1870. Mesohaline. Reported from Solomons Is., Md. by Pfitzenmeyer (1960) and from Oxford, Md. by Hanks (1968). It seems most unusual that *E. catula*, abundant in Va., has never been found in Maryland, and that *E. chlorotica* is unknown from Va.

Order Nudibranchia

Family Dorididae

*Doris verrucosa* Linnaeus, 1758. Polyhaline. YR (Mumfort Is.), five taken on Zostera in autumn, GAM.

Family Corambidae

*Doridella obscura* Verrill, 1870. Meso- and polyhaline. Lower CB, most common nudibranch, often abundant on Alcyonidium. Cory (1968) reported (as *Corambella*) feeding on *Acanthodesia* and Membranipora.

Family Polycecididae


Family Onchidoridae


Family Favorinidae


Family Aeolidiidae

*Aeolidia papillosa* (Linnaeus, 1761). Euhaline. Ocean City, Maryland (Franz, 1968).

Family Goniodoridae

*Crinsida cupella* Vogel and Schultz 1970. (See ref.) Lower poly- and upper mesohaline (20 ppt). YR (Aberdeen Rock, about Y25), species is probably rare although the four specimens were found on a single oyster shell.

Subclass Pulmonata

Order Basommatophora

Family Elibolidae

*Phytia myosotis* Draparnaud, 1801. Meso- and polyhaline. NMNH has material from: (Md.), mouth of St. Leonard's Creek, Patuxent R., Carson's Slip, Crisfield. (Va.), Shellbay, west of Chincoteague, Watt's Bay, Accomack Co.; and in Northampton Co., Willis Wharf, and Fisherman's Is.; RR, mouth of Greenvale Creek, Mollusk, Lancaster Co.; "swamps" at Bosservain Ave., Norfolk, JPME.
Family Melampidae

Melampus bidentatus Say, 1822. Upper meso- and polyhaline. Intertidal salt marshes, mostly associated with Distichlis and Spartina patens, often abundant, MW.

Detracia floridana (Pfeiffer, 1856). Upper meso- and polyhaline. Difficult to distinguish from M. bidentatus. Dr. Morrison found a few specimens in a sample which contained over 100 M. bidentatus. The sample was from less than a m² area in Poropotank River marsh.

Class Amphineura
Order Chitonida
Family Ischnochitonidae

Chaetopleura apiculata (Say, 1830). Euhaline. ES (Hog Is. Bay oyster bed), rare, WGH.

Class Cephalopoda
Order Decapoda
Family Loliginidae

Lolliguncula brevis Blainville. CB (mouth), occasionally common, MW. Tangier Sound, common throughout the year, (Schwarz, 1960b).
References Cited


General References


Henderson, J. B. and P. Bartsch. 1914. Littoral marine mollusks of Chincoteague Island, Va. Proc. U. S. Nat. Mus. 47:411-421, 2 pls. A total of 81 species and subspecies were found in two days collecting. The 11 new species are undoubtedly all synonyms. Of the rest, 29 are now known under other names and four cannot be traced. Eleven valid species reported by Henderson and Bartsch are not included in the present checklist.


PHYLUM ARTHROPODA

In accordance with a new set of river abbreviations devised by Richard Moncure, VIMS, the following symbols are used in this section.

CL - Lower Chesapeake Bay
CU - Upper Chesapeake Bay
JC - Chickahominy River
JA - James River
MP - Mattaponi River
MB - Moback River
PM - Pamunkey River
PX - Patuxent River
PK - Planketank River
PO - Potomac River
RA - Rappahannock River
YK - York River
WA - Wachapreague

The following abbreviations used generally in the checklist are used in certain parts of the arthropod section.

CB - Chesapeake Bay
ES - Eastern Shore
GP - Gloucester Point
JH - James River
SI - Solomons Island
YR - York River

Class Merostomata

Limulus polyphemus (L., 1758). Upper meso- to euhaline.

Class Arachnida

Order Acari

Family Halacaridae

Subfamily Rhombognathinae

Rhombognathus magnirostris Trouessart, 1889. Mesohaline

Subfamily Halacarinae

Halacarus anomalus Trouessart, 1894. Mesohaline. PX (SI).
(Newell, 1947).

(Newell, 1947).

Species unknown: Oligohaline, occasional strays to 7 ppt.
PM (Lee Marsh to White House), IV-X. (Van Engel and Joseph, 1968).

References Cited

Newell, I. M. 1947. A systematic and ecological study of the Halacaridae of eastern North America. Bull. Bingham Oceangr. Coll. 10, 252 p. A study which increased the number of halacarid species known to eastern North America from 4 to 41, 14 of these described as new. Includes some Chesapeake material. Details on collection and study techniques.
Class Pycnogonida
Willard A. Van Engel

Unless otherwise noted, the list of pycnogonids is that of Hedgpeth (1968). Most of the depths given by Hedgpeth are in fathoms and are in error; those cited here, and the station location and hydrographic data are from the cruises of the Fish Hawk (Wells, Bailey and Henderson, 1929).

Family Pallenidae
Callipallenene brevirostris (Johnston, 1837). Meso- and polyhaline. CL, Fish Hawk station 8821, "Sandy Pt.", 37°05'36"N. 8 meters, 17.7 ppt, 24.8°C, VII; station 8898, "Thimble Shoal", 37°00'35", 75015'24", 28 meters, 22.69 ppt (20 meters), 10.1°C, XII. YK, common on hydroids, MW.

Family Phoxichiliidae

Anoplodactylus pygmaeus (Hodge, 1964). Meso- and polyhaline (?). JA, (Norfolk, WHOI fouling collections), VIII. YK (VEPCO intake), X, MW.

Family Endeidae

Family Tanystylidae
Tanystylum orbiculare Wilson, 1878. CL, Fish Hawk station 8341, off Wolf Trap, 37°22'12", 76°10'25" 9.5 meters, X; station 8500, off New Point Comfort 37°16'50", 76°14'27", 5.5 fathoms, V; on Lynnhaven Trolley Bridge, VI; Virginia Beach, on mast washed ashore, X. YK, Gloucester Point, on Molgula and sponges, MW.

References

Hedgpeth, J. W. 1948. The Pycnogonida of the western north Atlantic and the Caribbean. Proc. U. S. Nat. Mus. 97: 157-342. A thorough study which lists five species from Chesapeake Bay. Depths given as fathoms are in error; some are in meters.

CLASS CRUSTACEA

Subclass Cephalocarida
Willard A. Van Engel

ES (Inside Wachapreague Inlet), 31.5 ppt, two ovigerous specimens, 8-VI-66, 6m, soft mud.
(Daugherty and Van Engel, 1969).

Subclass Branchiopoda
Willard A. Van Engel

Superorder Diplostraca
Order Cladocera
Suborder Haploptera
Family Leptodoridae

Suborder Eucladocera
Superfamily Sidoidae
Family Sidae
Sida crystallina (O. F. Muller, 1785). Oligohaline.
PM40, abundant, V. (Van Engel and Joseph, 1968).
Diaphanosoma brachyurum (Lieven, 1848). Oligohaline.
PM35-50, abundant VI-VIII, present VIII. (Van Engel and Joseph, 1968).
Penilia avirostris Dana, 1849. Polyeuraline.
CL, common and occasionally abundant IV, VII-IX, XI; in adjacent continental shelf waters; WA Channel and Inlet, occasional, VIII. (Van Engel and Joseph, 1968).

Superfamily Chydoroidea
Family Bosminae

Family Daphnidae
Daphnia longispina (O. F. Muller, 1785). Oligohaline.
PM (Lee Marsh), rare, III. (Van Engel and Joseph, 1968).
Simocephalus expinosus (Koch, 1841). Oligohaline. PM50, rare, VI. (Van Engel and Joseph, 1968).

Superfamily Polyphemidea
Family Polyphemidae
Podon polyphemoides Leuckart, 1859. Euryhaline CL, mouth and adjacent offshore waters, occasional. (Van Engel and Joseph, 1968). Herman et al (1968) report it from below Chalk Point in the lower part of Patuxent River, Maryland; spring and fall, thus extending range to oligohaline (?) waters.
Evadne nordmanni Loven, 1836. Poly- and euhaline. CL, V; YK00-10 V and VIII; common, found with but more abundant than E. spinifera and E. tergestina. (Van Engel and Joseph, 1968).
Evadne spinifera P. E. Muller, 1868. (See E. nordmanni). (Van Engel and Joseph, 1968).
References Cited


Subclass Ostracoda

The following list is mainly from the papers of Tressler and Smith (1946) and Elliot, Ellison and Nichols (1966), which are referred to by the symbols WT and HE.

Subclass Ostracoda

Order Myodocopa
Family Cylindroleberidae
  Cylindroleberis mariae (Baird, 1850). Mesohaline. YK (GP, Yorktown), infauna, abundant in subtidal sand, MW.

Family Sarsiellidae
  Sarsiella texana Kornicker and Wise, 1962. Upper mesohaline - polyhaline. YK (GP), silt-clay, 30 feet to 30/m², MW.

  Sarsiella zostericola Cushman, 1906. Found with S. texana, 5 to 10 times as abundant, MW.

Order Podocopa
Family Darwinulidae
  Darwinula aurea Brady and Robertson. Freshwater. RA, common, HE.

Family Cytheridae
  Cythere praesclerochilus Tressler and Smith, 1948. Mesohaline. PX (SI), I-VII, X, intertidal sand, WT.
  Cythere triangularis Tressler and Smith, 1948. Mesohaline. PX (SI), XI, rare; Tar Bay, VI, soft bottom, scarce, WT.
  Sarsocythere patuxiensis Tressler and Smith, 1948. Mesohaline. PX (SI), VII, scarce, 15 feet, in weeds, WT.

Family Cyctherideidae
  Clythrocytheridea sp. Mesohaline. RA (depths less than 18 ft.), rare, HE.
  Cushmanidea seminuda Cushman. Mesohaline and polyhaline. RA00-27, sand, abundant, HE.
  Cyprideis beaveni Tressler and Smith, 1948. PX and Mill Creek, 1-3 feet, weeds and detritus, rare, WT.
  Cyprideis castas Benson. RA, rare, HE.
  Cyprideis littoralis (Brady, 1869). PX (SI), spring and summer, in plant growth, WT.
  Cyprideis torosa Jones, 1857. Mesohaline. RA19-27, HE.
  Cytheridea papiliosa (Bosquet, 1852). Mesohaline. PX (SI), common fall to spring, WT.
Cytheridea punctillata (Brady, 1865). Mesohaline. PX (SI), abundant all year, WT.
Perissocytheridea brachyforma Swain. Mesohaline. RA00-27, scarce, HE.
Pontocythere sulcata (Puri, 1958). Mesohaline. RA00-22, shallow sand, common, HE.

Family Cytheruridae
Cytherura gibba (O. F. Muller, 1785). Mesohaline. PX (SI), most of the year; most common, WT. RA00-22, sand, common, HE.

Family Hemicytheridae
Hemicythere strandentia Tressler and Smith, 1948. Mesohaline. PX (SI), VI, numerous, intertidal, WT.
Hemicythere truitti Tressler and Smith, 1948. Mesohaline. PX (SI), 15 feet, sand, all year, WT.

Family Leptocytheridae
Leptocythere macallana (Grady and Robertson, 1869). Mesohaline. PX (SI), common all year, WT.

Family Loxoconchidae
Loxoconcha impressa (Baird, 1850). Mesohaline. PX (SI), littoral zone, summer and early fall, WT. YK (GP), common on Zostera, MW. RA00-22, apparently confined to Zostera and Ruppia, HE.

Cytheromorpha fusca (Brady, 1869). Freshwater - oligohaline. PX (SI), winter, WT. RA33-40, scarce, HE.

Cytheromorpha pascazoulaensis Mincer. Oligo- and polyhaline. RA00-33, abundant (45% of total ostracods), more common in deeper water, HE.

References Cited


General References


Subclass Mystacocarida

Derocheilocaris typicus Pennak and Zinn, 1953. Polyhaline. YK (Sandy Point) abundant, sand beach (McGinty and Higgins, 1968).

References Cited

C. B. Wilson (1932a) authored the sole comprehensive study of the copepods of Chesapeake Bay. Papers dealing with specific localities or particular groups have augmented our knowledge of copepods (Burrell, 1968; Davis, 1944; Herman et al., 1968; Jeffries, 1962, 1964, 1967; Heinle, 1965, 1969; Yeatman, 1970). Salinity and temperature ranges, when given, are from a survey by V. G. Burrell, Jr. from January 1969 to January 1970. Dr. H. C. Yeatman identified all cyclopoid copepods and his comments on the species have been included. (Parasitic copepods are included in the parasites section.)

Order Calanoida

Family Calanidae

Calanus finmarchicus (Gunnerus, 1765). Euhaline (above 28 ppt).
CB (mouth).

Eucalanus pleatus (Giesbrecht, 1888). Upper poly- and euhaline (24-31 ppt). First record for CB. CB (mouth) summer, scarce.

Family Paracalanidae


Paracalanus indicus Wolfenden, 1905. Poly- and euhaline (above 21 ppt). Lower CB, fall and winter, spawning probably occurring throughout this period. First record for CB.

Paracalanus parvus (Claus, 1863). Euryhaline. Upper CB, abundant, autumn. This species may actually be P. indicus and P. quasimodo lumped together (Bowman, 1971).


Family Pseudocalanidae

Pseudocalanus minutus (Kroyer, 1840). Meso- to euhaline (above 8 ppt).
CB and lower YR, winter and spring. Wilson (1932a) called this species P. elongatus, but With (1915) found the two species to be the same (Wilson, 1932b), HPJ.

Family Temoridae

Temora discaudata Giesbrecht, 1880. CB, rare, CBW.

Temora longicornis (Muller, 1792). Poly- and euhaline (19-32 ppt). CB (mouth), fall and spring, VGB. Breeding season protracted, CBW.

Temora stylifera (Dana, 1849). Euhaline (above 29 ppt). CB (mouth), early fall, rare, VGB. First record for CB.

Temora turbinata (Dana, 1849). Upper-polyhaline and euhaline (above 27 ppt). CB (mouth), fall, rare. Although Wilson (1932a) listed this species as abundant in fall and winter, present information indicates he may have confused this species with T. longicornis, a congener abundant in CB.

Eurytemora americana Williams 1906. Poly- and euhaline (about 23 ppt). Middle and lower CB, winter and spring, rare.

Eurytemora affinis (Poppe, 1880). Freshwater to polyhaline (to 20 ppt). Middle and upper CB, abundant, breeds throughout year. Most American records of E. hirundoides are probably this species according to M. S. Wilson (1959).

Family Centropagidae

Centropages furcatus (Dana, 1852). Upper poly- and euhaline (above 24 ppt). CB (mouth), late summer, rare. First record for CB.

Centropages hamatus (Lilljeborg, 1853). Meso- to euhaline (above 8 ppt). Winter and spring form, spawns in winter.

Centropages typicus Kroyer, 1849. Polyhaline (above 19 ppt). Lower CB, present all year except mid-summer, often found with C. hamatus; breeds in winter. First record for CB.
Family Diaptomidae


Pseudodiaptomus coronatus Williams, 1906. Freshwater. All year, more abundant in fall. Breeding season protracted.

Family Pseudocyclopidae

Pseudocyclops sp. Polyhaline? One female of this bottom dwelling genus was caught at the mouth of CB in February. A description awaits the collection of more specimens.

Family Candaciidae

Candacia armata Boeck, 1872. Polyhaline. Lower CB, abundant, GDG; Governor's Run, Md., CBW.

Family Pontellidae

Labidocera aestiva Wheeler, 1889. Upper meso- and polyhaline (above 12.7 ppt). Lower CB, common, CBW.

Labidocera wollastoni Lubbock, 1857. Euhaline. CB (mouth), rare, CBW.

Pontella pennata Wilson, 1932. Euhaline, CB (mouth), rare. This species may be synonymous with Pontella meadi (Fleminger, 1957).

Family Acartiidae

Acartia clausi Giesbrecht, 1892. Oligo- to polyhaline. Common in bay and tributaries almost to fresh water in winter and early spring, replacing Acartia tonsa in the lower portions; breeding throughout period of occurrence. Wilson (1932) confused this species with Acartia tonsa and Acartia longiremis (Bowman, 1961).

Acartia longiremis Liljeborg, 1853. Polyhaline. Lower CB, present and breeding late winter and spring, rare. Acartia tonsa Giesbrecht, 1892. Euryhaline. Most abundant copepod replaced by Acartia clausi in lower CB in winter and spring, apparently breeds all year, (Bowman, 1961).

Family Tortanidae

Tortanus discaudatus (Thompson and Scott, 1897). Meso- and polyhaline (above 8 ppt). Lower CB and tributaries, late winter and spring, probably breeds in spring in the Bay.

Order Harpacticoida

Family Canuellidae

Canuellia canadensis Willey, 1923. Oligo- and lower mesohaline (fresh water to 10.5 ppt). Upper YR and Pamunkey R. present all year, most abundant winter and spring and usually benthic, 3.8 to 27.5°C. Juveniles and ovigerous females not found. Bloody Point, Md., rare, CBW.

Family Ectinosomidae

Ectinosoma curticorne Boeck, 1872. Euryhaline. Abundant, CBW.

Ectinosoma normani T. & A. Scott, 1894. Mesohaline. Lower Potomac R., "about 30 females", CBW.

Microsetella norvegica (Boeck, 1864). Euhaline. CB (mouth), scarce, CBW.

Family Tachidiidae

Euterpina acutifrons (Dana, 1848). Poly- to euhaline (19-31ppt). Lower In and CB, all year except coldest period, 7-27°C, most common in bottom samples. Females with eggs and spermatophores in summer. VAB, HCY.

Microarthridion littorale (Poppe, 1881). Upper mesohaline. Love Point, Md., rare, CBW.

Family Harpacticidae

Harpacticus cheilifer (O. F. Müller, 1776). Euhaline. CB (mouth), two females, CBW.

Harpacticus gracilius Claus, 1863. Upper meso- and polyhaline. YR (GP and Guinea Marshes), on sponges Halichondria bowerbanki and Microciona prolifera (Yeatsman, 1970). Winter and spring, CBW.


Family Tisbidae

Tisbe furcata (Baird, 1837). Upper meso- and lower polyhaline. GP and Guinea marshes, on Halichondria and Microciona (Yeatsman, 1970). Lower CB, sporadic, CBW.
Family Peltidiidae

Alteutha oblonga (Goodsir, 1845). Polyhaline. Lower CB as A. depressa (Lang, 1948) rare, CBW. Lower YR, summer, few specimens, 20.1-21.60 ppt, 24C, UGB, HCY.

Family Thalestridae


Paradactylopodia brevicornis (Claus, 1866). Euryhaline. Point Lookout, Md., two specimens, CBW.

Family Parastenhelliidae

Parastenhelia spinosa (Fischer, 1860). Polyhaline, scarce, CBW.

Family Diosaccidae

Amphiascopsis cinctus (Claus, 1866). Euryhaline, scarce, CBW.

Amphiascus parvus Sars, 1906. Lower polyhaline. GP and Guinea Marshes, summer, Halichondria and Microciona apparently grazes on algae and feeds also as a scavenger, because no sponge cells were visible in the gut. (Yeatman, 1970).

Diosaccus tenuicornis (Claus, 1863). Euryhaline. CB (mouth), rare.

Pararobertsonia chesapeakensis (Wilson, 1932). Mesohaline. Off Governor's Run, Md., March, several specimens (only one female), CBW.

Family Ameiridae

Nitocra sp. Polyhaline. GP, late fall, an oyster larvae culture contaminant.

Family Cletodidae


Family Laophontidae


Order Cyclopoida

Family Oithonidae

Oithona similis Claus, 1866. Polyhaline. Eurythermal, most abundant in spring, occurs with Oithona brevicornis, breeds spring and fall, CBW.

Oithona spinirostris Claus, 1863. Euryhaline. CB (mouth), rare.

Family Cyclopidae


Family Clausidiidae

Hemicyclops adhaerens (Williams, 1907). Polyhaline (22-30 ppt).
Lower CB, VII-VIII, rare. Gooding (1960) examined Wilson's (1932a) specimens of Hemicyclops americanus from Chesapeake Bay and found them identical to this species.

Family Lichomolgidae


Family Oncaeidae

Oncaea mediterranea Claus, 1863. Poly- and euhaline (above 20 ppt).
Lower CB, summer and fall, breeds in fall, scarce. First record for CB.

Oncaea minuta Giesbrecht, 1892. Polyhaline. Lower and middle CB, scarce, CBW.

Oncaea venusta Phillippi, 1843. Euhaline. CB (mouth), rare, CBW.

Family Corycaeidae

Corycaeus amazonicus F. Dahl, 1894. Euhaline (above 30 ppt). CB (mouth), IX-XII.

Corycaeus elongatus Claus, 1863. CB (York Spht), scarce, CBW.

Corycaeus venustus (Dana, 1853). Polyhaline. Lower CB, fall and winter, rare, CB.

Parranula gracilis (Dana, 1853). Upper meso- to euhaline (16-31 ppt).
Low CB, breeds early fall. Wilson (1932a) called this species Corycella carinata Giesbrecht. However, Gonzales and Bowman (1965) reexamined his specimens and found them to be this species.

Family Artotrogidae

Lower CB, Cape Charles City, winter, 145 ft., six specimens, CBW. GP, summer, on sponges, shallow water; winter, on Microciona, deeper water, abundant, MW, HCY.

Family Ergasilidae

Ergasilus cerastes Roberts, 1969. Oligohaline (to 6ppt), Pamunkey R. A parasite of catfish (Ictalurus sp.) according to Roberts (1970), however all local specimens have been caught in plankton nets. First record for Va.

Ergasilus labricis Kroyer, 1863. Euryhaline. James R. on gills of striped bass, Morone saxatilis, WGH.

Family Bomolochidae

Bomolochus eminens Wilson, 1911. Mesohaline. Point No Point, Md., fish parasite, local host unknown, (Wilson, 1932a).

Family Asterocheridae


REFERENCES


SUBCLASS CIRRIPEDEA

Willard A. Van Engel

Order Lepadomorpha
Family Lepadidae
Octolasmis lowei Darwin, 1854. Meso- to euhaline. Piankatank, RA00 to CB00 and beyond, all months, occasional, on gills of aged adult female blue crabs, WAVE.

Order Thoracica
Suborder Balanomorpha
Family Chthamalidae
Chthamalus fragilis Darwin, 1854. Upper meso- and polyhaline. YK, abundant in high intertidal on pilings and Spartina. ES (seaside), very abundant on tall Spartina, JDA.

Family Balanidae
Balanus amphitrite Darwin, 1854. Polyhaline. CL (mouth) scarce, JDA.
Balanus improvisus Darwin, 1854. GP, most common barnacle below intertidal, JDA.
Chelonibia patula (Ranzani, 1818). Meso-to euhaline. CL, all months, occasional, on carapace of aged adult female blue crab; YR00-25, rare, I-V, IX-X, in some years, WAVE.
Chelonibia testudinaria (L., 1758). Poly- and euhaline. CL, on sea turtles, WAVE.
Platylepas hexastylos (Fabricius, 1798). Poly- and euhaline. CL, once on blue crab, WAVE. Chincoteague Bay, on green turtle (Schwartz, 1960).

Order Rhizocephala
Loxothylacus panopaei (Gissler, 1884). Meso- to euhaline. CB, Deal Island (Md.) to Elizabeth R. (Va.), RR00-40, YR00-35, JR00-32, frequent on abdomens of Eurypanopeus depressus and Rhithropanopeus harrisii since 1964; single specimen on E. depressus from Chincoteague Bay. (Daugherty, 1969), WAVE.

REFERENCES


SUBCLASS MALACOSTRACA

Order Mysidacea
Family Mysidae

Neomysis americana (S. I. Smith, 1873). Euryhaline.
Abundant in rivers, less so in bay and on ES, perhaps cyclic or sporadic (Hopkins, 1965), all depths, MW.
Usually 10-100 times more abundant on bottom than surface both day and night in York River. (Van Engel and Joseph, 1968).

Mysidopsis bigelovii Tattersall, 1926. Meso- to euhaline.
Mobjack Bay, frequent, GG. YK (Mumfort Is.), common on eelgrass in deeper water, X - XI, GAM. WA, common, WAVE.

Heteromysis formosa (S. I. Smith, 1873). Poly- to euhaline.
ES (Cedar Island), intertidal, 31.8 ppt, 22-VII-66, Morris Roberts. Hampton Roads, VIII-64, DFB.

REFERENCES


Order Cumacea

Willard A. Van Engel

The cumaceans of the Chesapeake Bay area have not been adequately studied. Numerous specimens have been collected with meter net and by bottom grabs from the lower Chesapeake Bay and several tributaries, from inlets on the seaside of the Eastern Shore and by meter net in inner continental shelf waters. Specimens have been taken from oligohaline to euhaline waters. At least six genera and six to nine species appear to be represented. Identification has lagged, due to uncertainty of specific differences.

Family Bodotriidae

Mancocuma altera Zimmer, 1943. Polyhaline. CL(numerous locations), Fish Hawk stations, 24.4-29.3 ppt, (Zimmer, 1943).


Cyclaspis varians Calman, 1912. Upper meso- to euhaline. Inner continental shelf, 36-37°N, 74°57'-75°047'W, surface-18 m, common, WAVE; YK(Clay Bank), VII-66, 3 specimens, eelgrass bed, RO. Elizabeth R. rare, Michael Richardson.

Leptocuma minor Calman, 1912. Euhaline. Inner continental shelf, 36°30'-36°30'N, 75°22'-75°047'W, VII-62, surface-18 m, abundant, WAVE; 37-38°N, 74°47'-75°047'W, VII-62, surface-18 m, rare to common, WAVE; CL mouth, sand, V-70, rare, DFB.
Family Leuconidae

*Leucon americanus* Zimmer, 1943. Meso- to euhaline. CB (numerous locations), Fish Hawk stations, above 9.16 ppt., (Zimmer, 1943); lower YK, silt-clay, rare; Sarah’s Creek, 800/m2; upper YK, abundant; lower PM, common to abundant; RA25-30; JA3-15 (Deep Creek), 13-III-67, ovigerous, Elizabeth R, rare; DFB, DG, JBF, MR, MW; PO18 (Tall Timbers), 28-III-68, J. E. Benedict.


Family Diastylidae

*Diastylis polita* S. I. Smith, 1879. Euhaline. Inner continental shelf, 36-38°N, 74°47'-75°37'W, surface-18 m, VII-62, occasional, WAVE; CL mouth, DFB.

*Oxyurostylis smithi* Calman, 1912. Upper meso- to euhaline. Inner continental shelf, 36°00'-37°30'N, 74°57'-75°47'W, surface-18 m, VII-62, common to abundant, WAVE; CL mouth, sand, rare, DFB; YK00-15, silt-clay, rare, DFB; lower YK (VEPCO area), sand, to 600/m2, MW. Md: (Chincoteague Bay), sand, rare, RO.

REFERENCES


Order Tanaidacea
Family Tanaidae
Leptochelia savigny (Kroyer, 1842). YK (Yorktown), sand, common, John Kraeuter; (Mumfort I.), rare, GAM.

Order Isopoda
Suborder Anthuridea
Family Anthuridae
Cyathura polita (Stimpson, 1855). Oligo and mesohaline. Common on debris-covered shallow sand, scarcer in deeper water, MW.
Cyathura burbancki Frankenberg, 1965. Poly and euryhaline. CL (off RA), medium-coarse, frequent, MW. JA (Middle Ground), abundant, DFB.
Ptilanthura tenuis (Harger, 1880). Poly- and euryhaline. CL (off RA), sand, 1 specimen, sand, MW, DG.

Suborder Flabellifera
Family Cyamothoidae
Aegathoa ouculata (Say, 1818). Polyhaline. CL (mouth), plankton tow, GG.
Aegathoa mediais Richardson, 1900. Mesohaline? CU (Barren Is.) species described from single specimen. May represent a juvenile stage of Lironeca ovalis. (Sandifer, Zwerner, and Kerby, unpublished).
Irons nana Schoedte and Meinert, 1883-84. Euhaline? Sand Bridge Beach, summer, from gill of Membras martinica, GG.
Lironeca ovalis (Say, 1818). Probably euryhaline. Common fish parasite throughout bay and rivers. Low salinity tolerance indicated by records from JA (Jamestown Beach), JHK; gill parasite of bluefish (Pomatomus), WGH; also common gill parasite of striped bass (Morone saxatilis) and silver perch (Bairdella chrysura); occasionally on other fish species.
Olencira praegustator (Latrobe, 1802). Euryhaline? Sand Bridge, abundant mouth parasite of menhaden (Brevoortia), MW; one record from Jamestown Beach, PAS, JHK.

Family Sphaeromidae
Ancinus depressus (Say, 1818). Euhaline. Sand Bridge, WGH. CL (Thimble Shoals), rare.
Paracereiscau data (Say, 1818). Upper meso- to euryhaline. ES (the Gulf), 4 males, 14 females, 8-VII-60; 4 males, 3 females, II-VI-61, SH, TEB. ES (Chincoteague), on Zostera, 32 males, 38 females, 12-VIII-65, MW. YK (Sandior Pt.) abundant on Zostera all year, especially late summer and autumn, GAM. This species has probably been often misidentified as Sphaeroma quadridentatum (Marsh, 1970).
Sphaeroma destructor Richardson, 1897. Polyhaline? RA (Urbanna) in hull of boat recently arrived from Florida, VI-62, WGH, TEB. Stray, unlikely to become established.
Sphaeroma quadridentatum Say, 1818. Oligo- to polyhaline. CL, Richardson (1905) recorded this species from Cape Charles City. Other records: YR (GP), under stones, WGH; among intertidal barnacles and algae, common, MW. Pamunkey 35-50 (Van Engel and Joseph, 1968). True abundance and occurrence of this form unknown, since, as noted above, it has probably been confused with P. caudata.
Cassidinidea lunifrons (Richardson, 1900). Upper meso- and polyhaline. YK (Sandy Pt.), intertidal, four live specimens in mantle cavities of mussels Modiolus demissus, 1968-9, PAS.
Suborder Valvifera

Family Idoteidae


Chiridotea caeca (Say, 1818). Meso- to euhaline. PM, rare, MW. Off CB, plankton, GG.

Chiridotea tuftsi (Stimpson, 1853). Poly- or euhaline. Offshore plankton, GG.

Erichsonella attenuata (Harger, 1873) Upper meso- and polyhaline. YK (Mumfort I.), abundant, GAM.

Erichsonella filiformis (Say, 1818). Upper poly- and euhaline. Habitat unknown, SH, TEB.

Idotea baltica (Pallas, 1772). Poly- and euhaline. On Zostera, common to abundant in summer, but less than E. attenuata, GAM.

Idotea metallica Bosc, 1802. Euhaline. Abundant in offshore plankton, GG.

Idotea triloba (Say, 1818). Near euryhaline. CL (Back R.) Zostera bed, 540/m², III-70, Robert Orth. YK (Mumfort I.), common on Zostera, GAM. Rare in deeper water but 600/m² found in Tangier Sound at 87 feet, MW. YK25-FM35 (Van Engel and Joseph, 1968).

Suborder Oniscoidea

Family Ligiidae

Ligia exotica Roux, 1828. Upper meso- to euhaline. YK (GP), abundant on shaded pilings and rock rip-rap, MW.

Suborder Epicaridea (Bopyroidea)

Family Bopyridae

Bopyrina latreuticola (Gissler, 1882). Euhaline. Off ES, branchial parasite of Latreutes fucorum, PAS.

Probopyrus pandalicola (Packard, 1879). Polyhaline. ES, fairly common branchial parasite of Palaemonetes, WAVE, PAS.

Pseudione upogebiae (Hay, 1917). Polyhaline. YK (Sandy Point), one male and one female collected 17-III-69 on gill of Upogebia affinis, PAS.

Pseudione furcata Richardson, 1904. Poly- and euhaline. Richardson (1905) states that four females were collected from Virginia's ES by H. E. Webster, male unknown, host unknown, PAS.

Family Entoniscidae

Cancrion (?) sp. Polyhaline. YK (GP) two females and one male endoparasitic in Eurypanopeus depressus, WAVE; apparently represents a new species of Cancrion, PAS.

REFERENCES


Burbank, W. D. 1963. Some observations on the isopod, Cyathura polita, in Chesapeake Bay. Chesapeake Sci. 4:104-105. Note on presence in Maryland and suggestions for research.

Order Amphipoda
Suborder Gammaridea /See Feeley and Wass (1971) for further information/

Family Ampelisidae
  YK (Mumfort I.), abundant on Zostera all year, especially in
  late summer and early fall, GAM. Not reported from
  Eastern Shore.

Ampelisca vandorum Mills, 1963. Upper meso- to euhaline. CL
  (Baek River), Zostera bed, 4200/m², III-70, RO. JA(HR),
  1500/m², DFB.

Ampelisca verrilli Mills, 1967. Poly- and euhaline. Lower
  YK, sand - silt, 350/m², MW. ES (Chincoteague Bay,
  Md.), Zostera bed, 130/m², RO.

Family Ampithoidae
Ampithoe longimana Smith, 1873. Upper meso- polyhaline.
  YK (Mumfort I.), abundant on Zostera all year.
  (Leonardtown, Md.), 23 specimens, VI-69, S. L. H. Fuller,
  J. K. Lowry. (Warwick R.), 2 specimens, JKL.

Cymadusa compta (Smith, 1873). Meso- polyhaline. YK
  (Mumfort I.), common on Zostera all year, abundant in
  shallow water, less so to 30 ft., GAM.

Family Acridae
Lembos smithi (Holmes, 1903). Poly- and euhaline. ES
  (Hog Island Bay), 1 specimen, SH, TEB. YK (Gloucester
  Pt.), 4 specimens, 11-67, algae detritus in Zostera bed.

Leptocheirus plumulosus Shoemaker, 1932. Oligo- mesohaline.
  Upper YK, lower PM, muddy shallows, abundant, JF. YK
  (Sarah’s Creek), 600/m² in leafy debris, MW.

Riftia spalacides spallacides. Upper meso- and polyhaline. YK (Mumfort
  I.), frequent on Zostera, especially in summer, GAM.

Family Bateidae
Batea catharinensis Muller, 1865. Upper meso- euhaline.
  Epifauna on hydroids, bryozoans and sponges, 10-40 ft.,
  often abundant. Color variations from the usual spotted
to solid purple are frequent, MW.

Family Corophiidae
  YK (GP), 30 ft., silt-clay, abundant, MW. YK10, very
  abundant in trawl net, WAVE.

Corophium aschericus Costa, 1857. Poly- and euhaline. YK,
  JA, abundant on hydroids and Zostera, 1970, DFB. YK
  (Mumfort I.), on Zostera, sporadic, occasionally abundant,
  VIII-X, ES (Wachapreague), over 600 in sponge, SH, TEB.

Corophium lacustre Vanhoven, 1911. Oligo- and lower meso-
  haline. PM90, marsh detritus, 10-40 ft., 4800/m², MW.

  YK (Mumfort I.), frequent on Zostera especially at deepest
  station, VI-X, GAM.
Corophium tuberculatum Shoemaker, 1934. (See reference). Polyhaline. JA and CL (mouth). This species is difficult to separate from C. acherusium but is apparently common only in higher salinities, DFB.

Corophium sp. Oligohaline. J. B. Feeley recognized this large species as different but had only a few specimens. It is presumably being described from Georgia. It's closest relative may be European.

Erichthonius brasiliensis Dana, 1855. Polyhaline. Tubicolous on hydroids and bryozoa. YK, abundant (400/m²), 15-70 ft., MW. YK (Mumfort I.), rare, GAM. Unciola inermis Shoemaker, 1945. Euhaline. CL (mouth), 1920, few small specimens, deeper water, CRS.


The three Unciola species described from the CB mouth area, have not been taken by VIMS personnel.

Family Gammaridae

Elasmopus levis Smith, 1873. Upper meso- and polyhaline. YK (Mumfort I.), on Zostera, abundant all year, especially in summer, GAM. YK, most abundant gammarid, JBF. JA(HR) abundant on Aeverrillia armata, XI-53, MW.


Gammarus fasciatus Say, 1818. Freshwater. PM40 & 50, occasional, JBF.

Gammarus tigrinus Sexton, 1939. Oligohaline. Bousfield (1969) lists numerous specimens from Md. and two from the Potomac. It has yet to be definitely identified from Virginia.

Gammarus palustris Bousfield, 1969. Euryhaline? YK (West Point), specimens taken in seaweed debris, IV-69. Bousfield gives many records from the upper Ches. Bay, others from Moblock Bay, ES and Norfolk. However, it appears that this species prefers oligo-mesohaline shallows and intertidal zones.

Gammarus mucronatus Say, 1818. Upper meso- and lower polyhaline. YK (Mumfort I.), abundant on Zostera, except in autumn, when it was absent; greatest numbers at deepest station, GAM. ES (Swash and Hog I. Bays), common on oyster ricks, IV-VI, 1960, SH, TEB.

Gammarus sp. 1 /See Bousfield, 1969 for these undescribed gammarids. This is a small amphipod similar to G. mucronatus but found oögerous although lacking mucronations.

Gammarus sp. 2 Bousfield reported a single male from St. Mary's Co., Md.

Rivulogammarus sp. 1. A large species known from three specimens taken in Md.

Rivulogammarus sp. 2. A small species known from two specimens from Ches. Beach, Md. Bousfield (personal communication) has emphasized the great variation in members of this genus on the mid-Atlantic coast, particularly in fresh and oligohaline waters.

Melita appendiculata (Say, 1818). Upper meso- haline. YK, on sponges, hydroids and bryozoans, JBF. YK (Mumfort I.), common to abundant in autumn on Zostera at deeper stations, JBF. ES (Seaside and Bayside), 3 specimens, 1960, SH, TEB.
Melita nitida Smith, 1873. Upper oligo- to midpolyhaline. 
YK (Terrapin Pt. marsh), abundant in creek, VII-70, MW.
At bases of hydroids and bryozoans in deeper water, JBF.

Family Haustoriidae

Acanthohaustorius intermedius Bousfield 1965. Upper poly- and euhaline. HR (Newport News Bar, Sewells Pt. Spit),
CL (mouth), sand, rare, DFB, ELB.

Acanthohaustorius millsi Bousfield, 1965. Upper poly- and euhaline. HR (Newport News Bar), sand, rare, DFB, ELB.

Amphiporea virginiana Shoemaker, 1933. Euhaline. Virginia Beach, Intertidal, abundant, CRS, Sand Bridge, but not in
CR, MW.

Bathyyporeia sp. Polyhaline. HR, one specimen, sand, DFB, ELB.


Lepidactylus euticus Say, 1818. Euryhaline. ES (The Gulf),
MW, ELB. CU (Fox Point, Rhode R.), John Vogel. JA
(Cobham Bay), shallow sand, frequent, Richard Peddicord.

ES (Cedar I., bayside beach), sand, intertidal, common,
4-IV-67, JBF.

CU (Locust Point, Rhode R., near Annapolis, Md.), sand,
John Vogel, ELB.

Family Ischyroceridae

CL (Bay Bridge-Tunnel), ES (Wachapreague Inlet),
abundant on pilings, YK mouth and HR, rare, JBF.

Family Liljeborgiidae

Idunella sp. Poly- and euhaline. Bousfield (personal
communication) has determined this species and stated
that it is probably commensal. YK (GP), one specimen;
ES (Hog Island Bay), nine specimens (5 males, 4 ovig.
females), JBF.

Listriella barnardi Wigley, 1966. Polyhaline. CL, YK,
probably commensal with Maldanopsis elongata, MW,
R. L. Wigley.

Listriella clymenellae Mills, 1962. Polyhaline. YR,
(GP), Zostera beds and beyond to ca 15 ft.; CB, rare
off RR, MW, TEB. Commensal with Clymenella torquata,
often abundant.

Family Lysianassidae

Lysianassa alba (Holmes, 1903). Polyhaline. YK, sandy-
silt shallows, rare, JBF, Pierre Brunel. CL (Back River),
Zostera bed, 1000/m2, Robert Orth.

Family Oedicerotidae

Monoculodes edwardsi Holmes, 1903. Euryhaline. YR, (to PM35),
JA (to JA36), RA (to RA40), always most abundant in upper
reaches. CL (off RA), frequent; PK (Stove Pt.), sand,
common, JBF.

Family Phoxocephalidae

Paraphoxus epistomus (Shoemaker, 1938). Poly- and euhaline.
YK (Tue Marsh Light), 200/m2, hard sand, MW; JA (mouth),
DBF.

Family Pleustidae

Parapleustes sp. Upper meso- and lower polyhaline. PX, Md.,
ELB. YK20, specimens on hydroids and bryozoans, JBF, ELB.

Sympleustes glaber (Boeck, 1861). Meso- and euhaline. (PM40),
JA (to JA19), RA25 to RA30; ES (WA), JBF; among hydroids
and bryozoans; not yet taken in CB.

Family Stenothoidae

Parametopella cypris (Holmes, 1903). Polyhaline. CL (off
mouth of Potomac R. and off New Point Comfort), Cowles (1930).
YK10 - YK15, scarce JBF.
Stenothoe gallensis (Walker, 1904). Polyhaline. ES (Cherrystone Creek), 8-VII-60, 47 specimens; (WA), 24-VI-60, 12 specimens, SH, TEB. YK (Mumfort I.), two specimens on Zostera, 8-X-69, GAM.

Stenothoe minuta Holmes, 1903. Upper meso- and euhaline. YK (Blackspear), on Plumularia diaphana; ES (WA), on Tubularia crocea; YK15, most abundant in December, JBF.

Family Talitridae

Orchestia grillus Bose, 1802. Meso- to euhaline? Salt-marsh amphipod, YK (GP), under eelgrass wrack; ES, (Cedar I.), JBF.

Orchestia platensis Kroyer, 1844. Upper meso- and polyhaline. Mainly under wrack on sand beaches. YK (GP), abundant, JBF.

Talorchestia longicornis (Say, 1818). Meso- to euhaline. LC, common "beach hopper", abundant in high intertidal sand of less exposed beaches, JBF.

Suborder Hyperiidea

Family Hyperiidae


Hyperoche medusarum (Krøyer). Poly- and euhaline. YK, plankton tow, JM. PX, F. J. Schwartz, TEB.

Suborder Caprellidea

Family Caprellidae (See McCain, 1968).

Aeginina longicornis (Krøyer, 1843). Euhaline? McCain (1968) lists this on the basis of its report from lower Ches. Bay "algal masses" by Ferguson and Jones (1949). However, it has not been found since then.

Caprella penantis Leach, 1814. Upper meso- to euhaline. CL, on sponges and hydroids, abundant, JM. YK (Mumfort I.), abundant on Zostera, especially in deeper water, winter-spring; scarce to absent, summer-fall, GAM.

Caprella equilibra Say, 1818. Poly- and euhaline. YK (GP), on hydroids, sponges and bryozoans, often abundant but seasonally sporadic, JM. YK (Mumfort I.), only two specimens on Zostera, 1-XII-68, GAM.

Paracaprella tenuis Mayer, 1903. Upper meso- and polyhaline. Common on hydroids, sponges, and bryozoans, JM. Caprellid most often taken in bottom grabs, MW. YK, (Mumfort I.), scarce on Zostera, except 61 specimens, 1.2m, 8-X-69, GAM.
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Croker, R. A. 1968. Distribution and abundance of some intertidal sand beach amphipods accompanying the passage of two hurricanes. Chesapeake Sci. 9:157-162. All species treated probably occur on Delmarva beaches.


Steinberg, J. E. and E. C. Dougherty. 1957. The skeleton shrimps (Crustacea: Caprellidea) of the Gulf of Mexico. Tulane Stud. Zool. 5:267-288. Descriptions of eight species, including two identified from Chesapeake Bay area by Dr. Steinberg. A paper which stimulated a comprehensive study of this group by McCain (1968).

ORDER DECAPODA
Willard A. Van Engel and Paul A. Sandifer

This list of the decapod fauna of the region consists of 64 species in 26 families found within the confines of the Chesapeake Bay, and an additional 29 species in 7 families from the Continental Shelf and Slope. The expansion of the list of Bay species given in the third revision (Wass, 1965) resulted from the inclusion of one species carelessly omitted earlier, five species newly discovered, and two freshwater and land species which must be considered accidental migrants into brackish water.

The decision to include Continental Shelf and Slope decapods resulted from a growing interest in the ecology and distribution of species (fish, mollusk and crustacean) now being commercially exploited, or for which a potential fishery may exist, or which may have an association, however small, with the intricate food web of the Bay.

There is also included an addendum of 14 species which would be expected to be found in shelf waters but for which no records have appeared.

Collectors and Authorities

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Suborder Natantia
Section Peneaidea

Family Sergestidae

Acetes americanus carolinae Hansen, 1933. Poly- and euhaline.

YK, MB, uncommon, X-XI, DSH, WAVE, PAS.

Lucifer faxoni Borradaile, 1915. Poly- and euhaline. Inner continental shelf, 36-38°N, 73°43'-75°47'W, more abundant offshore, surface-9m, uncommon at 18m, IV, VII-IX, XII, WAVE; CL, VIII, X, XI, PAS; MB, X, PAS.

Family Penaeidae

A large collection of juvenile and adult shrimp has been maintained by the Crustaceology Department since 1948. Identifications of specimens of the genus Penaeus collected through 1968 were made or verified by Dr. Isabel Perez Farfante whose publication provides details of life history, ecology and distribution of the genus in the western Atlantic.

Penaeus aztecus aztecus Ives, 1891. Meso- to euhaline, usually upper meso- and polyhaline. CB and tributaries, north to Tred Avon R., Md., numerous locations; Jamestown (JA) VII-66, 5 ppt; VII-XI, rare to occasional, WAVE, (Perez Farfante, 1969); ES (Swash Bay), WAVE.

Penaeus duorarum duorarum Burkenroad, 1939. Upper meso- to polyhaline. CB and tributaries, north to PX, numerous locations, all months, minimum temperature 3.5°C, rare to occasional, WAVE, (Perez Farfante, 1969).
Penaeus setiferus (Linnaeus, 1767). Euhaline. CB and tributaries, numerous locations, to 1 ppt in Chickahominy R. (JA) and at PM45, V-XII, rare to occasional, WAVE, (Perez FarPante, 1969).

Trachypenaus constrictus (Stimson, 1871). Polyhaline. CL, eastern side, deep water, VII, IX, XII, frequent, WAVE, (Cowles, 1930).

Section Caridea

Family Pasiphaeidae

Leptochela serratorbita Bate, 1888. Euhaline. Inner continental shelf, 3600'N, 74009'-75035'W and 37°00'Ns 74°45'-750lO'W, occasional, surface-18m, WAVE.

Family Palaemonidae

Leander tenuicornis (Say, 1818). Euhaline. Inner continental shelf, PAS; on Sargassum, (Fine, 1969); CB mouth, PAS.

Macrobrachium ohone (Smith, 1874). Oligo- and mesohaline.

Palaemonetes intermedius Holthuis, 1949. Meso- to polyhaline. YK00, 06 (BP), Lynnhaven Bay (Broad Bay), Pungoteague Cr., Pocomoke Sound, PX (SI, and St. Leonards Cr., 5.4 ppt), ES (Chincoteague, Isle of Wight, Assawoman bays), in eelgrass, shallow water, uncommon in Virginia, common in Maryland and ES; WAVE, RS and LH, (Schwartz, 1964), FAC.

Palaemonetes vulgaris (Say, 1818). Meso- to polyhaline. YK00-06, JA10, Lynnhaven Bay (Broad Bay), PX (SI), ES (Chincoteague, Sinepuxent bays), less common than P. pugio in Virginia, rare in Maryland, taken in shallow and deep water, WAVE, FAC, RS and LH, (Cory, 1967).

Family Alpheidae

Alpheus heterochaelis Say, 1818. Polyhaline. CB, YK00-06 (GP), uncommon, occasionally in holding trays of oysters, WAVE.

Alpheus normanni Kingsley, 1879. Polyhaline. CB, YK00-06 (GP), uncommon, occasionally in oyster trays, WAVE; ES (Cherrystone Cr.), FAC.

Family Ogyridae

Ogyrides alpaeostris (Kingsley, 1879). Polyhaline (?). Kingsley described the species from a single specimen collected by H. E. Webster from Northampton County (seaside); never found again in Virginia

Ogyrides limicola Williams, 1955. Meso- to euhaline. CL, occasional, DPB; YK00-20, common, but not abundant in mud bottom, DPB, WAVE; YK06 below bridge, depth 9m, 150/sq.m., MW; MB, larvae, X, PAS; ES (Bradford Bay, Accomack Co.), 32.5 ppt, WAVE.

Family Hippolytidae

Latreutes fucorum (Fabricius, 1789). Euhaline. Inner continental shelf, 37-380N, 74020'-75010', surface-9m, occasional, VII-62, WAVE; floating Sargassum (Fine, 1969); outside mouth of CB (Cowles, 1930); CB mouth, PAS.
Family Crangonidae

**Crangon septemspinosa** (Say, 1818). Euryhaline. Inner continental shelf, 37°02'-38°01'N, 74°54'-75°01'W, 16-26m, 2-5°C, JAM and JDM; ES (Assawoman, Isle of Wight, Sinepuxent and Chincoteague bays) (Schwartz, 1964); CB, numerous locations, outside the bay mouth to Swan Pt., Md. (39°30'N), JAL3-32 (0.94 ppt), YK00-40, RA11-30, P010-25, Choptank 10, Tangier and Pocomoke sounds, more abundant in lower Bay and in lower portions of Virginia rivers (polyhaline waters) especially XI-VI, farthest upriver in summer, occasionally in winter months; ovigerous all months, fewer in summer; larvae II-V in Bay although V-VIII and X in PX, silty-sand bottoms, WAVE, PAH, RS and LH, (Cowles, 1930; Frey, 1942).

Suborder Reptantia

Section Macrura

Superfamily Nephropidea

Family Nephropidae

**Nephropsis aculeata** Smith. Euhaline. Inner continental shelf, 37°02'N, 74°31'W, 183m, LOC, I, JAM, and JDM.

Family Homaridae

**Homarus americanus** H. Milne-Edwards, 1837. Poly- and euhaline. Continental shelf, 35°52'-38°01'N, 73°20'-75°01'W, 15-274m, 4-20°C, numerous, XI-IX, JAM and JDM; numerous, up to 25 lbs, frequently taken along with scup and seabass by trawlers, and by lobster pots, 60 to 200m offshore; 37-38°, 74°30'-75°22' surface, 20.7-22.2°C, four early stage larvae, VII-VII, WAVE; CB (Gwynn's Island, Thimble Shoals, Ocean View, Cape Charles Light) by crab dredge; Y00-Y05, J24, by crab pot, 9-13 inches total length, occasionally up to 15 lbs, WAVE.

Family Astacidae

**Cambarus diogenes** Girard, 1852. Fresh, occasionally oligohaline. Stratura (76°01'W), 15m, JAM and JDM; numerous, 9-13 inches total length, occasionally up to 15 lbs, WAVE.

Cambarus uhleri Faxon. Gloucester County, burrowing form, small female, IX-61, WAVE.

Specimens not available for identification were collected at PM45, freshwater, 15-IX-54. Other species probably present, for 10 species are known from Maryland (Meredith and Schwartz, 1960).

Superfamily Scyllaridea

Family Scyllaridae

**Scolyurus depressus** (Smith, 1881) (= S. nearctus Holthuis). Euhaline. Continental shelf, off Cape Charles, 37°00'-30°W, 117m, 12, Albatross station 2421, one specimen (Lyons, 1970).

Superfamily Thalassinidea

Family Callianassidae

**Callianassa atlantica** Rathbun, 1926 (= C. stimpsoni Smith). Polyhaline. ES (Cedar Island) PAS; CL (Cowles, 1930).

**Callianassa sp.** Polyhaline. CL, mouth, larvae, VII-IX, PAS.

Family Upogebiidae

**Upogebia affinis** (Say, 1818). Polyhaline. CL, occasionally, to 20m (Cowles, 1930); lower YR frequently in shallow water by digging, MW; ovigerous VII, WAVE.

Family Laomediidae

**Naushonia oregonoides** Kingsley, 1895. Euhaline. Continental shelf, 37-38°N, 73°43'-75°47'W, surface to 18m, larvae, VII, WAVE.

Section Anomura

Superfamily Galatheidea

Family Galatheidae

**Munida iris** Milne-Edwards. Euhaline. Continental shelf and slope, 35°37'-38°01'N, 73°38'-74°50'W, 121-274m, 8-13°C, occasional throughout the year, ovigerous V, VIII, IX, JAM and JDM; 82-128m, 1-55, CER; 78-328 meters (Cowles, 1930). **Munida caribaea** Smith, 1882. Euhaline. Continental shelf, 36°38'-30°-37°19'-45'N, 74°02'-00'-74°40'-10'W, 121-179m, ovigerous III, IV (Smith, 1884).

Family Porcellanidae

**Euceramus praelongus** Stimpson, 1860. Polyhaline. CL, many records, 6-14m, WAVE, (Cowles 1930); lower YR(GR), few, 1-12m, WAVE; MB, larvae, X, PAS.
Polyonyx gibbesi Haig, 1956. Poly- and (?) euhaline. CL, many records, 9-27m, WAVE; lower YR, occasional, one at GP; MB, larvae, X, PAS; commensal with Chaetopterus...

Porcellana sigsbeiana Milne-Edwards, 1880. Euhaline. Continental shelf, 35°21'N, 74°53'W, 101m, 18C, one specimen, II, JAM and JDM.

Superfamily Paguridea

Family Diogenidae

Clibanarius vittatus (Bosc, 1802). Poly- and euhaline. ES, IX, HDH; Cape Charles City (Richards, 1931); YR(GP) rare, perhaps through introduction, WAVE; PO(Dunston, Va.), (Cowles, 1930).

Dardanus insignis (Saussure, 1858). Euhaline. Continental shelf, 35°02'N, 74°52'W, 51-53m, two juveniles (Smith, 1884); CL, common year-round, ovigerous IV (Cowles, 1930; Ferguson and Jones, 1949), frequent in blue crab dredge catch XII-III, WAVE.

Family Paguridae

Catapagurus gracilis Smith. Euhaline. Continental shelf, 37°00'40"N, 74°35'40"W, 128m, 17.2C, X, 2 specimens (Smith, 1887).

Catapagurus kroyeri Stimpson. Euhaline. Continental shelf, 36°41'15"-37°19'45"N, 74°26'00"-74°39'50"W, 121-179m, 17.2C, IV, V, X, 4 specimens (Smith 1884, 1887).

Pagurus politus Smith 1882. Euhaline. Continental shelf, 36°38'30"-37°19'45"N, 74°02'00"-74°39'50"W, 128-179m, 17.2C, IV, V, X, 16 specimens (Smith 1884, 1887).

Pagurus pollicaris Say, 1817. Poly- and euhaline. Continental shelf, 37°31'N, 74°52'36"W, 53m, single specimen (Smith, 1884); CL (PO mouth to Bay mouth), 6-27m, all months (Cowles, 1930; Richards, 1931; Ferguson and Jones, 1949), WAVE; YR00-10, common, water's edge to deep water, ovigerous III-X (Roberts, 1969); MB, larvae, X, PAS.

Pagurus politus Smith 1882. Euhaline. Continental shelf, 36°03'30"-37°19'45"N, 74°02'00"-74°39'50"W, 128-179m, 17.2C, IV, V, X, 16 specimens (Smith 1884, 1887).

Pagurus pollicaris Say, 1817. Poly- and euhaline. Continental shelf, 37°31'N, 74°52'30"W, 51-53m, two juveniles (Smith, 1884); CL, common year-round, ovigerous IV (Cowles, 1930; Ferguson and Jones, 1949), frequent in blue crab dredge catch XII-III, WAVE.

Superfamily Hippidea

Family Hippidae

Emerita talpoida (Say, 1818). Poly- and euhaline. Continental shelf, 36°-38°N, 74°07'-75°27'N, surface-18m, larvae V, VII, VIII, WAVE; Sand Bridge Beach and other outer beaches, burrowing form abundant; Lynnhaven Inlet (Ferguson and Jones, 1949); Fort Wool, (Uhler, 1879).

Family Albuneidae

Lepidopa websteri (?) Benedict, 1903. Poly- and euhaline. Continental shelf, 36°01'00"-37°05'00"N, 74°07'-75°07'W, 102-682m, 11.4-14.4C (Smith, 1884, 1887; Rathbun, 1937).

Family Calappidae

Calappa sulcata Rathbun, 1898. Euhaline. Continental shelf, 35°01'7"-35°21'N, 7°053'-7°003'W, 49-101m, 18-19°C, XII, II, JAM and JDM.

Hepatus epheliticus (L., 1763). Euhaline, perhaps polyhaline. CB, single male, 1880 (Rathbun, 1937); no other records north of Hatteras are known.

Hepatus pudibundus (Herbst, 1785). Euhaline, perhaps polyhaline. CB, single damaged specimen, 3°-III-71, PAH; previously known only as far north as Georgia (Williams, 1965).

Subsection Brachygnatha

Superfamily Brachyrhyncha

Family Portunidae

Arenaeus cribrarius (Lamarck, 1818). Euhaline, perhaps polyhaline. CB mouth (Smith's Island), five specimens; common "offshore", Cape Charles, sandy beach, 2 juv. males, 2 juv. females (Rathbun, 1930).

Bathyneutes superba (Costa, 1853). Euhaline. Continental shelf, 37°-38°N, 128-183m (=100 fathoms), 8.2-14.4°C, occasional most months (Smith, 1887; Rathbun, 1930; Cowles, 1930), JAM and JDM; ovigerous I, JAM and JDM.

Callinectes sapidus Rathbun, 1896. Euryhaline. AT and ES, common to occasionally abundant in nearshore waters; CB and tributaries, common to abundant all months, water's edge to deep water; molting, mating and ovigerous V-X, rarely IV, XI, XII; 2-32°C; WAVE, (Rathbun, 1930), JAM and JDM.

Cronius ruber (Lamarck, 1818). Euhaline. AT, on floating Sargassum (Fine, 1899).

Ovalipes quadulpensis (Saussure, 1858). Euhaline. Continental shelf, 35°01'-37°03'N, 75°03'-75°30'W, 18-49m, 11-19°C, JAM and JDM.

Ovalipes ocellatus (Herbst, 1799). Poly- and euhaline. Continental shelf, nearshore, 35°01'-37°03'N, 75°03'-75°30'W, 11-22m, 11-22°C, occasional, JAM and JDM; common on sand bottom along ocean beaches, Md. and Va., WAVE, (Mansueti, 1962; Schwartz, 1964); CB, mouth (Cape Charles to Cape Henry), numerous locations, 7-46m, occasional, year-round, (Rathbun, 1930; Cowles, 1930), WAVE.

Portunus gibbesii (Stimpson, 1859). Poly- and euhaline. Continental shelf, 37°00'-38°00'N, 75°02'-75°30'W, 18-49m, 6-19°C, occasional (Rathbun, 1930) JAM and JDM; CL, numerous locations, 7-46m, occasional, year-round, (Rathbun, 1930; Cowles, 1930), WAVE.

Portunus sayi (Gibbes, 1850). Euhaline. Continental shelf, 36°47'-37°05'N, 6°00'-7°40'W, occasional, a pelagic form found floating with Sargassum (Rathbun, 1930; Cowles, 1930).

Portunus spinicarpus (Stimpson, 1871). Euhaline. Continental shelf, 35°21'N, 7°45'-8°15'W, 49m, 19°C, II, ovigerous, JAM and JDM; northern record is offshore, east of Oregon Inlet, N. C. (35°02'N, 7°40'W, 79m, 14.1°C (Rathbun, 1930; Cowles, 1930).

Portunus spinimanus Latreille, 1819. Poly- and euhaline. Continental shelf, 37°10'N, 7°50'W, 33m (Rathbun, 1930), 35°15'N, 7°00'W, 18-49m, 6-19°C, occasional (Rathbun, 1930) JAM and JDM; ES, Chincoteague (Rathbun, 1930); ES, Hog Island, Bay, two males, 15-X-70, MC; CB mouth, Smith Island (Rathbun, 1930).

Family Cancridae

Cancer borealis Stimpson, 1859. Euhaline, occasionally polyhaline. Continental shelf, numerous records from 36°-38°N, 5-183m (=100 fathoms), 3-17.2°C, common most months (Smith, 1884, 1887; Rathbun, 1930; Cowles, 1930), JAM and JDM; common in lobster pots, 69-108mm females, 74-148mm males, LRS; small specimens rarely taken near mouth of Chesapeake Bay, RTT, PAH.

Cancer irroratus Say, 1817. Poly- and euhaline. Continental shelf, numerous records from 36°-38°N, 5-183m, 2-20.5°C, common most months (Smith, 1884; Rathbun, 1930; Cowles, 1930), JAM and JDM, LRS, RTT,
Family Xanthidae

Eurypanopeus depressus (Smith, 1869). Meso- to euhaline, rarely oligohaline. ES, numerous records; CB, Magothy Bay (Magothy R. mouth) Md. to CB mouth, numerous records, common on oyster bars, less common since 1964 following infection with sacculinid Loxothylacus panopaei, intertidal to 48m, 4.5-33.6 (on ES) ppt, 5.3-29.4C, common year-round, ovigerous IV-IX (Cowles, 1930; Rathbun, 1930; Richards, 1931; Ferguson and Jones, 1949; Ryan, 1956; Daugherty, 1969), WAVE; PX, larvae, V-X (Herman et al, 1968).

Hexapanopeus angustifrons (Benedict and Rathbun, 1891). Poly- and euhaline. CB, Bloody Point Lt., Md. to CB mouth, numerous records though found infrequently, 7-48m, 18-32 ppt, 4.4-24.8C, common year-round, ovigerous VII, VIII (Cowles, 1930; Rathbun, 1930; Ryan, 1956), WAVE.

Neopanope texana sayi (Smith, 1869). Meso- to euhaline. ES, numerous records; CB, Little Deal I, Md., to CB mouth, numerous records, the most abundant xanthid, subtidal to 45.75m, 5.88-33.6 (on ES) ppt, 5.3-29.4C, common year-round, ovigerous V-VIII, (Cowles, Uhler, 1879; Cowles, 1930; Rathbun, 1930; Ryan, 1956; Schwartz and Cargo, 1960; Daugherty, 1969), WAVE.

Family Pinnotheridae

Dissoactylus mellitae (Rathbun, 1900). Euhaline (?). CB, (Kiptopeake Beach), VIII-61, clinging to outside of sand dollars, Mellita quinquiesperforata, FAC, MW.

Pinnixa chaetopterana Stimpson, 1860. Polyhaline. CL, YR, few records, commensal of Chaetopterus varieopatus. (Cowles, 1930; Boesch, 1971), WAVE, MW.

Pinnixa cylindrica (Say, 1818). Polyhaline. CL, few records, Point Lookout Light, Md., 37m, 8.6C (Rathbun, 1918); YR(GP), one specimen with Arenicola, IV-61, MW.


Pinnixa retinens Rathbun, 1918. Polyhaline. Holotype from Poplar Island, Md., 37m, soft bottom, Fish Hawk station 8528 (Rathbun, 1918). Common in Chesapeake Bay; found only in two other areas, Florida and Texas, rare, MW.

Pinnixa sayana Stimpson, 1860. Polyhaline. CB, Barren I, Md., 48m, 7.2C; Cove Pt., Md., 7m, 11.1C (Rathbun, 1918); YR, 3-24.4m, MW, DPB; JR (Hog Pt.), TC.

Pinnixa spp. MB, larvae, X, PAS.

Pinnotheres maculatus Say, 1818. Polyhaline. PO mouth and off New Point Comfort (Rathbun, 1918; Cowles, 1930); MB, larvae, X, PAS; larvae also taken by MHR.

Family Grapsidae  
*Sesarma cinereum* (Bosc, 1801 or 1802). Meso- and polyhaline. Taken frequently along shores where Spartina grass or shelter occurs, MW; Arundel-on-the-bay, Md., to CB mouth (Smith I.) (Rathbun, 1918; Frey, 1942); YR (Portopatank River) (Kerwin, 1971).

*Sesarma reticulatum* (Say, 1817). Meso- and polyhaline marshes. Found in marshes bordering the bay and its tributaries, MW; CB mouth (Smith Island) (Rathbun, 1918); Cape Charles City (Richards, 1931).

Family Ocypodidae  
*Ocypode quadrata* (Fabricius, 1787). Poly- and euhaline. ES, burrowing above high tide line on outer sand beaches; CL, on western shore beaches from New Point Comfort to Fort Monroe (Rathbun, 1918); CB mouth (Smith Island) (Rathbun, 1918); Cape Charles City (Richards, 1931).

Family Goneplacidae  
*Ger~on guinguidens* Smith, 1879. Euhaline. Continental shelf, 3°00'N, 73°35'W, 168m, 11°C, JAM and JDM.

Superfamily Oxyrhynchia

Family Majidae  
*Libinia dubia* H. Milne-Edwards, 1834. Poly- and euhaline. ES (Isle of Wight, Assawoman and Chincoteague bays) (Schwartz, 1964); CB, northern record Sandy Pt. Light, Md. (39°01'40"N, 76°20'36"W), southern record CB mouth (Rathbun, 1925; Cowles, 1930), WAVE; adults in lower YR and Bay; small specimens in summer in YR (Boesch, 1971a).

*Collodes robustus* Smith, 1880. Euhaline. Continental shelf and slope, 36°41'15"-37°06'00"N, 74°05'00"-74°35'30"W, 102-682m, 7.2-14.4°C, ovigerous III (Smith, 1884, 1887; Rathbun, 1925).

*Euprognatha rastellifera* Stimpson, 1871. Poly- and euhaline. Hampton Roads, 20-22m, and "Virginia" from the J. S. Kingsley collection (Smith, 1884; Rathbun, 1925); not reported since.

*Pella mutica* Gibbes, 1850. Euhaline (?). "Eastern Shore", exact locality not given, from the J. S. Kingsley collection in Union College, Pa. (Rathbun, 1925); also reported north and south of Virginia-Maryland waters.

*Rochinia crassa* A. Milne-Edwards, 1879. Euhaline. Continental shelf, 37°06'N, 74°35'W, 194m, 12°C, JAM and JDM.

Superorder Stomatopoda

Family Squillidae  
ADDENDUM

The following list contains species reported north and/or south of Virginia and Maryland and may also occur in Virginia waters, but have not been reported, and species for which no detailed records have been located.

Family Oplophoridae

Acanthephyra purpurea A. Milne-Edwards. Eualine. East and South Atlantic, 192-5394m (Rathbun, 1929).

Hymenodora glacilis (Bucholz). Eualine. Newfoundland banks to Virginia, 251-5394m (Rathbun, 1929).

Family Pandalidae

Dichelopandalus leptocerus (Smith). Eualine. Newfoundland banks to North Carolina, 13-786m (Rathbun, 1929).

Family Hippolytidae

Lebbeus polaris (Sabine). Eualine. Atlantic America, south to Chesapeake Bay 5-510m (Rathbun, 1929).

Caridion gordonii (Bate). Eualine. Bay of Fundy to Chesapeake Bay, 37-307m (Rathbun, 1929).

Family Galatheidae

Munidopsis curvirostris Whiteaves. Eualine. Gulf of St. Lawrence to Cape Fear, N. C., 137-2360m (Rathbun, 1929).

Family Paguridae

Parpagurus pilosimanus Smith. Eualine. Grand Bank of Newfoundland to Gulf of Mexico, 157-4061m (Rathbun, 1929).

Family Raninidae


Family Latreillidae


Family Dromiidae


Family Leucosidae

Myropas quinquiespinosa Stimpson, 1871. Reported from offshore Massachussetts and North Carolina (Rathbun, 1937).

Family Porunidae

Porunus anceps (Saussure, 1858). Eualine. Northern record is from surface waters east of Currituck Sound, N. C. (36020°24'N, 74°46'30"W, Rathbun, 1930).

Family Xanthidae

Eurytium limosum (Say, 1818). Poly- (?) and eualine. Not reported north of South Carolina since 1891 (Rathbun, 1930), formerly reported from New Jersey by Say.

Family Majidae

Rochinia tanneri (Smith, 1883). Eualine. Reported north and south of Virginia-Maryland waters (Rathbun, 1925).

REFERENCES


Class Asteroidea
Order Forcipulata
Family Asteriidae
Asterias forbesi (Desor, 1845). Upper poly- and euhaline. Frequent in bay below Maryland-Virginia line (Cowles, 1930). Found recently by VIMS personnel only near bay mouth, sand bottom; formerly to York Spit Light and Wolf Trap in abundance (Sewell Hopkins).

Family Astropectinidae
Luidia clathrata (Say, 1825). Normally euhaline. Off Great Wicomico River, 80-100 feet, 16-IX-57, one specimen, James Whitcomb, MW.

Family Asteriidae

Class Holothuroidea
Order Apoda
Family Synaptidae
Leptosynapta tenuis (Ayres, 1851). Upper meso- and polyhaline. Abundant in fine sand of shallows, 100/m². Less common in deeper areas and Zostera beds. Reported swarming in spring by Dexter Haven.

Order Dendrochirota
Family Cucumariidae
Cucumaria pulcherrima (Ayres, 1852). Polyhaline. Occasionally abundant on old oyster rocks of lower YR and Mobjack Bay, common Hampton Roads, DFB.

Order Ophiuroidea
Family Cucumariae
Dendroceratium (Say, 1825). Polyhaline. Tangier Sound, 2 1/3-13 fms. (Koeler, 1914). Lower mid-CB, 7-I-58, J. Whitcomb, LT.

Class Echinoidea
Order Centrechinoida
Family Arbaciidae
Arbacia punctulata (Lamarck, 1816). Euharine. Willis G. Hewatt found a single test of this species on Old Plantation Flat, on sand bottom at a depth of 30 feet. Rudee Inlet, July, 1965, Robert Bailey. ES (Hog Is. Bay and Wachapreague Inlet), M. Castagna.

Order Exocyclida
Suborder Cyppeastrina
Family Scutellidae
Melita quinquiesperforata (Leske, 1778). Upper poly- and euharine. York Spit Light (rare) and seaward. Strangely, Cowles made no mention of this species. As of 1971, apparently confined to small area near shore on lower bayside of ES, MW.
PHYLUM CHAETOGNATHA

By George C. Grant

*Sagitta elegans* Verrill, 1873. Poly- and euhaline. Abundant winter and spring; distributed well within system.

*Sagitta enflata* Grassi, 1881. Upper poly-euhaline. In lower CB in summer; Mobjack Bay, August.

*Sagitta hispida* Conant, 1895. Polyhaline. Sporadic inshore. Enters CB late summer, fall; Mobjack Bay, August-October.

*Sagitta tenuis* Conant 1896. Poly- and euhaline. Warm season counterpart of *S. elegans*, extending well into CB, dominant in Mobjack Bay, August-October.

PHYLUM HEMICHORDATA

Class Enteropneusta
Family Harrimaniidae

*Saccoglossus kowalewskii* (A. Agassiz, 1873). Upper mesopolyhaline. Abundant in shallow areas of fine sand bottom. Less common in deeper water. The eating of enteropneusts causes the "ticky" condition of fish i.e., smelling strongly of iodoform.

PHYLUM CHORDATA

Subphylum Urochordata (Tunicata)

Class Ascidacea

Order Aplousobranchia
Family Synoicidae


Order Phlebobranchia
Family Perophoridae

*Ecteinascidia turbinata* Herdman, 1880. Polyhaline (22.5 ppm). YR (near mouth), 37°15'N, 76°25'W, 2-VIII-66, 24.5C, mud-shell, specimens ovigerous (Calder *et al.*, 1966). Only record for Virginia zoogeographic subprovince, found again the following year and in 1971. *Perophora viridis* Verrill, 1871. Polyhaline. On oysters and trays at VIMS pier, summer and fall; as basal stolons in winter, JDA.

Family Botryllidae

*Botryllus schlosseri* (Pallas, 1766). Polyhaline. Rare on oyster beds in lower Chesapeake Bay. Colony on Zostera by VIMS pier, June 16, 1962. Abundant at VIMS pier during higher salinities of late '60's, JDA.

Family Molgulidae

*Molgula manhattensis* (DeKay, 1843). Upper meso- and polyhaline. Abundant on pilings, oyster rocks, any firm substrate above 10 ppt. Killed only by extreme cold or other adverse conditions; to 1000/m², YR (Vepco area), MW.

Subphylum Cephalochordata

*Branchiostoma caribaeum* Sundevall, 1853. Poly- and euhaline. (Off RR), also lower YR; sand bottom, very rare, MW. Point Lookout, Md. (Schwartz, 1960a.).
REFERENCES


GENERAL REFERENCES TO INVERTEBRATES


Cowles, R. P. 1930. A biological study of the offshore waters of Chesapeake Bay. Bull. U. S. Bur. Fish. 46:277-381. A comprehensive report based on collections of the "Fish Hawk". Valuable hydrographic information and reports on certain groups. Restriction to deeper water presents a distorted view of the fauna, e.g., only nine species of amphipods were reported. Most of the 36 species of polychaetes reported by Treadwell were kindly rechecked by Dr. Marian Pettibone and the correct names are included here. Only ten of the names remain unchanged. It is unfortunate that Cowles was unable to include the mollusks.

Cronin, L. E., J. C. Daiber and E. M. Hulbert. 1962. Quantitative seasonal aspects of zooplankton in the Delaware River estuary. Chesapeake Sci. 3:63-93. Nearly all the species listed may be found in Chesapeake Bay.


Hanks, R. W. 1968. Benthic community formation in a "new" environment. Chesapeake Sci. 9:163-172. Mya-Macoma-Nereis association dominated early; 18 species listed. Polydotra ciliata, Odostomia trifida and Hydrobia minuta at Oxford, Md. are new records for the Bay. However P. ciliata is apparently a synonym for P. websteri (Sarah Haigler, pers. comm.), and the Genus Hydrobia has not been well studied on this coast.


Woods Hole, Massachusetts, Marine Biological Laboratory. 1964. Keys to marine invertebrates of the Woods Hole region, R. I. Smith, editor, Systematics-Ecology Program Contr. No. 11. A manual which partially supersedes that of Miner (1950). Taxonomy is updated but, as must be expected, treatment of the groups varies considerably and some smaller organisms are omitted. Illustrations, check lists, literature references and some commentary enhance the value of the keys. If one includes the oceanic habitat, probably 50% of the species may be found in Virginia.
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This list includes 287 species of marine, freshwater and estuarine fishes which have been reported to occur within the Chesapeake drainage below the fall-line or within tidewater. The fish fauna of the Chesapeake coastal zone may be conveniently divided into four ecological groups: diadromous species; estuarine species; marine species and freshwater species.

Eleven species of diadromous fishes occur, including ten species which are anadromous. These fishes spend most of their lives in the sea or lower estuary and ascend the tributaries to spawn in fresh water. The young of all anadromous species use the estuary as a nursery ground. The remaining diadromous species, the American eel, Anguilla rostrata is catadromous and spends most of its life in the estuary or in fresh water and descends the tributaries and migrates out into the open ocean to spawn in the region of the Sargasso Sea.

Only 27 species of estuarine fishes including three anadromous species occur. Resident fauna of the estuary consists of these 27 species plus 2 marine species. The remainder of the marine species occur only seasonally.

Of the 174 marine species, 59 are regular summer visitors. Forty-four of these occur in the Bay system both as adults and juveniles, five occur mostly as adults and ten mostly as juveniles. An additional 93 species occur rarely or sporadically during the summer. During the winter only six marine species are regular visitors and four of these occur not only as adults but also as juveniles. Sixteen additional species occur rarely or sporadically in the winter.

The freshwater component of the fish fauna includes 46 species which normally inhabit the coastal plain and 32 species which occur only occasionally as strays from above the fall line or which rarely enter the Chesapeake drainage through Dismal Swamp.

Status of Knowledge of Fishes in the Chesapeake Bay System

Taxonomy: The taxonomy of those species which regularly occur is well known. Much work remains to be done at the sub-specific and racial levels. The anadromous species, in particular, bear intensive study if rational decisions are to be made in managing commercial stocks.

Distribution and abundance: Many papers have been published on the distribution of certain fishes in the Bay, particularly those species of importance to the commercial or sport fisheries. Much more information on distribution exists as unpublished manuscripts and as raw data in the various research institutions involved in work on the Bay. Much research needs to be done on the seasonal distribution of smaller dominant species (so called forage fishes) and on the distribution of different life history stages of all species. Least known is the seasonal occurrence of large adult marine species, particularly sharks. Commercial fisheries catch statistics provide crude estimates of the relative abundance of commercially important species from year to year. Virtually no criteria are available for accurately estimating true abundance or mortality of any commercial species, with the exception of certain populations of striped bass, Morone saxatilis. Estimates of even relative abundance of commercially unimportant species are all but non-existent.
Biology: Knowledge of various aspects of the biology of the fishes of the Bay varies tremendously with each species. It is amusing that perhaps the best known species biologically are the three-lined stickleback, Gasterosteus aculeatus, one of the least abundant and Opsanus tau one of the most abundant and ecologically most important species in the Bay. We know very little or nothing about the biology of most Bay species.

Role in Bay ecosystem: The trophic role of the adults of most major species of fishes in the Bay is known. Also qualitative aspects of community relationships for major species are known. Much work needs to be done on the quantitative inter-relationships of various life history stages of all species within entire communities (including invertebrates and plants).

Sensitivity of fishes to environmental changes wrought by man: The effects of individual environmental changes (dredging, thermal or chemical pollution, etc.) have been determined for certain species. The possible effects of each one of all the major changes which have or are likely to occur in the Bay system have not been determined for a single species. Much work needs to be done on the simple effects of the major environmental changes on various life history stages of commercially important and other dominant and ecologically important species. In particular, very little research has been done on the synergistic or chronic effects of man-made environmental changes on fishes in the Bay system.

Format of the Checklist

Species are arranged in the list phylogenetically. The arrangement and most of the scientific and common names are those used in "A list of common and scientific names of fishes from the United States and Canada," American Fisheries Society Special Publication No. 6, 1970. I have deviated from the arrangement and the nomenclature in the A.F.S. list, most notably within the elasmobranch fishes, simply because the A.F.S. classification does not readily reveal the phylogeny of the animals. In fact I would prefer an even greater proliferation of higher taxa than are included herein. Such actions must await completion of research in progress and precise documentation elsewhere. Other changes in classification and nomenclature were made to conform with recent publications. These changes have been justified in the text. Structure of the classification of higher categories follows Nelson (1967).

Each species account includes the following information (when available): basic habitat (freshwater, estuarine, marine); salinity range, and zone most often occupied in the estuary (oligohaline, 0.5–5 ppt.; mesohaline, 5–18 ppt.; polyhaline, 18–30 ppt.; habitats with salinities below 0.5 are considered freshwater, those with salinities above 30 ppt. are considered marine); geographic occurrence within the Chesapeake Bay; abundance; seasonality; ecology; literature citations. Most data on distribution, abundance and salinity range were collected over a 15-year period by several people at the Virginia Institute of Marine Science (VIMS) and are based mostly on monthly trawl surveys, with supplementary information from gill net and seine collections. All these data have been computerized and are available as printouts, for reference only, from the Virginia Institute of Marine Science. Literature records of ecological limits have been drawn only from works based on research in the Chesapeake region.

The compilation of this checklist has been aided by the invaluable assistance of several of my students both past and present, notably Douglas Markle, John McEachran, and Linda Pushee. This checklist employs ecological information compiled from computerized data which was accrued from projects directed by W. Jackson Davis, George C. Grant, Edwin B. Joseph, William Massman, John Merriner, Clarence Richards, and Willard A. Van Engel. Martin Wiley of the Chesapeake Biological Laboratory (CBL) has generously shared ideas and unpublished information for fishes in Maryland waters. Robert E. Jenkins of Roanoke College has provided helpful information and criticisms on the distribution of fresh water species. Marvin Wass has given editorial assistance and encouragement during all phases of the preparation of this list and Marion Hart translated my notorious handwriting into typescript.
SUPERCLASS CYCLOSTOMATA

CLASS CEPHALASPIDOMORPHI

ORDER PETROMYZONTIFORMES (PETROMYZONTIA; HYPOARTII)


Lampetra aepyptera (Abbott). Least brook lamprey. Fresh water; 1.5 ppt; locally common to rare; Anne Arundel, Baltimore, Calvert, Kent, and Prince George counties, Md.; Potomac, Rappahannock, York and James drainages, Nassawadox Creek, Northampton Co., Va. (HUBBS and TRAUTMAN, 1939; JENKINS, pers. comm., 1971; MANSUETI, 1951; RANEY, 1941; SCHWARTZ, 1961a; VIMS records; WILEY, 1970).


Petromyzon marinus Linnaeus. Sea lamprey. Anadromous; common; probably ascends most major Chesapeake drainages in spring; larvae (ammocoetes) remain in fresh water 3-4 years; adults marine, parasitic on fishes. (BIGELOW & SCHROEDER, 1948a).

SUPERCLASS GNATHOSTOMATA

CLASS ELASMOBRANCHIOMORPHI (BIGELOW & SCHROEDER, 1948b, 1953a).

ORDER LAMNIFORMES / The early record of Carcharodon carcaras (UHLER & LUGGER, 1876) as abundant in the entire bay probably referred to young Carcharhinus milberti. Carcharodon does not normally enter estuarial and its occurrence is rare to occasional on the east coast of the U.S. The nearest authenticated record of Carcharodon CB off Smith Island, Va. (FOHLER, 1945). /

FAMILY ORECTOLOBIIDAE - CARPET SHARKS

Ginglymostoma cirratum (Bonnaterre). Nurse shark. Marine; rare, lower CB; (record questionable). (BIGELOW & SCHROEDER, 1948b; LUGGER, 1877).

FAMILY ODONTASPIDIDAE - SAND TIGERS

Odontaspis taurus (Rafinesque). Sand tiger. Marine, polyhaline; occasional; summer, fall; lower CB. (BIGELOW & SCHROEDER, 1948b; TRUITT et al, 1929; VIMS records).

FAMILY CETORHINIDAE - BASKING SHARKS

Cetorhinus maximus (Gunnerus). Basking shark. Marine, polyhaline; rare, lower CB; winter. (BIGELOW & SCHROEDER, 1948b; MASSMANN, 1957).

ORDER CARCHARHINIFORMES

FAMILY CARCHARHINIDAE-REQUIEM SHARKS (COMPAGNO, 1970; GARRICK, 1967; SPRINGER, 1950). / A report of Carcharhinus obscurus from CB by TRUITT et al (1929) cannot be attributed to a definite species because their description was too general. The nearest valid record of C. obscurus to CB is 2 mi. off Wachapreague Inlet, Va. (VIMS coll.) /

Carcharhinus leucas (Valenciennes). Bull shark. Marine-fresh water; occasional to common; upper and lower CB; summer. (BIGELOW & SCHROEDER, 1948b; SCHWARTZ, 1959a, 1960b; VIMS records).


Rhizoprionodon terraenovae (Richardson). Atlantic sharpnose shark. Marine; rare; mouth of CB; summer. (BIGELOW & SCHROEDER, 1948b; SPRINGER, 1964).

Mustelus canis (Mitchill). Smooth dogfish. Marine-25 ppt, polyhaline; rare, upper CB; common to occasional, lower CB; summer, fall. (BIGELOW & SCHROEDER, 1948b; SCHWARTZ, 1960a; VIMS records).
Family Sphyrnidae - hammerhead sharks (Gilbert, 1967a, b)

*Sphyrna tiburo* (Linnaeus). Bonnethead. Marine, polyhaline; occasional, lower CB; summer. (Bigelow & Schroeder, 1948b; VIMS records).

*Sphyrna zygaena* (Linnaeus). Smooth hammerhead. Marine, polyhaline; rare to occasional, upper CB; summer, fall. (Bigelow & Schroeder, 1948b; Hoese, 1962; VIMS records).

Order Squatiniformes

Family Squatinidae - angel sharks

*Squatina dumerili* Lesueur. Atlantic angel shark. Marine-27 ppt, polyhaline; rare, occasional, lower CB; summer, fall. (Bigelow & Schroeder, 1953a; Hildebrand & Schroeder, 1928; Schwartz, 1960c; VIMS records).

Order Myliobatiformes

Family Dasyatidae - stingrays

*Dasyatis americana* Hildebrand & Schroeder. Southern stingray. Marine-27 ppt, polyhaline; rare, upper CB; occasional, lower CB; summer. (Bigelow & Schroeder, 1953a; Hildebrand & Schroeder, 1928; VIMS records).

*Dasyatis centroura* (Mitchill). Roughtail stingray. Marine-20 ppt, polyhaline; rare, upper and lower CB; summer, fall. (Bigelow & Schroeder, 1953a; Mansueti, 1960a; Uhler & Lugar, 1876).

*Dasyatis sabina* (Lesueur). Atlantic stingray. Marine, polyhaline; rare, upper CB; occasional, lower CB; summer, fall. (Bigelow & Schroeder, 1953a; Hildebrand & Schroeder, 1928; VIMS records).

*Dasyatis sayi* (Lesueur). Bluntnose stingray. Marine-18 ppt, polyhaline; abundant; lower CB; summer, fall. (Bigelow & Schroeder, 1953a; Hildebrand & Schroeder, 1928; VIMS records).

Family Gymnuridae - butterfly rays

*Gymnura altavela* (Linnaeus). Spiny butterfly ray. Marine-25 ppt, polyhaline; rare; lower CB; summer. (Bigelow & Schroeder, 1953a; Massmann, 1957).

*Gymnura micrura* (Bloch & Schneider). Smooth butterfly ray. Marine-25 ppt, polyhaline; common to occasional; lower CB; summer, fall. (Bigelow & Schroeder, 1953a; Hildebrand & Schroeder, 1928; VIMS records).

Family Myliobatidae - eagle rays

*Aetobatus narinari* (Euphrasen). Spotted eagle ray. Marine; rare; lower CB; fall. (Bigelow & Schroeder, 1953a; Massmann, 1957).
Myliobatis fremvilliei Lesueur. Bullnose ray. Marine-15 ppt, polyhaline; rare, upper CB; occasional, lower CB; summer, fall. (Bigelow & Schroeder, 1953a; Hildebrand & Schroeder, 1928; Schwartz, 1960c; VIMS records).

Family Rhinopteridae - cownose rays
Rhinoptera bonasus (Mitchill). Cownose ray. Marine-13 ppt, polyhaline; abundant to common; upper and lower CB; summer, fall. (Bigelow & Schroeder, 1953a; Hildebrand & Schroeder, 1928; Joseph, 1961; VIMS records).

Family Mobulidae - mantas
Manta birostris (Walbaum). Atlantic manta. Marine; rare; lower CB; summer. (Bigelow & Schroeder, 1953a; Hildebrand & Schroeder, 1928; VIMS records).

Class Teleostomi - Bony Fishes

Order Acipenseriformes

Family Acipenseridae - sturgeons (Vladykov & Greeley, 1964)
Acipenser brevirostrum Lesueur. Shortnose sturgeon. Anadromous; spring; juveniles estuarine; adults marine; rare, Potomac R., endangered. (Smith & Bean, 1899; Vladykov & Greeley, 1964).

Acipenser oxyrhynchus Mitchill. Atlantic sturgeon. Anadromous; spring; juveniles estuarine all year; adults marine; rare to occasional, probably all major tributaries; commercial importance minor. (Hildebrand & Schroeder, 1928; Truitt et al., 1929; VIMS records; Vladykov & Greeley, 1964).

Order Elopiformes

Family Elopidae - ladyfishes (Berry, 1964; Greenwood, 1970)
Elops saurus Linnaeus. Ladyfish. Marine; rare, lower CB; spring, summer, fall. (Hildebrand 1964c; Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; Schwartz, 1962a; VIMS records).

Family Megalopidae - tarpons (Greenwood, 1970)
Tarpon atlanticus (Valenciennes). Tarpon. Marine, polyhaline; rare, upper CB; occasional, lower CB; summer. (Greenwood, 1970; Hildebrand, 1964c; Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; Shreves, 1959; Truitt et al., 1929; VIMS records).

Family Albulidae - bonefishes
Albula vulpes (Linnaeus). Bonefish. Marine; rare, lower CB; recorded in spring but more likely to occur in summer, early fall. (Alexander, 1961; Hildebrand, 1964d; Mansueti & Hardy, 1967; Massmann, 1957).

Order Anguilliformes (Apodes and Lyomeri)

Family Anguillidae - freshwater eels (Ege, 1939)
Anguilla rostrata (Lesueur). American eel. Catadromous; abundant, all tributaries, entire Bay; adults migrate from bay in fall to spawn in Sargasso Sea; young migrate upstream in spring; immature individuals resident in tributaries or bay all year; minor commercial importance. (Hildebrand & Schroeder, 1928; Wenner, 1972).

Family Congridae - conger eels (Kanazawa, 1958)
Conger oceanicus (Mitchill). Conger eel. Marine-16 ppt, polyhaline; occasional, lower CB; fall, winter, spring. (Hildebrand & Schroeder, 1928; VIMS records)

Order Clupeiformes

Alosa aestivalis (Mitchill). Blueback herring. Anadromous; spring; juveniles, estuarine; adults, marine; abundant most major tributaries; major commercial importance. (Hildebrand, 1964a; Mansueti & Hardy, 1967).

Alosa mediocris (Mitchill). Hickory shad. Anadromous; spring; juveniles estuarine, adults marine; common, most major tributaries; minor commercial and sport importance. Hildebrand, 1964a; Mansueti & Hardy, 1967).

Alosa pseudoharengus (Wilson). Alewife. Anadromous; spring; juveniles estuarine, adults marine, abundant, most major tributaries; major commercial importance. (Hildebrand, 1964a; Mansueti & Hardy, 1967).

Alosa sapidissima (Wilson). American shad. Anadromous; spring; juveniles, estuarine; adults marine; common, most major tributaries; major commercial and minor sport importance. (Hildebrand, 1964a; Mansueti & Hardy, 1967).

Brevoortia tyrannus (Latrobe). Atlantic menhaden. Marine-freshwater; entire bay; juveniles and adults abundant to common; spring, summer, fall; major commercial importance. (Hildebrand, 1964a; Mansueti & Hardy, 1967; Reintjes, 1969).

Clupea harengus harengus Linnaeus. Atlantic herring. Marine-17 ppt, polyhaline; adults occasional, lower CB; rare, upper CB; winter, spring; minor commercial importance. (Hildebrand, 1964a; Mansueti, 1962a).

Dorosoma cepedianum (Lesueur). Gizzard shad. Estuarine, 0-29 ppt, oligo-polyhaline; adults and juveniles common to abundant; entire bay, most tributaries; minor commercial importance. (Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; Miller, 1960, 1964).

Dorosoma petenense (Gunther). Threadfin shad. Fresh water-17 ppt, polyhaline introduced; adults and juveniles common, James River drainage; recorded Rappahannock R. (Miller, 1964; VIMS records).


Opisthonema oglinum (Lesueur). Atlantic thread herring. Marine-26 ppt, polyhaline; adults and juveniles, occasional to abundant; entire bay, summer; minor commercial importance. (Berry and Barrett, 1963; Hildebrand, 1964a; Schwartz, 1960d, VIMS records).

Family Engraulidae - anchovies (Berry, 1964; Hildebrand, 1964a; Stevenson, 1955).

Anchoa hepsetus (Linnaeus). Striped anchovy. Marine-5, meso-polyhaline; estuarine; adults & juveniles occasional, upper CB; common to locally abundant, lower CB; spring, summer, fall; pelagic. (Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; VIMS records).

Anchoa mitchilli (Valenciennes). Partially Bay anchovy. Marine-1-33 ppt, oligo-polyhaline; adults & juveniles, pelagic, upper & lower CB and most tributaries; spring, summer, fall; deeper water, winter. (Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; VIMS records).

Order Salmoniformes

Family Salmonidae - trouts (Bigelow, 1964; Dymond, 1964). The presence of Salmo salar in CB reported as a recent stray by some authors (Schwartz, 1967) is as yet unverified. The species has not been resident in streams south of the Connecticut River in historical times. The species was unsuccessfully introduced (as fry) into the Potomac and Susquehanna Rivers in the late 19th century. All three species of trouts below enter salt water and may be expected in upper CB during the cooler months.

Saivelinus fontinalis (Mitchill). Brook trout. Fresh water; native, upper reaches most tributaries; introduced, lower reaches Md. tributaries, including Patuxent R., Rock Creek, Severn R., Principio Creek, Basin Run, and Deer Creek; populations maintained by stocking in our area. (Bigelow, 1964; Schwartz, 1967).

Salmo gairdneri Richardson. Rainbow trout. Fresh water-18.8 ppt; introduced, lower reaches Md. tributaries; rare, upper CB; winter; populations maintained by stocking. (Dymond, 1964; Schwartz, 1967).
Salmo trutta Linnaeus. Brown trout. Fresh water; introduced, lower reaches Md. tributaries; populations maintained by stocking. (Dymond, 1964; Schwartz, 1967).

Family Umbriidae - mudminnows

Umbra pygmaea (DeKay). Eastern mudminnow. Fresh water-4 ppt.; locally common to abundant, most tributaries; small, sluggish streams, weed beds. (Mansueti & Hardy, 1967; Schwartz, 1963a; Truitt et al, 1929; VIMS records).

Family Esocidae - pikes (Crossman, 1966; Dick, 1964)

Esox americanus americanus Gmelin. Redfin pickerel. Fresh water-8.7 ppt.; common; most tributaries; small, sluggish streams, weed beds; known to hybridize with E. niger. (Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; Schwartz, 1960e; VIMS records).

Esox niger Lesueur. Chain pickerel. Fresh water-22 ppt.; common; most tributaries; known to hybridize with E. americanus; sluggish streams, weed beds. (Elser and Mansueti, 1961; Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; Schwartz, 1960e; VIMS records).

Order Cypriniformes (Ostariophysi - in part)

Family Cyprinidae - minnows and carps (Eddy, 1969; Moore, 1968)

Hybrid Notropis rubellus X Clinostomus funduloides, N. cornutus X N. rubellus, and N. cornutus X C. funduloides have been reported just below the fall line in Maryland (Tsai & Zeisel, 1969). The ide, Leuciscus idus (Linnaeus), reported released in the lower Potomac R., by Smith and Bean (1899) probably failed to become established.

Tinca tinca (Linnaeus). Tench. Fresh water; introduced in Potomac; probably extinct in CB system. (Schwartz, 1964; Smith & Bean, 1899).

Carassius auratus (Linnaeus). Goldfish. Fresh water-17.0 ppt., introduced; rare to occasional; probably most tributaries. (Mansueti & Hardy, 1967; VIMS records).

Cyprinus carpio Linnaeus. Carp. Fresh water-17.6 ppt., introduced; common to abundant, all major tributaries; occasional, upper, lower CB (Moback Bay). (Mansueti & Hardy, 1967; Raney & Massmann, 1953; Wilye, 1970; VIMS records).

Exoglossum maxillingua (Lesueur). Cutlips minnow. Fresh water; rare to occasional, scattered localities on coastal plain; common, upland portions all major tributaries; clear gravelly creeks. (Fowler, 1945; Massmann et al, 1952; Schwartz, 1963a; Tsai, 1968).

Hybognathus rugulosus (Girard). Eastern silvery minnow. Fresh water-14 ppt.; occasional; mainstream, larger tributaries. (The trivial name regius follows use recommended by Pflieger, 1971).

(Mansueti, 1950; Mansueti & Hardy, 1967; Mansueti & Scheltema, 1953; VIMS records).

Notemigonus crysoleucas crysoleucas (Mitchill). Golden shiner. Fresh water-5.1 ppt.; common to abundant; most major tributaries; ponds, sluggish streams. (Hoener, 1969; Mansueti, 1950; Mansueti & Hardy, 1967; VIMS records).

Pimephales promelas Rafinesque. Fathead minnow. Fresh water; introduced; cultured in Stevensville Fish Hatchery, Mattaponi drainage (York River), King and Queen County, Va. (Univ. of Richmond Coll. No. 1918; R.E. Jenkins, pers. comm.).

Clinostomus funduloides funduloides Girard. Rosyside dace. Fresh water; rare to locally common on coastal plain; all tributaries; clear, gravelly creeks. (Mansueti, 1950; Schwartz, 1963a; Tsai, 1968; VIMS records).

Semoilus corporalis (Mitchill). Falilfish. Fresh water; occasional to common; coastal plain, most tributaries; most abundant above fall line; longer, clear streams. (Mansueti, 1950; Mansueti & Hardy, 1967; Raney & Massmann, 1953; Tsai, 1968; VIMS records).

Semoilus atramaculatus atramaculatus (Mitchill). Northern creek chub. Fresh water; occasional to common; most major tributaries; small, clear streams. (Raney & Massmann, 1953; Schwartz, 1963a; Tsai, 1968; VIMS records).
Rhinichthys atratulus atratulus (Hermann). Eastern blacknose dace. Fresh water; rare to common, scattered localities on coastal plain; most abundant above fall line; all major tributaries; clear, cool creeks. (Fowler, 1945; Mansueti, 1950; Tsai, 1968; VIMS records).

Rhinichthys cataractae (Cuvier & Valenciennes). Longnose dace. Fresh water; rare to occasional, scattered localities, mid-coastal plain; most abundant above fall-line; all major tributaries; cool, swift streams. (Moore, 1968; Schwartz, 1963a; Tsai, 1968).

Nocomis micropogon (Cope) River chub. Fresh water—"brackish" (one record Solomons, Md., off C.B.L. dock); rare to common; coastal plain from Susquehanna south; most abundant above fall line; clear gravelly streams. (Lachner & Jenkins, 1971; C.B.L. coll.; Martin, pers. comm.; Raney & Massmann, 1953; VIMS records).

Nocomis leptcephalus (Girard). Bluehead chub. Fresh water; rare to occasional; coastal plain from York R. south; most abundant above fall line; clean, sandy streams. (Lachner & Jenkins, 1971; Raney & Massmann, 1953).

Notropis amoenus (Abbott). Comely shiner. Fresh water; occasional to common; all tributaries; schooling, midwater, moderate & longer streams. (Snelson, 1968; Tsai, 1968) on coastal plain (Schwartz, 1963a; VIMS records).

Notropis analostanus (Girard). Satinfin shiner. Fresh water-2.0 ppt.; common, most larger tributaries in low gradient areas. (Gibbs, 1963; Mansueti & Hardy, 1967; Schwartz, 1963a; VIMS records).

Notropis bifrenatus (Cope). Bridle shiner. Fresh water-11.8 ppt.; rare to occasional, most tributaries; sluggish streams. (Jenkins & Zorach, 1970; Mansueti & Hardy, 1967).

Notropis gonalhybais (Cope). Ironcolor shiner. Fresh water; rare to occasional; scattered Md. and Va. coastal plain localities; swamps, weedy streams. (Jenkins, pers. comm.; Mansueti & Hardy, 1967; Schwartz, 1963a).

Notropis cornutus (Mitchill). Common shiner. Fresh water; rare to occasional on coastal plain; most abundant above fall line, all major tributaries, clear streams. (Mansueti, 1950; Schwartz, 1963a; Tsai, 1968; VIMS records).

Notropis hudsonius amarus (Girard). Spottail shiner. Fresh water-10.7 ppt.; abundant; all major tributaries; mainstream and sluggish, weedy necks, creeks and swamps. (Mansueti & Hardy, 1967; Mansueti & Scheltema, 1953; Schwartz, 1963a; VIMS records).

Notropis proene proene (Cope). Swallowtail shiner. Fresh water; occasional, scattered localities on Md. & Va. coastal plain; most abundant above fall line, all major tributaries; clear, swift streams. (Mansueti, 1950; Raney, 1950; Schwartz, 1963a; Tsai, 1968; VIMS records).

Notropis rubellus (Agassiz). Rosyface shiner. Fresh water; occasional, scattered localities Md. & Va. coastal plain; most abundant above fall line, all major tributaries; clear, swift streams. (Jenkins, pers. comm; Tsai, 1968; Tsai & Zeisel, 1969).

Notropis spilopterus spilopterus (Cope). Eastern spotfin shiner. Fresh water; occasional; Susquehanna and Potomac drainages; creeks, larger streams. (Gibbs, 1957; Jenkins, pers. comm.).

Family Catostomidae - Suckers /Minytrema melanops, former record from the Bay by Hildebrand & Schroeder (1928) is apparently based on the misidentification of Moxostoma macrolepidotum (Robins and Raney, 1957; Schwartz, 1962b)/

Carpiodes cyprinus cyprinus (Lesueur). Northern quillback carp-sucker. Fresh water-10.7 ppt.; rare on coastal plain; Susquehanna to Potomac & James drainages; rare upper CB. (Raney, 1950; Schwartz, 1964a; Truitt et al, 1929; VIMS records).

Catostomus commersoni (Lacépède). Common sucker. Fresh water—"brackish water"; locally common, all tributaries; occasional, upper CB; larger streams, ascends small creeks to spawn in spring. (Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; VIMS records).

Erismyzon sucetta sucetta (Lacépède). Lake chubsucker. Fresh water; locally common, impoundments and quiet backwaters; all tributaries. (Fowler, 1911; Hildebrand & Schroeder, 1928; VIMS records).
Erimyzon oblongus oblongus (Mitchill). Creek chubsucker. Fresh water; common; all major tributaries; sluggish streams, swamps. (Mansueti & Hardy, 1967; VIMS records).

Moxostoma macrolepidotum macrolepidotum (Lesueur). Northern redhorse. Fresh water-5 ppt.; occasional; all major tributaries; mainstream & larger creeks. (Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; Raney & Massmann, 1953; VIMS records).

Hypentelium nigricans (Lesueur). Northern hogsucker. Fresh water-brackish (Tangier Sound); rare to occasional, scattered localities on coastal plain; most abundant above fall line, all major tributaries; clear stream riffles. (Powder, 1917; Massmann et al, 1952; C.B.L. coll. Martin Wiley, pers. comm.).

Order Siluriformes (Nematognathi; Ostariophysi - in part)

Family Ictaluridae - freshwater catfishes (Taylor, 1969; Schwartz, 1961)

Ictalurus catus (Linnaeus). White catfish. Fresh water-14.5 ppt., common to abundant, most tributaries; mainstream; minor commercial and sport importance. (Hildebrand & Schroeder, 1928; Mansueti & Hardy, 1967; Schwartz, 1964c; VIMS records).

Ictalurus furcatus (Lesueur). Blue catfish. Fresh water-"brackish" water; introduced; rare; Potomac R. (Ameiurus ponderosus (Bean)). (McAtee & Weed, 1915; Mansueti, 1950; Schwartz, 1961b; Truitt et al, 1929).

Ictalurus natalis (Lesueur). Yellow bullhead. Fresh water; occasional; all major tributaries; swamps, ditches, sluggish streams. (Mansueti, 1950; Mansueti & Hardy, 1967; VIMS records).

Ictalurus nebulosus (Lesueur). Brown bullhead. Fresh water-S ppt.; abundant; all major tributaries; sluggish oxbows, backwaters, impoundments; minor commercial and sport importance. (Mansueti & Hardy, 1967; VIMS records).

Ictalurus punctatus (Rafinesque). Channel catfish. Fresh water-15.1 ppt.; introduced; all major tributaries; mainstream; minor commercial and sport importance. (Mansueti & Hardy, 1967; VIMS records).

Order Myctophiformes (Iniomi)

Family Synodontidae - lizardfishes - (Anderson et al, 1966)


Order Percopsiformes

Family Amblyopsidae - cavefishes

Chologaster cornuta Agassiz. Swampfish. Fresh water; enter James R. drainage through ditches and canals from Dismal Swamp; headwaters of Elizabeth and Nansemond rivers. (Fowler, 1945; VIMS records).

Order Percopsiformes - trout perches

Family Percopsidae - trout perches

Percopsis omiscomaycus (Walbaum). Trout-perch. Fresh water; rare or extinct; Potomac and Susquehanna drainages, Chesapeake & Baltimore canal; endangered. (Mansueti, 1950; Schwartz, 1964a; Smith & Bean, 1899; Truitt et al, 1929; Uhler & Lugger, 1876).
Order Batracoidiformes (Haplodoci)
Family Batracoididae - toadfishes
Opsanus tau (Linnaeus). Oyster toadfish. Estuarine-0.7-30 ppt., meso-polyhaline; abundant, upper and lower CB; oyster rock, mud bottoms, summer; winter, channels. (Hildebrand & Schroeder, 1928; Swartz & Van Engel, 1969; VIMS records).

Order Gobiosociformes (Xenopterygii)
Family Gobiesocidae - clingfishes
Gobiesox strumosus Cope. Skilletfish. Estuarine; 4-26 ppt., meso-polyhaline; common to abundant, upper and lower CB; oyster reef, eelgrass beds, summer; channels, winter. (Hildebrand & Schroeder, 1928; VIMS records).

Order Lophiiformes (Pediculati)
Family Lophiidae - goosefishes
Lophius americanus Valenciennes. Goosefish. Marine-14 ppt., polyhaline; occasional, lower CB; late fall, winter, early spring. (Hildebrand & Schroeder, 1928; VIMS records).

Family Antennariidae - frogfishes
Histrio histrio (Linnaeus). Sargassumfish. Marine; rare; associated with floating Sargassum weed which may be blown into the bay during the summer. (Hildebrand & Schroeder, 1928; Uhler & Lugger, 1876).

Family Ogcocephalidae - batfishes
Ogcocephalus vespertilio (Linnaeus). Longnose batfish. Marine; rare; lower CB; members of this family occur along the edge of the continental shelf off CB. (Hildebrand & Schroeder, 1928; Uhler & Lugger, 1876).

Order Gadiformes (Anacanthini)
Family Gadidae - codfishes
Gadus morhua Linnaeus. Atlantic cod. Marine; rare-occasional; lower CB; late winter, spring; northern stray. (Hildebrand & Schroeder, 1928).

Microgadus tomcod (Walbaum). Atlantic tomcod. Anadromous, but does not spawn in Chesapeake system; rare; lower CB; northern stray. (Massmann, 1957).

Pollachius virens (Linnaeus). Pollock. Marine; rare-occasional, lower CB; late winter, early spring; northern str. (Hildebrand & Schroeder, 1928; Massmann, 1960; VIMS records).

Urophycis chaus (Walbaum). Red hake. Marine-7 ppt., polyhaline; occasional-common; lower CB; winter, spring; migrates offshore, summer. (Hildebrand & Schroeder, 1928; VIMS records).

Urophycis regius (Walbaum). Spotted hake. Marine-2 ppt., meso-polyhaline; common, lower CB; late winter, spring; occasional, upper CB; channels; migrates offshore; summer and south in fall. (Barans, 1972; Hildebrand & Schroeder, 1928; VIMS records).

Urophycis tenuis (Mitchill). White hake. Marine; rare; spring; lower CB. (VIMS records and collection).

Family Merlucciidae - silver hakes
Merluccius bilinearis (Mitchill). Silver hake. Marine-12 ppt., polyhaline; occasional to common; lower CB; fall, winter, spring; migrates offshore & north, summer. (Hildebrand & Schroeder, 1928; VIMS records).

Family Ophidiidae - cusk-eels and brotulas
Rissola marginata (DeKay). Striped cusk-eel. Marine-14 ppt., polyhaline; occasional; lower CB; spring, summer, fall; burrows in bottom. (Hildebrand & Schroeder, 1928; VIMS records).

Order Atheriniformes (Beloniformes; Synentognathi; Cyprinodontiformes; Microcyprini)
Family Exocoetidae - flyingfishes (Brunn, 1935; Staiger, 1965)
Cypselurus heterurus (Rafinesque). Atlantic flyingfish. Rare, lower CB; record may be invalid, pelagic. (Uhler & Lugger, 1876).

Family Hemiramphidae - halfbeaks (Collette, 1962a, 1965) (All species are pelagic).
Hemiramphus brasiliensis (Linnaeus). Ballyhoo. Marine; rare; lower CB. (Hildebrand & Schroeder, 1928; VIMS collections).
Hemiramphus balao Leseuer. Balao. Marine; rare; upper CB; summer, pelagic. (D.J. Hardy, pers. comm.; CBL collection).
Hyporhamphus unifasciatus (Ranzani). Halfbeak. Marine-12 ppt., meso-polyhaline; adults and juveniles abundant; entire CB; summer, fall. (H. unifasciatus as presently recognized is a composite species/B. B. Collett, pers. comm./Current usage is followed here pending revision) (Hildebrand & Schroeder, 1928; Schwartz, 1962a; VIMS records).

Family Belonidae - needlefishes (Berry & Rivas, 1962; Collette & Berry, 1965) (All species are pelagic).
Ablennes bians (Valenciennes). Flat needlefish. Marine; rare to occasional; lower CB; late spring, summer, early fall. (Hildebrand & Schroeder, 1928; VIMS records).

Strongylura marina (Walbaum). Atlantic needlefish. Marine-fresh water, oligo-polyhaline; adults and juveniles abundant entire Bay; summer, fall. (Hildebrand & Schroeder, 1928; Schwartz, 1962a; VIMS records).

Tylosurus acus (Lacépède). Agujon. Marine; occasional; lower CB; late spring, summer. (Hildebrand & Schroeder, 1928; VIMS records).

Family Scomberesocidae - sauries
Scomberesox saurus (Walbaum). Atlantic saury. Marine; rare mouth of CB; pelagic. (Uhler & Lugger, 1876).

Family Cyprinodontidae - killifishes (Brown, 1957; Miller, 1955).
Cyprinodon variegatus Lacepède. Sheepshead minnow. Estuarine 0-32.8 ppt., meso-euhaline; abundant; entire CB; summer, shallow flats, marshes, tidal ponds; wintering in channels or in low salinity ponds, buried in silt. (Hildebrand & Schroeder, 1928; VIMS records).

Fundulus confluentus Goode and Bean. Marsh killifish. Estuarine, fresh-polyhaline; rare; scattered localities entire bay; muddy marshes, grass flats. (Fowler, 1945; Hildebrand & Schroeder, 1928; Schwartz, 1968; VIMS records).

Fundulus diaphanus (Lesueur). Banded killifish. Fresh water-20 ppt., oligohaline; common-abundant; all tributaries. (Hildebrand & Schroeder, 1928; VIMS records).

Fundulus heteroclitus (Linnaeus). Mummichog. Estuarine-0-32 ppt., mesohaline; abundant entire bay; muddy marshes, channels, grass flats, in summer; ascends streams to fresh water, or burrows in in silt in winter. (Hildebrand & Schroeder, 1928; Richards & Castagna, 1970; Schwartz, 1968; VIMS records).

Fundulus luciae (Baird). Spotfin killifish. Estuarine-0-27.8 ppt., rare; scattered localities lower bay; tidal creeks. (Hildebrand & Schroeder, 1928; Richards & Castagna, 1970; Truitt et al, 1929; VIMS records).

Fundulus majalis (Walbaum). Striped killifish. Estuarine-0-32 ppt., meso-polyhaline; abundant; entire CB; tidal creeks, sandy flats, grass beds, summer; winter habitat? (Hildebrand & Schroeder, 1928; Richards & Castagna, 1970; Schwartz, 1968; VIMS records).

Lucania parva (Baird). Rainwater killifish. Estuarine-0-31.2 ppt., mesohaline; weed beds, muddy coves, summer; low salinity tidal ponds, burrowed in silt in winter. (Hildebrand & Schroeder, 1928; Richards & Castagna, 1970; Schwartz, 1968; VIMS records).

Family Poeciliidae - livebearers
Gambusia affinis (Baird and Girard). Mosquitofish. Fresh water-18 ppt., oligo-mesohaline; abundant; most tributaries south of Annapolis; tidal ponds; streams; winters in silt in low salinity or fresh water. (Hildebrand & Schroeder, 1928; Schwartz, 1968; VIMS records).

Family Atherinidae - silversides
Membras martinica (Valenciennes). Rough silverside. Estuarine-3-24 ppt., mesohaline; common; grass flats, channel edge, summer; winter habitat? (Hildebrand & Schroeder, 1928; VIMS records).

Menidia beryllina (Cope). Tidewater silverside. Estuarine-0-35.5 ppt., oligo-mesohaline; abundant; entire CB; tidal creeks, grass flats, summer; channels, winter. (Hildebrand & Schroeder, 1968; Richards & Castagna, 1970; VIMS records).

Menidia menidia (Linnaeus). Atlantic silverside. Estuarine-0-31 ppt, meso-polyhaline; abundant; entire CB; tidal creeks, grass flats, summer; channels, winter. (Hildebrand & Schroeder, 1928; VIMS records).
Order Beryciformes (Berycoidei)
Family Holocentridae - squirrelfishes
Holocephalus ascensionis (Osbeck). Squirrelfish. Marine; rare lower CB; late summer. (VIMS collection).

Order Gasterosteiiformes (Thoracostei; Hemibranchii; Lophobranchii; Solenichthyes)
Family Gasterosteidae - sticklebacks
Apeltes quadracus (Mitchill). Fourspine stickleback. Estuarine-3-26 ppt., meso-polyhaline; abundant; entire CB; grass flats, summer; channels and channel edge, winter. (Hildebrand & Schroeder, 1928; VIMS records).

Gasterosteus aculeatus Linnaeus. Threespine stickleback. Anadromous; locally common in small tributaries of James and York drainages where spawning occurs in fresh or slightly brackish water; winter, spring; rare or absent from CB remainder of year. (Hildebrand & Schroeder, 1928; VIMS collection and records).

Family Fistulariidae - cornetfishes
Fistularia tabacaria Linnaeus. Bluespotted cornetfish. Marine; rare-occasional, lower CB; late summer, early fall. (Hildebrand & Schroeder, 1928; VIMS records).

Order Perciformes (Percomorphi, Acanthopterygii)
Family Percichthyidae - temperate basses
The record of the tilefish, Lopholatrus chamaeleonticeps from CB (Hildebrand & Schroeder, 1928) based on an example in a fish market is doubtless of a specimen caught at the shelf edge. It is highly unlikely that this species would occur, even as a stray in CB.

Marone saxatilis (Walbaum). Striped bass. Anadromous-marine; estuarine, oligo-polyhaline; abundant; all major tributaries; summer, flats; channels; winter, channels; parts of populations leave CB for coastal waters in severe winters; older year classes leave CB in summer; major commercial & sport importance. (Hildebrand & Schroeder, 1928; Mansueti, 1961b; Raney, 1952; VIMS records).

Family Serranidae - sea basses (Rivas, 1964b; Robins & Stark, 1961; Smith, 1961)
Centropristis striata (Linnaeus). Black sea bass. Marine-12 ppt., polyhaline; common; lower CB; spring, summer, early fall; juveniles, deeper grass flats, often near sponges; adults, channels, wrecks, old pilings; migrates offshore during winter; commercial & sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Mycteroperca microlepis (Goode and Bean). Gag. Marine, polyhaline; occasional, lower CB; summer, early fall. (Hoese et al, 1961; VIMS records).

Family Centrarchidae - sunfishes. (Moore, 1968; Eddy, 1969)

Acantharchus pomotis (Baird). Mud sunfish. Fresh water; local, rare to common; scattered Va. and Md. localities; sluggish streams, swamps, acid-water habitats. (Schwartz, 1964a; VIMS records).

Ambloplites rupestris (Rafinesque). Rock bass. Fresh water; introduced; rare on coastal plain; recorded from upper CB, off Worton Pt., Md. (C.B.L. coll., M. Wiley, pers. comm.); most abundant above fall line; all major tributaries. (Mansueti, 1955; VIMS records).

Centrarchus macropterus (Lacepede). Flier. Fresh water-7 ppt., locally common, sluggish streams; York River system south. (VIMS records).

Enneacanthus chaetodon (Baird). Blackbanded sunfish. Fresh water; locally rare to common; eastern shore of Md.; acid-water, impoundments, weed beds, cypress lowlands. No records for elsewhere in CB. (Mansueti, 1950; Schwartz, 1961d, 1964a).

Enneacanthus gloriosus (Holbrook). Bluespotted sunfish. Fresh water 12.9 ppt; locally occasional to common, Md. & Va.; sluggish streams, acid ponds. (Hildebrand & Schroeder, 1928; Mansueti, 1950; VIMS records).

Enneacanthus obesus (Girard). Banded sunfish. Fresh water; occasional; sluggish streams, acid-water swamps, ditches, in muddy bottoms; Md. & Va. (Mansueti, 1950; VIMS collection).

Lepomis auritus (Linnaeus). Redbreast sunfish. Fresh water; occasional to common; all tributaries; minor sport importance. (Mansueti, 1950; VIMS records).

Lepomis cyanellus Rafinesque. Green sunfish. Fresh water; introduced; locally rare to occasional from Potomac R. north and east; rare or absent on Va. coastal plain. (Mansueti, 1950; Tsai, 1968).

Lepomis gulosus (Cuvier). Warmouth. Fresh water; rare to occasional; scattered localities; sluggish weedy streams; Md. & Va. (Fowler, 1945; Mansueti, 1950; VIMS records).

Lepomis macrochirus Rafinesque. Bluegill. Fresh water-18.0 ppt; introduced; common to abundant; all tributaries; impoundments; major sport importance. (Fowler, 1945; Mansueti, 1950; VIMS records).

Lepomis gibbosus (Linnaeus). Pumpkinseed. Fresh water-18.2 ppt; common to abundant; all tributaries; major sport importance. (Fowler, 1945; Hildebrand & Schroeder, 1928; Mansueti, 1950; VIMS records).

Micropterus dolomieui Lacepede. Smallmouth bass. Fresh water-7.4 ppt; introduced; occasional to common, Rappahannock R. north on coastal plain; absent E. Shore; rare to occasional south of Rappahannock on coastal plain; most abundant, all major tributaries above fall-line; clear gravelly streams; major sport importance. (Fowler, 1945; Hildebrand & Schroeder, 1928; Mansueti, 1950; Massmann et al, 1952; VIMS records).

Micropterus salmoides (Lacepede). Largemouth bass. Fresh water-12.9 ppt; introduced; common to abundant; all tributaries; sluggish streams, weed beds; major sport importance. (Fowler, 1945; Hildebrand & Schroeder, 1928; Mansueti, 1950; VIMS records).

Pomoxis annularis Rafinesque. White crappie. Fresh water-1.5 ppt; introduced; rare, Va. drainages; rare to locally common, Md. drainages & impoundments. (Hildebrand & Schroeder, 1928; Schwartz, 1959b).

Pomoxis nigromaculatus (Lesueur). Black crappie. Fresh water-1 ppt; introduced; occasional to abundant all major tributaries, impoundments; major sport importance. (Fowler, 1945; Mansueti, 1950; Schwartz, 1959b; VIMS records).
Family Percidae - perches

**Etheostoma f. fusiforme** (Girard). Swamp darter. Fresh water-1.3 ppt; locally rare to common, most tributaries; back waters of sluggish streams, mill ponds, acid-water; vegetation, dark boggy habitats. (Collette, 1962b; Mansueti, 1951; VIMS records).

**Etheostoma olmstedii** Storer. Tessellated darter. Fresh water-13 ppt, oligohaline; common to abundant, most tributaries; streams, swamp runs. (Cole, 1967; VIMS records; Zorach, 1971).

**Etheostoma sellare** (Radclyffe & Welsh). Maryland darter. Fresh water; rare, endemic to Swan Creek near Havre de Grace, Md., and adjacent drainages; clear, rapid, gravelly streams; endangered. (B. B. Collette, pers. comm.; Schwartz, 1964b).

**Etheostoma serriferum** (Hubbs & Cannon). Sawcheek darter. Fresh water; occasional, enters CB area from the south in Dismal Swamp, head waters of Elizabeth and Nansemond rivers, James drainage; sluggish streams (midstream), weed beds. (Collette, 1962b).

**~theostoma vitreum** (Cope). Glassy darter. Fresh water; scattered coastal plain localities from Patuxent R. Md. south; most abundant above fall line; clear, sandy streams. (Fowler, 1945; Jenkins, 1971; Tsai, 1968).

**Perea flavescens** (Mitchill). Yellow perch. Fresh water-13 ppt; common to abundant, most tributaries; large streams, some impoundments, swamps; minor sport importance. (Hildebrand & Schroeder, 1928; Mansueti, 1950; VIMS records).

**Percina caprodes** (Rarinesque). Logperch. Fresh water; rare or extinct, Potomac drainage; endangered. (Mansueti, 1950; 1955; Smith and Bean, 1899).

**Percina notogramma** (Raney and Hubbs). Stripeback darter. Fresh water; rare; few scattered localities on coastal plain; most abundant above fall line, all major tributaries. (Mansueti, 1950; Tsai, 1968; VIMS records).

**Percina peltata** (Stauffer). Shield darter. Fresh water; rare, a few scattered localities on coastal plain, most abundant above fall line, all major tributaries (Mansueti, 1950; Tsai, 1968; VIMS York piedmont drainage records).

**Stizostedion v. vitreum** (Mitchill). Walleye. Fresh water; introduced; rare, Susquehanna, upper CB; most abundant above fall line, all major tributaries (C.B.L. records, Martin Wiley, pers. comm.).

Family Priacanthidae - bigeyes (Caldwell, 1962a,b)

**Pristigenys alta** (Gill). Short bigeye. Marine; occasional to common, summer, lower CB; mouth of tidal creeks, vicinity of spits, reefs, bars; migrates south, fall; minor sport and commercial importance. (Hildebrand & Schreoder, 1928; VIMS records).

Family Pomatomidae - bluefishes

**Pomatomus saltatrix** (Linnaeus). Bluefish. Marine-1 ppt, meso-polyhaline; large older fish pass through in spring, followed by younger (2-4 lb.) fish which summer in Bay; young of year (snappers) enter lower CB and tributaries in late summer and fall; large fish return late fall; in winter, absent from CB, all sizes migrating offshore and south. Abundant, lower CB; occasional, upper CB; pelagic, major commercial and sport importance. (Hildebrand & Schroeder, 1928; Norcross et al., 1972; VIMS records).

Family Rachycentridae - cobias

**Rachycentron canadum** (Linnaeus). Cobia. Marine, polyhaline; occasional to common, summer, lower CB; mouth of tidal creeks, vicinity of spits, reefs, bars; migrates south, fall; minor sport and commercial importance. (Hildebrand & Schroeder, 1928; Joseph, et al., 1964; Richards, 1967).

Family Echeneidae - remoras

**Remora osteochir** (Cuvier). Marlinsucker. Marine; rare, CB, oceanic stray (if record valid). (Truitt et al, 1929). (Remoras are often found attached by the head to sharks, rays, billfishes or other large fishes. (Cressey & Lachner, 1970).
Echeneis naucrates Linnaeus. Sharksucker. Marine-9.2 ppt, polyhaline; occasional, summer, upper and lower CB. (Hildebrand & Schroeder, 1928; Schwartz, 1960d; VIMS records).

Remora australis (Bennett). Whalesucker. Marine; rare, summer, lower CB; summer. (Massmann, 1957).


Alectis crinitus (Mitchill). African pompano. Marine, polyhaline; rare, upper CB, fall; occasional, lower CB, summer, pelagic. (Hildebrand & Schroeder, 1928; Schwartz, 1960d; VIMS records).

Caranx bartholomaei Cuvier. Yellow jack. Marine; rare; lower CB; summer; pelagic. (Richards, 1963).

Caranx fuscus Geoffroy Saint-Hilaire. Blue-runner. Marine-21 ppt, polyhaline; occasional, summer, fall, upper CB; occasional to common; lower CB; occasional to common, summer, fall; pelagic; minor commercial importance. (Bohke & Chaplin, 1968; Hildebrand & Schroeder, 1928; Schwartz, 1960d; VIMS records).

Caranx hippos (Linnaeus). Crevalle jack. Marine-1 ppt, meso-polyhaline; occasional to common; lower CB; summer, fall; pelagic; minor commercial importance. (Hildebrand & Schroeder, 1928; VIMS records).

Caranx latus Agassiz. Horse-eye jack. Marine-30 ppt, polyhaline; rare; lower CB; summer, fall; pelagic. (Hildebrand & Schroeder, 1928; VIMS records).

Chloroscombrus chrysurus (Linnaeus). Atlantic bumper. Marine; rare; lower CB; fall; pelagic. (Bean, 1891; VIMS collection).

Oligoplites saurus (Bloch & Schneider). Leatherjacket. Marine; rare; lower CB; spring, fall; pelagic. (Hildebrand & Schroeder, 1928).

Selar crumenophthalmus (Bloch). Bigeye scad. Marine-15 ppt, meso-polyhaline; rare, upper CB; occasional to common, lower CB; summer, fall; pelagic. (Hildebrand & Schroeder, 1928; Schwartz, 1960d; VIMS records).

Selene vomer (Linnaeus). Lookdown. Marine-1 ppt, polyhaline; occasional, upper CB; occasional to common, lower CB; summer, fall; pelagic. (Hildebrand & Schroeder, 1928; Schwartz, 1960; VIMS records).

Seriola dumerili (Risso). Greater amberjack. Marine; occasional, upper CB; occasional to common, lower CB; summer, fall; pelagic; shallow sandy beaches; minor commercial importance. (Hildebrand & Schroeder, 1928; VIMS records).

Seriola fasciata (Bloch). Lesser amberjack. Marine; rare, lower CB; pelagic. (Ginsburg, 1952a; Massmann, 1957).

Seriola rivoliana Valenciennes. Almaco jack. Marine; rare to occasional; lower CB; summer, fall; pelagic. (Ginsburg, 1952a; Massmann, 1957; VIMS records).

Seriola zonata (Mitchill). Banded rudderfish. Marine; occasional, lower CB; summer; pelagic. (Ginsburg, 1952a; Massmann, 1957; VIMS records).

Trachinotus carolinus (Linnaeus). Florida pompano. Marine, polyhaline; common; lower CB; summer, fall; pelagic; shallow sandy beaches; minor commercial importance. (Hildebrand & Schroeder, 1928; VIMS records).

Trachinotus falcatus (Linnaeus). Permit. Marine; rare to occasional; lower CB; summer; fall; pelagic. (Hildebrand & Schroeder, 1928; VIMS records).

Trachinotus goodei Jordon & Evermann. Palometa. Marine; rare; lower CB; pelagic. (Hildebrand & Schroeder, 1928; VIMS records).

Trachurus lathami Nichols. Rough scad. Marine-14 ppt, polyhaline; rare to occasional, upper CB; occasional, lower CB; summer; pelagic. (Massmann, 1960; Mansueti, 1960b; VIMS records).

Vomer setapinnis (Mitchill). Atlantic moonfish. Marine, polyhaline; rare, upper CB; occasional to common, lower CB; summer, fall; pelagic. (Hildebrand & Schroeder, 1928; Schwartz, 1960d; VIMS records).
Family Coryphaenidae - dolphins (Collette & Gibbs, 1969)
Coryphaena hippurus Linnaeus. Dolphin. Marine; rare; lower CB; summer; pelagic; an oceanic stray. (Massmann, 1957).

Family Lutjanidae - snappers (Anderson, 1967)
Lutjanus cyanopterus (Cuvier). Cubera snapper. Marine; rare, lower CB; tropical; rare to occasional; lower CB; summer. (VIMS collection).
Lutjanus griseus (Linnaeus). Gray snapper. Marine, polyhaline; occasional; lower CB; summer, fall. (Hildebrand & Schroeder, 1928; VIMS records).

Family Lobotidae - tripletails
Lobotes surinamensis (Bloch). Tripletail. Marine, polyhaline; occasional; lower CB; summer, fall. (Hildebrand & Schroeder, 1928; VIMS records).

Family Gerreidae - mojarra (Curran, 1942; Bohlke & Chaplin, 1968; Cervigon, 1966)
Eucinostomus argenteus Baird & Girard. Spotfin mojarra. Marine; rare; lower CB; summer; tropical stray. (Bean, 1891; Hildebrand & Schroeder, 1928; VIMS collection).
Eucinostomus gula (Quoy and Gaimard). Silver jenny. Marine; rare; lower CB; summer; tropical stray. (Hildebrand & Schroeder, 1928; VIMS collection).

Family Pomadasyidae - grunts (Courtney, 1961; Bohlke & Chaplin, 1968)
Haemulon aurolineatum Cuvier. Tomtate. Marine; rare, lower CB. (Uhler & Lugger, 1876).

Family Sparidae - porgies (Bohlke & Chaplin, 1968; Caldwell, 1965; Randall & Caldwell, 1966)
Stenotomus chrysops (Linnaeus). Scup. Marine-17 ppt., polyhaline; common-abundant, lower CB; large adults, early spring; immatures, summer, fall; migrates offshore in winter; minor commercial importance. (Hildebrand & Schroeder, 1928; VIMS records).

Family Sciaenidae - drums (Gilbert, 1966; Ginsburg, 1929; Hildebrand & Cable, 1934; Welsh & Breder, 1923)
Bairdiella chrysura (Laépède). Silver perch. Marine-fresh water; abundant. lower CB; rare to occasional, upper CB; spring, summer, fall, deeper flats, channels; winter, deeper channels, may migrate out of CB; may remain in CB in mild winters but usually migrates south out of CB. (Hildebrand & Schroeder, 1928; VIMS records).

Cynoscion nebulosus (Cuvier). Spotted seatrout. Marine-5 ppt., meso-polyhaline; occasional to common, spring, summer, fall, lower CB; rare to occasional, upper CB; minor to major commercial importance. May remain in CB in mild winters but usually migrates south out of CB. (Hildebrand & Schroeder, 1928; VIMS records).
Cynoscion nothus (Holbrook). Silver seatrout. Marine, polyhaline; occasional; lower CB. (Hildebrand & Schroeder, 1928; VIMS records).
Cynoscion regalis (Bloch and Schneider). Weakfish. Marine-fresh water; juveniles mesohaline, summer, fall; adults meso-polyhaline,
spring, summer, fall; abundant lower CB; rare-occasional, upper CB; may remain in deeper water of CB in mild winters but usually migrates south; major commercial & sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Leiostomus xanthurus Lacépède. Spot. Marine-freshwater; adults medo-polyhaline; juveniles mesohaline; abundant, spring, summer, fall; upper & lower CB; migrates out of CB and south in winter; major commercial & sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Larimus fasciatus Holbrook. Banded drum. Marine-15 ppt, polyhaline; occasional; summer, lower CB. (Hildebrand & Schroeder, 1928; VIMS records).

Menticirrhus americanus (Linnaeus). Southern kingfish. Marine-14 ppt., polyhaline; occasional to common; lower CB; summer, fall; migrates south, winter; minor commercial & sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Menticirrhus littoralis (Holbrook). Gulf kingfish. Marine, polyhaline; rare; lower CB; summer, fall. (Hildebrand & Schroeder, 1928; VIMS records).

Menticirrhus saxatilis (Bloch & Schneider). Northern kingfish. Marine-4 ppt, meso-polyhaline; common; lower CB; summer, fall; migrates south in winter; minor commercial and sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Micropogon undulatus (Linnaeus). Atlantic croaker. Marine-freshwater, meso-polyhaline; adults rare to abundant; spring, summer, fall; juveniles may remain in CB in channels, mild winters; high mortality, severe winter; minor to major commercial & sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Pogonias cromis (Linnaeus). Black drum. Marine-freshwater; adults, polyhaline; common; spring, summer, fall; lower CB; migrate south in winter; juveniles, meso-polyhaline, may remain in CB in mild winters; migrates south in winter, minor commercial and sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Scaenops ocellata (Linnaeus). Red drum. Marine-16 ppt; adults polyhaline; rare to occasional, spring, summer; occasional to common, fall; juveniles, meso-polyhaline; occasional to common, fall; may remain in CB in mild winters; migrates south in winter; minor commercial and sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Stellifer lanceolatus (Holbrook). Star drum. Marine-27 ppt, polyhaline; rare to occasional; summer; lower CB. (Hildebrand & Schroeder, 1928; VIMS records).

Umbrina coroides Cuvier. Sand drum. Marine; rare; fall; lower CB. (Hildebrand & Schroeder, 1928).

Family Kyphosidae - sea chubs (Moore, 1962)

Kyphosus incisus (Cuvier). Yellow chub. Marine; spring, lower CB. (Hildebrand & Schroeder, 1928; VIMS records).

Kyphosus sectatrix (Linnaeus). Bermuda chub. Marine; rare; summer; lower CB. (Hildebrand & Schroeder, 1928).

Family Ephippidae - spadefishes

Chaetodipterus faber (Broussonet). Atlantic spadefish. Marine-12 ppt, meso-polyhaline; occasional to common; lower CB; summer, fall; rock piles, wrecks; minor sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

Family Chaetodontidae - butterflyfishes. (Bohle & Chaplin, 1968)

Chaetodon auriga (Cuvier). Spotfin butterflyfish. Marine; rare to occasional; summer, fall; lower CB; tropical stray; usually juveniles. (Hildebrand & Schroeder, 1928; Richards, 1963; VIMS records).

Family Labridae - wrasses (Bigelow & Schroeder, 1953b; Bohle & Chaplin, 1968).

Tautogolabrus adspersus (Walbaum). Cunner. Marine-11 ppt, polyhaline; rare to occasional; lower CB; summer, fall, winter; northern stray. (Hildebrand & Schroeder, 1928; VIMS records).
Scarus coeruleus (Bloch). Blue parrotfish. Marine; rare; lower CB; tropical stray. (Hildebrand & Schroeder, 1928; Smith & Kendall, 1958).

Family Mugilidae - mullets
Mugil cephalus Linnaeus. Striped mullet. Marine; 17 ppt, polyhaline; summer, fall; occasional; upper and lower CB; tidal creeks & flats; winter, rare in CB; most migrate out of CB to south; minor commercial importance. (Hildebrand & Schroeder, 1928; Mansueti, 1962b; VIMS records).
Mugil curema Valenciennes. White mullet. Marine; 1 ppt; juveniles mesohaline, summer, fall; adults polyhaline, summer, fall; occasional, upper CB; occasional to common, lower CB; tidal creeks & flats; winter, migrate from CB to the south; minor commercial importance. (Hildebrand & Schroeder, 1928; VIMS records).

Family Sphyraenidae - barracudas (DeSylva, 1963)
Sphyraena borealis DeKay. Northern sennet. Marine; rare to occasional; lower CB; summer. (Everman & Hildebrand, 1910; VIMS records).
Sphyraena guachancho Cuvier. Guaguanche. Marine; rare; lower CB; summer. (Hildebrand & Schroeder, 1928; VIMS records).

Family Polynemidae - threadfins. (Randall, 1966).
Polydactylus octonemus (Girard). Atlantic threadfin. Marine; rare; summer; lower CB. (Hildebrand & Schroeder, 1928).
Polydactylus virginicus (Linnaeus). Barbu. Marine; rare; summer; lower CB. (Richards, 1963).

Astroscopus guttatus Abbott. Northern stargazer. Marine; 1-11 ppt., meso-polyhaline; occasional, entire year, lower CB; rare, fall, upper CB; burrows into sand bottoms; electrogenic. (Hildebrand & Schroeder, 1928; Schwartz, 1960d; VIMS records).

Family Blenniidae - combtooth blennies. (Springer, 1959, 1968)
Blennius marmoratus Poey. Seaweed blenny. Marine; rare; lower CB; this record may be in error. (Hildebrand & Schroeder, 1928; Uhler & Lugger, 1876).
Hypsohennius bentzi (Lesueur). Feather blenny. Estuarine; 12-30 ppt, meso-polyhaline; common; entire CB; frequents deeper flats and oyster reefs, summer; shallow flats, fall; channels at higher salinities, winter. (Hildebrand & Schroeder, 1928; VIMS records).
Chasmodes bosquianus (Lacépède). Striped blenny. Estuarine; 12-25 ppt., meso-polyhaline; common to abundant; entire CB; shallow flats, oyster reefs, spring, summer; deeper flats, reefs, fall; channels at higher salinities, winter. (Hildebrand & Schroeder, 1928; VIMS records).

Family Gobiidae - gobies (Bohlke & Robins, 1968; Dawson, 1969; Ginsburg, 1933).
Evorthodus lyricus (Girard). Lyre Goby. Marine; rare; lower CB; fall. (Dinsburg, 1931; Hildebrand & Schroeder, 1928; Massmann, 1957).
Gobionellus boleosoma (Jordan & Gilbert). Darter goby. Marine; rare; lower CB; fall. (Massmann, 1957).
Gobiosoma bosci (Lacépède). Naked goby. Estuarine; 0-27 ppt, meso-polyhaline; common to abundant; entire CB; shallow flats, weed beds, oyster reefs, spring, summer, fall; deeper channel edges & channels in higher salinity, winter. (Hildebrand & Schroeder, 1928; Schwartz, 1971; VIMS records).
Gobiosoma ginsburgi Hildebrand & Schroeder. Seaboard goby. Estuarine; 15-31 ppt, polyhaline; occasional to common, upper CB; common-abundant, lower CB; deeper flats, oyster reefs, spring, summer, fall; channels in higher salinity, winter. (Hildebrand & Schroeder, 1928; Schwartz, 1971; VIMS records).

Gobiosoma gibbosum Ginsburg. Code goby. Marine; 15.8 ppt, meso-polyhaline; rare; winter; upper CB; channel edge; tropical stray? (Schwartz, 1971).

Microgobius gulosus (Girard). Clown goby. Marine; 15.8 ppt, meso-polyhaline; rare; winter; upper CB; channel edge; tropical stray? (Dawson, 1969; Schwartz, 1971).
Microgobius thalassinus (Jordan & Gilbert). Green goby. Estuarine-
11-13 ppt., meso-polyhaline; occasional to common, entire CB;
deeper oyster reefs (10-20 ft.), spring, summer, fall; channel
edges, channels, winter; inhabits living sponges. (Ginsburg,
1934; Hildebrand & Schroeder, 1928; Schwartz, 1971; VIMS records).

Family Ammodytidae - Sand lances. (Richards et al, 1963; /-A. ameri-
16
canus is considered a synonym of A. hexapterus (Winters, 1970)/
Ammodytes hexapterus Pallas. Inshore sand lance. Marine; rare;
fall, winter; lower CB; sandy bottoms. (Massmann, 1960; Richards
et al, 1963; VIMS records).

Family Trichiuridae - cutlassfishes
Trichiurus lepturus Linnaeus. Atlantic cutlassfish. Marine- 16
ppt., meso-polyhaline; occasional to common; entire CB; spring,
summer, fall; pelagic; occasional sport catch. (CBL records,
M. Wiley, pers. comm.; Hildebrand & Schroeder, 1928; VIMS records).

Family Scombridae - mackerels and tunas (Collette & Gibbs, 1963a; Fitch
& Roedel, 1962; Gibbs & Collette, 1966; Matsu, 1967; Rivas, 1951).
Euthynnus alletteratus (Rafinesque). Little tunny. Marine, poly-
haline; occasional; upper & lower CB; late spring, summer, fall;
pelagic; minor commercial & sport importance. (Mansueti &
Mansueti, 1962; Massmann, 1957; Schwartz, 1960d).
Sarda sarda (Bloch). Atlantic bonito. Marine-10 ppt, polyhaline; 
occasional; upper & lower CB; spring, summer, fall; minor com-
mercial and sport value; pelagic. (Hildebrand & Schroeder, 1928;
Mansueti, 1962a).

Scomber japonicus Houttuyn. Chub mackerel. Marine, polyhaline;
rare to occasional; lower CB; spring, pelagic. (Uhler & Lugger,
1876; VIMS records).

Scomber scombrus Linnaeus. Atlantic mackerel. Marine, polyhaline;
occasional; lower CB; late fall, winter, early spring; minor
commercial importance. (Hildebrand & Schroeder, 1928; VIMS re-
cords).

Scomberomorus cavalla (Cuvier). King mackerel. Marine-14 ppt, poly-
haline; rare to occasional, upper CB; occasional, lower CB; pel-
agic; minor commercial and sport importance. (Butz & Mansueti,
1962; Massmann, 1960).

Scomberomorus maculatus (Mitchill). Spanish mackerel. Marine,
polyhaline; occasional to common; lower CB; spring, summer, fall;
pelagic; minor commercial & sport importance. (Hildebrand &
Schroeder, 1928; VIMS records).

Scomberomorus regalis (Bloch). Cero. Marine; rare; lower CB;
tropical stray. (Uhler & Lugger, 1876).

Thunnus thynnus (Linnaeus). Bluefin tuna. Marine; rare; lower CB;
summer; oceanic stray. (Hildebrand & Schroeder, 1928).

Family Xiphiidae - swordfishes
Xiphias gladius Linnaeus. Swordfish. Marine; rare; lower CB; re-
cord questionable. (Uhler & Lugger, 1876).

Family Scombrolophidae - ruffs, cigarfishes and b arrelfishes
(Haedrich, 1967; Haedrich & Horn, 1969). /Because all stromateoid
fishes were placed in one family in the A.F.S. list with no
justification, I prefer to follow the recent, thorough revision
by Haedrich (1967)/

Hyperoglyphe periformis (Mitchill). Barrelfish. Marine; rare;
upper and lower CB; summer, fall. (Merrimen, 1945; Schwartz,
1963b; VIMS records).

Family Stromateidae - butterflyfishes (Haedrich, 1967; Haedrich &
Horn, 1969; Horn, 1970)

Peptrilus paru (Linnaeus). Harvestfish. Marine-4 ppt, meso-poly-
haline; summer, fall; common, lower CB; occasional, upper CB;
pelagic; minor commercial importance; migrates south in winter.
(I follow Horn (1970) in placing P. alepidotus (Linnaeus) within
the synonymy of P. paru) (Hildebrand & Schroeder, 1928; Horn,
1970; Mansueti, 1963; VIMS records).

Peptrilus triacanthus (Peck). Butterfish. Marine-5 ppt, meso-poly-
haline; spring, summer, fall; common-abundant, lower CB; occasional,
upper CB; pelagic; minor-major commercial importance; migrates off-
shore, south in winter. (Hildebrand & Schroeder, 1928; Horn, 1970;
Mansueti, 1963; VIMS records).
Family Triglidae - searobins (Miller (in press); Ginsburg, 1950; Teague, 1951).

**Prionotus carolinus** (Linnaeus). Northern searobin. Marine-5 ppt, meso-polyhaline; common, upper CB; abundant, lower CB; spring, summer, fall; deeper flats, channel edges; migrates offshore & south in winter. (Hildebrand & Schroeder, 1928; VIMS records).

**Prionotus evolans** (Linnaeus). Striped searobin. Marine-16 ppt, meso-polyhaline; occasional-common, lower CB; rare to occasional, upper CB; spring, summer, fall; deeper flats, channel edges; migrates offshore & south in winter. (Hildebrand & Schroeder, 1928; VIMS records).

**Prionotus scitulus** Jordan and Gilbert. Leopard searobin. Marine; rare; lower CB; southern stray. (Ginsburg, 1950).

**Prionotus tribulus** Cuvier. Bighead searobin. Marine; rare; lower CB; southern stray. (Ginsburg, 1950).

Family Cottidae - sculpins (Bigelow & Schroeder, 1953b).

**Hemitripterus americanus** (Gmelin). Sea raven. Marine; rare; lower CB; winter, early spring. (Uhler & Lugger, 1876).

**Myoxocephalus octodecemspinosus** (Mitchill). Longhorn sculpin. Marine-27 ppt, polyhaline; rare to occasional; lower CB; winter. (VIMS collection & records).

Family Cyclopteridae - lumpfishes and snailfishes

**Cyclopterus lumpus** Linnaeus. Lumpfish. Marine, polyhaline; occasional; lower CB; winter, early spring. (Hildebrand & Schroeder, 1928; VIMS records).

Family Dactylopteridae - flying gurnards

**Dactylopterus volitans** (Linnaeus). Flying gurnard. Marine; rare; fall; lower CB. (Hildebrand & Schroeder, 1928).

Order Pleuronectiformes (Heterosomata)

Family Bothidae - lefteye flounders (Gutherz, 1967; Ginsburg, 1952b; Norman, 1934; Parr, 1931). /Neotropus macrops/ described by Hildebrand and Schroeder (1928) from CB is apparently a reversed (teratological) specimen of E. microstomus. Reported differences in morphometrics between these two forms may be attributed to the small size of N. macrops, which exhibits juvenile proportions, i.e., shallower body and longer head and eyes typical also of E. microstomus. Massmann (1958 et seq) listing of Citherichthys macrops from Chesapeake Bay was apparently in reference to Neotropus. Citherichthys macrops Dresel is a distinct taxon and to my knowledge has not been recorded from CB or the mid-Atlantic Bight./

**Etropus crossotus** Jordan & Gilbert. Fringed flounder. Marine-13 ppt, polyhaline; rare to occasional; lower CB; spring, summer, fall. (Hildebrand & Schroeder, 1928; VIMS coll.).

**Etropus microstomus** (Gill). Smallmouth flounder. Marine-7 ppt, meso-polyhaline; common; lower CB; all year; channels, mud bottom. (Hildebrand and Schroeder, 1928; VIMS records).

**Paralichthys dentatus** (Linnaeus). Summer flounder. Marine-6 ppt, meso-polyhaline; occasional to common, upper CB; common to abundant, lower CB; spring, summer, fall; flats to channel edges; migrates offshore in winter; major commercial & sport importance. (Hildebrand & Schroeder, 1928; VIMS records).

**Scophthalmus aquosus** (Mitchill). Windowpane. Marine-13 ppt, meso-polyhaline; occasional to common, upper CB; common to abundant, lower CB; extends to lower part of salinity range; winter, spring; present entire year. (Hildebrand & Schroeder, 1928; VIMS records).

Family Pleuronectidae - righteye flounders (Bigelow & Schroeder, 1953; Norman, 1934).

**Hippoglossus hippoglossus** (Linnaeus). Atlantic halibut. Marine; rare; lower CB; winter; northern stray. (Walford, 1946).

**Limanda ferruginea** (Storer). Yellowtail flounder. Marine; rare; lower CB; winter; northern stray. (Uhler & Lugger, 1876).

**Pseudopleuronectes americanus** (Walbaum). Winter flounder. Estuarine-5-30 ppt, meso-polyhaline; common to abundant, upper CB; occasional to common, lower CB; flats, channel edges, late fall, winter, spring; deeper channels or migrates offshore, summer; minor commercial importance. (Hildebrand & Schroeder, 1928; VIMS records).
Family Soleidae - soles

*Trinectes maculatus* (Bloch & Schneider). Hogchoker. Estuarine-0-32 ppt, oligo-polyhaline; abundant, entire year; entire CB; channels, channel edges, mud bottoms; young on shallow mud flats, summer. (Dovel et al, 1969; Hildebrand & Schroeder, 1928; VIMS records).

Family Cyprinidae - tonguefishes (Ginsburg, 1951).

*Symphurus plagiusa* (Linnaeus). Blackcheek tonguefish. Marine-7 ppt, meso-polyhaline; all year; channels, mud bottom; common, lower CB; occasional, upper CB. (Hildebrand & Schroeder, 1928; VIMS records).

Order Tetraodontiformes (Plectognathi)

Family Balistidae - triggerfishes and filefishes (Berry & Vogele, 1961; Moore, 1967; Randall, 1964).

*Aluterus schoepfi* (Walbaum). Orange filefish. Marine-16.4 ppt, polyhaline; occasional, upper CB; common, lower CB; summer; deeper bars, spits, often seen drifting beneath jellyfish, nipping at tentacles. (Hildebrand & Schroeder, 1928; Schwartz, 1960d; VIMS records).

*Stephanolepis hispidus* (Linnaeus). Planehead filefish. Marine-19 ppt, polyhaline; occasional, lower CB; summer, fall. (Stephanolepis = Monacanthus, after Berry & Vogele (1961), and Bohlke & Chaplin (1968). (Hildebrand & Schroeder, 1928; VIMS records).

Family Ostraciidae - boxfishes (Bohlke & Chaplin, 1968; Tyler, 1965).


*Lactophrys trigonus* (Linnaeus). Trunkfish. Marine; rare, summer, lower CB; tropical stray. (Hildebrand & Schroeder, 1928; VIMS records).

Family Tetraodontidae - puffers (Shipp & Yerger, 1969a, b).


*Sphoeroides testudineus* (Linnaeus). Checkered puffer. Marine; rare; lower CB; questionable record: (Lugger, 1877).

Family Diodontidae - porcupinefishes (Bohlke & Chaplin, 1968).

*Chilomycterus schoepfi* (Walbaum). Striped burrfish. Marine-2 ppt, polyhaline; common; summer, fall; upper and lower CB; deep flats, channel edges; migrates south, winter. (Hildebrand & Schroeder, 1928; Schwartz, 1960d; VIMS records).

*Diodon hystrix* (Linnaeus). Porcupinefish. Marine; rare; lower CB; summer. (Uhler & Lugger, 1876; Truitt et al, 1929).
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CHAPTER VII:

Herptiles of the Maryland and Virginia Coastal Plain

J. A. Musick

This list includes 43 species of amphibians and 59 species of reptiles reported from the coastal plain of Virginia and Maryland. Included among the Amphibia are 1 species of siren; 17 species, 10 genera and 6 families of salamanders; and 25 species, 8 genera and 5 families of frogs. The reptiles include 24 species, 15 genera and 6 families of turtles; 7 species, 5 genera and 4 families of lizards; and 28 species, 17 genera and 2 families of snakes.

Distribution: The most notable feature of the distribution of herptiles in our region is the rapid depauperization of the fauna from southern Virginia northward. *Siren lacertina, Amphiuma means, Necturus punctatus, Desmognathus auriculatus, Stereochilus marginatus, Eurycea longicauda guttolinea*, *Gastrophrynecarisolinensis, Bufo terrestris, Hyla femoralis, H. gratiosa, H. squilla, Limnaceus ocellariss, Acris p. gryllus, Pseudacris trinley*, *Crysemys g. concinna, C. f. Floridana, C. s. scripta, Deirochelys reticularia, Eumecees inexpectatus, Onemodophorus sexlineatus, Ophisaurus attenuatus longicaudus, Natrix e. erythrogaster, N. taxispilata, Regina rigida, Virginia striata*, *Farancia a. abacura, F. e. erythrogramma, Lamprephiis calligaster Phomomaoculata, Agkistrodon p. piscivorus and Crotales horridus atricaudatus* all reach their normal northern limit of distribution in the Chesapeake Bay region. Most of these species are derived from the diverse austroriparian fauna to the south. Conversely several northern forms reach their southern limit of distribution on the coastal plain in the region. Most of these species become more montane in distribution from north to south. Included within the northern group are Desmognathus fuscus, *Hemidaenius scutatum, Rana sylvatica, Bufox americanus, Hyla versicolor, Acris c. crepitans, Pseudacris triseriata kalmi, Regina septemvittata and Diadophis punctatus edwardsi.*

The physiography of the study area is such that the coastal plain may be conveniently divided into 7 geographic regions for faunal analysis. "Southside" Virginia is the area south of the James River. The "Lower Peninsula" is bounded by the James and York rivers; the "Middle Peninsula" by the York and Rappahannock rivers and the "Northern Neck" by the Rappahannock and Potomac rivers. The coastal plain on the "Western Shore, Maryland" becomes narrower toward the head of Chesapeake Bay where the coastal plain fauna encroaches by way of river flood plains into the piedmont. This encroachment is greatest along the largest river, the Susquehanna, which with the adjacent Eastern Shore peninsula, Elk Neck, will be hereafter as the "Bay Head." Elk Neck, although a coastal plain in physiography, is more closely allied to the piedmont in ecology (Conant, 1945). The remaining geographic area is the Eastern Shore of Maryland and Virginia, which comprises the southwestern portion of the Delmarva peninsula.

Discounting sea turtles and introductions, the ranges of 82 species of herptiles include "Southside" Virginia (table 1); whereas the adjacent peninsula to the north, the Lower Peninsula, is included within the ranges of only 68 species. From there the number of species decreases from 61 on the Middle Peninsula to 60 on Northern Neck, 58 on W. Shore, Maryland and 54 in the Bay Head area. The E. Shore has 55 species. Four species are found only in the Bay Head area. Of these, Cryptobranchus alieghenensis and *Malaclemys georgica* are Susquehanna relicts of the Mississippi fauna and are absent from all other Atlantic slope drainages, whereas *Clemmys insculpta* and *C. muhlenbergi* are piedmont and montane forms in Maryland and Virginia but occur in the Bay Head area undoubtedly because of the piedmont influences on the ecology there.

Format: Taxa above the generic level are arranged phylogenetically. Within each account are given details of the geographical distribution within the Maryland and Virginia coastal plain, comments on ecology and maximum size attained. The last is from Conant (1958) and method of mensuration depends on the taxon and is stated after each order or infraorder. Literature citations follow each account and may include reference to the Virginia Herpetological Society (VHS) records of specimens housed in various museums. The
following abbreviations will be used to designate respective institutions: 
American Museum of Natural History, AMNH; Carnegie Museum, CM; Cornell University, CU; Ohio State University, OSU; National Museum of Natural History, USNM; University of Michigan, UM; Museum of Comparative Zoology, MCZ.

Previous works: The literature on the herpetology of Maryland and Virginia is voluminous, scattered and varied in competence from undocumented heresay (Carroll, 1950) to the excellent monograph of McCauley (1945). Local faunal lists (Hay, 1902; Dunn, 1920) have contributed much to the accumulated knowledge published in recent more inclusive lists (Harris, 1969).

I have attempted to review most of the Virginia and Maryland literature on coastal plain herptiles and have also included new distributional information based on VIMS collections. Certain Maryland publications (Harris, 1966a, b, 1968a, b; Fowler, 1945; Prince et al, 1955; Nemuras et al, 1966; Wells, 1968) have been unavailable to me to date but information therein has been summarized by Harris (1969). For those interested in identifying herptiles, Conant's (1958) Field Guide is unsurpassed for lay use and quite valuable to scientists. In addition, references cited herein after the order or infraorder will be helpful to herptile identification.

Acknowledgements: I wish to thank J. D. Hardy for his cooperation in obtaining literature and specimens and in sharing information on ecology and distribution of herptiles. Dr. G. R. Brooks of the College of William and Mary has likewise provided literature, range record information and specimens and has also made available to me distributional maps prepared by the Virginia Herpetological Society over a period of years under the direction of W. L. Witt and F. J. Tobey. In addition Mr. Tobey provided information on middle peninsula distribution records (in litt) and on the location of voucher specimens for various counties. Much of the information herein derives directly from the devoted work done by many members of VHS and the Maryland Herpetological Society over several years. Their contributions are and will be valuable additions to knowledge so long as the societies continue to insist that members place voucher specimens in established, cataloged collections to document new distributional records. Lastly I wish to thank Dr. Marvin Wass for his editorial assistance, Pam Townsend for typing the manuscript and Linda Pushee for preliminary editing.
**Zoogeography of Chesapeake Bay Herptiles**

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**SS**= Southside, **LP**= Lower Peninsula, **MP**= Middle Peninsula, **NN**= Northern Neck, **WM**= Western Shore, Md., **BH**= Bay Head, **ES**= Eastern Shore.
Hyla chrysoscelis
Hyla versicolor
Hyla c. cinerea
Hyla c. crucifer
Hyla femoralis
Hyla gratiosa
Hyla squirella
Limnaeodus ocularis
Acris c. crepitans
Acris g. gryllus
Pseudacris brimleyi
Pseudacris t. feriarum
Pseudacris triseriata kalmi
Chelydra s. serpentina
Sternotherus odoratus
Kinosternon s. subrubrum
Clemmys guttata
Clemmys insculpta
Clemmys muhlenbergi
Terrapene c. carolina
Malaclemys t. terrapin
Malaclemys geographica
Chrysemys p. picta
Chrysemys c. concinna
Chrysemys f. floridana
Chrysemys rubriventris
Chrysemys scripta troosti
Deirochelys r. reticularia
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Eumeces inexpectatus
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Class Amphibia

Order Trachystomata, one family in our area. (Bishop, 1943). Maximum size of sirens given herein is total length from tip of snout to tip of tail.

Family Sirenidae - Sirens, one species in our area. *Siren lacertina* Linnaeus. Greater siren. Rare to occasional; scattered localities on western shore of CB as far north as Washington, D.C.; restricted to coastal plain; aquatic; has been taken in brackish water (Neill, 1958); shallow ponds, ditches, sluggish streams; max. size, 36 in. (Dunn, 1918; Hay, 1902; Werler & McCallion, 1951; USNM).7

Order Caudata - Salamanders, six families in our area. (Bishop, 1947; Keller, 1954; Worthington, 1968). Maximum size of salamanders given herein is total length from tip of snout to tip of tail.

Family Cryptobranchidae - hellbenders, one species in our area. *Cryptobranchus alleganiensis* (Daudin). Hellbender. Rare; Susquehanna drainage only; Cecil Co., Md.; more abundant above fall line; aquatic; clear, cool, rapid streams with boulders; habitat endangered by industrialization, stream channelization, and mining; max. size, male, 22 in., female, 29 1/8 in. (Conant, 1945; Dundee, 1971; Fowler, 1915, 1947a; Harris, 1969).7

Family Ambystomatidae - Mole salamanders, three species in our area. *Ambystoma maculatum* (Shaw). Spotted salamander. Locally rare to abundant, entire area; no records on E. Shore of CB south of Talbot Co., Md. or W. Shore south of James R. on coastal plain, although present on N.C. coastal plain; breeds in temporary ponds; early spring; fossorial remainder of year; mixed deciduous forest, taken from beneath driftwood on sand beach 20 ft. from CB, Calvert Co., Md.; max. size, 9 in... (Anon., 1971; Brittle, 1967; Anon., 1969; Cargo, 1960; Conant, 1945; Dunn, 1918; Hardy, 1952; Hardy & Mansueti, 1962; Harris, 1969; Kilkmiklovic, 1972b; Wood & Wilkinson, 1952; VHS; USNM, AMNH, UM).7

*Ambystoma opacum*. (Gravenhorst). Marbled salamander. Locally common - to abundant, entire area; no records E. Shore, Va., but probably occurs; nests in fall in dry pond beds; eggs hatch in spring rains; pine woods, sandy soils; adults terrestrial, fossorial; reported from under debris on Potomac R. tidal flats; max. size, 5 in. (Anderson, 1967a; Anon., 1971; Buxbaum & Mansueti, 1942; Conant, 1945; Dunn, 1917, 1918; Hardy & Mansueti, 1962; Harris, 1969; Kilkmiklovic, 1972b; Mansueti, 1943; Noble & Brady, 1933; Stine, 1953; Werler & McCallion, 1951; VHS; USNM, AMNH, CM).7

*Ambystoma tigrinum* (Green). Eastern tiger salamander. Rare or absent, Va.; rare or extinct, W. Shore, Md.; locally common, E. Shore, Md.; south to include Dorchester and N. Worcester Co.; breeds in temporary ponds in cornfields, etc.; late winter, adults fossorial rest of year; max. size, 13 in. (Anon., 1971; Conant, 1945; Dunn, 1918; Gelbaugh, 1967; Harris, 1969; Stine, 1953; Stine et al, 1954; VHS; USNM).7

Family Amphiumidae - Amphiumas, one species in our area. *Amphiuma means* Garden. Two-toed amphiuma. Locally rare to common, Va., north to Pamunkey R., Indian Reservation, King William Co. and New Kent Co., Va.; York River drainage; aquatic; ditches, pools, swamps, streams, and in crayfish burrows; max. size, 40 in. (Dunn, 1918; Engeling, 1969a; Richmond, 1945; Smith, 1899; Werler & McCallion, 1951; VIMS records; Wm. & Mary Coll.; VHS; USNM, AMNH, CM, UM).7

Family Salamandridae - Newts, one species in our area. *Notophthalmus v. viridescens* (Rafinesque). Red-spotted newt. Locally common in entire area except records lacking for E. Shore from Caroline Co., Md., to Accomac Co., Va.; adults aquatic; ponds; juveniles terrestrial, "red-eft" terrestrial stage often omitted in coastal plain populations; max. size, 15 in. (Brittle, 1969; Cooper, 1953; Dunn, 1918; Engeling, 1969a; Hardy & Mansueti, 1962; Harris, 1969; Kilkmiklovic, 1972a; Mecham, 1967; Richmond & Goin, 1938; Reinke & Chadwick, 1940; Werler & McCallion, 1951; Wood & Goodwin, 1954; VHS; USNM, CM).7

Family Proteidae - mud puppies and waterdogs. *Necturus punctatus* (Gibbes). Dwarf waterdog. Rare, recorded in area only in SE Va. north to Dinwiddie Co. in Chown R. drainage; aquatic; sluggish streams, backwaters, sandy-muddy bottoms, under leaves and debris; max. size, 7 ¾ in. (Bishop, 1943; Conant, 1958; VHS; CU).7
Family Plethodontidae - Lungless salamanders, ten species and six genera in our area.

Desmognathus f. fuscus (Green). Northern dusky salamander. Common to abundant, entire area above James R. on W. Shore of CB and Wicomico Co., Md. on E. Shore; terrestrial but usually in very moist places; woodland streams, springs, ravines, under wet leaf litter; nests beneath rocks and logs adjacent to water in summer; max. size, 5 1/4 in. /Brittle, 1969; Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1915; Hardy & Mansueti, 1962; Harris, 1969; Reed, 1957a; VIMS records; (VHS; USNM, CM).

Desmognathus auriculatus (Holbrook). Southern dusky salamander. Locally common, Dismal Swamp south; stagnant pools, cypress ponds, acid soil, beneath logs and bark, sandy streams; max. size, 4 3/4 in. /Werler & McCallion, 1951 (apparently as D. f. fuscus); Valentine, 1963; (VHS; USNM).

Stereochilus marginatus (Hallowell). Many-lined salamander. Common south of James R., Va.; aquatic, under logs and debris; swampy pools, backwaters, sluggish streams, gum-cypress forests; nests beneath logs or moss, Fontinalis in or at edge of water in spring; max. size, 4 in. /Brady, 1927; Werler & McCallion, 1951; Wood & Rageot, 1918; (VHS; USNM, UM, CM).

Plethodon c. cinereus (Green). Red-backed salamander. Locally rare to abundant, entire area; terrestrial; under and in rotting logs; deciduous and coniferous woodlands; nests in rotting logs in summer; breeds in fall; max. size, 5 in. /Anon., 1970; Brittle, 1969; Conant, 1945; Cooper, 1959b; Dunn, 1918; Engeling, 1969a; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Harris, 1969; Reed, 1957a; Smith, 1963; Werler & McCallion, 1951; VIMS records; (VHS; USNM, UM, CM).

Plethodon glutinosus (Green). Slimy salamander. Locally rare to abundant, entire W. Shore, Va.; absent coastal plain Md. and entire E. Shore, Va.; terrestrial; moist woodland, ravines; beneath litter and humus; nests beneath stumps, rocks and in crevices in summer; probably breeds in fall; max. size, 7 3/8 in. /Conant, 1945; Dunn, 1918; Harris, 1969; Hoffman, 1953; Marsiglili, 1950; Richmond & Goin, 1935; Werler & McCallion, 1951; (VHS; USNM, UM, CM).

Hemidactylium scutatum (Schlegel). Four-toed salamander. Locally common, entire W. Shore south to James R. and all E. Shore, Md.; no E. Shore, Va. records. Nests in sphagnum bogs in spring; adults terrestrial; hardwood or, occasionally, coniferous forests; max. size, 3 ¼ in. /Conant, 1945; Dunn, 1918; Hardy & Mansueti, 1962; Harris, 1969; Mansueti & Simmons, 1943; Neill, 1963; Richmond & Goin, 1938; Wood, 1955; (VHS; USNM, UM).

Pseudotriton r. ruber (Sonnini). Northern red salamander. Occasional to locally common, W. Shore, Md. and Va., except no records below James R. on coastal plain; E. Shore south to Talbot Co., Md. Clear springs and rivulets under moss or debris; sandy-rocky substrates; nests submerged beneath rocks and logs in fall; max. size, 7 1/8 in. /Brittle, 1969; Conant, 1945; Dunn, 1918; Fowler, 1915; Hardy & Mansueti, 1962; Harris, 1969; Hoffman, 1953; VIMS records; (VHS; USNM, CM, UM).

Pseudotriton m. montanus Baird. Eastern mud salamander. Occasional, W. Shore, Md. and Va., south of Baltimore Co.; E. Shore, Md., Queen Anne's Co. to Worcester Co.; small streams, muddy springs; nests on submerged leaves, debris in fall; max. size, 7 in. /Brady, 1924a; Conant, 1945; Dunn, 1918; Fowler, 1941, 1946a; Hardy & Mansueti, 1962; Hoffman, 1947; VIMS records; (VHS; USNM, UM).

Eurycea b. bislineata (Green). Northern two-lined salamander. Occasional to common entire area; intergrades with E. b. cirrigera in southern Va.; brooks, springs, wet hillsides, under litter; breeds late winter, early spring; nests in running water beneath rocks, twigs in spring, summer; max. size, 4 ½ in. /Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1915; Hardy & Mansueti, 1962; Harris, 1969; Mittelman 1966; Reed, 1957a, 1957b; Richmond, 1945b; Werler & McCallion, 1951; Wood, 1949, 1953; Wood & McCutcheon, 1954; Valentine, 1962; VIMS records; (VHS; USNM, UM).

Eurycea longicauda guttolinata (Holbrook). Three-lined salamander. Occasional, W. Shore of Va., only; swamps, ditches, springs, wet hillsides near streams; max. size, 7 1/8 in. /Brittle, 1969; Dunn, 1918; Engeling, 1969a; (VHS; USNM, UM).
Order Salientia - Frogs & toads, five families in our area. (Altig, 1970; Livezey & Wright, 1947; Wright & Wright, 1949). Maximum size of frogs and toads given herein is "head-body" or "standard" length, the distance from the tip of the snout to the rear of the anus.

Family Pelobatidae - Spadefoot toads, one species in our area.

Scaphiopus h. holbrooki (Harlan). Eastern spadefoot toad. Locally abundant, entire region; fossorial and secretive, except at night during heavy rain when it forages on surface and breeds during summer; max. size, 2 7/8 in., sandy soils. (Burger, 1957; Conant, 1945; Hardy & Mansueti, 1962; Harris, 1969; Klimkiewicz, 1972a; Rageot, 1969; Reed, 1956b, 1957a; Richmond & Goin, 1938; Stine et al., 1956; VIMS records; Wasserman, 1968:70.1; (VHS; USNM, CM, AMNH)).

Family Ranidae - True frogs, seven species in our area.

Rana catesbeiana (Shaw). Bullfrog. Locally common, entire region, ponds, marshes, backwaters, lake shores; breeds in mid-summer; minor commercial and sport value (frog legs); max. size, 8 in., our largest frog. (Anon., 1970; Conant, 1945; Dunn, 1918; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Harris, 1969; Reed, 1957a; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, UM)).

Rana clamitans melanota (Rafinesque). Green frog. Common, entire region, ditches, streams, ponds, swamps; breeds in spring, summer; max. size, 4 in. (Anon.; 1970; Brady, 1927; Collins, 1966; Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1915, 1925a; Hardy & Mansueti, 1962; Harris, 1969; Reed, 1957a; Richmond & Goin, 1938; Schaaf & Smith, 1971:107.1; (VHS; USNM, CM, AMNH, UM)).

Rana palustris Le Conte. Pickerel frog. Occasional, entire region, sphagnum bogs, cool streams, flooded meadows; breeds in early spring; max. size, 3 1/8 in. (Subspecies R. p. mansuetii, described from coastal sphagnum habitat, is not currently recognized but may prove to be valid when systematics have been thoroughly studied.) (Conant, 1945; Dunn, 1918; Gronberger, 1915; Hardy, 1964; Hardy & Mansueti, 1962; Harris, 1969; Reed, 1957a; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, AMNH, UM)).

Rana sylvatica Le Conte. Wood frog. Occasional, entire Md. coastal plain; no records Va. E. Shore (but probably present); W. Shore Va., above fall-line except one Fairfax Co. locality along Potomac estuary; (Engeling's (1969a) record of this species from the lower peninsula is in error (Tobey pers. comm.)) max. size, 3 3/4 in. (Conant, 1945; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Harris, 1969; Klimkiewicz, 1972a; Neill, 1958; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, UM)).

Rana pipiens Schreber. Northern leopard frog. Common, above fall-line, may enter region along fall-line and at the head of CB in Md.; basically a Piedmont form; max. size, 4 1/8 in. (Harris, 1969; Klimkiewicz, 1972a).

Rana virgatipes Cope. Carpenter frog. Locally common, E. Shore Md.; Dorchester & Wicomico Co.'s. southward; unrecorded from E. Shore, Va., although probably present; on W. Shore only in Dismal Swamp, Va.; sphagnum bogs; breeds spring & summer; max. size, 2 5/8 in. (Reed's (1957a) record from Charles Co., Md., was based on a misidentification (Hardy, 1972a). (Brady, 1927; Conant, 1945, 1947; Dunn, 1918; Gosner & Black, 1968:57.1; Harris, 1969; Meanley, 1951; Reed, 1957b; Werler & McCallion, 1951; (VHS; USNM)).
Family Microhylidae (Brevicipitidae) - Narrow-mouthed toads, one species in our area. (Wright & Wright, 1949).

Gastrophryne carolinensis (Holbrook). Eastern narrow-mouthed toad. Locally abundant, W. Shore, Va., north to Calvert & St. Mary's Co.'s. Md.; woodlands, swamp borders; secretive, under debris, in rotting logs, enters brackish habitats; breeds spring, summer; in flooded fields, marshy ponds; max. size, 1 7/16 in. /Collins, 1966; Conant, 1958b; Dunn, 1918; Fowler & Stine, 1953; Hardy, 1953; Hardy & Mansueti, 1962; Harris, 1969; Mansueti, 1942; Neill, 1958; Nelson, 1972a; 120, 1972b; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM)/.

Family Bufonidae - Toads, four species in our area.

Bufo a. americanus Holbrook. American toad. Locally common, on E. Shore from Wicomico Co., Md. to Northampton Co., Va. and from head of CB (Cecil Co., Md.) to lower peninsula of Va. (New Kent Co.); upland areas, woods, fields; breeds in temporary ponds, backwaters, early spring; may interbreed with B. w. fowleri in scattered localities, usually where man has disturbed the environment; max. size, 4 ¼ in. /Conant, 1945; Dunn, 1918; Fowler, 1915; Hardy & Mansueti, 1962; Harris, 1969; Klimkiewicz, 1972a; Reed, 1957a; VIMS records; (VHS; USNM, CM, AMNH)/.

Bufo fowleri Hinckley. Fowler's toad. Abundant through entire region; ubiquitous; in fields, forests, swamps, sandy soils; often occurs on coastal islands; at edges of salt marsh; possibly our most salt tolerant amphibian; breeds spring, summer, ponds, swamps, backwaters; max. size, 3 ½ in.; (Brady's (1924b) record of Bufo americanus from Hog Island, Va. is probably attributable to B. fowleri). /Brady, 1927; Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1925; Gronberger, 1915; Hardy & Mansueti, 1962; Harris, 1969; Neill, 1958; Reed, 1957a; Richmond & Goit, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, AMNH)/.

Bufo terrestris Bonnaterre. Southern toad. Locally abundant, south of James R., Va. only; fields, swamps; pine woods; breeds early spring to late summer, temporary pools; has been taken close to brackish water; max. size, 3 7/8 in. /Brady, 1927; Neill, 1958; Werler & McCallion, 1951; (VHS; USNM)/.

Bufo quercicus Holbrook. Oak toad. Rare, in area south of James R., Va. only, pine woods; breeds spring to fall, pools, ditches, during heavy rains; has been taken on beaches close to brackish water; max. size, 1 1/8 in. /Cooper, 1950a; Hoffman, 1955; Neill, 1958; Rageot, 1969; (VHS; USNM)/.

Family Hylidae - Tree frogs, twelve species and four genera in our area.

Hyla chrysoscelis Cope. Southern gray tree frog. Locally common, W. Shore, Va. & Md., north to Anne Arundel Co., where range overlaps H. versicolor, a sibling species; distribution on E. Shore unclear but Delaware collections are 4:1 H. chrysoscelis : H. versicolor; brushy swamps, woodlands; breeds in summer; max. size, 2 3/8 in. (Hardy & Mansueti, 1962; (as H. versicolor); Hoffman, 1946; Noble & Hassler, 1936; Rainl, 1968; VIMS records; Zweifel, 1970).


Hyla c. cinerea (Schneider). Green tree frog. Locally abundant, entire region, marshes, ponds, often adjacent to CB, slightly brackish habitats; breeds in summer, pond edges, marshes; max. size, 2 ½ in. (The race H. c. evittata described for the Potomac drainage is not sufficiently distinct to be considered a subspecies.) /Bartsch, 1944; Conant, 1945; Dunn, 1918, 1937; Fowler, 1915; Hardy, 1952; Hardy & Mansueti, 1962; Harris, 1969; Hoffman, 1955; Miller, 1899; Neill, 1958; Rageot, 1969; Reed, 1956a, 1957a, 1960; Richmond & Goit, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, AMNH)/.
Hyla c. crucifer Wied. Northern spring peeper. Locally common, entire region, wooded edges of ponds, marshes, swamps; breeds early spring; max. size, 1 3/8 in. /Collins, 1966; Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1915; Hardy & Mansueti, 1962; Klimkiewicz, 1972a; Reed, 1957a, 1957b; VIMS records; (VHS; USNM, CM, AMNH).  

Hyla femoralis Sonnini and Latreille. Pine woods tree frog. Locally common, only on W. Shore in Va. north to New Kent Co. and on middle peninsula (Gloucester Co.); pine woods, swamps, brackish marshes; max. size, 1 5/8 in. /A record of the specie from Md. (Fowler & Orton, 1947) is considered to be invalid/. /Brady, 1927; Cooper, 1970; Fowler, 1915; Hardy & Mansueti, 1962; Neill, 1958; Reed, 1957a; VIMS records; (VHS; USNM, CM, AMNH).  


Hyla squirella Sonnini and Latreille. Squirrel tree frog. Locally common south of James R., Va.; ubiquitous, swamps, marshes, woodlands, gardens, close to brackish habitats; breeds, summer; max. size, 3 in. /Dunn, 1918; Hoffman, 1955; Rageot, 1969; VIMS records; (VHS; USNM, CM, AMNH).  

Limnaeoedus ocularis (Bosc & Daudin). Little grass frog. Rare, south of James R., Va.; roadside ditches, grassy edges of ponds; breeds in summer; max. size, 11/16 in.; our smallest frog; has been taken in salt marsh. /Burger, 1961; Neill, 1958; Rageot, 1969; VIMS records; (VHS; USNM, CM, AMNH).  

Acris c. crepitans Baird. Northern cricket frog. Common, south of James R. on coastal plain, entire E. Shore; meadow creeks, pond edges, marshes, swamps, fresh ponds adjacent to CB, subjected to seasonal inundation; breeds spring, summer; max. size, 1 3/8 in. /Collins, 1966; Conant, 1945; Engeling, 1969a; Fowler, 1915; Hardy & Mansueti, 1962; Klimkiewicz, 1972a; Mansueti, 1942; Reed, 1957a; VIMS records; (VHS; USNM, CM, AMNH).  

Pseudacris triseriata feriarum (Baird). Upland chorus frog. Abundant, entire W. Shore Md. & Va.; roadside ditches, swamps; breeds in winter, early spring; max. size, 1 3/8 in. /Gosner & Black, 1958; Harris, 1969; Mansueti, 1953a; VIMS records; (VHS; USNM, CM, AMNH).  

Family Kinosternidae - Musk and mud turtles, two species and two genera in our area.

Sternothaerus odoratus (Latreille). Stinkpot. Common, entire area; aquatic; sluggish streams, swamps, impoundments; rarely basks; unlike its relative Kinosternon, it rarely if ever enters brackish areas in CB, although reported to do so elsewhere by Neill, (1958); max. size, 5 3/8 in. /Anon., 1968; Collins, 1966; Conant, 1945; Dunn, 1918; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Harris, 1964; Reed, 1957a; Richmond & Goin, 1938; Schwartz, 1967; Werler & McCallion, 1951; (VHS; USNM, CM)/.

Kinosternon s. subrubrum (Lacepede). Eastern mud turtle. Common to abundant, entire region; aquatic, tidal marshes, sloughs, ditches; resident in brackish habitats to at least 12 ppt.; max. size, 4 7/8 in. /Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Harris, 1969; McCauley, 1945, 1946; Neill, 1938; Reed, 1957a; Richmond & Goin, 1938; Schwartz, 1967; Wetmore & Harper, 1917; VIMS records; (VHS; USNM, CM, AMNH)/.

Family Emydidae - Freshwater, marsh and box turtles, seventeen species and six genera - Freshwater, marsh and box turtles, seventeen species and six genera in our area. (McDowell, 1964).

Clemmys guttata (Schneider). Spotted turtle. Locally rare to common, entire region; ponds, bogs, meadowbrooks, including heads of brackish marshes; max. size, 5 in. /Anon., 1968; Conant, 1945; Dunn, 1918; Engeling, 1969a; Ernst, 1972a:124.1; Fowler, 1915; 1925; Hardy & Mansueti, 1962, 1969; McCauley, 1945, 1946; Neill, 1938; Reed, 1957a; Richmond & Goin, 1938; Schwartz, 1967; Werler & McCallion, 1951; VIMS records; (VHS; USNM, CM, AMNH)/.

Clemmys insculpta (Le Conte). Wood turtle. Rare, enters region only in NE Md. (Elk Neck; E. Shore, head of CB); terrestrial, but often in aquatic habitats; more abundant above fall-line; max. size, 9 in. /Conant, 1958b; Ernst, 1972b:125.1; Harris, 1969; Norden, 1967; Reed, 1956a; Schwartz, 1967; Williams & Handley, 1953).

Clemmys muhlenbergi (Schoepff). Bog turtle. Rare, enters region on flood plain of Susquehanna R. /Reports of this species from Fairfax Co., Va (Bradly, 1924c) are in question (Klimkiewicz, 1972b) and its occurrence on the Va. coastal plain is doubtful; meadow bogs, sluggish streams; endangered by destruction of habitat through draining and filling; max. size, 4 1/2 in.; listed in IUCN Red Book as rare (Honegger, 1968). (Barton & Price, 1955; Campbell, 1960; Cooper, 1949; Harris, 1969; McCauley, 1945; McCauley & Mansueti, 1943, 44; Nemuras, 1966a, 1967, 1969; Schwartz, 1967).

Terrapene carolina (Linnaeus). Eastern bog turtle. Common to abundant area; terrestrial; woodlands, fields; rarely aquatic but once observed swimming in 7 ft. of water, York R., Va., at ca 18 ppt. salinity; max. size, 6 1/4 in. /Anon., 1968; Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1915; 1925; Hardy & Mansueti, 1962, 1969; McCauley, 1945; McCauley & Mansueti, 1943, 44; Nemuras, 1966a, 1967, 1969; Schwartz, 1967).

Malaclemys terrapin (Schoepff). Northern diamond-backed terrapin.

Estuarine, oligo-polyhaline, entire CB and most brackish tributaries; heads of tidal creeks, salt marshes; aquatic; occasionally basks on marsh; formerly of great commercial importance; decimated by over harvesting; recovering and abundant where marsh habitats intact; population increase in some areas apparently checked by incidental capture and death by drowning in crab pots; max. size, female, 8 3/4 in., male, 5 1/4 in. /Anon., 1968; Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1915; Hardy & Mansueti, 1962; Harrison, 1969; Neill, 1958; Reed, 1957a; Richmond & Goin, 1938; Schwartz, 1967; Stickele, 1950; VIMS records; Wood & Goodwin, 1954; (VHS; USNM, UN, AMNH)/.

Malaclemys geographica (Lesueur). Map turtle. Uncommon, Susquehanna drainage (Harford & Cecil Cos., Md.); large open bodies of water, often basking; (Dunn's 1918 report of this species from Nansemond Co., Va. is undoubtedly in error or attributable to an introduction); max. size, female, 10 3/4 in., male, 5 3/4 in. /Conant, 1945; Dunn, 1918; Engeling, 1969a; Hardy & Mansueti, 1962; Harris, 1968; Lawler & Musick, 1972; McCauley, 1945; Reed, 1957a; Schwartz, 1967; Werler & McCallion, 1951).

Malaclemys kohni (Baur). Mississippi map turtle. Introduced; one record from Patuxent R.; another, a juvenile, from Anne Arundel Co., Md.; native to Mississippi valley; max. size, female, 9 3/4 in., male, 5 in. (Cooper, 1961; Schwartz & Dutcher, 1961).
Malaclemys pseudogeographica (Gray). False map turtle. Introduced but probably not established, Md.; one record; Alexandria, Va.; one record; native Mississippi valley; max. size, female, 9 in., male, 4 1/2 in. (Dunn, 1918; Schwartz & Dutcher, 1961).

Chrysemys p. picta (Schneider). Eastern painted turtle. Common to abundant, entire region; intergrades with C. p. marginata along fall-line; aquatic, often basks; lakes, marshes, sluggish streams, brackish parts of tidal rivers; max. size, 7 1/8 in. (Brady, 1927; Conant, 1945; Dunn, 1918; Ernst, 1971; 106.1; Engeling, 1963a; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Neill, 1958; Reed, 1957a; Richmond & Goin, 1938; Werler & McCallion, 1951; VIMS records; (VHS; USNM, CM)).

Chrysemys c. concinna (Le Conte). River cooter. Detailed distribution in region poorly known; intergrades with C. f. floridana at and below fall-line; Piedmont rivers, scattered records north to Potomac R. (Fairfax Co.); Recent authors (Cochran & Goin, 1970; Conant, 1958a; Crenshaw, 1955; Weaver & Rose, 1967) have accorded full species status to C. f. concinna. Chrysemys f. floridana and C. f. concinna certainly represent two separate but closely related phyletic lines and each form includes several geographic populations which are considered to be subspecies. However, because the concinna forms hybridize with floridana forms in the northern parts of their ranges, the recognition of concinna as a full species is here considered tentative pending detailed studies of northern populations of both forms. (Dunn, 1918, 1920; McCauley, 1945; Weaver & Rose, 1967; Werler & McCallion, 1951; (VHS; USNM, MCZ, CM)).

Chrysemys f. floridana (Le Conte). Florida cooter. Detailed distribution in region poorly known; intergrades with C. c. concinna at and below fall-line; coastal plain in large permanent bodies of water, rivers, lakes, marshes with aquatic vegetation; reported as rare in Back Bay; one record, probably an introduction, near Baltimore, Md. (Bayless, 1972; Neill, 1958; Schwartz, 1967; Weaver & Rose, 1967; Werler & McCallion, 1951).

Chrysemys scripta (Schoepff). Yellow-bellied turtle. Scattered records, Va. north to lower peninsula and New Kent Co.; ponds, lakes; frequent introduction beyond normal range from pet trade; max. size, 10 3/4 in. (Engeling, 1969a; Reed, 1957a; (VHS; USNM, CM)).


Chrysemys scripta troosti (Holbrook). Cumberland turtle. Introduced and established near Baltimore, Md.; native to Cumberland, Tennessee river valleys; max. size, 11 in. (Cooper, 1959; Harris, 1969; Mansueti, 1941).


Chinimys reevesi (Gray). Reeves turtle. (= Geoclemys reevesi). Introduced, one record from Anne Arundel Co., Md.; probably from pet trade; native to China and Japan; max. size, 4 in. (Cooper, 1961a).

Family - Chelonidae - Sea turtles, four species and four genera in our area.

Caretta caretta (Linnaeus). Atlantic loggerhead. Common, lower CB; marine, but penetrates estuaries far into brackish water; nests in summer on Va. barrier beaches; may nest occasionally on Md. beaches; leaves CB in colder months; max. size, 84 in., 1000 lbs.;
listed in IUCN Red Book as not in immediate danger, future precarious (Honegger, 1968). (Brady, 1924; Cooper, 1947; Dunn, 1918; Fowler, 1925; Hardy & Mansueti, 1962; Harris, 1969; Klimkiewicz, 1972a;
McCaughey, 1945; Mansueti, 1953; Reed, 1957a; VIMS records).

Chelonia mydas (Linnaeus). Atlantic green turtle. Rare in CB, marine, summer; max. size, 850 lbs., over 60 in., CB records mostly under 200 lbs. IUCN Red Book status, "dramatically reduced - through over exploitation." (Honegger, 1968). (Agassiz, 1857; Brady, 1924; Engeling, 1969a; Hardy & Mansueti, 1962; Reed, 1957a; Robert-

Eretmochelys imbricata (Linnaeus). Atlantic hawksbill. Rare, marine, known only from a shell labeled "Chesapeake Bay" in coll. of Nat. Hist. Soc. of Md.; max. size, 36 in., 100 lbs.; IUCN status, "clearly endangered" (Honegger, 1968).


Family Dermochelyidae - Leatherback turtles.

Dermochelys coriacea (Linnaeus). Atlantic leatherback. Occasional in CB; summer; marine; largest living turtle; max. size, 96 in., 1600 lbs.; IUCN status, "clearly endangered" (Honegger, 1968). (Agassiz, 1857; Ford 1879; Hardy, 1969; Hardy & Mansueti, 1962; Jones, 1968; Reed, 1957a; VIMS records).

Family Trionychidae - Softshell turtles.

Trionyx spinifera Lesueur. Eastern spiny softshell. Introduced; one record, Anne Arundel Co., Md.; native to St. Lawrence, Great Lakes and Mississippi R. drainages; max. size, female, 17 in., male, 8 ½ in. (Mansueti & Wallace, 1960).

Order Squamata - Lizards and snakes

Suborder Lacertilia - lizards, four families in our area. (Cooper, 1948a; Harris, 1969; McCaughey, 1945; Smith, 1946; Tobey, 1972).

Infraorder Iguania

Family Iguanidae - Iguanids, one species in our area. The green Anolis carolinensis has been reported from extreme S.E. Va. (Conant, 1958b; Tobey, 1972). These reports are based on sight records and no specimens have been found to substantiate the presence of the species in Va. The species is best excluded from the Va. list until voucher specimens have been collected.7

Sceloporus undulatus hyacinthinus (Green). Northern fence lizard. Locally common, entire region; pine woods, dry uplands, field edges on logs, stumps, fences; breeds spring; nests late spring; max. size, 3 ½ in. (Brittle, 1970; Collins, 1966; Conant, 1945; Dunn, 1918; Engeling, 1969a; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Klimkiewicz, 1972b; McCaughey, 1945; McLeian et al, 1943; Reed, 1957a; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, AMNH7).7

Family Scincidae - Skinks, four species and 2 genera in our area. (Davis, 1968; Taylor, 1935)

Eumeces fasciatus (Linnaeus). Five-lined skink. Locally common entire region; woodland, sawdust piles, abandoned out-buildings; breeds spring; nests late spring; max. size, 3 1/8 in. (Brady, 1924; Brittle, 1938; Conant, 1945; Davis, 1968; Dunn, 1918; Engeling, 1969a; Hardy & Mansueti, 1962; Klimkiewicz, 1972b; McCaughey, 1945; McLeian et al, 1943; Reed, 1957a; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, AMNH7).7

Eumeces inexpectatus Taylor. Southeastern five-lined skink. Rare to locally abundant, W. Shore Va., absent Md. and E. Shore; bark and sawdust piles, woodlands; often arboreal, near ponds, found supratidally; max. size, 3 ½ in. (Davis, 1968; Engeling, 1969a; Hoffman, 1953; Reed, 1957a; Richmond & Goin, 1938; Tobey, 1972; (VHS; USNM, CM, AMNH7).7

Infraorder Rhipidoglossa
Eumeces laticeps (Schneider). Broad-headed skink. Rare to locally common, entire region; woodlands, sawdust piles, standing hollow trees, often arboreal; breeds spring, nests mid-summer; max. size, 5 ½ in. /Conant, 1945; Davis, 1968; Fowler, 1946b; Hardy & Mansueti, 1957b; Klimkiewicz, 1972b; Reed, 1957a; Richmond & Goin, 1938; Tobey, 1972; (VHS; USNM, CM, UM)/.

Lygosoma laterale (Say). Ground skink. Rare to locally abundant, W. Shore, Va. and Md. as far north as Anne Arundel Co.; E. Shore, Va. and Md. north to Talbot Co.; dry woodlands beneath litter, bark, etc.; nests mid-summer; max. size, 1 7/8 in. /Anon., 1970; Brady, 1927; Conant, 1945, 1958b; Dunn, 1918; Engeling, 1970; Hardy & Mansueti, 1962; Harris, 1969; McCauley, 1945; Richmond & Goin, 1938; Tobey, 1972; (VHS; USNM, CM, UN, MO, AMNH)/.

Family Teiidae - Whiptails, one species on our area.

Cnemidoehorus sexlineatus (Linnaeus). Six-lined race runner. Locally abundant; W. Shore Va. & Md., north to Baltimore; dry, open, sandy habitats often in association with Opuntia sp. cactus; often found on beaches in dunes; nests, summer; max. size, 3 in. /Collins, 1966; Dunn, 1918; Engeling, 1970; Hardy & Mansueti, 1962; Harris, 1969; McCauley, 1945; Reed, 1957a; Richmond & Goin, 1938; Tobey, 1972; (VHS; USNM, CM)/.

Infraorder Anguinomorpha

Family Anguinidae - Lateral fold lizards, one species in our area. (Holman, 1971:110).


Suborder Serpentes - Snakes, two families in our area. (Harris, 1969; Kelly et al., 1936; McCauley, 1945; Tobey, 1964; Witt, 1962; Wright & Wright, 1957). Maximum size for snakes given herein is total length from tip of snout to tip of tail.

Infraorder Caenophidia

Family Colubridae - Colubrids, twenty four species and fourteen genera in our area. (A report of the pine snake, Pituophis melanoleucus from the Md. coastal plain (McCauley, 1945) is based on sight records. No specimens exist in established collections to substantiate the presence of this species on the coastal plain of Md. or Va. Thus I choose to omit it from the list for the present).

Natrix erythrogaster (Forster). Red-bellied water snake. Locally common W. Shore Va. north to lower peninsula (Newport News); E. Shore in Pocomoke drainage north to Wicomico and Dorchester Co.'s., Md., and into Delaware; /Cooper's 1969 report of this species from W. shore, Md., is of dubious validity (Hardy, 1972b; Harris, 1969)/; cypress swamps, ditches, canals; max. size, 62 in. /Conant, 1943, 1945; Engeling, 1970; Meanley, 1951; Werler & McCallion, 1951; VIMS records; (VHS; USNM, AMNH)/.

Natrix sipedon (Linnaeus). Northern water snake. Abundant entire region; may occasionally hybridize with N. fasciata in extreme S.E. Va., ubiquitous in aquatic habitats, lakes, streams, swamps, ponds, marshes, salt marshes; habitats with salinities at least as high as 12 ppt.; max. size, 51 in. /Brady, 1924b, 1927; Collins, 1966; Conant, 1945, 1949; Engeling, 1969a; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Klimkiewicz, 1972b; Neill, 1958; Reed, 1957a; Richmond & Goin, 1938; (VHS; USNM, CM, AMNH, UM)/.

Natrix taxispilota (Holbrook). Brown water snake. Common, W. Shore north to lower peninsula Va., New Kent Co., Chickahominy R., James drainage; cypress swamps, river "bottoms" lower flood plain; often basked in trees overhanging water, may enter brackish water; max. size, 69 in. /Neill, 1958, 1959; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM)/.

Regina rigida (Say). Glossy water snake. Locally occasional; isolated population New Kent Co., Va.; nearest other populations south of Albemarle Sound, N.C.; creeks, freshwater tidal marsh; may enter brackish water; max. size, 24 in. /Huheey, 1959; Huheey & Palmer, 1962; Neill, 1958; Richmond, 1940; (VHS; CM)/.
Regina septemvittata (Say). Queen snake. Rare to occasional on coastal plain on E. Shore south to Kent Co., Md.; on W. Shore south to Caroline Co., Va., common above fall-line; small streams, marshes, climbs shrubs overhanging water; max. size, 36 ½ in. (Collins, 1966; Conant, 1945; Hardy & Mansueti, 1962; Harris, 1969; McCauley, 1945; Murray, 1969).

Thamnophis sauritus (Linnaeus). Eastern ribbon snake. Common, entire region; margins of ponds, streams, wet woods, marshes, behind barrier beaches; max. size, 38 in. (Conant, 1945; Engeling, 1969a; Fowler, 1915; Hardy & Mansueti, 1962; Klimkiewicz, 1972b; Neill, 1958; Reed, 1957a; Rossman, 1970; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, UM)).

Thamnophis sirtalis (Linnaeus). Eastern garter snake. Common, entire region; ubiquitous; fields; edges of woodlands, margins of streams, ponds, marshes, adjacent to brackish water; max. size, 48 in. (Brittle, 1970; Collins, 1966; Conant, 1945; Engeling, 1969a; Fowler, 1951; Hardy & Mansueti, 1962; Harris, 1969; Klimkiewicz, 1972b; McCauley, 1945; Neill, 1958; VIMS records; Werler & McCallion, 1951; Witt, 1964; (VHS; USNM, CM)).

Storeria dekayi (Holbrook). Northern brown snake. Locally rare to abundant, entire region; woodland, beneath dead wood, leaves; max. size, 18 in. (Brittle, 1969; Conant, 1945; Engeling, 1969a; Fowler, 1925; Hardy & Mansueti, 1962; Klimkiewicz, 1972b; Reed, 1957a; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; Witt, 1962; (VHS; USNM, CM)).

Storeria occipitomaculata (Storer). Northern red-bellied snake. Rare to occasional, entire region; no records E. Shore, Va., but probably present; dry upland woods, pine forest, woodland-field ecotones, under cover; max. size, 16 in. (Conant, 1945; Hardy & Mansueti, 1962; Klimkiewicz, 1972b; Reed, 1957a; Werler & McCallion, 1951; (VHS; USNM, CM)).

Virginia striatula (Linnaeus). Rough earth snake. Occasional, W. Shore, Va., north to Henrico Co., and lower peninsula; secretive, woodland, beneath dead wood, leaves; max. size, 12 3/4 in. (Engeling, 1970; VIMS records; (VHS; USNM, CM, UM)).

Virginia v. valeriae Baird & Girard. Eastern earth snake. Occasional, entire region; records lacking for Queen Anne's Co., south to Dorchester Co., E. Shore Md., and W. Shore Va., north of middle peninsula; secretive, fields, woodlands; max. size, 12 5/8 in. (Conant, 1945; Cooper, 1948b, 1958b; Fowler, 1925; Hardy & Mansueti, 1962; Murray, 1969; Reed, 1957a; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, UM)).

Heterodon platyrhinos Latreille. Eastern hog-nose snake. Occasional to common entire region; dry sandy uplands, woods, fields, barrier beach dunes; one taken in York River in 12 m water, 20 ppt. salinity; max. size, 43 in. (Brady, 1924; Collins, 1966; Conant, 1945; Engeling, 1969a; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Hardy & Olmon, 1971; Klimkiewicz, 1972b; Neill, 1958; Reed, 1957a; VIMS records; (VHS; USNM, CM, UM, MCZ).

Diadophis punctatus (Linnaeus). Southern ring-necked snake. Rare to occasional, entire region; intergrades with D. p. edwardsi on E. Shore and along fall line; W. Shore, Md. specimens closer to edwardsi; damp wooded hillside, under litter; max. size, 17 ¾ in. (Collins, 1966; Conant, 1945; Engeling, 1969a; Fowler, 1925; Hardy & Mansueti, 1962; Mansueti, 1942; McCauley, 1945; Reed, 1957a; Werler & McCallion, 1951; Witt, 1962; (VHS; USNM, CM, UM)).

Carphophis a. amoena (Say). Eastern worm snake. Locally rare to common, entire region; secretive; fossorial; woodlands; edges of fields; collected near CB under driftwood; max. size, 13 in. (Brittle, 1969, 1970; Conant, 1945; Engeling, 1969a; Hardy & Mansueti, 1962; Klimkiewicz, 1972b; Richmond & Goin, 1938; Reed, 1957a; VIMS records; (VHS; USNM, CM, UM, MCZ).

Farancia abacura (Holbrook). Eastern mud snake. Rare to occasional; north to James R., Va.; swamps, ditches, canals; found in salt marshes; max. size, 80 in. (Neill, 1958; Werler & McCallion, 1951; (VHS; USNM)).
Farancia e. erythrogramma (Latreille). Rainbow snake. Rare to locally common; W. Shore; scattered localities north to Charles Co., Md., on the Potomac R.; no records for middle peninsula or Northern Neck, Va.; sandy fields adjacent to marshes; spring fed streams, partially fossorial; taken in salt water; max. size, 60 in. /Cooper, 1960; McCauley, 1939, 1945; Neill, 1958, 1964; Richmond, 1945a; Richmond & Goin, 1938; (VHS; USNM, CM, UM)/.

Coluber c. constrictor Linnaeus. Northern black snake. Common, entire region; fields, edges of woodlands, barrier beach dunes, salt marsh edges; dry upland habitats; max. size, 73 in. /Brady, 1924b; Brittle, 1970; Collins, 1966; Conant, 1945; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Klimkiewicz, 1972a; Neill, 1958; Reed, 1957a; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, UM)/.

Opheodrys aestivus (Linnaeus). Rough green snake. Common, entire region, edges of fields, ponds, streams; climbs shrubs; cryptic, found in supratidal vegetation; max. size, 42 in. /Brady, 1924b; Collins, 1966; Conant, 1945; Engeling, 1969a; Fowler, 1925; Hardy & Mansueti, 1962; Murray, 1969; Neill, 1958; Reed, 1957a; Richmond, 1952; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, UM)/.

Elaphe g. guttata (Linnaeus). Corn snake. Rare to locally common; sandy pine woods; fields, farm lands; secretive; max. size, 72 in. /Brittle, 1969, 1970; Conant, 1945; Hardy & Mansueti, 1962; McCauley, 1945; VIMS records; (VHS, UM)/.

Elaphe o. obsoleta (Say). Black rat snake. Common; entire region; woodlands, farms, out buildings; partially arboreal; max. size, 101 in. /Brittle, 1970; Collins, 1966; Conant, 1945; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Klimkiewicz, 1972a; Reed, 1957a; Richmond & Goin, 1938; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, UM)/.

Lampropeltis calligaster rhombomaculata (Holbrook). Mole snake. Locally common, W. Shore north to Baltimore, Md., partially fossorial; farm and woodlands; in contradiction to most reports, often seen active on surface during day in our area; max. size, 45 in. /Brittle, 1969; Cooper, 1961b; Harris, 1969; Howden, 1946; Murray, 1969; Nemuras, 1966b; VIMS records; (VHS; UM, CM)/.

Lampropeltis g. getulus (Linnaeus). Eastern king snake. Occasional, entire region; sandy pine woods, near water; edges of swamps; max. size, 82 in. /Brady, 1927; Brittle, 1970; Collins, 1966; Conant, 1945; Engeling, 1969a; Fowler, 1925; Hardy & Mansueti, 1962; Nemuras, 1966b; VIMS records; Werler & McCallion, 1951; Witt, 1962; (VHS; USNM, CM, UM)/.

Lampropeltis triangulum temporalis (Cope). Coastal plain milk snake. Rare, entire region; intergrades with L. t. triangulum along fall line, and L. t. doliata in southern Va. (W. Shore); sandy woodlands, burrows into rotting stumps & logs; secretive; max. size, 39 3/4 in. /Anon., 1959, 1970; Conant, 1945; Fowler, 1915, 1925; Hardy & Mansueti, 1962; Mansueti, 1962; Mansueti, 1942; McCauley, 1945; Reed, 1957a; Werler & McCallion, 1951; (VHS; USNM, MCZ, CM)/.

Cemophora coccinea copei (Jan). Southeastern scarlet snake. Rare, E. Shore, Md., occasional to common W. Shore Md. & Va.; fossorial; secretive; edges of fields, pine woods; max. size, 32 3/4 in. /Conant, 1945, 1958b; Cooper, 1950b; Engeling, 1969a; Fowler, 1945a; Hardy & Mansueti, 1962; McCauley, 1945; VIMS records; Werler & McCallion, 1951; (VHS; USNM, CM, UM)/.

Family Viperidae - Pit vipers, four species and three genera in our area.

Agkistrodon contortrix mokasen (Daudin). Northern copperhead. Locally common, entire region; shows characters intergradient with A. c. contortrix, on E. Shore and W. Shore in S. Va.; woodlands, farms, fields, in association with wild blueberry shrubs; VENOMOUS; max. size, 53 in. /Anon., 1970; Brittle, 1970; Collins, 1966; Conant, 1945; Engeling, 1969a; Hardy & Mansueti, 1962; Reed, 1957a; VIMS records; Werler & McCallion, 1951; Wood, 1954; (VHS; USNM, AMNH)/.

Sistrurus m. miliarius (Linnaeus). Carolina pigmy rattlesnake. Rare, one record, extreme S.E. Va., W. Shore, Virginia Beach; nearest population south of Albemarle Sound, Va.; may be introduction; VENOMOUS; max. size, 21 in. (Tobey, 1960; Witt, 1962).

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Two volumes, both published in paperback and now out-of-print, are essential to a general knowledge of ornithology in Chesapeake Bay and adjacent environs. These are: A Checklist of the Birds of Virginia by Joseph J. Murray (1952) and Birds of Maryland and the District of Columbia by Robert E. Stewart and Chandler S. Robbins (1958). The latter volume is interesting because of its quantitative ecological information, with counts made of breeding pairs in many habitats. This work was obtained too late to include data for more than a few species in this compilation. Information contained herein is largely from Audubon Field Notes and its successor, American Birds. The Raven, journal of the Virginia Society of Ornithology, contains a great many records but a complete review of these and other journals must await a more definitive work.

Records of the past two decades provide much new data, particularly for the Eastern Shore. Christmas Bird Counts (CBC's) for Tidewater areas in Virginia, except Brooke, were checked for recent records. In these one can discern the effect on Back Bay of the dune-breaching Ash Wednesday storm of 1962, the erratic wanderings of ducks, and dramatic population changes in a few species.

This list contains 223 species. Most of these obviously depend on an aquatic habitat, but a number of fringe species, particularly swamp dwellers, are subjective, as are the Killdeer, Golden Plover, swallows and some sparrows. Those designated as occurring in swamps appear to be more common there than in upland forests, but only thorough censuses in varied habitats can verify this. Selection of swamp species was largely based on the Maryland account (Robbins and Stewart, 1958) and information provided by F. R. Scott. Five species, the Yellow-bellied Flycatcher, and the Connecticut, Palm, Tennessee and Wilson's Warblers breed in northern bogs but are not associated with wetlands here, although the Palm Warbler is most abundant coastwise.

I am particularly indebted to F. R. Scott for his categorization of the included species according to seasonal occurrence and preferred habitat. Of the 222 species, only 85 (38%) have bred recently in Virginia; 62 of these being fairly common to abundant (Table 2). Five other species, four waterfowl and the Great Black-backed Gull have recently bred on the Eastern Shore seaside but breeding populations were not established. Twelve species breed only locally and most have restricted nesting areas. Only nine species have populations stable all year; only two of these, the Oystercatcher and Belted Kingfisher, being truly water dependent. Although 93 species have occurred in all seasons; 31 of these do not normally breed here.

A total of 66 species are most common as transients, 53 are equally abundant in winter and as transients and 51 are equally present in summer and during migration. Only 3 birds, the Anhinga, Wilson's Petrel and Swainson's Warbler are most likely to be seen in summer; two arctic-boreal species, the Dovekie and Snow Bunting have occurred only in winter. The 39 stragglers, species occurring three times or less, may be divided into 17 summer wanderers and 22 boreal, or western strays. The Black-capped Petrel and the White-tailed Tropicbird were single hurricane waifs found inland and not known from the coastal plain. Exotic waterfowl occasionally escape, and the Cinnamon Teal which nested at Ocean City may have been such a bird. Other stragglers will arrive, but some, e.g. Bachman's Warbler, are unlikely to appear again.

The Peregrine Falcon nested in western Virginia until 1947 and the Golden Eagle may once have nested there (Murray, 1952). As these great raptors were declining, the Glossy Ibis and Cattle Egret were becoming common to abundant on the Eastern Shore. From the north the Herring and Great Black-backed Gulls were increasing, both finally nesting on the Eastern Shore. Although spectacular, they seem poor substitutes for the Caspian and Roseate terns which once nested there; nor for the Short-eared Owl and Marsh Hawk which may have controlled microtines in summer.
Of greater ecological interest is the habitat information provided by Scott. His categories are open water, marsh, wooded swamp and beach. Open water is divided into ocean, seaside estuaries (Eastern Shore bays), Chesapeake Bay (includes estuarine tributaries), and fresh water. Marshes are either salt or fresh. Assigning species to these various habitat categories, or combinations thereof, reveals some of the complexity of the aquatic ecosystem in the lower Bay.

Under the heading of open water, 86 species are entered, 16 oceanic, 22 fresh water, five from seaside estuaries and four in Chesapeake Bay. The 42 species less restricted to habitat have 12 in all areas except freshwater, 11 in the Bay and fresh water, seven in the ocean-Chesapeake Bay and Chesapeake Bay-estuarine bay combinations. Two species, the Osprey and the Caspian Tern, occur in all open-water habitats. The Bald Eagle and the Belted Kingfisher are resident in freshwater, Chesapeake Bay and seaside bays, although the mighty eagle is now seldom seen at the coast. Only the Common Tern occurs over the ocean and in coastalwise estuaries.

Placed in the marsh, swamp and beach categories are 140 species, mostly waders, ducks, rails, shorebirds, terns and passerines. The largest group is that allied to swamps, 30 species; followed by fresh marsh, 29; salt marsh, 28; salt and fresh marsh, 23 and beach, 20. Four species occur in salt and fresh marsh and swamps; three are at home on salt marsh or beaches and the Yellow-crowned Night Heron tolerates swamps and salt marsh. The purple Sandpiper favors rock riprap, the Golden Plover prefers plowed fields and Lincoln’s Sparrow seeks dense cover. Fifteen stragglers are not included in this listing.

Others occur near water but are less dependent: The Ipswich Sparrow frequents dunes. The Brown-headed Nuthatch seems tied to loblolly pine near water. Tree Swallows nest over water at Chincoteague and swarm over myrtle bushes in fall. Bank and Rough-winged Swallows nest in river banks. Barn Swallows nest in numbers under piers and boat sheds and all swallows seem to rely heavily on giant cordgrass marshes for roosting in the fall migration. It may be decades before students determine preferences for all of our smaller birds. Species which prefer a certain habitat in one area may occupy a different one elsewhere; e.g. the White-breasted Nuthatch apparently breeds only in swamps on the coastal plain (Scott, 1969). Two species not included here, the Red-shouldered Hawk and Hairy Woodpecker seem to prefer nesting in swamps.

A brief perusal of American Birds emphasizes the importance of coastal reserves. In the 1970-71 CBC's, at least 25 of the 28 counts with over 150 species were on a seacoast. Cape Charles was eighth among the 903 counts with 173 species. Chincoteague National Wildlife Refuge had 153 and Bodie-Pea Island 151. Of those species which recently began nesting in Virginia, most first nested at Chincoteague NWR. It remains to be seen whether public ownership of Virginia's barrier islands will allow breeding of the beach nesters, which are further restricted each year. Of the true water birds breeding in Virginia, over 30 species either nest only on the Eastern Shore seaside or are most common there.

"Avant garde" colleagues have encouraged my use of the systematic order presented by Mayr and Short (1969). This work, substantiated by 511 references, may be somewhat followed in the next revision of the A.O.U. checklist. The combining of genera, 37 in this list, seems sensible and may hasten such work in other groups. These groupings particularly occur among the herons, shorebirds and terns.

The lower Chesapeake Bay, its tributary rivers, the nearby Eastern Shore seaside with its array of bays, flats, marshes, beaches, and dunes; and southward, the shallow Back Bay, provide habitats for myriad waterfowl, waders, shorebirds, gulls and terns in season. Westerly, the great pocosin Dismal Swamp and those swamps associated with rivers in tidal fresh water are a haven for many less-known passerines and typically support more species than do adjacent upland forests. To gain basic environmental knowledge of these swamps, more work like that of Meanley (1969) in the Dismal Swamp must be done, particularly during the heat, ticks, insects, dense briars, and lush poison ivy of April to July.
Many habitat censuses have been made in Maryland but Virginians lag in this endeavor. Increasing pressures are being placed on marshes, and swamps may be changed even more rapidly by the activities of beavers and loggers. The competition of the nutria with birds in the Back Bay should be studied. Hopefully, this hurried compilation will lead to a more careful work on the water and wetland birds of the Chesapeake ecosystem, perhaps to include the Delmarva Peninsula.

The eagle and the peregrine are endangered species and the eagle could be the next species to fall from the Virginia list of breeding species. American Birds (Dec. 1971) has a "Blue List" of birds which seem to be decreasing. This ominous list includes the Black-crowned Night Heron, Marsh Hawk, Osprey, Oystercatcher, Least Tern, Barn Owl, and several known only as stragglers. Since the Barn Owl depends largely on well-built duck blinds for nest sites, its numbers could perhaps be increased by providing housing in less built-up areas. The Osprey also uses man-made platforms, but the other species may simply need suitable habitat. The Osprey and Barn Owl suffer more from DDT and PCB's in some areas than in others.

Now that the Peregrine Falcon has been bred in captivity, it may be possible to save it and other species from total extinction, if not from extinction in nature. In a sense, all species are influenced by man. A few have benefited by man's design; notably the Canada Goose and Gadwall. The Wood Duck and most other birds nesting in holes or man's structures could also benefit. On the other side, species such as the Herring Gull, Phish Crow, Blue Jay, Starling, Purple Grackle and Cowbird, which man seems to have benefited, may slowly reduce numerous other species by parasitism, competition and predation.

Birds have suffered from being easily seen and sometimes decimated in the past. Now they may benefit, in contrast to plants and other animals, by their visibility if enough people are concerned. The present work results from the effort of many more persons than were involved in other parts of the checklist. Some are mentioned by name in the list, but most are noted by their initials as they appeared in Audubon Field Notes and their names appear below. Some of the life histories done by the industrious Arthur C. Bent were used, especially for food habits. Particular mention must be made of F. R. Scott, an indefatigable birder who has succeeded Joseph J. Murray as editor of The Raven, and of Mitchell A. Byrd, president of the Virginia Society of Ornithology, who has banded many thousands of waders and passerines. In addition, Dr. Byrd's students have banded most of the ospreys fledged in Virginia in the past 3 years.

J. M. Abbott
I. J. Abramson
Donald R. Ambrosen
J. E. Ames
H. T. Armistead
Martha Armstrong
R. L. Askins
S. S. Baker (Mrs.)
Arthur C. Bent
F. G. Buckley (Mrs.)
Paul A. Buckley
F. C. (L. E.) Burford (Mrs.)
Mitchell A. Byrd
S. Calver
C. W. Carlson
H. M. Church (Mrs.)
A. E. Conway
W. A. Cooper
D. A. Cutter
Paul B. Daly
C. W. Darden (Mrs.)
Paul G. DuMont
Philip A. DuMont
S. H. Dyke
W. E. Efford
Gene Evans

Robert Fletcher
E. F. Polson
Granger H. Frost
Robert E. Gilmore
M. Gochfeld
L. C. Goldman
J. H. Grey
Gisela A. Grimm
Charles W. Hacker
Gustav W. Hall
C. O. Handley
Darelyn Handley
Henry Hespensheide
Jonathan Higman
P. L. Hurlock
W. H. Julian
Norma Katz
Robert S. Kennedy
V. M. Kleen
Marcia Lakenan
L. Machen (Mrs.)
T. W. Martin
Travis McCormick
E. T. McKnight
Gale Monson
Marcia Nelson

M. Newton
Gordon Orians
J. A. Pond
J. C. Pullman
B. L. Pyle (Mrs.)
F. C. Richardson
J. H. Roberts
W. F. Rountrey
F. G. Schneider
D. R. Simonson
R. L. Smith
District of Columbia Audubon Society
C. C. Steirly
C. E. Stevens
G. W. Stewart
John Terborgh
R. W. Thomen
Tom Thomson
Jacob M. Valentine
C. R. Vaughn
Rome Waterfield
Robert J. Watson
E. G. Webster, Jr.
Tom Weiboldt
A. E. Weinrich
Bill Williams
### Seasonality and Habitats of Va. Wetland Birds

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### Seasonal Occurrence

- **Res.** = Resident
- **Sum.** = Summer
- **Win.** = Winter
- **Tran.** = Transient
- **Stra.** = Stra. (Seasonal)

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* b-breeds, a-abundant, c-common, fc-fairly common, u-uncommon, s-scarce, r-rare, *-seaside estuaries.
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CLASS AVES

Family Gaviidae

Gavia immer. Common Loon. Winter resident, rare at Washington, D.C., abundant on the sea coast. Occasional straggler in summer. Winter (CBC's): Murray (1952) reported the Common Loon as being more common than the Red-throated. This has been true at Chincoteague since 1959, but at Back Bay the reverse has always held. Numbers of the two species seem to fluctuate similarly. The all time highs of 1970 for both species were greater than the '69 CBC by 5.2 for the Common Loon and 12.4 for the Red-throated. The Common Loon has suffered terrific die-offs on Lake Michigan, loses nesting sites every year in the northern states and many have been killed when caught in pound nets. Yet it seems relatively stable at present.

Gavia stellata. Red-throated Loon. Common winter resident lower CB, ocean, Back Bay, possibly increasing (917 in '70 CBC vs 508 in '67); Chincoteague, 29-XI-70, 222. Wallops I., 10-III-71, 5000, CRV. Food: Mainly small fish.

Family Podicepedidae

Podiceps grisegena. Red-necked Grebe. Rare winter resident. Lower Chesapeake Bay and coast. (16 of 29 count records from Chincoteague). Doubtfully increasing (7 in '70 count vs 5 in '68). Food: Small fish, crustaceans, mollusks.

Podiceps auritus. Horned Grebe. Abundant winter resident. All tidal waters, some freshwater sections. Sporadic, possibly declining. Low of last 14 counts was 239 in '61, high was 3,514 in '66, 3 highest counts of '69 & '70 declined from 24-39% in '70. Alexandria, 2-XI-57, 385; Hampton, 19-XI-70, 2000. Gloucester Pt., spring migration, '71, noted by winter no. of 2-4 increasing to 8, 19-III; to 34, 29-III, dwindling to 10, 21-IV, and often by 1 per day to 1, 30-IV, with none later. Two in breeding plumage, Chincoteague Causeway, 3-IV-57. Food: Crustaceans and mollusks in Va.


Family Procellariidae


Puffinus gravis. Greater Shearwater. Oceanic. Rare summer straggler, Chincoteague, 10-VIII-57, 1 found dead, PAD. Food: Fish and squid.

Puffinus diomedea. Cory's Shearwater. Oceanic. Rare summer straggler, Back Bay Refuge, 14-VII-68, 1 specimen (first Va. record), RW. Food: Fish, crabs.

Pterodroma hasitata. Black-capped Petrel. One record, a bird brought alive to Blacksburg, 30-VIII-1893, after a terrific coastal storm (Murray, 1952).

Family Hydrobatidae

Oceanodroma leucorhoa. Leach's Petrel. Rare summer and autumn straggler. Cape Charles Ferry, 17-VII-45, 3, Mrs. Reed; 28-VII-48, 6, FRS. Chincoteague Causeway, 5-X-48, Buckalew (Murray, 1952).


Family Pelecanidae

Pelecanus occidentalis. Brown Pelican. Rare summer straggler. Nearly all recent records single birds, 11-IV to 12-XI. Virginia Beach, 2-VIII-’70, Stevens, 2 imm. and 2 mm., RLA. The Brown Pelican has declined on the Gulf Coast, but nesting success was quite good in the Carolinas in ’71, almost 1500 young being fledged, B. Neeley, U.S.F. & W.S., and R. Steiner. Food: Mostly mullet and menhaden.

Pelecanus erythrorhynchos. White Pelican. Murray (1952) had four 19th century records, 3 from the Washington area and a sighting at Bone I. One was at Blackwater NWR, Md., 28-II to first week in V-’70. GWS, WHJ.

Family Pugionidae

Plegadis falcinellus. Man-o’-war Bird. Chesapeake Bay Bridge-Tunnel, 3-VII-’68, immature harassing terns (Buckley, 1970).

Family Sulidae


Family Phalacrocoracidae

Phalacrocorax auritus. Double-crested Cormorant. Mainly as abundant transient; usually scarce in winter. 1970 CBC’s: Back Bay, 76; Cape Charles, 71; Little Creek 58 and Chincoteague, 28, were 3 to 28 times hi-VII-thr. and other year, except at Newport News, where only 3 were seen, as against 86 in 1966. Spring flights are especially conspicuous. Apparently stable. Food: fish, eels being often eaten.

Phalacrocorax carbo carbo. Great Cormorant. Rare spring and autumn straggler from Europe. Craney I., 31-X-62, 2, LEB et al; CB Bridge Tunnel I, 12-IV-69, 1, MAB.

Family Anhingidae


Family Ardeidae

Botaurus stellarus. American Bittern. Common spring and fall migrant, frequent in winter near coast. CBC’s indicate a stable population. Food: Insects, frogs, fish, crayfish, mice and shrews. Murray thought this bittern was probably resident at Norfolk and listed 3 eggs, June 3, at Washington, D. C., 27-IV and 25-IX, AGB. Hampton Roads Bird Club. Species probably decreasing as marshes disappear, esp. tall grass marsh. Food: Same as American Bittern; perhaps more insects.

Ixobrychus exilis exilis. Least Bittern. Rare migrant. Murray recorded this shy bittern as a locally common summer resident in marshes below Alexandria, with young in July. Norfolk, 20-VII-’26, nest. No breeding records occur in recent Audubon Field Notes.

Nycticorax violaceus. Yellow-crowned Night Heron. Scarce inland to frequent on Eastern Shore in summer, increasingly rare in winter. Breeding: Norfolk, good sized colony, last egg hatched 21-VI-61, CWD; Hampton, '65, 5 pairs nesting, 7 young raised 1-63, 1 nest, 3 young, "continuation of a sharp decline", WPS. Mockhorn I Refuge, 27-VI-65, 11 adults, 5 young, MAB et al. Coastal Va., 1970, 5 colonies, Norfolk, colony of 8 nests produced 24 young, CWD; Mockhorn I, 2 colonies ca 100 pairs, MAB. Small colony at Gloucester Point was driven out in mid-60's. Winter CBC's, '57-63, 19 seen; only 3 since then. Increase in population obviously possible with protection of nest sites. Food: Largely crabs and crayfish, likely mostly fiddler crabs in coastal Va.

Butorides virescens. Green Heron. Common to abundant summer resident, rare in winter. Breeding: Parramore I, 18-VIII-56, young left nest, FRS. Assawoman Inlet, 30-V-57, 102 nests, most with young, JMW, FRS. Probably nests in most tidewater counties where unmolested. Winter: Only 7 CBC dates. Probably stable but likely to decrease through habitat destruction. Food: Minnows, tadpoles and crustaceans.

Bubulcus ibis. Cattle Egret. Abundant spring and late summer migrant, rare in winter. This small egret, a common sight in Africa and eastward to Indonesia, arrived in South American in the 1940's and reached Virginia in the early 50's. Chincoteague NWR, 12-VI-55, 4, J.T. Breeding: Wachapreague, 18-VI-61, 1 nest, FRS. Wakefield, Westmoreland Co., Va. 1969, 25 summered, probably bred, FRS & RJW. Smith's Point, Md., early VI-VIII-69, 200 pairs, MAB; 15-VIII-69, many eggs and small young, 387 young banded during summer, MAB, WPM. Post-breeding: Fields between Kiptopeke and Wachapreague, 9-VII-66, 350, PCB. Cape Charles, 20-IX-69, 249 migrating. FRS. CBC records are coastal and single except for 2 at Chincoteague (1963) and 49 at Back Bay (1967). This agrarian species could be leveling off but seems likely to increase further, perhaps affecting other waders, thru nest site competition, as it increases.


Egretta rufescens. Reddish Egret. Rare straggler in white phase. Norfolk (Stumpy Lake), VI-42, 1 observed on 4 dates; Mrs. Reed; 2-6-11-51, 6, WFR. (Murray, 1952).


Egretta thula. Snowy Egret. Abundant summer resident on coast, scarce inland. Rare in winter, except at Cape Charles and Chincoteague. Breeding: Hog I., 1-VI-58, 300 nests; Minnows, 350 pairs, FRS, JMW. Late record, Wachapreague, 23-VIII-69, few small young in nests, FRS. Post-breeding: Chincoteague NWR, 18-IX-56, 1200, JMW; 28-VIII-65, 2220 FRS et al. Winter (CBC's): 1970 Cape Charles, 40; Chincoteague, 14, double all previous count totals. Stable or possibly increasing.

Ardea cinerea. Great Blue Heron. Abundant permanent resident, although scarcer in winter. A few heronries in swamps are occupied only by this species, which prefers large sycamores as nesting trees. F. R. Scott flies over coastal Virginia every spring to check on these heronries, which are occupied long before the trees leaf out. A heronry near North Carolina has been saved by the Nature Conservancy. The rapid growth in bird watching is exemplified by CBC's of this species: 1952 (2 counts), 9: 1956 (5 counts), 60; 1960 (7 counts), 107; 1966 (8 counts - first Cape Charles count), 320. A possible increase in this species is indicated by the 1970 CBC of 578, 210 more than in 1969, 5 of the 9 counts reporting all time highs. However, higher counts of this conspicuous heron could well be due to an increase in observers. Shooting of "Tommy" or "blue cranes" still occurs locally. Food: The Great Blue Heron is a most polyphagous species, eating fish usually, but also insects, crustaceans, mice, shrews, rats, frogs, snakes and turtles.

Family Ciconiidae

Mycteria americana. Wood Ibis. Rare summer straggler. Murray has a record of 4 in New Kent Co, 1893 and of one seen from the York R. Bridge, 8-V-49, Mrs. T. P. Thompson. Since this species is now on the endangered list, it is unlikely to be seen this far north again.

Family Threskiornithidae

Plegadis falcinellus. Eastern Glossy Ibis. Abundant summer resident, rare in winter. The Glossy Ibis was hypothetical in Virginia until the early 1950's. It is close to becoming the most abundant breeding wader on the coast, but no one has a good explanation for its Atlantic Coast population explosion (FRS, pers. comm.). Breeding: Hog I, 23-VI-56, 1 nest, FRS; 1-VI-57, 3 nests, FRS, JMV, mid VI-61, 50 pairs, CCS et al; 375 pairs, 26-V-68, MAB. Wachapreague, spring-62, 12 nests with 1-3 eggs scattered among nests of Snowy Egrets and Louisiana Herons, FRS. Chincoteague, 1970, new heronry contained 800 pairs of adults among the total of 3000 pairs of birds, MAB. Post breeding: Chincoteague Refuge, 28-VIII-65, 800, FGS et al; 29-VIII-70, 700, PGD. Species has now been seen in IV & V at several places on the western side of Ches. Bay. Winter: Chincoteague, 4 CBC's, 59-70. Probably still increasing and may eventually nest along Ches. Bay. Food: Fish, insects, crabs, snails, young moccasins.


Family Phoenicopteridae

Phoenicopterus ruber. American Flamingo. Rare straggler. Chincoteague, NWR, 9-XI-69, 1 seen flying with Snow Geese, GE et al.

Family Anatidae

Dendrocygna bicolor. Fulvous Tree-Duck. Rare straggler IV-XI. Back Bay, 19-X-60, 1, first Va. record, TMcC, JHG. Hog I. Refuge, Surry Co., 4-7-XI-61, 42, CCS. Chincoteague, 1965, 8 present thru nesting season, FLM et al; 29-VI-61, 1, TWM; 10-VIII-69, 1, PBD. Cygnus olor. Mute Swan. Nonmigratory swan slowly spreading out from New York-New Jersey area. Dyke, Fairfax Co., 8-III-69, 1, HTA. Cygnus columbianus. Whistling Swan. Abundant winter resident, mainly upper Ches. Bay, Back Bay and N. C. Presquile NWR, 22-IX-66, 27, JCF. In the severe winter of 69-70, swans were seen in Gloucester Co. on the York River and also the Ware River, where 32 stayed for 2 months. Leedstown, 10-III-70, 60, FRS. CBC's at Back Bay range from 111 ('66) to 14400 ('61); Cape Charles and Chincoteague counts being about 1 to 3% of Back Bay no. Probably increasing slightly; very subject to lead shot poisoning. Food: Mainly vegetation and seeds of aquatic plants, but shellfish are also eaten. Over 500 were flushed from a cornfield at Ridgely, Md., 26-II-70, RP.

Anser interboreus. Snow Goose. Abundant winter resident at Chincoteague and Back Bay. Back Bay and Curles Neck, 13-X-63, 1st flights. Chincoteague Ref., mid - XI-68, 15,000, EFF. Back Bay, 24-XI-69 40,000, REG; and V-64, 15, DRA. CBC's: Back Bay, 465 ('55) to 65,000 ('64). Chincoteague, 0.7% ('64) to 437% ('61) of Back Bay count. Stable, or possible increasing. May require management in future if winter food supply is endangered by overfeeding. Food: Saltmarsh cordgrass roots mainly, also other marsh grasses and planted grain. (This species is now considered synonymous with the Blue Goose (Mayr & Short, 1970).

Anser caerulescens. Blue Goose. Common winter resident at Hopewell (Presquile Ref.); 13-X-63, first flight, FRS; 18-XII-70, 225. CBC's: Hopewell, 6-205; Back Bay, 0-10; Chincoteague, 0-23 except 822 in '59. Probably stable. Food: Roots and vegetative parts of marsh plants.

Branta canadensis. Canada Goose. Abundant winter resident; breeding range being extended southward through ease of rearing in captivity and imprinting. Pair bred at Chincoteague in 1971, because female had a broken wing. Early fall record: Hopewell, 15-IX-68, 40, FRS. Late spring record: Bull Run, Fairfax Co., 17-V-69, 9, Moxsoon. Winter: On all 9 CBC's for first time in 1970, setting records for Chincoteague and Cape Charles. Back Bay has varied from 880 ('62) to 10,300 ('66). Of all the N. Am. waterfowl the Canada goose has perhaps fared the best, now having a stable, if not increasing population. Food: nearly all vegetation in winter.

Branta bernicla. Brant. Abundant winter resident on ES. Once common in lower Ches. Bay and showing signs of reappearing there. Fall: Cedar I, 8-VIII-64, 1, FWS et al. Chincoteague, 12-XI-55, 10,000, FRS, COS. Spring: Chincoteague, 14-V-60, 300, ETM et al. Parramore I, 28-V-64, 87, Mrs. Burford, Winter CBC's: Chincoteague, 1,600 ('64) to 32,000 ('66). Cape Charles had a record 8,724 in '70, after none in '69. Little Creek had 1,000 in '69, quadrupling earlier records. Population evidently still increasing, after suffering severe reduction from eel grass blight 40 years ago. Food: Diet switched from eel grass to sea lettuce in Va., making flesh all but inedible. Recently started feeding in grain fields.

Branta nigricans. Black Brant. Rare straggler from west coast. Specimen from Cobb I, IX-1888. Captain Crumb reported 1 or 2 shot each winter. Apparently no records in this century (Murray, 1952).

Aix sponsa. Wood Duck. Common permanent resident in swampy areas, abundant in winter and during migration at Presquile NWR; scarce to rare on coast. Breeding: No data, but breeding wherever nest trees or boxes are adequate in swamps. Eggs, early IV (Murray, 1952). Migration: Presquile NWR, X-62, 500, JHR; '63, 1200 at end of fall migration; 7-26-XI-69, 200, FDD. Winter (CBC's): Presquile, 18 ('57) - 1600 ('66). Little Creek and Washington had all time highs of 34 and 49 in '70. Rare at all other areas. Food: Fruits and nuts of woody plants and yellow pond lily. Said to be only duck eating quantities of "wampee duck corn" (arrow arum seed). Increased over its low nos. of the '30's, but could probably be increased many-fold if hunters would put up and maintain nest boxes.

Anas penelope. European Widgeon. Occasional straggler from Europe. Murray listed 20 killed in Va. (9 from Back Bay) and 10 seen (5 in Back Bay). Records occur from early October to mid-April. Chincoteague NWR, 3-X-57, 1, JOP. Williamsburg, 28-III-11-IV-59, JHU, NK. Reported from at least 10 mid-Atlantic localities, winter, 69-70. A European x American Widgeon hybrid was also reported.
Anas penelope americana. American Widgeon. Rare summer breeder; abundant, altho erratic, winter visitor, often found on salt water.

Breeding: Chincoteague, 1956 nesting season, 10 and broods, JMV.

The fantastically high '69 CBC of 78,850 at Back Bay contrasts with counts of 11-134 in '62-'66. This count more than doubled the total of those taken since 1954, although 40,000 were seen in 1951. On the other hand, the Newport News count has been exceptionally stable, varying only from 158-2082 in 16 years and being over 1000 for 9 consecutive years. Possibly decreasing; '70 CBC less than 1/4 that of '69.

Anas strepera. Gadwall. Frequent to abundant winter resident; increasingly common breeder from North Carolina northward on the coast; rare inland. Breeding: Murray hinted at its increase but gave no nesting records. Chincoteague, 1956-57, 50 present, some broods seen, JMV; 9-VIII-64, hen with brood, FRS. Alexandria & Mason's Neck, 4-VII and VIII records, JMA. Winter (CBC's): Back Bay, 1 ('55)-1200 ('60); Cape Charles, 18 ('65)-130 ('70); Chincoteague 73 ('62)-350 ('64). The ability of this species to increase its breeding range and numbers in the midst of considerable human populations testifies to the success of wetlands conservation and indicates the potential for greater increases. Food: Widgeon grass and other submerged aquatics, plus a sizeable proportion of invertebrates.

Anas crecca. Common Teal. Rare straggler. Murray took a specimen at Lexington, 11-IV-37. Other records are from the Potomac R. area, the last at Hunting Creek, 9-III to 7-IV-56, JMA.

Anas carolinensis. Green-winged Teal. Abundant winter resident on the coast, often common inland; has bred at Chincoteague. Breeding: Chincoteague, 1956, 50 present, some broods seen, JMV; 9-VII-60, hen with brood, FRS. Alexandria & Mason's Neck, 4-VII and VIII records, JMA. Winter (CBC's): Chincoteague, 37 ('63)-4200 ('61); Back Bay, 5 ('61)-918 ('66); Cape Charles, 4 ('66)-146 ('70); Hopewell, 1 ('63)-400 ('70); Washington, 25 ('63)-463 ('59); Little Creek, 5 ('69)-87 ('68). The CBC total for 1970 was the 2nd highest. The data typify the gregarious and wandering nature of ducks. This teal has obviously increased since Murray (1952). Food: Mostly seeds of marsh grass, some insects and mollusks.

Anas platyrhynchos platyrhynchos. Mallard. Abundant winter resident in salt fresh water; common on the coast. Breeding in small numbers on refuges and where attracted by tame mallards. Breeding: Back Bay, to 6-VII-69, 15 broods, REG. Chincoteague, 20 nesting, 2 broods seen VI-57, JMV. Craney I, 13-VI-65, hen with 9 young, FWS. Winter (CBC's): The erratic migrations of ducks are typified by the mallard counts. In 1970, when hunter's complained bitterly about the lack of ducks, an all time record total of 6693 was set for the 9 areas included. However, the total would have been much higher if Cape Charles been included. Perhaps little significance can be attached to Fort Belvoir's low count of 1 in '51 and its highest (410) in '70 and paralleling it, Back Bay's 10 in '51 and high of 2759 in '70. Until '67, Hopewell usually had more than the other counts combined. The mallard prefers freshwater more than most other ducks do. It is said to be decreasing, but a close association with man precludes its extinction. Food: Primarily seeds of marsh plants, also aquatic insects.

Anas platyrhynchos rubripes. Black Duck. Abundant winter resident and most common duck breeding widely in Tidewater marshes. Chincoteague Ref., 6-VII-69, 35 broods, JMV. Back Bay, to 6-VII-69, 6 broods, REG. Nests at Grandview, Hampton, 10-IV-69, MAB et al, and Ellen I, Gloucester Co., IV-71, 1 with 8 eggs, KLM, indicate the willingness of this duck to nest wherever it is unmolested. Winter (CBC's): Black duck numbers seem to follow those of the mallard, but always exceeding it. The highest was at Fort Belvoir and usually so at Back Bay, Little Creek and Washington. The Chincoteague count of 13,400 may stand for all time since the species is said to be declining greatly, although Back Bay had its highest count in '70. Food: Similar to the mallard's, but including more animal food, especially univalve mollusks.


Anas creata. Shoveler. Winter resident, rare inland to occasionally plentiful at Chincoteague, rare in summer, apparently nested at Chincoteague, '57, JMV. Winter (CBC's), Chincoteague, '64, 1400; exceeding combined counts of other areas except in '68. Scarce at Washington, not at Fort Belvoir or Newport News. Stable or slightly decreasing.

Aythya valisineriab. Canvasback. Frequent to abundant winter resident and frequent summer straggler. Murray declared it to be the most common duck at Back Bay with counts up to 20,000. Summer records come from Craney I, Goose I, and Hollis Marsh I, FWS, JMA. The peak of the fall migration in 1962 at Back Bay was estimated at 15,000 (DA), yet since the 1961 CBC of 900, only 86 have been seen, with 0's for 4 CBC's. Both Little Creek and Newport News had their 2nd highest CBC's in 1970. The highest reported CBC was 1,678 ('67) at Fort Belvoir. The Washington CBC record closely parallels that of the Ring-necked Duck. This fabulous waterfowl may not be in danger but it will always require close scrutiny. Its population seems to be afflicted by a preponderance of drakes, often 4-1. Food: Wild celery, pondweeds and considerable animal food in brackwater.

Aythya americana. Redhead. Formerly common, but now scarce winter resident. Summer: Hollis Marsh I., 10-VII-55, 1 pr., JMA et al; Craney I, VI-VIII-64, FWS. Migration: Back Bay, fall '62, peak of 4 CBC's; Back Bay, 40,000 ('67); Back Bay, 1400 ('60); others over 100 in all areas. As often absent as present in most count areas. Food: Aquatic plants, some insects and mollusks. Seems to be continuing its decrease.

Aythya collaris. Ring-necked Duck. Winter resident, more common inland. Murray reported this freshwater devotee as greatly increased and common in winter on the coast. It seems to fall in a great gray category of birds which go unnoticed by bird watchers except at CBC time. The latter reveal some interesting tidbits: The ecological devastation of the Ash Wednesday storm in Back Bay is shown by the '61 count of 1000 followed by none in the next 5 years. Little Creek had more in the combined '55-56 counts than in all counts since. Washington climbed from 3 in '59 to 409 in '64 and has steadily declined, except for 0 in '67, to 15 in '70. To cap it all, the great duck areas, Back Bay, Hopewell and Chincoteague had none in '70 to augment the record low total of 60. Unless CBC's are in the wrong places, this species is in trouble. Food: Plants and seeds, with 1/4 being animal.
Aythya marila. Greater Scaup. Occasional to abundant winter resident, scarce summer straggler. The peregrinations of the 2 scaups, assuming perfect ability in all CBC participants, is ridiculously mystifying. In '57, Fort Belvoir had 1200 Greater and 1 Lesser Scaup, while Little Creek had 55 Lesser and 1 Greater Scaup. Newport News tallied 2010 Lesser Scaup in 15 CBC's while finding only 2 of the Greater. Mathews had the top CBC (567) of Lesser Scaup in '69, but found no Greater. Conversely, Chincoteague had 1,002 Greater Scaup in 9 counts but only 84 Lesser. Only at Back Bay has the FW&S estimate of 1 Greater: 3 Lesser Scaup seemed to hold if all counts are totaled. However, for any one year, it has been quite untrue; in '57 and '61, when 460 and 400 Lesser Scaup were seen, no Greater appeared. In '58, there were 122 Greater Scaup and only 3 Lesser. Summer: Craney I, Hampton Roads, all summer, '59, 8, JEA, WFR. Food: Largely invertebrate in winter; wild celery and pondweeds in fresh-oligohaline waters.

Aythya affinis. Lesser Scaup. Abundant winter visitor. Winter (CBC's): Overall ratio of Greater to Lesser Scaups ca 6:5 at Fort Belvoir and 5:9 at Little Creek. A bag limit of 4 has recently obtained for the scaups in Ches. Bay, double the no. for other ducks, although 1970 totals of only 212 Lesser and 61 Greater Scaup were recorded, an all time low, considering the areas censused. Summer: Goose I, V-59, 9 (7 summered), JMA. Craney I, '59, 1 all summer, JEA, WFR. Scaups obviously require annual attention by observers able to separate the two, if they are to be safely harvested. Food: As in the Greater Scaup, but probably more animal food as they range further south.

Somateria mollissima. Common Eider. Rare winter straggler seen increasingly frequently since installation of the CB Bridge Tunnel. Little Creek, 26-XII-56, 1, FWS, HH. Craney I, 27-IX-63, FWS. Cape Charles, 29-XII-68, 1, PAD.


Histrionicus histrionicus histrionicus. Harlequin Duck. Rare straggler, mouth of Ches. Bay; occasional inland. Fall migration: Mt. Vernon, 7-X-65, 5, JMA. Alexandria, 9-XI-63, 70, ETM. Potomac R, off Lewisetta, 29-XI-70, 650, FRS. Winter (CBC's): Chincoteague, 6 ('59)-1132 ('62); Little Creek 32 (5 times)-387 ('69). Cape Charles, 2 ('65)-352 ('69). These data indicate considerable wandering or year-to-year fluctuation. However, this deep-diving species ranges over much of the lower Ches. Bay and a total census would be difficult.

Clangula hyemalis. Oldsquaw. Abundant winter resident along the coast and in lower Ches. Bay; occasional inland. Fall migration: Mt. Vernon, 7-X-65, 5, JMA. Alexandria, 9-XI-63, 70, ETM. Potomac R. off Lewisetta, 29-XI-70, 650, FRS. Winter (CBC's): Chincoteague, 6 ('59)-1132 ('62); Little Creek 32 (5 times)-387 ('69). Cape Charles, 2 ('65)-352 ('69). These data indicate considerable wandering or year-to-year fluctuation. However, this deep-diving species ranges over much of the lower Ches. Bay and a total census would be difficult.

Melanitta nigra. Common Scoter. Rare to abundant winter resident in lower Ches. Bay and along the coast. Not as common as other scoters (Murray, 1952). Chincoteague NWR. Winter (CBC's). Murray's comment on abundance is borne out in all areas. At Chincoteague 8,730 more Am. Scoters have been seen, but exceeded Surf Scoter only on 4 counts. Most bizarre switch for this species was at Chincoteague with 1 ('63) followed by 16,300 ('64). All 3 species were very low in '68, but plentiful last years. Food: Mollusks, crustaceans, fishes, echinoderms, eelgrass & widgeongrass.

Melanitta perspicillata. Surf Scoter. Abundant saltwater resident in winter. Average, 25-XI to 3-III; six records near Washington (Murray, 1952). Potomac R. off Lewisetta, 28-XI-70, 6000, FRS. Fort Belvoir, 21-XII-69, 2, PAD, PGD, only CBC record. Other CBC's: Chincoteague, 0 ('68)-4772 ('62); Cape Charles, 18 ('68)-5045 ('67). All counts: 227 ('68)-8890 ('67). Fluctuations bear some resemblance to that of the other two scoters, all three being low in '68-'69. Surf Scoter outnumbered White-winged Scoter at Chincoteague 4:5 to 1 (12 counts); at Cape Charles 32 to 1 (6 counts). Obviously gregarious and wandering, but rather stable.

Bucephala albeola. Bufflehead. Abundant winter resident on the coast and common inland. Migration: York R., near Yorktown, 11-III-61, 450; 16-IV-61, 270, FRS. Winter (CBC's): Only missing from 6 of 114 counts. Max. nos.: Cape Charles, 575 (166); Chinleague, 293 (65); Norfolk, 768 (173). Winter (CBC's): York R., near Yorktown, 11-III-61, 450; 16-IV-61, 270, FRS. Winter (CBC's): Only missing from 6 of 114 counts. Max. nos.: Cape Charles, 575 (166); Chinleague, 293 (65); Norfolk, 768 (173). This hole-nesting whirligig is little hunted and appears stable. Food: Chiefly invertebrates, more vegetation in freshwater areas.

Bucephala clangula. Common Goldeneye. Common to abundant winter resident in meso- to euhaline open water. Winter (CBC's): Highest counts in '69 & '70, both years 688, resulting from the addition of the Mathews count. Fluctuation seems less than in most ducks, but is still marked; as note ranges for Newport News, 4 (53)-450 (62); Little Creek, 1 (68) - 105 (60). Chinleague, 33 (68) - 329 (65). This hole-nesting whirligig is little hunted and appears stable. Food: Largely invertebrates, aquatics in freshwater. Stomach of an oil-killed bird from the York R. contained only xanthid crabs.

Mergus cucullatus. Hooded Merganser. Frequent to common near coast in winter, scarcer inland; recently nested for first time in Md. Eastern Shore, 3 different localities, mid VI-61, TWM et al. Chinleague NWR, 25-XI-61, 500, TWM. Murray said this was "the most generally distributed" of the 3 mergansers in the interior. However, CBC's show it highest at Little Creek, 8 (57)-234 (68); followed by Cape Charles, 70 (67)-155 (70) Chinleague, Newport News, Back Bay and Norfolk. This strikingly beautiful duck, although hunting New, highest nos. in '61, is in good shape. Like all hole-nesting ducks, except the wood duck, its fate depends mainly on northern forestry practice.

Mergus serrator. Red-breasted Merganser. Common to abundant winter resident in meso- to euhaline waters. Hampton, 9-XI-70, 3000, WFS. CBC's: Back Bay, 5 (65)-279 (57); Little Creek, 14 (64), 142 (55) except 6074 (56) & 6692 (57); Cape Charles 124 (68)-352 (67); Chincoteague NWR, 124 (68)-413 (67); Newport News, 5 (56), 2 (61); Hopewell (only 2 counts), 3 (55), 70 (65). This merganser seems more stable than most ducks, and although die-offs have occurred, no decrease is evident.

Mergus merganser. Common Merganser. Winter resident common to abundant in freshwater, rare to frequent on the coast. Breeding: Dyke, Va., 1 pair, 1 young, VI-VII-65, SSB et al. Migration: Chincoteague NWR, 2-XI-65, L.H. Average stay, 20-XI to 27-IV (Murray 1962). CBC's: Fort Belvoir, 2 (68)-431 (55); Hopewell, 9 (56)-253 (63); Washington, 7 (69)-215 (59). Present every year at Cape Charles (1-6), but not in other coastal counts. A hole-nester which may be expected to decline unless bird lovers' put up next boxes in it's breeding range. All records from 6 main count areas for this species were established at least 8 years ago.

Oxyura jamaicensis. Ruddy Duck. Abundant in fresh to mesohaline waters, less common on the coast, few occasionally summering. Chincoteague, summer '61, breeding suspected. Migration: Alexandria, 2-X-66, 29; 13-IV-59, 2100, JMA. Summer: Hunting Creek, summer '65, 7; Goose I, summer '59, 8, JMA. Craney I, 29-V-69, 20, PAB. Winter: (CBC's): Washington, D. C. has exceeded other areas since '60 (usually all areas combined), except in '69 when Pt. Belvoir had 4735; 1st year 9611 (62). Counts in '70 lower everywhere except at Washington, by 94% at Pt. Belvoir. Fortunately, this pert little duck continues in abundance being little subject to gunning. Food: largely insect larvae (incl. tabanid larvae), mollusks, crustaceans and freshwater aquatics.
Family Accipitridae

Elanoides forficatus. Swallow-tailed Kite. Rare southern straggler. All records in April (2) and August (2). Seashore State Park, Norfolk, 19-IV-59, Mrs. LEB et al. Only record since those in Murray, (1952).

Buteo lagopus. Rough-legged Hawk. Rare winter visitor in Virginia. Included here because, since Chincoteague has had a CBC, 22 have been seen there, 24 at the other areas combined. Uniformity of scattered records indicates stability. Food: Principally lemmings in summer, meadow mice in winter.


Haliaetus leucocephalus. Bald Eagle. Rare permanent resident, now confined to oligohaline and freshwater areas. Murray listed our national emblem as a "common resident along the coast and along Chesapeake Bay; eggs, February 15 to March." Records in Audubon Field Notes and its successor, American Birds, document the disaster which has befallen the American king of birds and made it a ghastly emblem warning of environmental destruction. Nesting: Va. shore of Potomac between Mt. Vernon and Quantico, 5-IV-59, 15 nests (6 occupied, 4 young), JMA. Ches. Bay area of Va., 1964, 9 young produced, JMA, FRS, et al; 1965, 24 active nests, 1 young raised; a ray of hope appears in 1968, 47 active nests, of 26 checked by 1-VI-68, 5 produced young, Bald Eagle Nest Survey. Fortunately, the CBC explosion came in time to document the eagles plight, particularly on the coast. In 1955, 5 areas tallied 11 eagles; in 1966, only 1, an adult was seen. In '55-58, 26 were reported from Back Bay, vs only 4 in the years since. It remains to be seen whether this symbol of our might will survive in the United States, since it is obviously still decreasing. Food: Mainly fish, also crippled water birds.

Circus cyaneus. Marsh Hawk. Abundant winter resident in coastal marshes, scarce inland. Formerly bred on coast but not commonly; no nest records (Murray, 1952). Cedar I, Va., 22-VI-68, 1, MAB. Winter (CBC's): Back Bay, 2 ('56)-49 ('68). Chincoteague, 1 ('63)-51 ('70). Considering no. of areas reporting, the lowest count (47) was in '66 and the highest (154) in '70. It is difficult to believe that any raptor could be increasing but at least the Marsh Hawk remains common. Food: Rodents, reptiles, birds and amphibians.

Family Pandionidae

Pandion halaetus. Osprey. Common to abundant summer resident all along the coast and up Chesapeake Bay, (Murray, 1952). Following the disappearance of the Bald Eagle from so many areas, the Osprey's affliction has received increasing attention. Virginia and Maryland populations have not suffered to the extent of those further north, but the chlorinated hydrocarbon snare seems still to be tightening. Murray related Tyrell's finding in June, 1934, of 76 nests around Smith's Point, Northumberland Co.; Scott (1969) believed this number would be decreased by about 25%. No recent nestings have been successful on the James R. Robert S. Kennedy, a student of Mitchell A. Byrd, observed osprey nesting in Tidewater Va. for 2 seasons. He found nesting success relatively good on the E. Shore in '70 but in '71, 55 nests produced only 15 young. Mathewson and others along the Bay northward remain productive. Early migration: Yorktown, 28-II-70, 1, RSK. Winter: Only 6 CBC dates, 3 of those from Hopewell, where 6 appeared in '67. The osprey suffers increasingly from a lack of suitable nesting sites, but the cumulative effect of DDT and PCB's is likely far more serious. Food: Fish, eel and catfish bones found in York R. nest. Sick and injured fish probably often taken.
Family Falconidae

**Falco peregrinus.** Peregrine Falcon. Scarce transient and rare winter resident on the coast. Murray recorded the peregrine as an uncommon transient and also reported several nestings in western Virginia and coastal nests nor far from the coast, April 14, 1946, reported by Jones. Migration: Assateague I., 11-XI-69, 4, COH, DH. Kiptopeke Beach, 21-XI-69, 2, MAB, et al. Wachapreague (near Parramore I), 26-IX-71, 1, MW and several others. Winter: 14 records from 7 areas, all singles except Cape Charles, 2, '69 & '70. The Peregrine Falcon, fastest bird and most prized for falconry, no longer breeds in eastern United States. Those seen in winter come from Labrador and Greenland.

Family Rallidae

**Rallus longirostris longirostris.** Clapper Rail. Abundant breeder in coastal marshes, common in winter. Cobb & Wreck Is., 24-28-VI-55, nest with 7 eggs. Abbott, (1955). Hog I, Surry Co., nest, C. C. Steirly. Towles Point, 25-V-68, 7, farthest penetration up the Rappahannock (Scott, 1969). Winter: Ship Shoal I, 13-XII-69, 40, FRS et al. CBC's: Cape Charles, 0-5; Chincoteague, 5-29; Little Creek, 0-15; Newport News, 0-9; Back Bay (3 dates) 2-14. The marsh hen continues to be a popular game bird on the Eastern Shore. The season opens early in Sept. and is quite long, so that several "rail tides" may occur, allowing hunters to reach these weak flyers. Large nos. may perish naturally if northeast winds cause prolonged high tides. Finding of 4 highway kills by the author in the spring of '69 indicates higher mortality during migration. CBC's indicate a possible slight decrease. Food: Periwinkles, fiddlers, other crustaceans, insects and seeds.

**Rallus longirostris elegans.** King Rail. Fairly common summer resident in fresh tidal marshes (Murray, 1952). Rare to scarce in winter on the coast. Murray mentioned it nesting at Washington; eggs 30-V to 18-VI. Back Bay NWR, 25-V-66, downy young, PAB et al. Winter (CBC's): Most seen at Cape Charles, 1 ('70)-7 ('68); Back Bay has had 0-13; and Creagالان none. Food: Plant seeds, snails and numerous arthropods.

**Rallus aquaticus limicola.** Virginia Rail. Breeds in fresh and brackish marshes (Murray, 1952). Scarce winter resident, most common in migration. Washington, breeds locally, eggs 26-V to 3-VI. Species is common enough that migration records do not appear in Aud. Field Notes. Winter (CBC's): Most common at Cape Charles, scarcer at Back Bay and Chincoteague. Marsh preservation is vital to this species and all other rails. Food: Some seeds, but mostly animal; arthropods, snails, slugs and small fish.

**Porzana carolina.** Sora. Common to abundant migrant, occasional on coast in winter, one presumed breeding record. Breeding: Langley Field, Hampton, 9-VI-38, F. C. Lincoln; "rather good evidence" (Murray, 1952). CBC's: Quite consistent at Cape Charles, 0-5; rare at Back Bay, Little Creek, Mathews and Newport News. Migration: Sandbridge Road, Back Bay, 18-IX-56, 75 dead after cold front and strong winds, PW. Food: Smaller seeds of marsh plants; mollusks, insects, spiders and crustaceans. The Sora must have decreased greatly since two men killed 1,235 in 2 days, 5 & 16-IX-1881, in a James River marsh (Murray, 1952). Except at Cape Charles, all CBC records (6) are singles since '60.

**Coturnicops noveboracensis.** Yellow Rail. Rare migrant. Murray mentions 2 specimens killed 4-X-1879 and 28-III-1884 in Potomac marshes. Only AFN record seems to be the Cape Charles CBC of 1 in '67. Food: Freshwater snails, insects, spiders, crustaceans, and seeds of sedges and smartweeds.

Porphyria martinica. Purple Gallinule. Rare wanderer, all records listed by Murray (1952) were in May. Pungo Marsh, 17-V-38, Mrs. Reed. Back Bay beach, 19-V-46, Perkins.


Fulica americana. American Coot. Common to abundant winter resident in fresh and brackish areas with rooted aquatics. Rare in summer, breeding locally. Breeding: Murray reports 2 pairs breeding in Byrd Park, Richmond, apparently rearing 2 broods in a season. He also cites its reported breeding at Knott's I, VII-56, young, WFR. Chincoteague NWR, summer '61, few pairs, probably breeding, TWM. Saluda, Middlesex Co., Va., 20-V-68, nest with 7 eggs, MAB. Migration: Chincoteague, X-67, 8600, EFW. Dyke, 16-X-65, 250, JMA. VIMS, '71, 1 stayed all summer. Winter (CBC's): Back Bay, less than 100 on 8 counts, highly variable, 10,000 ('51), 19 ('61), 19 ('63), 19,800 ('70); Cape Charles, 97-226; Little Creek, 0-143; Newport News, 0-111; Chincoteague, 0-1091; Washington, 1-77 (last 10 years). In '62 & '63, the totals for all counts were 13 & 16. This hunter-despised rail seems very capable of adapting to man and should survive as long as its habitat does. Food: Mostly vegetation, but some, as the approx. 20 at VIMS every winter, must eat a lot of invertebrates.

Family Haematopodidae

Haematopus ostralegus. American Oystercatcher. Abundant permanent resident on the Eastern Shore seaside, and showing signs of moving into Ches. Bay. Breeding: Cobb & Wreck I's, 14-VI-55, 150, 3 nests, JT. Cedar I, 4-VIII-60, 35-40, incl. 4 family groups, PWS. Hog I, 12-VIII-61, 104, LCG et al. Tangier I, 11-VI-65, 5 adults, first breeding season record for Ches. Bay, FRS. New Point Comfort Light, VII ca. 1966, pair which acted like they had a nest among the boulders, MW. Migration: Assawoman I. (northern end), 5-IX-60, 245, AEW. Yorktown, 26-XI-66, MAB. CBC's: Only Cape Charles, 69 ('66)-313 ('70) and Chincoteague, 3 ('59)-148 ('70); except 1 at Newport News ('61). This striking shorebird has increased dramatically since Bent (1929) reported that no nests or young were seen on Cobb I in 1907. In the 1970 CBC, 160 more were seen than in 1965, the previous record year. Food: Fiddler crabs, oysters, shrimps, barnacles, insects, sea worms.

Family Charadriidae

Charadrius hiaticula semipalmatus. Semipalmated Plover. Abundant transient along the coast; average dates at Cape Henry, 2V-17V, 28VII-4XI (Murray, 1952). Alexandria, 4-VI-61, 20, JMA. Species evidently so common that migration records are not worth publishing for the coast. CBC's: In 2/3 of the counts at both Cape Charles & Chincoteague. Apparently stable or even increasing slightly. Food: Small polychaetes, mollusks, crustaceans and insects.

Charadrius melodus. Piping Plover. Common migrant, frequent nester and uncommon winter resident on the outer coast, rare inland. Breeding: Murray listed no recent records. Cedar I, 4-VIII-60, 1 downy young, PWS. Cobb I, 18-VI-66, 8 adult, 5 young, FCB. Chincoteague, NWR, 17-V-68, nest with 4 eggs, EFM, RLS. Cedar I, 22-VI-68, nest with 4 eggs, MAB. Migration: Chincoteague, 21-IX-68, 60, CWC et al: 2-IV-69, 65, MAB. CBC's: Cape Charles & Chincoteague, 0-9 at each. Due to human pressures on dune habitats, this sand-bound plover is likely to decrease somewhat. Food: Insects and marine invertebrates.
Charadrius wilsonia. Wilson's Plover. Seems more common in summer on the E. Shore than is Piping Plover. Breeding: Bent (1929) reported 22 egg records, for Va., 4V-20VI. Cobb I., 18-VI-66, 12 adults, 15 young, FCB. Near Wallops I, 17-VI-61 nest with 1 egg and 2 young, CCS et al. Cedar I, 10-VI-69, nest photographed on washover, 1 egg destroyed, 1 pipped and 1 chick out; 2 others seen running near parents, MW. Grandview, Hampton, 10-V-51, WFR (Murray, 1952). It is also strange that no records are available from mid-June through April. This species seems almost certain to decrease.

Charadrius vociferus. Killdeer. Permanent resident, breeding away from shorelines, but dispersed along sandy shores of the bay and coast in winter. Breeding: Williamsburg, 24-III-56, nest with 4 eggs, JHG. Lexington, eggs present, 1-IV to 9-VII, (Murray, 1952). Robert J. Huggett was shown a nest with 3 young at Seaford, York Co., 8-IV-72. CBC's: A quite uniformly distributed species present every year for most tidewater counts. Back Bay: 7('52)-166('69), Cape Charles, 21('67)-401('70); Chincoteague, 1('59)-150('70); Fort Belvoir, 4('60 & '61)-129('57); Hopewell, 1('58)-111('56); Little Creek, 19('63)-362('57); Newport News, 42('64)-172('61), Washington, 26('66)-234('59). This shorebird is probably the only bird considerably water-dependent which has been recorded on all of the 114 counts checked, although 3 were only singles. The total of 966 in '70 was 200 above the '69 record, a result of the large Cape Charles count. The striking "kill-dee" suffers from being common and a nongame species, in that little study seems to have been done on it. As the shorebird most closely associated with man, it fares well, but its fate will depend much on future agricultural practice. Food: Largely animal, in Va., probably insects in summer, marine worms and crustaceans in winter, also some seeds.


Family Scolopacidae


Scolopax minor. American Woodcock. Apparently more common in summer than realized earlier. Abundant at Cape Charles in winter; common to scarce elsewhere. Breeding: Back Bay Ref., 2-IV-66, nest of 3 eggs, FGB, PAB. CBC's: Cape Charles, 3('65)-122('68); Back Bay, 0-10; Chincoteague, 0-10. Other counts 1 or 2, except 3 at Mathews ('70). The woodcock has suffered from prolonged cold spells in the south and from pesticides in the north. In Virginia, hunting pressure is low and the winter population relatively stable. Swamps are vital to the continued breeding success of "this recluse of the boggy thickets". Food: Principally earthworms, but also slugs, insects, centipedes and spiders.
Gallinago gallinago. Common Snipe. Occasionally abundant in migration; common on the coast where low marshes are extensive. Chincoteague Bay, near Horntown, Va., 15-XI-60, 300, TWM. Cobb I, 19-VIII-39, "Brooks saw good numbers and heard a flock of 500 a few days earlier"; an unprecedented record reported by Murray (1952). CBC's: Distribution more uniform than shown by most species. Back Bay, 22(70)-100('61); Cape Charles, 2(65)-26('68); Chincoteague 4('62)-39('66); Hopewell, 1-27; Little Creek, 0-20; Newport News, 0-6; Washington, 1-19. Steady declines at Back Bay, Little Creek, Newport News, and Washington may indicate habitat loss. Food: Earthworms, insects and their larvae, some seeds.

Numenius arquata americanus. Long-billed Curlew. This magnificent curlew of the prairies has long been only a rare straggler on the east coast where once it was an abundant game bird. Murray (1952) refers to a specimen taken 11-IV-1842 on the Potomac; to 3 seen at Ragged I, 1932; and one at Rogue I, 18-IV-41. Armistead (1970) saw one at Cape Charles, 28-XII-69.

Numenius phaeopus. Whimbrel. Common migrant on the Eastern Shore, rare in winter. Chincoteague, 15-IV-61, 1, TWM, et al; Cedar I, 6-VI-68, 14 Whimbrel, MAB. Wallops I, 7-VII-62, 4, TWM, FRS; Metompkin Inlet, 7-VII-68, 25, Dyke. Chincoteague, 13-XII-59, 1, TWM. CBC's, Chincoteague, 2(63), 1(64), 1(65). Cape Charles, 4-1('66-'70). The Whimbrel is much increased in recent decades, but will probably do well to maintain present numbers. Food: Earthworms, sandworms, insects, small mollusks, and crustaceans. Fairly common summer resident inland (Murray, 1952), scarce to common during migration, very rare in winter.

Catoptrophorus semipalmatus. Willet. Abundant nester on Eastern Shore seaside, scarce to frequent in winter. Breeding: Cobb I, 1875, breeding in large nos., H. B. Bailey; 1907, no more than 3 pr. breeding; 1922, 15 pr. bred (Bent, 1929). Cedar I, 12-VI-55, 150 prs. nesting, 35 nests found, eggs of one half-hatched, J. W. Assawoman I, 30-V-57, 19 nests (2 only 25 ft. apart), FRS, JMV. Metompkin I, 24-V-69, 47, MAB. CBC's: Cape Charles, 10 ('70)-69('69); Chincoteague, 0-4; Little Creek, 1('62); Mathews, 2('70). If marshes are protected the cry of the Willet seems sure to increase around lower Ches. Bay. It very likely nests now on Plum Tree I and in Gloucester Co., where it has been seen at the Poropotank R. and the Guinea Marshes in summer. It is possibly the most abundant nester on the E. Shore, since its nests are found in marshes and on dunes and are dispersed over great areas. Food: Probably fiddler crabs to a great extent in summer.

Tringa hypoleucos. Spotted Sandpiper. Craney I, 4-VII-65, 37; 27-X-63, 1, FWS. Chincoteague NWR, 24-XI-67, 1, ML, MN. CBC's: Newburyport, 1(60); 2(65). Cape Charles, 1 ('69). Bent (1929) referred to it as "best known of our sandpipers". Hopefully this will always be so, yet the species is quite certain to suffer as increasing humans flock with their pets, to water courses in summer. Food: Insects, crustaceans, worms.

Tringa ochropus solitaria. Solitary Sandpiper. Scarce to fairly common transient. Cape Henry, 5 records in IV-4V; fall, 23-VII to 17-LX (Murray, 1952). No recent Virginia records were noted. F. R. Scott (in litt.) refers to it as a common transient along streams of freshwater marshes.

Tringa nebularia melanoleuca. Greater Yellowlegs. Common to abundant on Eastern Shore in winter and in migration, scarcer inland, although common in spring along brackish marshes. Cape Henry, 27-III to 10-VI and 26-VII to 30-X. CBC's: Cape Charles 22('68)-68('70); Chincoteague, 5('68), 54('70). Scarce to rare at Back Bay, Little Creek, Hopewell and Newport News. The record no. in '70 is encouraging for this tattler gifted with exasperating loquacity. Bent (1927) wrote nostalgically of the glorious days when shorebirds were fair game. On Oct. 24, 1863 Greater Yellow-legs were sent from Newburyport to a stall in Boston. Food: Killifish, crustaceans, insects, worms and snails.
Tringa flavipes. Lesser Yellowlegs. Common transient and winter visitor, but evidently less frequent than the Greater Yellow-legs. Frequent in winter on Eastern Shore seaside, rare elsewhere. Lang­horne's Pond, Albermarle Co., 16-VIII-55, 66, CES (after Hurricane Connie). Fort Belvoir, 1, 21-XII-69, PAD, PUD. CBC's Cape Charles, 37 ('70), 19 in all 5 previous years. Chincoteague, 0–28, rare at Back Bay, Hopewell, Little Creek and Mathews. More migration data is needed on the yellow-legs. Bent (1927) states that the Lesser Yellow-legs is more abundant but Murray (1952) reports the Greater more common at Cape Henry. Strangely, Bent had no winter records north of Florida. Species probably no more than stable. Food: More insectivorous than its larger congener.

Limosa fedoa. Marbled Godwit. Migrant, formerly common on the coast, but nor rare (Murray 1952). "Occasional" might be justified now, in spite of 4 amazing CBC's at Cape Charles. All records are strictly coastal except for 1 at Rigby I, Mathews Co., 14-IX-55, JT, LG. Spring: Fisherman's I, 9-V-68, 1. 29-V-68, 4; Smith I, 1-VI-69, 6, PAB et al. Murray and no spring records. Fall: Hog I, 18-VI-61, 2 (a pair), FRS, CCS. Fisherman's I, 19-VI-68, 1, PGB, PAB. Chincoteague, 28-VIII-65, FGS et al; 29-XI-70, 1, PGD. Craney I, 8-IX-69, 5, PGB et al. CBC's: Cape Charles, 36-43 for 4 counts; unbelievably high and so uniform that one wonders if a persistent flock returned each year. Chincoteague 4 ('60). Nesting only on the prairies of the Dakotas and Saskatchewan, this magnificent shorebird seems most likely to decrease.

Limosa haemastica. Hudsonian Godwit. Rare to occasional fall migrant, one spring record. Murray (1952) gave 2 records, both at Chincoteague: 3-X-48 and 9-IX-49. All records are coastal and cover almost every year on the Bay's west side. Spring: Back Bay NWR, 25-V-68, 1, PAB et al. Chincoteague, 15-VII to 15-VIII-63, 1, RLP, FGS; 11-VII-68, 7, GM. 21-IX to 24-X-61, 5, FGS. 30-IX-67, 14, ML, MN, 7-XI-70, 1, CWC. Stumpy Lake, 14-17-X-PAB et al. Craney I, 27-X-63, 1, PWS. Frequency of sightings and numbers seen give hope for this species; always so rare that even Audubon never saw a live one.

Limnodromus griseus. Short-billed Dowitcher. Common migrant, occasionally abundant on the Eastern Shore in July. Murray (1952) reported this once heavily-gunned species as "now not common", migrating 2-V to 12-VI and 29-VII to 14-IX. Fall migration: Chincoteague NWR, 20-VII-63, 2500, FGS. Metompkin Inlet, 7-VII-68, 500, SHD. Warren, Va., 4-VIII-64, 2, SC. CBC's: Only 4 dates, Little Creek, 1 ('61), 7 ('63), 3 ('70). Adequate habitat has allowed this species to regain some of its former numbers.


Calidris canutus rufus. Knot. Erratic; occasionally abundant in migration, but more often common to scarce. Fisherman's I, 22-V-68, 1000, PAB, PGB. Goose I, 24-V-58, 1; 10-VIII-58, 1, JMA. CBC's: Recorded on one count each for Back Bay, 8 ('57); Cape Charles, 18 ('57); and Little Creek, 1, ('66). Fantastic is the 520 count at Chincoteague in '70; only 2 CBC records having occurred there before. The Knot will likely never be known again as it was in Massachusetts when they gathered "in exceedingly large numbers, estimate of which were useless" (Mackay, in Bent, 1927), but recent reports of the "redbreast" are encouraging. Food: Coquinas, horseshoe crab eggs, insects and crustaceans.

Calidris maritima. Purple Sandpiper. Increasingly frequent transient and winter visitor at the mouth of Chesapeake Bay and Craney I. Murray (1952) had only 2 records, one each for the Cape Charles and Little Creek breakwaters. Chincoteague NWR, 26-X-68, 7, CWC. Ches. Bay Bridge Tunnel, 3-X-70, k, RLA. Craney I, 25-26-XI-60, 50, JEA, et al. Bridge Tunnel, about 15-III-68, 2 wintering birds left; 9-29-V-68, 20 present, FBO, PAB. CBC's: Little Creek, 1 ('55)-36 ('68).
Other records at Cape Charles (4) and Newport News (2). The "rock snipe" has definitely benefited by the use of granite rip-rap. Food: small crabs, shrimp, mosses, algae, spiders, mollusks.

**Calidris alpina.** Dunlin. Most abundant shorebird near the coast during migration and in winter; rare in summer. Cobb I, 18-VI-66, 60 summering, PCB. CBC's: Cape Charles, 3954('69)-15,859('66); 1('61)-5, 649('70). The finding of only one Dunlin in '61, followed in '66 by 18 this shows that shorebirds can be even more erratic than ducks. Murray reported it as "now only a fairly common transient"; July 19 to May 24, scarce in winter, sometimes absent. Fortunately, the "red-back", most abundant sandpiper in Europe, fares well here, too. Food: Calidris minutilla. Least Sandpiper. Frequent to abundant transient, uncommon in winter on the coast to rare in Ches. Bay. Chincoteague, 6-IV-55, 200, JT, Parramore I, 20-VIII-55, 10, PAD, DACS. Hopewell, XII-69, 26, FRS. CBC's: Cape Charles, 0-49; Chincoteague, 2-28 (all since '64); Fort Belvoir, 21('69); 1 or 2 records in 5 remaining areas. Food: Green flies, mosquitoes, small crustaceans, worms and insects.

**Calidris bairdii.** Baird's Sandpiper. Rare transient, numerous fall records, only one for spring. Four Mile Run, 3-IX-1894, immature collected, R. S. Mathews, Alexander I, 9-23-X-30, 10 (3 collected). Ball (Murray, 1952). Chincoteague NWR, 16-V-64, 1, FGS, Alexandria, 24-VII-63. Alexandria, 12-27-X-63, 2, ETM. All records of the past decade are of 1-3 birds. Migrating mainly thru the Mississippi Valley, its continued visits in Chesapeake Bay area will depend on barrier island and wetland retention. Food: Amphipods, algae, insects.


**Calidris pusilla.** Semipalmated Sandpiper. Abundant migrant and winter visitor on the Eastern Shore, scarce to fairly common inland. Cape Henry, 2-V to 11-VI and 19-VII to 30-X. Chincoteague, 6-IV-55, 6, JT, 17-V-64, 25,000, FGS. Parramore I, 20-VIII-55, 30, PAD, DACS. CBC's: Cape Charles, 69('67)-423('68). Chincoteague, 0('68)-399('66); rare at 4 other areas. This "peep" is the most abundant shorebird and likely the most often seen in Tidewater areas. No longer allowed as a potpie ingredient, it should delight man as long as he remains concerned. Food: Small items of almost everything edible in its habitat.

**Calidris mauri.** Western Sandpiper. "Rather common fall transient, although rare in spring" (Murray, 1952). Cooke (1929) termed it accidental at Washington, although Ball reported 44 local specimens only 3 years later and called it "not uncommon" in fall (Murray, 1952). It is apparently too common to receive much attention in Audubon Society journals. Murray's several records included the first one, Virginia
Beach, 6-IX-1884. Only recent migration record is Parramore I, 20-VII-55, 350, PAB, DCAS. It nests only in Alaska and Murray gave only 2 spring records: Cape Henry, 19-V & 14-VI-45. CBC's: Cape Charles, 0-17; Chincoteague, 0-15; dramatic is the one Little Creek record, 95('67). Fate of this species is dependent on events in the Alaskan tundra. Food: As in other "peeps."

Calidris alba. Sanderling. Abundant transient and winter resident on beaches of the coast and lower Ches. Bay; rare inland. Peaks of migration in mid-V and mid-VIII (Murray, 1952). Chincoteague NWR, 28-VII-65, 7,500, FGS et al. CBC's: Cape Charles, 0-17; Chincoteague, 0-15; dramatic is the one Little Creek record, 95('67). Fate of this species is dependent on events in the Alaskan tundra. Food: As in other "peeps."


Family Recurvirostridae


Himantopus himantopus mexicanus. Black-necked Stilt. Occasional straggler, mainly in spring, from the far west or South Carolina. Murray (1952) reported it from Cobb I, 8-VI-29 and Sandbridge, 9-V-40. A total of 17, some perhaps duplicates, were reported from Back Bay and Chincoteague, 6'68-'70. Back Bay, '66, 2 throughout nesting season, DRA; 27-IV-68, 5, PGB et al; 25-IV-69, 4, RW. Chincoteague NWR, 4-29-V-69, 2, HMO et al; Fall: Chincoteague NWR, 28-VIII-70, RSK, BW; 24-IX-69, COH, DH. Seems to be increasing in the east during migration. Food: Freshwater insect larvae, crustaceans, mollusks, small fish.
Family Phalaropodidae


Phalaropus lobatus. Northern Phalarope. Occasional both spring and fall along the coast, rare inland, probably occasionally common off the coast. Murray had several records and many more have since accumulated. Winter-spring: Crane I, 1-I-57, 4; 19-V-57, 3, JEA, PD. Chincoteague, 18-VI-63, 12, SHD et al. Back Bay NWR, 27-VI-68, 73 after a coastal storm, PD. Summer-fall: Chincoteague, 6-VII-66, 1, ML, MN. Crane I, 23-IX-69, 6, MAB, GWH; 22-IX-70, 11 CWD et al. Species could be increasing slightly - or migrating eastward more often. Food: Freshwater insects, invertebrates in summer.


Family Stercorariidae


Stercorarius parasiticus. Parasitic Jaeger. Oceanic winter marauder seldom seen from shore. Murray (1952) had records from V, VIII & IX. Several records in the same months and XI have since accrued. Spring: Cape Henry (1-6 mi. offshore), 1-V-62, 8, PWS. Back Bay NWR, 9-XI-69, 1, COH, DH. This species occurs regularly offshore where birders seldom venture. Being an Arctic nester, one may hope this species is stable. Food: Probably nearly all fish in winter.


Family Laridae


Larus minutus. Little Gull. Very rare straggler, but may be expected now that it breeds in Ontario. First state record, Ches. Bay Bridge Tunnel, 5-XII-64, CWC et al.

Larus delawarensis. Ring-billed Gull. Abundant winter resident and transient throughout tidewater. Immatures plentiful in summer. CBC's: Present on all counts. Little Creek, 1560 ('55)-27,200 ('66). As with the Herring Gull the highest total count was in '66(37,938); counts since then being less than half that number. The Ring-billed Gull, an inland nester, may be decreasing. Food: More agrarian than other gulls, eating grain and insects. Also eats garbage and marine organisms.


Larus hyperboreus. Glaucous Gull. Occasional straggler. Murray (1952) gave 3 sight records, 2 from near Washington in II and 1 from Norfolk in V. Since then there have been at least 12 sightings from Chincoteague NWR to Back Bay, in the months of IV-VI-VIII, X & XII. CBC records at Cape Charles (2), Chincoteague (1) and Washington (1).


Larus argentatus. Herring Gull. Abundant winter visitor and common in summer, breeding on the Eastern Shore since 1948. Breeding: Gulf Marsh I, (near Cobb I), 12-VI-48, 2 pairs of adults and 2 young, Buckalew; Chincoteague, 5-VI-60, 3 nesting pairs (1 nest with young), FRS. Hog I, 7-VIII-61, 12 imm. nesting, LEB. Fisherman's I, 21-VI-64, 5 nests with eggs and young, PWS. Chincoteague, 26-VI-65, several large non-flying young, MAB et al. Fisherman's I, 5-VI-65, 28 nests, PWS, 1966, 39 nests, FGB, PWS; 17-V-68, 1st eggs laid, FGB, PAB. CBC's: Little Creek, 1500 ('55)-40, 200 ('66). Hopewell, 5 ('58)-327 ('70). Back Bay, 85 ('51)-4590 ('66). Highest total count, 62,224 ('66), twice as high as any count since then. The Herring Gull is stable, if not increasing. Garbage, fish refuse, eggs and young of other birds. Breeding of the large gulls on the barrier islands may have an adverse effect on breeding terns.


Larus marinus. Great Black-backed Gull. Once a rare winter visitor and uncommon 20 years ago as a winter visitor, 20-VIII to 28-IV; this awesome gull is now abundant in winter, common in summer, and the latest addition to the breeding birds of Va. Formerly coastal it is now often common in the tidal rivers. Summer: Craney I, 4-VIII-61, 100-7EA, WFR; 13-VI-65, 90; 31-VI-66, 64, PWS. Lewisetta, 5-VI-66, 130 PWS. Brooke 23-XII-69, 280; 22-XII-70, 320 ETM. The southward explosion of this species is seen in the CBC's: Back, 13 ('58)-512 ('70); Fort Belvoir, 1 ('61)-129 ('69). Cape Charles had the highest count, 1368, in its first count ('65). The '70 9-count total of 2939 was 1008 over the next high in '66. The irruption of this predaceous gull is unexplained, since it does not appear to be a "garbage gull". It and the Herring Gull have largely stopped the breeding of Laughing Gulls in Maine. (Nisbet, 1971). Food: Eggs and young of other sea-birds, passerines forced down at sea, discarded or robbed fish.
Rynchops nigra. Black Skimmer. Abundant summer resident on the Eastern Shore, breeding on sand beaches of smaller islands. In 1907, large colonies occurred on Cobb, Pig, and Wreck Is. (Bent, 1921). Stevens estimated 400 nests on Wreck and 90 on Cobb, 11-VIII-51 (Murray, 1952). Craney I, 19-VII and 2-VIII, several nests with eggs and young, PWS, first record away from immediate coast. Fisherman's I, 5-VII-65, 1000 active nests, PWS. Nested on Cedar I in '56 & '60, but human interference probably prevents nesting there now. This favorite of tourists seems likely to decrease. Reported on 3 CBC's at Chincoteague.

Food: Small fishes and shrimp caught mostly at night.

Sterna nilotica. Gull-billed Tern. Beach-nesting tern abundant in past century on the Eastern Shore, a rare breeder by 1913 and still rare in late 40's (Murray, 1952). Now frequent to common breeder. In 1890's breeding in abundance, reduced to 1,000 on Cobb I by 1900; Wreck I, 1907, 8-10 pairs, Cobb I, 1909, 10 prs (Bent, 1921). Fisherman's I, 19-VI-61, 50 prs, CCS et al; 1-VII-66, 40 nests with eggs. Cedar I, 8-VIII-62; 55 prs, FRS. Smith I, 1-VI-69, over 200, Buckleys. Craney I, 5-VII-64, nest with 2 eggs, PWS.

Craney I, 5-VII-61, several nests with eggs and young, PWS; 1-VII-66, 400 reduced to 200 by earlier storm (birds finally quit because of storms, dogs and Laughing Gulls), MAB. Ship Shoal I, 21-V-71, colony of some 3000, most pairs apparently incubating, MAB, RSK. CBC's: Only one record in last 3 years, earlier up to 10 at Little Creek. The Royal Tern will require protection from man if it is to maintain its present numbers.

Food: Largely insects caught over marshes.

Sterna sandvicensis. Sandwich Tern. Scarce summer visitor and rare breeder. Murray (1952) had 2 records: an adult male taken at Cobb I, 12-VII-1880 and a set of eggs taken in 1912 by Bailey who found it extremely rare. Wachapreague, 8-V-59, 2, Mrs. LEB. Fisherman's I, 5-VI-65, 2200 nests with eggs; 5-VII-65, 1500-1800 2/3-grown young unable to fly, PWS; 1-VII-66, 500 young, 200 nests with eggs just hatching, PGB. Near Wachapreague, 16-VI-68, colony of 600 reduced to 200 by earlier storm (birds finally quit because of storms, dogs and Laughing Gulls), MAB. Ship Shoal I, 21-V-71, colony of some 3000, most pairs apparently incubating, MAB, RSK. CBC's: Only one record in last 3 years, earlier up to 10 at Little Creek. The Royal Tern will require protection from man if it is to maintain its present numbers.

Food: Small fish, some squid and shrimp.

Sterna caspia. Caspian Tern. Common migrant and scarce summer visitor. The only nesting records for Va. seem to be those of Bailey (Bent, 1921) who said that "a few pair still breed on one of our coastal islands". Murray reported the Caspian increased although the Royal Tern had greatly diminished. It is more common inland than on the coast.

Migration: Cape Henry, 8-IV to 27-VII to 12-XII (Murray, 1952). Arlington, 13-IV-63, 60, JMA. Jamestown area, 2-V-59, 100, MA et al; 1-IX-57, 90, JHG, WE. Shirley, 24-VII-66, 15, FRS. Records for June have occurred at Goose I, JMA; Dyke, JMA; Chincoteague, FGB; and Fisherman's I, Buckleys. This large "sea-swallow" may be decreasing. Having once nested in Virginia it would seem that it might be encouraged to do so again. Food: small shrimp and fish; mussels in freshwater.


Sterna albifrons, Least Tern. Extremely abundant a century ago, this little tern was decimated for hat ornaments, so that none were seen on Cobb I in 1907 (Bent, 1921). It increased quickly with protection but small nesting colonies at Jamestown, Gloucester Pt., and elsewhere have been destroyed, so that nesting seems mostly confined, in Va., to the Eastern Shore now. The beach at Back Bay had nests in one colony in '38 and 30 nests in '46, but none have been reported recently. Hollis Marsh, 12-VII-68, 12 nests with eggs, JMA; Dameron Marsh, 19-IV-65, 0. Chincoteague, 9-VI-62, 130, all immature, FRS. Migration: Chincoteague, 8-IX-67, 1850, MAB. Goose I, 4-X-58, 440, JMA. Cape Henry, 29-XI-67, 450, FGB, PAB. CBC's: Back Bay, (0 on 10 dates-3050('69); Little Creek, 0-399('67); no inland records. Possibly increasing. Food: Feeds less on fish than do other terns, more on insects.

Chlidonias niger, Black Tern. Coastal transient, locally common. Murray (1952) reported single IV and V records. Chincoteague, 14-IV-55, 4; 25-VI-55, 25, JMV; 10, 11-VIII-57, 300, PAD et al; 15-IX-58, 450, JHG et al. Hopewell, 4-IX-55, 19, RJW, FRS. Since this tern is dependent on freshwater marshes it seems likely to decrease, but lack of recent records seems due to commonness of species. Food: Largely aquatic insects, also minnows, crayfish and spiders.

Chlidonias leucopterus, White-winged Black Tern. Very rare straggler. Chincoteague, 16-V into VIII-63, 1, and again in '64 to 9-VIII, FGS et al.

Family Alcidae

Alca torda, Razorbill. Rare winter visitor. Murray recorded specimens taken from 15-X to 29-III. Wreck I, 6-VI-64, dried specimen, AEC et al. Chincoteague NWR, 25-I-69, 1, Folsom.

Uria lomvia, Thick-billed Murre. Rare winter visitor. Murray listed many early records from the Arlington-Washington area and several from the coast, 22-XI to 26-I. Lack of recent records indicates possible decrease of this large alcid.

Plautus alle, Dovekie. Rare coastal visitor in winter. Murray provides numerous records, 28-XI to 5-II. On the latter date, in 1940, Richard Pough reported 25-50 flushed hourly by a steamer while off the coast of Va. Wachapreague, 25-VI-70, 1, CVR.

Cepphus grylle, Black Guillemot. Rare straggler taken by Capt. Crumb on Cobb I (Murray, 1952).

Family Tytonidae

Tyto alba, Barn Owl. Uncommon resident. Murray reported it breeding in towers but said nothing about its use of duck blinds. Eggs were reported from 25-I to 5-V. Breeding: Chincoteague, '60, offshore duck blinds, 5 nests with eggs or young. Assateague, 22-VII-59, 2 nests (7 eggs, 1 young) in duck blinds. Fisherman's I, 21-VI-64, nest with 2 eggs, PWS; 22-VI-66, nest with 4 eggs. Fisherman's I, 21-VI-64, nest with 2 eggs, FRS, CCS. The monkey-faced owl seems almost entirely dependent on adequate duck blinds in the Ches. Bay areas. Autos
probably account for most of the predation on this species, which seems
likely to decrease. Food: Mostly rodents, some sparrows & Blackbirds,
80 pellets taken from a YR blind averaged over 2 mouse skulls per pellet.

Family Strigidae

Strix varia varia. Barred Owl. Most common in swamp areas; abundant in
the Dismal Swamp (Murray, 1952). Flood-plain and swamp forests, 6
breeding pairs on 1,142 acres of lowland forest along Patuxent River
in 1943 (Stewart and Robbins, 1958).

Asio flammeus. Short-eared Owl. Uncommon winter resident, most frequent
on the Eastern Shore. Bailey reported it breeding in marshes of the
Eastern Shore and along Ches. Bay. The last nest record seems to be
one at Leesburg, 17-IV-50 (Murray, 1952). CBC's: Back Bay (4 counts)
1 (thrice)-15 ('68). Cape Charles, 0-5. Chincoteague, 1 (thrice)-31
('65). Road kills and agricultural practices will probably produce
further declines in this mouser.

Family Trochilidae

Archilochus colubris colubris. Ruby-throated Hummingbird. In moist forests
and hedgerows; particularly attracted to jewelweed and trumpet creeper
flowers; 13 breeding pairs in 85 acres of flood-plain forest (Stewart
and Robbins, 1958). Two nests over small creek in West I. Swamp,
Jumunkey R., July, 1970; seen at trumpet vine flowers.

Family Alcedinidae

Ceryle alcyon alcyon. Belted Kingfisher. Common resident, nesting
along shores and water courses, wherever banks afford adequate nesting
sites. Murray's records of nesting are all inland; eggs, 25-IV to
10-V. Species is too common to produce migration records in AFN.
CBC: Present all count dates except 3. Back Bay, 0-('51)-18('60);
Cape Charles, 15('65)-31('70); Little Creek, 7('56, '64)-24('67);
Newport News, 2('58)-16('67); Chincoteague, 11('59)-42('68); Fort
Belvoir, 0('51)-18('64); Hopewell, 0('59)-10('64); Washington, 3('60,
'63)-17('68). One cannot assume by nos. that this species is increas­
ing since increased coverage might allow overcounting. Food: Fish,
frogs, crayfish.

Family Picidae

Dryocopus pileatus. Pileated Woodpecker. Common permanent resident;
largely confined to swamps on the coastal plain, where it seems to
nest almost entirely in large sycamores. Wood ducks have probably
been much dependent on nest holes made by the "logcock". This
striking species is certain to decrease as the last peeler-sized trees
come out of the swamps. Beavers are likely detrimental to its habitat.
Food: Mostly grubs and beetles in decaying wood in Va. Also sassa­
fras and poison ivy berries in fall.

Family Tyrannidae

Sayornis phoebe. Eastern Phoebe. Common summer resident, except on the
coast (Murray, 1952). Scarce in winter. Murray listed no nest records
east of Richmond, but it has nested on our house in Gloucester several
times (2 broods in '70). It is included here because it often nests
under bridges and seems confined to swamps in winter. The coastwise
nesting increase of this Flycatcher is heartwarming to the nostalgic.

Empidonax virescens. Acadian Flycatcher. Flood-plain and swamp forests;
45 breeding pairs per 100 acres in lowland seepage swamp, Prince
Georges Co., 1946 (Stewart and Robbins, 1958). Abundant in the Dismal
Swamp and at Richmond (Murray, 1952).

Empidonax trailli trailli. Traill's Flycatcher. Rare transient formerly
known, and more appropriately, as the Alder Flycatcher. Nests in alder
and willow thickets, possibly south to Virginia (Murray, 1952).

Family Hirundinidae

Tachycineta bicolor. Tree Swallow. Abundant transient. Highly depend­
ton on oligohaline marshes for roosting in fall and, along the coast,
on wax myrtle berries during northers. Evidently once nested more
commonly in coastal Virginia. Murray lists nest records for Back Bay,
upper end, 15-VI-27; King Wm. Co. (Aylett); and Smith I, 10-VI-1897.
One seen at Cheatham Annex, York Co., in VI-69, probably nested in a
death stub in Cheatham pond. CBC: Cape Charles, 31('69).
**Riparia riparia.** Bank Swallow. Breeding "restricted to areas over open water, marshes and barrier beaches (Stewart and Robbins, 1958). Scarce to uncommon transient, 12 Cape Henry records (Murray, 1952). Scott (1969) reported a colony with 71 nests found by Church and Hacker at Stratford and a smaller one near Wakefield.

**Stelgidopteryx ruficollis.** Rough-winged Swallow. Commonly nests solitarily in stream banks. A pair once attempted to nest at VIMS. Murray reported it uncommon near the coast, but reported probable nesting at Cape Maynard Nichols has found it nesting in bluffs along the Rappahannock.

**Hirundo rustica erythrogaster.** Barn Swallow. Common to locally abundant summer resident in Tidewater. Long dependent on man for nesting sites, this swallow is increasingly dependent on waterside structures, since old barns and sheds are disappearing. Has appeared at VIMS in III but usually in early IV. Observations indicate that the Fish Crow may be a predator of this swallow. Future status seems entirely in man's hands.

**Family Corvidae**

**Corvus ossifragus.** Fish Crow. Abundant on the Eastern Shore and common JMA. Dyke, 23-VIII-70, 45, JMA. CBC's: Back Bay, 3('56)-130('58); Cape Charles, 1('55)-49('70); Chincoteague, 17('67)-277('70). Appears stable or slightly increasing. Food: Grain, insects, carrion, bird eggs.

**Family Sittidae**

**Sitta carolinensis.** White-breasted Nuthatch. Apparently almost entirely confined to swamps in the coastal plain (Scott, 1969). Murray had no nest records east of Richmond. Nested in a bird house at edge of Beaverdam Swamp, Gloucester, Va. in 1962. Meanley (1969) reported it common in Dismal Swamp where he saw 6 in 1/2 mile, one with nesting material, 11-IV-69.

**Sitta pusilla.** Brown-headed Nuthatch. "Open stands of loblolly pine near tidewater (usually at the margins of tidal marshes)." CBC in southern Dorchester Co., 1958, had 214 (Stewart and Robbins, 1958). Maynard Nichols found it fairly common in the White Stone area and reports it up the Potomac to Sandy Point and up the Rappahannock to Warsaw (Scott, 1969).

**Family Troglodytidae**

**Troglodytes troglodytes.** Winter Wren. Common winter visitor, being present on most CBC's. Obviously most common in swamps with sizeable trees.

**Telmatodytes palustris.** Long-billed Marsh Wren. Common to abundant resident of coastal marshes, but probably nesting mostly in giant cord-grass and cattails of oligohaline marshes. CBC's: Back Bay 0('55)-65('66); Cape Charles, 3('66)-24('65); Little Creek, 0('64)-10('68); Chincoteague, 0('51)-11('68). Counts indicate stability, but this "over-builder" is entirely dependent on tall marsh vegetation. Food: Mainly grasshoppers.

**Cistothorus platensis stellaria.** Short-billed Marsh Wren. Rare to plentiful in winter on the coast. Peterson (1947) gave Northern Delaware as the southern breeding limit of this wren, but Murray (1952) presented evidence for its breeding in southeast Virginia; Pungo, 17-20-V-32, 6 pairs. Acted as if breeding, Howell; Sandbridge, 1951, VI & VII, 5 singing, Grey; VII, young bird seen, Rountrey. CBC's: Back Bay, 0('69)-37('66); Chincoteague, 0('67)-20('64); Cape Charles 2('69)-13('68). Absence for 7 years at Newport News after being present 6 years straight may indicate habitat loss. Status dependent on retention of high marsh habitat.

**Family Mimidae**

**Dumetella carolinensis.** Catbird. Especially in shrub swamps and brush of wet or moist sites; 80 pairs per 100 acres of shrub swamp, Prince Georges Co., 1945 (Stewart and Robbins, 1958). The few wintering seem to prefer swamps and shrubby shores.
Family Sylviidae

*Polioptila caerulea*. Blue-gray Gnatcatcher. Brushy, partially open swamp and flood-plain forests, 7 breeding pairs per 100 acres in Prince George's Co., Patuxent R., Pocomoke R., 78-59 (Stewart and Robbins, 1958). Beaverdam Swamp, 9-IV-72, 12 on 20 acres. Murray reported Cape Henry nests, 14-IV to 4-VI.

Family Motacillidae

*Anthus spinoletta rubescens*. Water Pipit. Irregular winter visitor, late X-late IV (Murray, 1952). Often abundant in winter on the coast, scarce inland. CBC's: Back Bay, 0('64)-739('57); Cape Charles, 10('67)-1414('68); Chincoteague, 1('67)-510('70). Hopewell had 300 in '61. If Back Bay and Little Creek counts are indicative, this wagtail may be decreasing, although the largest count (1726) was in '70.

Family Vireonidae


Family Parulidae


*Vermivora bachmani*. Bachman's Warbler. Peterson (1947) said this swamp bird was "perhaps the rarest North American songbird". Murray (1952) reported a sighting by Weber and Griscom in the Dismal Swamp and one collected at Aylett, King William Co.

*Vermivora pinus pinus*. Blue-winged Warbler. Most numerous as transient in flood-plain and swamp forests; Pocomoke R., 5-V-51, 23; Patuxent Refuge, 10-V-50, 17 (Stewart and Robbins, 1948). Very rare on the Va. coast, although Murray (1952) believed that Bailey had found two nests near the coast.


*Dendroica discolor*. Prairie Warbler. Peterson (1947) records this warbler from mangroves in Florida but otherwise from dry areas. Murray (1952) reports it as a common to abundant summer resident all over the state but has no nest records east of Richmond. Thus Meanley's (1969) report of this species breeding in heavy swamp forests along Jericho Ditch in the Dismal Swamp from 1966 to 1969 is most interesting.

*Dendroica coronata*. Myrtle Warbler. Winters locally in flood-plain and swamp forests where poison-ivy is common and in tide-water areas with bayberries. CBC's: Dorchester Co., 6,500 (53); Ocean City, 4,001 (54). Md. migration peaks in early May and late October (Stewart and Robbins, 1958). Spring peak in April at Gloucester; spring food mainly midges.

Seiurus noveboracensis. Northern Waterthrush. Scarce transient on the coastal plain. Murray lists two V & four IX records for Cape Henry; also a specimen from the Dismal Swamp, 21-V-02. Both waterthrushes prefer streamside in wooded swamps.

Seiurus motacilla. Louisiana Waterthrush. Common summer resident in Beaverdam Swamp and probably all coastal swamps, although Murray's definite site records are from Appomattox west. Destruction of bottomland forest by beavers affects this species adversely.  

Helmitheros swainsonii Swainson's Warbler. Locally common summer resident in the Dismal Swamp, with a few occurring in the Pocomoke Swamp in Md. Dismal Swamp: Nests with eggs, 1-V to 29-VI; 11 nests found (Meanley, 1969). This rare denizen of canebrake swamps will likely decrease as its habitat does.

Protonotaria citrea. Prothonotary Warbler. Common summer resident in Tidewater and southeastern swamps. Cape Henry, 4-IV to 14-IX; nests 22-IV to 18-V, feeding young 8-VIII (Murray, 1952). Erection of bird houses in appropriate swamps would favor this beautiful warbler.

Geothlypis trichas. Yellowthroat. Common to abundant in summer, rare in winter on coast. Seems to prefer shrubby marshes and shores; less common in swamps.

Oporornis formosus Kentucky Warbler. Murray gave no nesting records east of Richmond, but said that more study of the bird's range was needed. Meanley (1969) saw only one, 23-V-69, in the Dismal Swamp during four years of breeding season studies. The species has been seen at Gloucester in Beaverdam Swamp in summer occasionally, but not until 1971 was a pair found carrying food and greatly agitated.

Wilsonia citrina. Hooded Warbler. In Va. seems largely confined to swamps on the coastal plain. Murray's only Tidewater nesting records were from Stumpy Lake and the Indian River. Meanley (1969) mentions it from Dismal Swamp as an associate of Swainson's Warbler.


Family Icteridae

Dolichonyx oryzivorus Bobolink. Transient on the coastal plain, seen in abandoned fields near water in spring. Stewart and Robbins (1958) report it as concentrating in fresh and brackish marshes in fall, especially those with wild rice, along some of the larger tributaries to the upper bay. Maximum counts: Snows Marsh, Baltimore Co., 12-IX-1899, 20,000; C.F.C. Kirkwood; Pocomoke R., Worcester Co., 16-IX-50, 2,000, J.H. Buckalew; Anne Arundel Co., 8-V-54, 431, PAD.  

Sturnella magna. Eastern Meadowlark. Breeds in hayfields and over-grown pastures; also in tidal marshes with salt meadow hay, black grass, switchgrass and American three-square. Somerset Co. had breeding densities (pairs/100 acres) of 5 in switchgrass and 7 in saltmeadow hay. Ocean City had a CBC of 4,167 in '55.

Aglæus phoeniceus. Red-winged Blackbird. One of the first birds noticed at Jamestown, the "redwing" is probably more abundant now. Murray (1952) reported it as abundant from Richmond east, with eggs by 10-IV. It is often the most abundant species in CBC's. A count of 10,000,000 occurred at Norfolk in 1960, lowest of 7 years there being 1,500,000 in 1957. No count of the 10 perused missed this species, although only 5 appeared at Hopewell in '64. More stable than most ducks, red-wing stability seems exemplified by Newport News, 106 ('64)-2,804 ('66), and Back Bay 599 ('51)-1,290,000 ('67). Vital statistics certainly indicate any recent increase in abundance.  

Xanthocephalus xanthocephalus Yellow-headed Blackbird. Rare straggler from the west. Murray gives a 29-VIII-12 record of two at Wallops I. Norfolk, 18-I-69, 1, GAG. Chinootague, 6-IX-69, 1, RWT.
**Quiscalus mexicanus.** Boat-tailed Grackle. Murray (1952) reported it as a summer resident of the E. Shore, wintering only in mild seasons. Although reporting it as much less common than when Bailey wrote in 1913, he recorded an examination of 27 nests by Handley in Northampton Co., 17-V-34. If indeed it had decreased, an irruption must have occurred by the time 3330 were estimated at Chincoteague Causeway, 13-IX-55, by Scott and Steirly. Grandview, Hampton, IV, V-62, "in some numbers", JAP et al. Nesting: Chincoteague, 12-V-62, 3 nests with young, PBS. It now nests in Gloucester Co. and perhaps at other places along the lower Bay.

**Euphagus carolinus.** Rusty Blackbird. Uncommon transient, scarce to plentiful in winter, esp. in swamps. CBC's: Back Bay, 0(6 years)–1600('60). Ft. Belvoir, 5('69)–476('58). Usually absent at Hopewell and Newport News. Seems tied to swamps with sizeable trees, probably not increasing.

**Euphagus cyanocephalus.** Brewer's Blackbird. Rare winter straggler from the prairies, not listed by Murray. Perhaps more common than reports indicate. Princess Anne C.H., 26, XI-56, 50, PSD. Hampton, 28-V-61, 3, CWH, WPS. CBC's: Norfolk, 3('60), 1('61). Back Bay, 1('70).

**Family Fringillidae**

**Carduelis tristis.** American Goldfinch. Often concentrates in winter and spring in flood-plain and swamp forests (Stewart and Robbins, 1958). In Beaverdam Swamp, Gloucester Co., Va., it feeds on seeds of wetland species in summer and fall, and on sycamore leaves in spring.

**Ammmodramus sandwichensis.** Savannah Sparrow. Characteristic of weedy fields, high saltmarsh meadows and beach grass of barrier islands. Breeds on Assateague I. Max. CBC: Ocean City, 471 in '54 (Stewart and Robbins, 1958). Murray (1952) didn't record it as breeding in Virginia.

**Ammmodramus princeps.** Ipswich Sparrow. "Scarce winter visitor on the coast" (Murray, 1952). A specimen collected by Scott at Seaford, York Co., 2-XII-49, seems to be the only record away from the coast. In the last 6 CBC's, it has appeared in nos. of 1–6 at Cape Charles, 0–6 at Chincoteague, 0–2 at Little Creek, and 0–3 at Back Bay except 21! in '70. Not considered distinct from A. sandwichensis by Mayr and Short (1970).

**Ammospiza caudacuta.** Sharp-tailed Sparrow. Breeding from Wallops I. north with a "populous colony at Chincoteague (Murray, 1952). He also referred to Bailey's statement that this species bred more commonly in salt marshes on the western side of the Bay than on the E. Shore. Murray gave Cobb I. as the northernmost wintering record, but this no longer holds, as evidenced by CBC's: Cape Charles, 7 ('68)–55('70). Chincoteague, 5('64)–49('65). Little Creek, 5 ('55)–108 ('67). Species is dependent on retention of salt marsh habitat, especially high marsh.

**Ammospiza maritima.** Seaside Sparrow. Saltmarsh sparrow breeding on the Eastern Shore and in larger marshes along the western shore of lower Chesapeake Bay. It nests in the upper salt marsh and breeds abundantly in Mathews Co. (P. R. Scott, pers. comm.). On the York R. it is common at Terrapin Pt. marsh in New Kent Co. CBC's: Cape Charles, 7('66)–42('70). Chincoteague, 1('64), '66) – 17('65). Little Creek, 0('57) – 79('64). This sparrow is apparently the most common nesting bird in the high salt marsh. Studies should be made of the local ecology, since high marsh is generally considered of little value and is apt to be sacrificed in many places.

**Passerella iliaca incertae.** Lincoln's Sparrow. Rare transient and winter resident. Murray gave no "records east of the upper Piedmont". The last 6 years of the 4 coastal CBC's give 3 records each for Cape Charles, and Back Bay and 2 for Little Creek, where 3 appeared in '69. Lincoln's "melodious skulker" breeds in bogs and tamarack swamps. Wet areas with heavy grass and herbaceous growth likely favor it in winter.
Passerella georgiana. Swamp Sparrow. Winter visitor frequent in swamps, often abundant along shrubby shores. Shyness seems to keep it from feeders. CBC's ('65-'70): Chincoteague, 120-334. Cape Charles, 199-444. Back Bay, 93-811. Little Creek, 71-153. At Back Bay it outnumbered the Song Sparrow 4 times, but never has at Chincoteague or Cape Charles. Breeds in northern marshes. Recent high counts likely reflect better habitat coverage.

Passerella melodia. Song Sparrow. Frequent to abundant in winter along shrubby shores. Frequent in open swamps. Murray listed specimens collected at Jamestown I, 10-V-51; Onomo, Mathews Co., 8-V-51; and Little Creek, 22-V-40; but gave no nest records. This is the only bird resident at VIMS, frequenting a hillside briar patch. CBC's (6 yrs): Back Bay, 122 ('65)-948 ('70). Little Creek, 88 ('67)-325 ('68). Cape Charles, 259 ('65)-1210 ('67).

Plectrophenax nivalis. Snow Bunting. Barrier beach sand dunes and sandy shores of Chesapeake Bay in winter; Ocean City, 29-I-06, 150, F.C. Kirkwood; CBC (55), 146; Gibson I, Anne Arundel Co., 28-XI-52, 25, Mrs. W. L. Henderson and Mrs. G. Tappon. Regular winter visitor although uncommon on the coast (Murray, 1952).
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MAMMALS OF WATER, WETLANDS, AND BARRIER ISLANDS

Order Insectivora
Family Talpidae
Condylura cristata (L) Star-nosed Mole. Damp meadows, marshes and swamps; swims among cattails and under ice. Dismal Swamp, and Richmond and Northumberland Cos. (Handley & Patton, 1947).

Family Soricidae
Sorex longirostris fisheri Merriam. Southeastern Shrew. Swampy thickets. Known only from the Dismal Swamp, where it is seemingly common (Bailey, 1946).
Biarna telmalestes Merriam. Dismal Swamp Shrew. Most common in dense undergrowth and cane brakes; known only from the Dismal Swamp (Handley & Patton, 1947).

Order Lagomorpha
Family Leporidae
Sylvilagus palustris Marsh Rabbit. Swamp and freshwater marshes. Known in Virginia only from Nansemond, Norfolk and Princess Anne Cos. (Handley & Patton, 1947).

Order Rodentia
Family Sciuridae
Sciurus niger L. Fox Squirrel. Last reported from Cape Charles and the Dismal Swamp in 1895, the fox squirrel has probably been extinct on the coastal plain of Virginia since the 19th century.

Family Castoridae
Castor canadensis Kuhl. Beaver. Extirpated from Virginia in 1911 and reintroduced in 1932, the beaver soon became a nuisance on much of the coastal plain. Its full ecological effect would be difficult to assess, but it obviously has destroyed at least hundreds of acres of flood plain hardwoods by flooding them. Sweet gum is a preferred food in Va. It girdles large trees and cuts those under 8-12 in. The trees usually "hang up" so that little food is obtained from them. Pine and red cedar are even more relished, altho generally scarcer. Beavers have benefited wood ducks by pond-building, but in the long run are probably detrimental by killing large nest trees.

Beaver pelt take in Va. was 4,184 in '66-67; 785 of those coming from Caroline Co. Habitat destruction by the beavers themselves and by man may be expected to decrease the Va. population, regardless of fur prices. A specimen killed on the Parkway in York Co. weighed 48 lbs, one from Gloucester Co. 42 lbs. It would be interesting to know if the subspecies carolinesis native to Va. had the habit of making winter food caches as does the introduced canadensis. These poles and limbs stored underwater seem to be rarely, if ever eaten, thus making the beaver far more destructive than it might originally have been in the state.

Family Cricetidae
Oryzomys palustris (Harlan) Marsh Rice Rat. Paradiso & Handley (1965) found rice rats in the wetter portions of marshes on Assateague Island in abundance. Bailey (1946) reported it from Westmoreland, Richmond, and New Kent Cos. as well as the coast.
Peromyscus gossypinus (Le Conte) Cotton Mouse. Known in Va. only from the Dismal Swamp, altho records since 1895, when it was numerous in or near cane, seem to be lacking (Handley & Patton, 1947).
Peromyscus nuttalli (Harlan) Golden Mouse. The type was described from "Norfolk" in 1832. In Coastal Va. it is known only from the Dismal Swamp, where it is likely scarce or rare, nesting above ground in tangles.
Microtus pennsylvanicus Ord. Meadow Vole. Bailey (1946) believed this species to be "the most common mammal found in the United States east of the Mississippi River". Paradiso and Handley (1965) said, "this is undoubtedly the most numerous mammal on Assateague Island". In 1956 they took 60 from a line of 100 traps in one night. The habitat was tall grass and myrtle at a pond edge. In the summer of 1969 I found them so abundant on Cedar and Parramore Islands that large patches were nearly denuded of beach grass behind the dunes.

Ondatra zibethicus (L) Muskrat. Fresh and saltwater marshes and swamps. Most common in low salinity and freshwater marshes along the Rappahannock, Piankatank, Mattaponi, Pamunkey and James Rivers. Paradiso and Handley (1965) found it "not numerous" on Assateague I. Most important furbearer in North America and certainly so in Virginia. Preferred foods are roots of Olney three-square, cattails and pickerel weed. Arrow-arum seems usually shunned. The mink is their traditional predator, but raccoons and red foxes may be more important in Virginia.

Synaptomys cooperi Southern Bog Lemming. The subspecies helenautes is confined to the Dismal Swamp. Hall & Kelson (1959) list S. c. stonei as occurring "south along Atlantic Ocean and Chesapeake Bay and up E. side Potomac River to Maryland: Hyattsville". However, no coastal plain records for Virginia were noted, thus the subspecies are well separated.

Family Muridae
Mus musculus L. House Mouse. Abundant in all habitats except sparsely vegetated dunes at Assateague I (Paradiso & Handley, 1965).

Family Zapodidae
Zapus hudsonius (Zimmerman) Meadow Jumping Mouse. Relatively common at Assateague I. Seven specimens collected in grass bordering freshwater and behind dunes (Paradiso & Handley, 1965).

Family Capromyidae
Myocaster coypus (Molina) Nutria. Introduced and now abundant in the Back Bay area. The nutria occupies the same habitat as the muskrat but is a grazer rather than a root-feeder. It has reduced muskrat numbers in Louisiana. Prices for pelts are very low. The meat is tasty but seems mainly used as catfish food, testimony to our opulence.

Order Cetacea
Family Ziphiidae

Family Physeteridae

Kogia breviceps (Blainville) Pygmy Sperm Whale. Seen four times in early spring in the vicinity of Cape Henry (Handley & Patton, 1947).

Family Delphinidae
Stenella plagiodon (Cope) Spotted Porpoise. Hypothetical. Either this species, or S. frontalis was probably the dolphin washed ashore on Assateague I, 28-IX-56 (Paradiso & Handley, 1956).

Family Stenidae
Steno bredanensis (Lesson). Rough-toothed Porpoise. The U.S. Nat. Museum has a specimen from Norfolk, taken before 1867 (Handley & Patton, 1965).


Tursiops truncatus (Montague) Atlantic Bottle-nosed Dolphin. This is the only cetacean which enters the lower York R. Handley & Patton reported it from "the vicinity of Washington, D. C."

Globicephala melaena (Traill) Atlantic Blackfish. Along the coast at Cape Henry, Smith I. and Chincoteague I. (Handley & Patton, 1947, as G. ventricosa). However, Paradiso & Handley (1965) state that a specimen washed ashore on Assateague I, May 1956, represents the southernmost record in the western Atlantic.

Family Balaenopteridae

*Balaenoptera physalus* (L) Fin-backed Whale. A large specimen stranded at the southern tip of Assateague I. in May, 1955. Another 30 ft. in length, entered the James R., 11-IV-66, and stranded on the north shore near Brandon Pt. "Pokey" had been shot about 30 times, presumably off the coast. The incident was closely studied by Fred Biggs of VIMS.


*Megaptera novaeangliae* (Borowski) Hump-backed Whale. Paradiso & Handley reported the finding of a vertebra of this rare whale near the southern tip of Assateague I.

Family Balaenidae

*Balaena glacialis* (Borowski) Atlantic Right Whale. Handley & Patton provide an interesting account of one which entered the North River, off Mobjack Bay in the fall of 1856, where Dr. P. A. Taliaferro dispatched it with a double-barreled shotgun; an impressive feat since the great beast was 46 ft. long and ca 20 ft. around. The only change in attitude toward marine mammals, esp. large ones, that man has made since then is to use larger weaponry.

Order Carnivora

Family Canidae

*Canis lupus lycaon* Timber Wolf. Now extinct over most of its range, this eastern subspecies was abundant when English colonists arrived. John Smith, William Byrd and John Clayton all wrote of it (Handley & Patton 1947).

*Vulpes fulva* (Desmarest) Red Fox. This favorite of genteel hunters is found mostly in upland brushy areas. In the Saxis marshes on seaside of the Eastern Shore it is said to actually live in the marsh, where it preys on muskrats to some extent (Charles Gilchrist, pers. communication). Even here its chief food would probably be meadow voles. Paradiso and Handley (1965) reported it from Assateague and Wallops islands.

Family Ursidae

*Ursus americanus* Black Bear. In eastern Virginia, confined to the Dismal Swamp where it is considerably dependent on fruits of the black gum, bears killed by hunters often being shot out of gum trees. One killed in the Dismal Swamp in 1944 was estimated to weigh ca 700 lbs. (Handley & Patton, 1946).

Family Procyonidae

*Procyon lotor* (L). Raccoon. Usually most common in swamps and along water courses. Increasing scarcity of den trees should curtail its numbers, but since it has no significant predators except man and his dog, it sometimes becomes so abundant that many die from distemper. It is said to be the chief predator of muskrats, preying on the young (Charles Gilchrist, personal communication).

Family Mustelidae

*Mustela vison* mink Peale and Beauvois. Mink. Scarce, all counties. Mice and rabbits are the usual food, but frogs, snakes, salamanders, birds, crayfish and muskrats are also taken.

*Lutra canadensis* (Schreber) River Otter. Wooded stream bank and marshes. Most abundant in coastal plain swamps (Handley & Patton, 1947). Frequent in marshes, we noted scats consisting solely of blue crab skeletons in one marsh. Crayfish and minnows appear to be commonly eaten along creeks.

Family Felidae

*Lynx rufus rufus* (Schreber) Bobcat. Now gone from the coastal plain except in the Dismal Swamp. Rabbits, mice and squirrels are the usual food (Handley & Patton, 1947).

Order Pinnipedia

Family Phocidae

*Phoca vitulina* L. Harbor Seal. Frequently seen along the coast. Handley and Patton (1965) mention four specimens from the lower James R. and Chesapeake Bay off Back R., York Co. Numerous individual seals have been shot in recent years and found wounded on beaches.
Order Artiodactyla
Family Cervidae
*Cervus nippon* Temminck. Sika Deer. This Asiatic deer had increased to about 1000 by 1965 on Assateague I. Another herd occurs on James I, Md. (Paradiso & Handley, 1965).

*Odocoileus virginianus* Zimmerman. White-tailed Deer. The Virginia white-tail is abundant on Parramore I and is frequently seen on other barrier islands. It also feeds occasionally in freshwater marshes.

Family Bovidae
*Capra hircus* L. Domestic Goat. Assateague I. herd numbered between 60 and 100 in 1965 (Paradiso & Handley, 1965). Herd on Watts I. has caused a browse line (Kenneth Marcellus, pers. communication).

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