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On the Presence of Three Vascular Plants, *Melothria pendula, Carex extensa,* and *Aneilema keisack,* in Maryland

ABSTRACT: Distributional data on three species of vascular plants, *Melothria pendula, Carex extensa,* and *Aneilema keisack,* are presented for tidewater Maryland. *M. pendula* is added to Maryland's flora. *C. extensa,* although previously collected, is reported upon for the first time in Maryland. *A. keisack* was [collected] on Maryland's Eastern Shore for the first [time].

Numerous strand and wetland vascular plant distributional data were collected by the authors during 1971 and 1972. This work was collateral to participation in Maryland's wetland mapping program and other management functions. Observations were made throughout the 16 tidewater counties and the City of Baltimore. Data for more than 100 species from over 200 sites were collected. Three of these species, *Melothria pendula* L., *Carex extensa* Good., and *Aneilema keisack* Hassk., have not been reported previously from Maryland. Consequently a number of herbarium examinations were conducted. Based upon these examinations and our observations and collections, it became apparent that all three species have been overlooked in Maryland.

M. pendula is an addition to the State flora; *A. keisack* and *C. extensa* have been collected only a few times in the past, although they have not been reported in the published literature. A more detailed elaboration of the status of all three species is given below. Present collection localities are shown on Fig. 1; voucher specimens will be deposited in herbaria at the Academy of Natural Sciences of Philadelphia (PH) and the University of Maryland (MARY).

In 1971 and 1972 *M. pendula* was found by the authors in the understory of a loblolly pine stand along the Chesapeake Bay about one-half a mile north of Flag Ponds in Calvert County, Maryland. It was also collected by Dr. Russel G. Brown at College Park, Maryland in the summer of 1973.

Although Fernald (1950) acknowledged that *M. pendula* formerly occurred as far north as Pennsylvania, we found no voucher specimens collected from Pennsylvania, Delaware or Maryland. Likewise, Mercer (1971) did not report it from Calvert County, Maryland, the county in which we recently collected it. However, two herbaria had collections from Virginia, the northern-most state in which this species is currently thought to occur. Thus, our collection represents either an extension of the range of *M. pendula* to Maryland or possibly its re-discovery.

C. extensa was found by the authors at two brackish marsh sites (Rock Creek and Dames Quarter Creek) in Somerset County, Maryland, on June 28, 1972, and at one site (Windsor Creek) in Wicomico County, Maryland, on August 11, 1972. Fernald (1950) maintained that this sedge was found only locally in coastal areas of New York and Virginia. Our herbaria searches, however, uncovered collections from southern Dorchester County, Maryland, by Neil Hotchkiss in 1961 and from Somerset County southwest of Dames Quarter by Francis Uhler in 1948. Both of these collections were also from brackish marshes where this species could be presently well-established in Maryland.

A. keisack was found in Wicomico County, Maryland, about three miles south of Salisbury along the Wicomico River on September 7, 1971. To the best of our knowledge, this represents the first *tidewater* collection of this species on Maryland's Eastern Shore and possibly for the entire State. It was growing above the intertidal zone on the edge of a fresh water tidal marsh. On October 11, 1971, it was also found on Mattawoman Creek in Charles County, Maryland, along the bank of a tidal creek in a wooded swamp and in a fresh tidal marsh. Fernald (1950) stated that this species occurred only in southeastern Virginia and East Asia.

Although our collections document the existence of *A. keisack* in Maryland, its presence on Mattawoman Creek was established at least by September of 1970, when beds were examined by Francis Uhler and Neil Hotchkiss of the Patuxent Wildlife Research Center. In addition, two herbarium specimens were collected in 1949 and 1950 at a non-tidal site on the Patuxent Wildlife Research Center in Maryland.

More study of vascular plant distribution in tidewater Maryland should further clarify the status of these and other wetland species. Higman (1972) mentioned a need for such study after comparison of two major checklists of Chesapeake Bay plants (Krause et al. 1971; Wass 1972) with an intensive local survey in Anne Arundel County, Maryland (Higman 1968). The local survey yielded a few species additional to both of the broader ones. In recognition of this need for better distribution data, the authors will continue their collections.

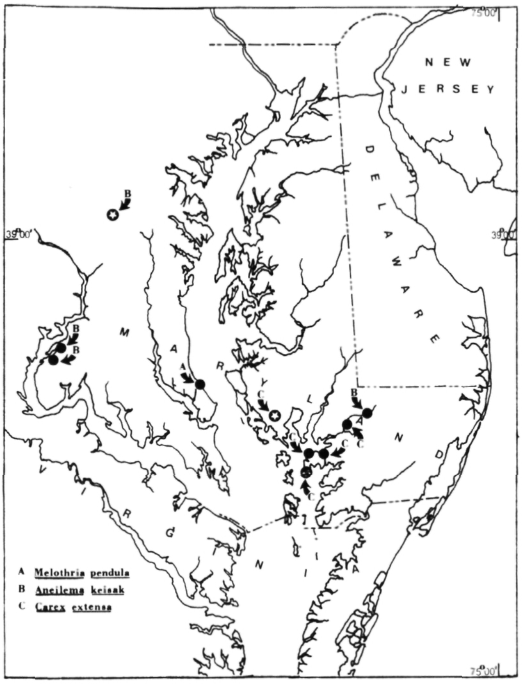

Fig 1. Map of Chesapeake Bay indicating collection sites. Areas with stars represent collection sites of specimens examined in herbaria. Herbaria collection sites are approximate.

The authors appreciate the use of the herbarium facilities at the New York Botanical Garden, University of Pennsylvania, Academy of Natural Sciences of Philadelphia, University of Delaware, University of Maryland, Patuxent Wildlife Research Center, National Museum of Natural History, Towson State College and Harvard University. Dr. E. Schuyler of the Academy of Natural Sciences of Philadelphia and Roman Gankin reviewed the manuscript. Pat Firesheets assisted by typing it.

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A New Electronic System for Counting and Measuring Bivalve Larvae

ABSTRACT: A particle measurement computer system was successfully used to measure lengths and areas of *Mercenaria mercenaria* larvae. This method can be used to expedite larval shellfish measurements and has applications for enumerating bivalve embryos.

Measurements of bivalve larvae are used to determine their growth responses under various experimental conditions (Calabrese and Davis 1970) and are also used as aids to their identification in the plankton (Loosanoff et al. 1966; Chanley and Andrews 1971). Recently implemented programs to assess the effects of marine contaminants on bivalve larvae will produce large numbers of samples for survival and growth determinations. Measurements have traditionally been made with ocular micrometers because of the small size of the larvae, and populations with wide growth variations required measurements of many individuals. The task of obtaining measurements through a microscope is a tedious one. This paper discusses the suitability of the Millipore[1] particle measurement computer system (πMC) for measuring and enumerating larval bivalves and reports some measurements made of laboratory reared larvae of the hard clam, *Mercenaria mercenaria*.

The πMC system consists of a microscope, television camera and monitor, and a digital analyzer. The magnified image from the microscope is transmitted to the television monitor, and, on command, larval images in an entire field are counted and measured automatically. Small contaminating particles can be eliminated from counts by the use of a lower limit

[1] The use of trade names in this paper does not imply endorsement by the National Marine Fisheries Service.

selector. Data can be automatically summed for successive microscope fields. Through the use of a light pen, measurements of individual larvae can be made. Measurements can be made of projected length, longest dimension, and area. Counts and measurements are displayed on the television monitor in units of micrometers or square micrometers. Provision can be made for an automatic print-out of the acquired data.

Samples containing up to 500 larvae in about 1 ml of water are placed on an uncovered Sedgwick-Rafter microscope slide for analysis by the πMC. Overlapping particles are counted or measured as single particles by the instrument; hence, crowding of the slide with larvae or excessive debris must be avoided.

Although rapid counts of bivalve eggs or other particles can be made with the πMC, we were unable to use the instrument for making differential counts of living and dead larvae. The instrument has an adjustable threshold to allow selection of particles different in gray values from their surroundings, but there is insufficient contrast between living and dead larvae to enable the instrument to make the necessary separation. Sufficient contrast for machine differentiation of live and dead larvae might be achieved with vital staining.

The πMC is most useful as a tool for measuring individual bivalve larvae. The longest dimension, an orientation independent quantity, is the most valuable of the various linear measurements possible with this instrument. For *M. mercenaria,* and most other bivalves, the shell length is greater than height throughout the larval period (Loosanoff et al. 1966; Chanley and Andrews 1971), and measurement of the longest dimension will be a measurement of length. Length has been reported most widely in the literature. For species in which the height becomes greater than the length as larvae mature, measurements of the longest dimension are still usable in determinations of the relative growth rates of cultures.

Loosanoff (1959) found a high correlation between length and height measurements for *M. mercenaria* larvae and concluded that nothing new would be added to an analysis of growth by reporting both parameters. We were particularly interested in comparing area and length as measures of larval growth. Utilizing the πMC system to measure larval areas and longest dimension, we obtained the data plotted in Fig. 1 for 1,600 *M. mercenaria* larvae. The linear relationship between length and area for *M. mercenaria* larvae for lengths up to 180 μ is expressed by the following equation: $Y = -14{,}386 + 191.7X$. The correlation coefficient of this relationship is very high ($r = 0.99$), indicating that length is as adequate a measure of size as area. Although not many were measured, our data indicated a slightly more rapid increase in area for corresponding increments in length for larvae larger than 180 μ, reflecting the more rapid growth in height of older specimens.

Loosanoff et al. (1966) and Chanley and Andrews (1971) reared a number of species of bivalve larvae and reported their length and width measurements as aids to their identification. The use of area measurements or shape factors for different bivalve larvae may further contribute to the identification of these larvae in the plankton. The aspect ratio, T, is a direct index of the elongation of a particle and is defined as $T = \pi L^2/4A$, where L is the longest linear dimension and A is the area. The longest dimensions and areas of *M. mercenaria* were measured using the πMC, and the calculated aspect ratios are plotted in Fig. 2. There was a tendency for larger larvae to have lower T values, indicating more circular particles. The larvae of other bivalve species should be similarly analyzed to

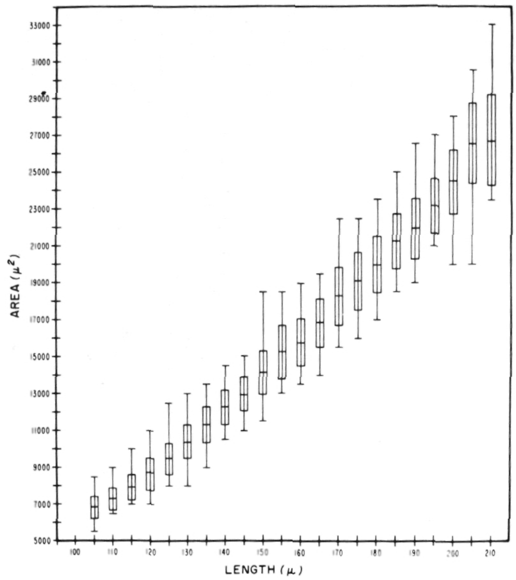

Fig. 1. Relationship between length and area of *Mercenaria mercenaria* larvae. The mean, standard deviation (boxed values) and range (extended lines) of area values are given for each corresponding length.

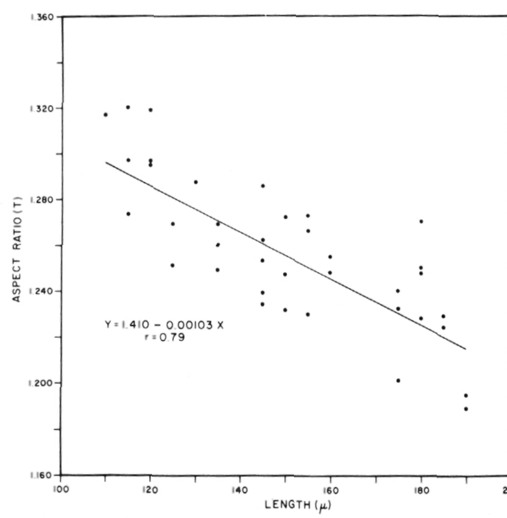

Fig. 2. Relationship between mean length and mean T values of *Mercenaria mercenaria* larvae (Each point represents the mean of a sample of 50 individuals).

see if significant differences in shape factors can be found and used as aids to identification.

The performance specifications for the πMC indicate a probable error of ± 2.7% for a single measurement of the longest dimension and ± 2.4% for a single measurement of the area. The magnitude of this error is similar to that encountered in manually aligning and measuring larvae with an ocular micrometer. In a large sampling program, the superiority of the πMC system over conventional techniques is obtained from a reduced probability of operator bias, reduced operator fatigue, consistent results between operators, and increased speed in sample handling and data processing.

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A Remotely Operated Shallow Water Benthic Suction Sampler[1]

Introduction

Traditional grab-type samplers are inadequate in many benthic sampling situations because of their following shortcomings: 1) escape of motile epifauna before closing of the jaws; 2) penetration to different substrate depths in different sediments; and 3) failure to close completely in shelly or coarse deposits. Spring loaded grabs alleviate some of these shortcomings, but most are not suitable for use from a small boat.

Suction samplers as used by Brett (1964), Haven et al. (1966) and Hughes and Thomas (1971a, b) have few of the drawbacks of conventional sampling devices. Massé (1967) and True, Reys and Delauze (1968) showed that suction samplers recover a greater biomass, a greater number of individuals and a greater number of species than grab-type samplers. Holme (1971) recommended diver-operated suction devices for macrofaunal sampling from small boats and when deep penetration is required. The presence of a diver, however, could cause the loss of motile epifauna. Similarly, the selection of a sampling spot by the casting of a ring (Brett 1964, Haven et al. 1966) or the implantation of a cylinder into the substrate (Emig and Leinhart 1967) would likewise result in loss of motile epifauna. The suction samplers designed by True et al. (1968) and Della Croce and Chiarabini (1971) were surface operated, thus dispensing with the need for a diver, making it more practical for use when water temperatures are low. The disadvantages of these samplers are their bulk and expense of construction.

I wish to thank Dexter S. Haven for his support throughout this project. I also gratefully acknowledge the contributions of Finn H. Larsen who built the sampler, Franklin and Kenneth Walker for technical assistance, and Jon A. Lucy, Jerome P. Sovich, and Asbury H. Sallenger, Jr. for underwater observations.

Description

A sampler that combined the simplicity of Brett's (1964) model and the surface control aspect of that of True et al. (1968) was built. This was essentially a 22 gauge stainless steel elbow with a 12.7 cm diameter and a 90° bend (Fig. 1). The distal end was extended 20 cm and the suction end 13 cm. This allowed an effective sampling depth of about 25 cm. At the elbow a 3.8 to 1.9 cm reduction nipple was fitted to aim down the axis of the distal arm. The large end of the nipple was fitted with a T-valve to allow for the bypass of water, thereby controlling the suction power. This feature is useful when the apparatus is diver-operated for the purpose of obtaining sediment samples. A single oyster tong shaft was fastened to the T-valve to permit lowering of the sampler. A mesh collecting bag was attached to the distal end of the sampler with an automotive hose clamp. Mesh sizes of 437, 505, and 700 microns were used and all appeared practical. A three horsepower, air-cooled, centrifugal water pump was connected to the sampler by a 3.9 cm fire hose (Fig. 2).

Operation

Trial sampling indicated that the best results occurred when the sampler was lowered from an anchored boat and lightly seated into the bottom to prevent escape of motile epifauna. Sampling began when the pump engine was started by an assistant. An

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