

STATUS REPORT: FRESH WATER AND TERRESTRIAL MOLLUSKS

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(fresh-water mussels, Bivalvia: Unionidae)

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(land snails, Gastropoda: Stylommatophora)

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These five persons composed the formal Symposium Committee on non-marine and estuarine Mollusca. Each was able to attend the Symposium and the Committee's deliberations. However, the Chairman assumes sole responsibility (and the possibility of discredit) for status-decisions and attendant information, though these be advanced in the name of the entire Committee.

Additional useful data were obtained directly or indirectly from Daniel J. Bereza, Leslie R. Hubricht, David H. Stansbery, George A. Te, Fred G. Thompson, and Kirk E. Wright.

Thanks (and apologies, as appropriate) are extended to persons inadvertently omitted above and to individuals who conscientiously, though anony-

mously, came and went during Committee deliberations. There were several of the latter folk.

Parenthetical taxonomic expressions following the names of Committee members reflect the specialty of each. Absence of such annotation indicates that a given member has a more or less broad knowledge of South Carolina mollusks, but no avowed research orientation in malacology.

THE TAXA

Mollusca

Bivalvia

Palaeoheterodonta

Unionoida

Unionacea

Unionidae (treated by Fuller later in this volume)

Heterodonta

Veneroida

Corbiculacea

Corbiculidae

Corbicula manilensis (Philippi)

(treated by Fuller later in this volume)

Sphaeriidae

Eupera cubensis (Prime)

Gastropoda

Streptoneura

Mesogastropoda

Viviparacea

Viviparidae

Viviparus intertextus (Say)

Valvatacea

Valvatidae

Rissoacea

Hydrobiidae

Gillia altilis (Lea)

Cerithiacea

Pleuroceridae

Goniobasis catenaria (Say)

G. proxima (Say)

Euthyneura

Basommatophora

Lymnaeacea

Lymnaeidae

Ancylacea

Ancylidae

Ferrissia mcneili (Walker)

Planorbidae

Helisoma magnificum (Pilsbury)

Physidae

Physa sp.

"Higher" (in this case, above the family ("-idae") level) molluscan classification remains in flux. The suprafamilial arrangements chosen for this report are those of Newell (1965) (Bivalvia) and Taylor and Sohl (1962) (Gastropoda). Anyone newly interested in acquiring a knowledge of South Carolina (or other) mollusks is advised that he *will* encounter conflicting systems. The beginning student (in particular) is additionally advised that, apart from taxonomic equivocations, such works as Barnes (1968) (a textbook) and Morton (1960) (an equally readable biological treatise) offer easily obtained, excellent avenues to an understanding of the role of the phylum Mollusca in natural history.

Individual species cited in the tabulation above are restricted to those animals that are actually mentioned in the present paper. This book offers supplemental accounts of the fresh-water mussels (by Fuller, below) and land snails (Grimm, below*). The object of all this material is to provide anyone, however inexperienced he or she may be, an accurate (though admittedly incomplete) *introduction* to the non-marine and estuarine mollusks of South Carolina.

The purpose of this paper is to provide the reader, layman and specialist alike, an introduction to South Carolina fresh-water mollusks with an emphasis upon taxa in jeopardy. Other mollusks (i.e., those that are characteristic of terrestrial, marine, or estuarine environments) are treated elsewhere in this book.

Mollusks (phylum Mollusca) include most soft-bodied animals that inhabit a hard shell composed chiefly of calcareous compounds. These invertebrate organisms are exemplified by such familiar creatures as tusk shells, coat-of-mail shells (chitons), clams, mussels, oysters, snails, squids, and octopuses. Two of these groups concern us here: snails (class Gastropoda) and clams and their relatives (class Bivalvia).

The latter group consists entirely of aquatic organisms. In South Carolina it is represented by pill, pea, and fingernail clams (family Sphaeriidae); fresh-water mussels (family Unionidae); and in introduced exotic, *Corbicula manilensis* (Philippi), the Asiatic clam (family Corbiculidae). Each of these groups makes an important contribution to Carolinian aquatic biology.

The Unionidae include more jeopardized mollusks than occur in any other South Carolina molluscan

* The account of land snails by Grimm is unavailable for inclusion in these proceedings

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group and are additionally considered in my paper on fresh-water mussels (below).

The Sphaeriidae include no species that are known to be jeopardized in South Carolina. However, *Eupera cubensis* (Prime) is noteworthy because of its few published records. Heard (1965) indicated few records for South Carolina, but other sources list this species as common in the middle Savannah River and in Cooper River tidewaters (Patrick et al., 1967; Fuller, 1976, 1977, 1978). *E. cubensis* appears to thrive in conditions induced by moderate eutrophication (Fuller, unpublished). This species can be distinguished from all other Nearctic sphaeriids by its darkly mottled shell. It has been described by Pennak (1953), Clench (1959), Clench and Turner (1956), and Heard (1965, 1968). The concepts to which I refer in this paper is Heard's (1965). This and other sphaeriids can be identified with the help of Herrington (1962) and Burch (1972, 1975).

As an industrial fouling organism and an enemy of native benthos, *Corbicula manilensis*, however alien, is a meaningful element in The Carolinian biota. This species will be considered at greater length elsewhere in this report (see Fuller on fresh-water mussels, below). Burch (1975) showed how to distinguish the Asiatic clam from indigenous Sphaeriidae.

Unlike South Carolina bivalves, which are wholly aquatic, the snails (Gastropoda) of the State are terrestrial, as well. Land snail problems are treated separately (see Grimm's paper, below*); certain of these taxa are in difficulties. There is no knowledge that South Carolina fresh-water snails are in any degree of jeopardy, but certain of them pose problems that should be borne in mind by the Palmetto State naturalist.

South Carolina fresh-water snails are divided amongst eight families in two subclasses: Viviparidae, Valvatidae, Hydrobiidae, and Pleuroceridae (Streptoneura), plus Lymnaeidae, Ancylidae, Physidae, and Planorbidae (Euthyneura). Each of these groups poses perplexing taxonomic and ecological problems.

Our first family of gilled, operculate snails is the Viviparidae, the live-bearer snails, so-called because their young are born, not as eggs or larvae, but as miniature adults. None of these animals is known to be jeopardized in South Carolina or elsewhere. However, one of them that occurs in the Palmetto State is a rarity, and Carolina naturalists should be aware of this species. The animal is *Viviparus intertextus* (Say), which characteristically occurs in smaller streams that have fast currents. This habitat

is atypical of the Viviparidae, which favor sluggish, muddy waters. Look for *V. intertextus* in upland, sandy-bottom streams, but few specimens are likely to be found. A paper by Clench and Fuller (1965) will aid in this animal's identification.

The Valvatidae are a group of solely fresh-water snails that includes few species. This family is badly in need of thorough taxonomic revision and in most parts of the country (e.g., the Carolinas) species' identifications remain uncertain at present. Binney's (1865b) then very thorough treatment and the excellent, but somewhat extralimital, account by Harman and Berg (1971) should prove of some help.

The Hydrobiidae are a family of usually minute snails that is represented in a wide variety of habitats. Nevertheless, however widespread geographically and ecologically, these animals are seldom encountered, and to allege that they are poorly known is a charitable commentary on our ignorance of them. None is known to be jeopardized in South Carolina, but this will surely change because so many hydrobiids are restricted to fragile ecotypes, such as springs and small estuaries (see, for example, Thompson's (1968) work on this family in Florida). There is, for instance, an undescribed and endangered species in Lake Waccamaw, southeastern North Carolina (Fuller, 1977). Perhaps it will eventually be detected in the lower Waccamaw basin of South Carolina. In addition, surely there are other, also unnamed species in the State, some of which probably will (or already have been) exterminated prior to their discovery. This is especially unfortunate because of the undoubtedly important role of these animals in the food web. At least one such hydrobiid, *Gillia altilis* (Lea), a great rarity, is known from South Carolina (Mazyck, 1913) and should be viewed as at least of special concern. Some aid in taxonomic determination may be gained from Thompson (1968) and the early monograph by Stimpson (1865), which was very thorough and workmanlike in its day. *Gillia*, in particular, was treated by Pennak (1953) and Clench (1959).

Numerous populations of riversnails (Pleuroceridae) have been reported for South Carolina (Mazyck, 1913; Goodrich, 1942; Patrick et al., 1967; Fuller, 1976, 1977). Most of these have routinely been assigned to *Goniobasis catenaria* (Say), the Chain Riversnail, but some have been identified as *G. proxima* (Say). The relationship between these two nominal species remains unclear. Researches by Fred G. Thompson promise solutions to at least some of these difficulties. Pleurocerids are notoriously vulnerable to sediment

yield, but, until such studies are completed, no accurate assessment of the jeopardy status of a given South Carolinian riversnail will be practicable. For aid in coping taxonomically with riversnail problems of South Carolina, the interested reader is referred additionally to Clench and Turner (1956), Goodrich (1942), and Tryon (1873).

The air-breathing ("pulmonate") aquatic snails of South Carolina involve four families, Lymnaeidae, Ancyliidae (fresh-water limpets, in part), Physidae (tadpole snails), and Planorbidae (ramshorn snails). Because their principal mode of gas exchange occurs through lungs, most pulmonate snails are somewhat indifferent to adverse water quality and other environmental abuse. Also, most favor the water's margin and are often content to dwell on moist soil. Accordingly, none is known to be jeopardized in South Carolina, but, again, our knowledge of these animals in the State is rather poor. In any event, there are several that deserve to be considered as of special concern.

An indeterminate tadpole snail (*Physa* sp.) of the Santee-Cooper basin requires careful study and might prove to be a jeopardized endemic (G. A. Te, personal communication). The Cape Fear Ramshorn (Fuller, 1977), apparently restricted to Cape Fear basin ponds in the vicinity of Wilmington, New Hanover County, southeastern North Carolina, is a biologically extraordinary species (Bartsch, 1908) that has not been unequivocally detected for about half a century. It is considered at least threatened in North Carolina (Fuller, 1977). It is mentioned here on the strength of the possibility, however remote, that it might be encountered (or may once have occurred) in South Carolina. This species is surely everywhere of special concern, but it cannot officially be listed as such for the State, because there are no supporting historical records. Finally, *Ferrissia mcneili* Walker is a limpet that Basch (1963) ascribed to Alabama alone, but was recently identified by Fuller (unpublished) in the Cape Fear basin in southeastern North Carolina. Were the latter determination additionally verified, this species might be expected in South Carolina, also, where it would probably prove to be of special concern at the least.

OVERVIEW

The preceding few pages will have forcibly brought home to the reader a sense of the embarrassingly impoverished "state of the art" in the case of fresh-water snails in South Carolina. So much remains to

be done in mere alpha taxonomy, quite apart from badly needed researches in the more sophisticated and important disciplines of ecology and physiology! In the meantime, however, I can recommend that the reader consider some additional references, not actually specified in the taxonomic accounts above. These include a classic treatment by Binney (1865a), the eccentric handbook by Webb (1942), the great monograph by Clarke (1973), and the good, though spotty, manual by Emerson and Jacobson (1976). More or less extralimital, these works will solve few problems for South Carolina naturalists, but will help show them where those problems lie, and that is a certain advantage. Geographically more to the point, the bibliographies in Fuller (1976, 1977, 1978) may be of additional assistance.

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