

waiians, who, however, occasionally will eat the mollusk raw. The large tiger cowry (*C. tigris* Linnaeus) is collected by the Hawaiians who, after boiling the shell, remove the animal to consume it. The humpback cowry (*C. mauritiana* Linnaeus) is used more frequently than the tiger cowry by the Hawaiians. Among the smaller varieties of cowries which are used is the snakehead cowry (*C. caputserpentis* Linnaeus), which is referred to as "alea-alea."

The tiger cowry is also used by the Japanese, who throw the live shell on hot coals to roast. Cooked in this manner, the cowry tastes very much like an oyster. The humpback cowry is also cooked in this way by the Japanese.

The tiger cowry is used principally by the Filipinos, however. The animal is hooked outside the shell and dried in place. The dried animal is then fried for the meal.

Shells of the family Neritidae are used for food by the Hawaiians, the Portuguese, and the Japanese. The small *Nerita picea* Recluz is called "pipipi" by the Hawaiians, who boil it and pick the animal out with a pin or sharp stick. The larger *Nerita polita* Linnaeus is referred to as "kupee." It is very meaty, and only a few are needed to make a meal. It is collected only at night. The Portuguese both boil and fry this mollusk.

Of the limpets, Phenacolepididae, the shell which the Hawaiians call "opihii" is the shell most commonly eaten in the Islands today. It is used by all races, eaten either boiled or raw. The opihii is almost a necessity at every luau or feast, and the Japanese plantation laborers consume the mollusks with their rice. The opihii is usually gathered by women who roam the reefs at low tide, carrying old table knives or screwdrivers to pry the shells from the rocks. Opihis form an important part of the diet of most of the Hawaiian families living near the shore, and often those from the plantation camps spend their Sundays collecting the mollusks. The Portuguese are also fond of them.

Other univalves which are collected for consumption are the trumpet shells (*Cymatium tritonis* Linnaeus), the partridge tuns (*Tonna perdrax* Linnaeus), and the large helmet shells (*Cassidae*). The partridge tuns are used by the Hawaiians and

Filipinos; the trumpets by the Hawaiians and Japanese; and the helmets by all three races.

The large helmet shells, some of which weigh from five to ten pounds, are used principally by the Filipinos, for whom they are collected commercially. The shell is hung up, and when the animal extends its body, a cord is tied close to the shell so that the animal can't retreat into its shell. The animals are dried before being cooked. The Filipinos season the mollusk with tamarind, ginger, and tomatoes; and they use both the broth and meat.

Generally cone shells (Conidae) are not used, because there are several poisonous varieties. However, a few families of Hawaiians on Kauai are known to occasionally collect the large *Conus millepunctatus* Lamarck for food. It is not often used because the large shell is prized as an ornament, and the only way in which the animal can be reached is by breaking the shell.

Bivalves in the Hawaiian Islands are not too popular as food. However, the Pearl Harbor oyster (*Pinctada gatliffi* Bartsch) and a white clam (*Tellina rugosa*) are occasionally collected. The rock oyster (*Spondylus hawaiiensis* Dall, Bartsch, Rehder), referred to as "pana-pana-pubi," is dug out of its shell with a chisel and then boiled.

The Hawaiians on Kauai use practically all the varieties of mollusks found on the reefs. Often the animals are mixed together in one pot and boiled. Because there are not many specimens of any one species except for the *Nerita* and the limpets, a meal of mixed mollusks is often consumed.

SOME LAND AND FRESHWATER MOLLUSKS FROM THE COASTAL REGION OF VIRGINIA AND NORTH AND SOUTH CAROLINA

By HARALD A. REHDER¹

Our knowledge of the molluscan fauna of the coastal plain area, from Virginia to northern Florida—and indeed all the

¹ Published by permission of the Secretary of the Smithsonian Institution.

way to Louisiana—is still very fragmentary, as a glance at the distribution records given in Pilsbry's recently published "Land Mollusca of North America" will show.

This present list is intended as a contribution to filling in some of these gaps, and to spur other collectors to investigate the land and freshwater shells of this area. This is a region which, though not rich from a malacological viewpoint, offers some fascinating problems in the zoogeography of the mollusks, and will undoubtedly reward the collector with some interesting discoveries. My colleague, Dr. J. P. E. Morrison, was kind enough to check the identifications in certain critical groups. The specimens were gathered by Mrs. Rehder and myself during a trip in the fall of 1946.

Virginia Beach, Princess Anne County, Virginia: Under old boards, bricks, and debris, not far from beach.

Ventridens ligera (Say). Common. This species is apparently rare in the coastal region. The only previous published records that we have noted for this faunal area are for Wilmington and Lake Waccamaw in North Carolina. There are several other lots in the U. S. National Museum collection from Surrey County, Virginia.

Mesodon thyroideus (Say) form *bucculenta* (Gould). Common.

Triodopsis tridentata juxtidens (Pilsbry). Fairly common.

Near North Landing River, Norfolk County, Virginia: Among stones along the edge of a small stream at the junction of State Routes 190 and 165.

Ventridens cerinoides (Anthony). Fairly common. This substantiates the record for this species for Norfolk County given by W. G. Binney (Pilsbry, Land Mollusca of North America, vol. 2, pt. 1, 1946, p. 452). We have also collected it along the James River, in Isle of Wright County, Virginia, near Rescue, 25 miles northwest of Norfolk.

Near Northwest, Norfolk County, Virginia: In Northwest River, on stones and plants along edge near bridge on State Route 170.

Ammicola limosa (Say). Fairly common.

Pseudosuccinea columella (Say). Rather common; small form.

Physa heterostropha Say. Two young specimens.

Musculium truncatum Lindsley. Two specimens.

Ferrissia (Lacnapea) fusca eugrapia Pilsbry. Two specimens.

Succinea avara Say. One specimen found on the muddy bank.

South of Moyock, Currituck County, North Carolina: Along edge of creek, on State Route 170.

Retinella (Glyphyalinia) indentata paucilirata (Morelet). This is a new northern record for this species in the coastal plain area. One specimen.

Stenotrema hirsutum (Say). Fairly common.

Haplotrema concavum (Say). Two specimens.

Kill Devil Hill, Dare County, North Carolina: In leaf mulch around base of shrubbery at the foot of the Wright Memorial.

Triodopsis hepstonensis (Shuttleworth). Fairly common.

5½ miles south of Elizabeth City, Pasquotank County, North Carolina: Under bark of fallen logs in small clearing along Route 17.

Zonitoides arboreus (Say). One specimen.

Philomycus carolinianus (Bose). Two specimens.

Edenton, Chowan County, North Carolina: Among stones, bricks, etc., along sea wall bordering Albemarle Sound.

Ventridens cerinoides (Anthony). Two specimens.

Mesodon thyroideus (Say). Rather common.

Triodopsis hepstonensis obsqleta (Pilsbry). Two specimens.

A northward extension of the range of this form.

Stenotrema hirsutum (Say). Common.

Haplotrema concavum (Say). Common.

Near Washington, Beaufort County, North Carolina: Under logs and debris along edge of Tar River.

Quichella (Mediappendix) vagans (Pilsbry). One specimen of this little-collected species, filling in part of the gap between the New Jersey records and that for Lake Waccamaw, North

Carolina cited by Pilsbry (op. cit., vol. 2, pt. 2, 1948, p. 844).
Ventridens cerinoides (Anthony). Two specimens.
Retinella (*Glyphyalinia*) *indentata paucilirata* (Morelet).
 Rather common.

Polygyra postelliana carolina Pilsbry. Fairly common. This is almost sixty miles further north than the previously northernmost record for this subspecies.

Mesodon thyroideus (Say) form *bucculenta* (Gould). One specimen.

Triodopsis hopetonensis obsolcta (Pilsbry). Common.

Wilmington, New Hanover County, North Carolina: Under boards in back yard of residence of A. H. Harriss, Dock Street.
Zonitoides arboreus (Say). Three specimens.

Anguispira alternata fergusonii (Bland). Fairly common.

Triodopsis hopetonensis (Shuttleworth). Common.

Arion circumscriptus Johnston. Nine specimens. A new southern record for this species.*

Greenfield Pond, Wilmington, North Carolina: Along sandy shore.

Campeloma rufum (Haldeman). Common.

Wrightsville Beach, New Hanover County, North Carolina: Under boards and in surrounding grass.

Succinea campestris Say. Three specimens.

Triodopsis hopetonensis (Shuttleworth). Fairly common.

Lake Waccamaw, Columbus County, North Carolina: Under logs and boards at settlement on north shore. The freshwater specimens were found along the sandy shore of the lake.

Campeloma rufum (Haldeman). Five specimens.

Ventridens cerinoides (Anthony). Three specimens.

Mesodon thyroideus (Say) form *bucculenta* (Gould). Fairly common.

Triodopsis solucari (J. B. Henderson). Common.

Triodopsis (*Neochilix*) *albolabris* (Say). One specimen.

* *Lampisibis ochraceus* (Say). Fairly common.

† *Elliptio complanatus quadrilaterus* (Lea). Also fairly common.

Myrtle Beach, Horry County, South Carolina: Under boards and around planks near boardwalk.

Succinea campestris Say. Common.

Euglandina rosea Fer. One young living specimen. This is a new record for this species, about 130 miles farther north than the previous record (Yemassee, Beaufort County, South Carolina).

Mesodon thyroideus (Say). Very common.

Triodopsis hopetonensis (Shuttleworth). Common.

Gastrocopta pentadon (Say). Two specimens.

Pupoides albitabris (C. B. Adams). Fairly common.

Hawaiiia minuscula (Binney). Common. These last three species were all found together under only three pieces of board.

Myrtle Beach, Horry County, South Carolina: At outlet of small pond, near Ocean Forest Hotel.

Pseudosuccinea columella (Say). One specimen.

Helisoma anceps (Menke). Fairly common.

Helisoma triobis (Say). Two specimens.

Physa pomilia Conrad. Common. The identification is somewhat uncertain.

Ventridens cerinoides (Anthony). Not uncommon.

Helicodiscus parallelus (Say). One specimen.

Between Myrtle Beach and Little River, Horry County, South Carolina: Under fallen leaves and near fallen logs.

Ventridens cerinoides (Anthony). Five specimens.

Zonitoides arboreus (Say). One specimen.

Helicodiscus parallelus (Say). One specimen.

Anguispira alternata fergusonii (Bland). One specimen.

Mesodon thyroideus (Say). One specimen.

Triodopsis fallax (Say). One specimen.

Near Myrtle Beach, Horry County, South Carolina: In and near creek flowing into Midway Swash, at Myrtle Beach State Park, on Route 17. The land shells were found around fallen logs.

Pseudosuccinea columella (Say). Common.

Physa species. Common.

Ventridens cerinoides (Anthony). One specimen.

Ventridens ligera (Say). One small specimen that is rather depressed and thin and may be referable to Pilsbry's form *stonei*, known from New Castle County, Delaware, and from near Wilmington, North Carolina. A new coastal region record for this species.

Ventridens intertextus (Binney). One specimen, also representing a new record for the coastal area.

Mesodon thyroideus (Say). Two specimens.

Triodopsis fallax (Say). One specimen. This and the specimen recorded from the preceding locality are referable to the form that Pilsbry (1939-40, p. 811) describes from Brunswick, New Hanover, and Bladen Counties, North Carolina. Further collections in this region may show that this is a good geographic race, worthy of a subspecific name.

Haplotrema concavum (Say). One young specimen.

Between Homewood and Bayboro, Horry County, South Carolina: In small pool on State Route 701.

Physa pómilis Conrad. One specimen.

Brookgreen Gardens, Georgetown County, South Carolina: Under fallen leaves, and on bank of small stream.

Ozyloma effusa (Shuttleworth). One specimen.

Ventridens cerinoides (Anthony). Fairly common.

Triodopsis hopetonensis (Shuttleworth). Two specimens.

Haplotrema concavum (Say). One specimen.

NOTES ON THE DISTRIBUTION OF SOME TERRESTRIAL GASTROPODS IN WESTERN PUERTO RICO

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The most comprehensive survey of the land mollusks of Puerto Rico is that made by van der Schalie.¹ Many workers have published various notes on the distribution of different

¹ van der Schalie, Henry, 1948. The land and fresh-water mollusks of Puerto Rico. Misc. Publ. Mus. of Zool., Univ. Mich., No. 70.

species in Puerto Rico, but none give the complete coverage presented by van der Schalie. During the years 1946 to August, 1949, the writer was privileged to work at the College of Agriculture and Mechanic Arts at Mayaguez, Puerto Rico. From this point various collecting trips were taken into areas not well covered by van der Schalie and others. The present paper deals with a listing of localities not previously given for a number of species; primarily in the western end of the island.

The localities representing new distribution records for some species are as follows: Mayaguez: on the coastal plain of mid-western end of the island. Maricao: in the mountains about 15 miles east of Mayaguez. Lares: in mountains about 20 miles northeast of Mayaguez. Corsica: on coastal plain about 10 miles north of Mayaguez. Guanica: on southwestern coastal plain in a very arid area. Rio Abajo: north-central mountain range about 10 miles northwest of Utuado. Cerro de Punta: the highest point on the island, 4400 ft., in the Toro Negro National Forest, about 5 miles south of Jayuya, in a rain forest. El Yunque: in mountain rain forest, about 25 miles southeast of San Juan.

A listing of the new distribution records, with localities, is here given.

Helicina phasianella "Sowerby" Pfeiffer, at El Yunque. Not previously reported from central mountains.

Lucidella umbonata (Shuttleworth) at Mayaguez, Maricao, Rio Abajo, Cerro de Punta, Lares and El Yunque. Previously reported from northern and southern coastal plains.

Megalomastoma croceum, form *maricao* Clench, at Cerro de Punta.

Succinea hyalina Shuttleworth, at Maricao.

Zonitoides arboreus (Say), at Cerro de Punta.

Lamellaia unilamellatus (D'Orbigny) at Mayaguez.

Varicella calderoni H. B. Baker, at Cerro de Punta.

Laccaricella playa H. B. Baker, at Rio Abajo.

Austrosolenites concator (Férussac) at Cerro de Punta.

Austrosolenites alticola H. B. Baker, at Cerro de Punta.

Melania darlingtoni Bequaert and Clench, at Cerro de Punta.

Platysuccinea portoricensis (Shuttleworth) at Maricao, and

Cerro de Punta.