arch would then be about nineteen miles and four-tenths. I give this estimate for the purpose of showing still more conclusively that there exists in our country to-day a geological power, which, were it not confined by the rigidity of the rocks, would have sufficient energy to form hills and mountains upon as grand a scale as those which we now behold.

April 19, 1876.

The President, Mr. T. T. Bouvé, in the chair. Forty-six persons present.

The following papers were presented: —

On a Diminutive Form of Buccinum undatum ♂: — Case of Natural Selection. By Edward S. Morse.

The law of sexual selection as illustrated by Darwin, has explained the many varied features of secondary sexual characters, and the reasons for their origin and persistence. Among these features are the prehensile organs of the male, the weapons of offence and defence, ornaments of various kinds, organs for call-notes, glands for emitting odors, etc. A leading character and with few unexplained exceptions, is the frequent difference in size between the sexes.

In the struggles between males for possession, or in the struggles which often happen between males and reluctant females, the largest and more powerful males would more often win, and would more frequently perpetuate their characters as secondary sexual features. Darwin, in his "Descent of Man," has traced these marked differences in size between the sexes in crustaceans, insects, and in all classes of vertebrates.

Among certain lamellibranchiates, as Dr. Kirtland long ago observed in the Unionidæ, the difference in size and form between the male and female is oftentimes well marked, so much so, indeed, as to have led to their separation as distinct species in some cases; the female having the shell larger and more bulging posteriorly to accommodate the swollen gills when filled with eggs.

Certain gasteropods are ovoviviparous, but few, if any, observations have been made on the relative size of the sexes. Jeffreys observes that the male of *Littorina littorea* has a smoother and more

slender shell, and among the Rissoas calls attention to the often marked difference in size between the sexes, the male being smaller.[1]

The usual causes for the origin and increase of secondary sexual characters could not obtain among the gasteropods. The males do not struggle among themselves for possession, and their low mental powers preclude the idea of preference and voluntary selection, by which marked features of size and of color would arise.

Among the pectinibranchiate gasteropods the male in copulation clings to that portion of the shell of the female directly above, and to one side of the genital organs, and in this position inserts the intromittant organ, having to thrust it below the margin of the shell to accomplish the act.

In Buccinum and allied forms, the female retains her hold to the rock, and from many positions assumed by the female, the sexual act can only be accomplished with an intromittant organ of extraordinary shape and size, and the curved shape and length of this organ in Buccinum bears some relation to the difficulty of approach.

The object in making this communication is to point out some curious results of natural selection on *Buccinum undatum*, within limited areas, in which the male scarcely equalled half the length of the female.

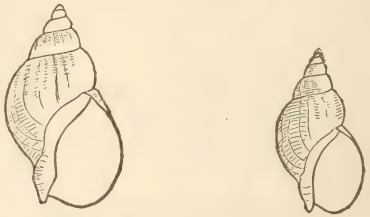
On a ledge in the harbor of Eastport, just east of the town, a small variety of *Buccinum undatum* occurs in great profusion. At the time of collecting them the sexes were pairing, and in every case (and hundreds were observed) the male was much smaller, sometimes not exceeding half the length of the female. It seemed impossible that the males could be mature, and yet they were not only found in actual connection, but an examination of the shell revealed the full number of whorls, and from other well known characters indicated the fact that they were full grown, though of diminutive size.

A glance at the condition of things at once revealed the mystery of these dwarfed males. The ledge on which these specimens were found is partly exposed at low tide, and is at all times washed by impetuous currents, so that it is quite difficult to land.

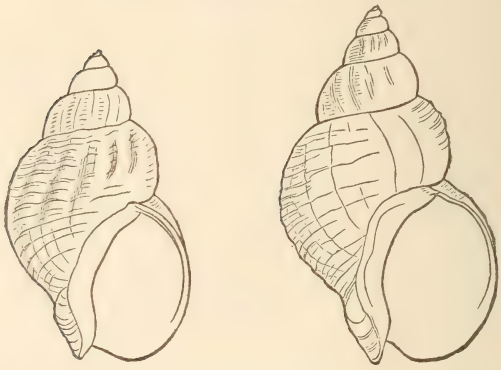
A study of the surface features of the ledge indicated the force of the tidal currents. There were no loose fragments of rock upon it, save those which were so tightly wedged in the crevices of the ledge that they could not be worked out with the hands. The specimens

[1] A more slender form of *Littorinella* (*Rissoa*) *minuta* was recognized by the lamented Prof. W. C. Cleveland as a distinct species under the name of *R. pigmenta*. He never published it, as he considered the possibility of the differences being only sexual.

of Buccinum in every case were found hid away in nooks, and concealed in the cracks and crevices marking the ledge. It was clearly obvious that only the smallest males could work their way in to such constricted quarters for the purpose of uniting with the females, and that the smaller males had the advantage over the larger males in this respect, there could be no question. The true state of the case was so instantly seen, that though hundreds of specimens were collected with the object of determining whether in any case a large male occurred, not a single exception was met with in which the female was not being fertilized by a diminutive male.



Shells of *Buccinum undatum*, male.



Shells of *Buccinum undatum*, female.

The constrained position in which these were found precluded the possibility of a large male with his cumbrous shell getting close enough to the female in her narrow quarters to perform the sexual act. The smaller males having this advantage, have from generation to generation perpetuated their dwarfed characters.

It would seem from these facts that natural selection has worked in an unusual way in producing secondary sexual characters, rarely, if ever, seen in gasteropods.

Both males and females presented a wide range of variation in the characters of the shell, some of them showing very distinctly the oblique folds so characteristic of the species, while in others these folds were scarcely visible. The shell of the male is smoother than that of the female, and is also more slender and more delicate. The figures represent normal males and females from this peculiar colony.

Critical and Historical Notes on Forficulariæ; including Descriptions of new Generic Forms and an Alphabetical Synonymic List of the Described Species. By Samuel H. Scudder.

In the tenth edition of his Systema Naturæ, Linné placed the two common species of European earwigs (*auricularia* and *minor*) in the genus Forficula, among the Coleoptera. Fabricius, in all his works, placed this genus at the head of his Ulonata (= Dermaptera DeGeer, Orthoptera auct.) following close upon the Coleoptera. Latreille, in 1796, was the first to recognize the wider separation of the earwigs from the other Dermaptera, and divided the whole order into three (unnamed) sections; of which the earwigs formed the first, Blatta the second, and the remaining Dermaptera the third. Duméril, in his Zoologie analytique (1806), recognizing the family value of the group, called it Labidoures — a name which, from its gallic dress, has no more claim upon our attention than perce-oreille. Kirby[1] subsequently maintained the ordinal character of the group, and gave it the name Dermaptera, in which he was followed in 1815 by Leach. But neither can this name be retained, since it was given by DeGeer in 1773 to the whole suborder afterward called Ulonata by Fabricius (1775), and—excluding the earwigs—Orthoptères by Olivier (1789).[2] Moreover, Latreille, recognizing it in its true character as a family of Dermaptera, had already[3] given the group the name of Forficulariæ, and this name must be retained. After tabulating the

[1] Trans. Linn. Soc. Lond., xi, 87 note (1813).

[2] By a strange oversight or neglect, the work of the distinguished Swedish naturalist, who first separated these insects from the Hemiptera of his fellow countryman Linné, has been very generally overlooked, and the term Orthoptera has been usually applied to the suborder—a name which, in its Latin form, was not proposed until 1806 by Latreille (in Sonnini's Buffon).

[3] Considerations générales sur l'order naturel des Crustacés, etc. (1810).