

XV. "SUPERTIDAL" ANIMAL COMMUNITIES IN THE PUGET SOUND REGION*

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Most ecological studies in regions along the seacoast have been restricted to those groups of animals which are for the most part restricted to an aquatic or semi-aquatic environment. In the intertidal belt the most frequent objects of attention have been those forms which are relatively inactive when uncovered by the receding tide and whose periods of greatest activity coincide with their immersion in sea water. There is, however, another group of animals associated with the region between tides, a group whose members retire before the advancing tide and whose habitat is more terrestrial than aquatic. This community is spoken of as "supertidal" to emphasize the difference between its mores and that of the more frequently studied intertidal community.

In the vicinity of Friday Harbor, Washington, where this study was begun during the summer of 1924, the tidal range is about twelve feet. Shorelines are varied from mud-flats to steep rock cliffs and afford accordingly a wide range of conditions between tide lines. In the present report, animals are listed according to families, or in some cases, according to genera, as final determinations have not yet been made.

On gravelly and sandy shores the dominant animals of the community here discussed are the Gammaridae. They are found chiefly above the mean tide line, wherever the sand is moist—under driftwood, under seaweed left by the receding tide, under stones, or in burrows in the sand. The numbers at times are enormous, the individuals seeming closely packed in favorable places. These animals are semi-aquatic and belong in a somewhat different category than most of those to be listed below.

On a gravelly beach gradually sloping between tide-marks, the ants, *Lasius niger*, and *Camponotus herculeanus* were found

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near high tide level as were a few spiders (Linyphiidae). Abundant over the surface of the sand from the water's edge to the line of driftwood at high tide was a Lycosid spider, *Pardosa* sp. At the water's edge a count showed about two spiders per linear metre. On being disturbed, either by wave action or by the approaching collector, these spiders uniformly reacted by running up the slope of the beach.

On rocky shores were found the same species of *Pardosa* and another spider belonging to the genus *Clubiona*. No spiders were found on rocks submerged at high tide and unconnected with the mainland. Flies belonging to the family Helomyzidae were abundant on shaded rocks and flying just above the water, as well as on the surface film in quiet pools. Two species of Chironomidae were also found on an isolated rocky island.

On a gradually sloping gravel-mud beach with pools of quiet water and much decaying seaweed were observed many insects, among which the flies were particularly abundant. A list follows:

Diptera

Ephydriidae (*Ephydra* sp?)

Borboridae (among seaweed) (*Leptocera limosa*)

Dolichopodidae (*Hydrophorus breviseta*) (*Dolichopus rupestris*)

Coleoptera

Staphylinidae

Carabidae

Hemiptera

Aradidae

Cercopidae

Spiders

Lycosidae—*Pardosa* sp?

Clubionidae—*Clubiona* sp?

Theridiidae—*Crustulina* sp?

Linyphiidae—Juvenile

On and over rotting seaweed were found especially:

Dolichopodidae (*Dolichopus canaliculatus*) Very numerous

(*Fucellia fucorum*)

Muscidae (*Orthellia caesarion*)

Attidae (Jumping spider)

Lycosidae—*Pardosa* sp?

The higher portion of a mudflat, covered by water only at

extreme high tide and supporting a scanty growth of *Salicornia ambigua* yielded also a large number of species, as follows:

Piptera

Ephydriidae (*Ephydra* species)

Borboridae—(*Leptocera limosa*) Abundant

Anthomyidae—*Pegomyia* sp?

Hymenoptera

Ampulicidae—*Rhinopsis* sp?

Bembecidae—*Sphecius* sp? Burrows of this species very numerous in loose sand.

Hemiptera

Aradidae

Capsidae

Spiders

Clubionidae—*Castaneira* sp?

At the upper limit of the high winter tides, on exposed sloping shores is a great deal of driftwood. Sweeping over this driftwood yielded the following Diptera:

Dolichopodidae (*Hydrophorus breviseta*)

Ephydriidae—*Ephydra* sp?

Asilidae—*Stenopogon* sp?

On and under the driftwood were found spiders belonging to the families Argiopidae, Attidae and Lycosidae, as well as Collembola and Thysanura. Silphid beetles and the wasp *Polistes variatus* were also present. On rocky shores Chironomidae belonging to the genera *Orthocladus* and *Chironomus* were collected.

The above preliminary account is sufficient to indicate the importance and interest of studies of the communities of the supertidal belt. A later publication will give a detailed list of species as well as a more thorough account of the physical environment of the various habitats.