

*G. dentatus*; *G. mulatus*, &c.) collectively known to whalers under the name "mountebank shrimps," deriving the designation from their peculiar agility in water. <sup>[1]</sup>

These small crustaceans are found in countless numbers on the great outlying banks off the North American Coast, and in the Labrador seas they are also in great profusion.

It is of especial importance to notice that very many, if not all of these free swimming creatures in the sea, from invisible microscopic forms to the largest shrimp, sink to different zones of water or rise to the surface with variations in temperature, and changes in the direction and force of the wind. In fine weather *where* the food is *at the surface*, the mackerel, the herring, and other surface feeders swim open mouthed against the wind. Dr. Brown states that the great Right whale and most of the whale species feed in a similar manner. The Right whale feeding, swims leisurely at the rate of about 4 miles an hour. Mackerel when feeding, come often by millions, like a swiftly moving ripple on the water, with eager staring eyes and mouths distended to entrap the floating prey. Many of the free swimming Pteropoda are active only during the night-time, sinking during the day to a certain zone of depth.

The effect of currents and tides, assisted by winds, is to drive these free swimming forms towards the different shores and into land locked or sheltered Bays. On the shores of the open sea, a continued land breeze drives them far out to sea, and the fish following them will be lost to view. Off the coast of the United States the mackerel ground is not unfrequently found near the summer limit of the Gulf stream, where wide spreading eddies prevail, caused by the meeting of the great Labrador current flowing in an opposite direction, or the surging up of the Arctic underflow. In these vast eddies the temperature is greatly reduced by the mixing of almost ice-cold water from beneath with a warm over-lying stratum.

It is here too that the free swimming mackerel food will congregate, sometimes at the surface, at other times at different depths, dependant upon the temperature of the mixed waters. In the vicinity of the south edge of the Grand Bank of Newfoundland, the line of contact between the Arctic and the Gulf streams is sometimes very marked by the local currents, which "boil and form strong eddies." <sup>(2)</sup> The line of contact of the two great cold and warm currents is continually changing for hundreds of miles with the varying seasons, and under the influence of winds, hence also the changes in geographical position and in the depth or zone of the the open sea mackerel grounds.

Inshore, the floating and free-swimming food is drifted too and fro by winds and tides, and great accumulations are sometimes thrown up upon the beaches in windrows after storms. This floating and swimming-food gathers in eddies, either near the coast line or at the junction of opposing tidal waves or currents. Hence, along sheltered and embayed coasts, confronting the open sea, in the vicinity of Banks, where great tidal currents and eddies are formed, or in the Gulf and Estuary of the St. Lawrence, where two opposite and wholly different tides, dragging along the coast-line, approach to meet, there will be the mackerel ground of the fishermen, but not necessarily *at the surface*.

In Professor Verrill's Report on the "*Vertebrated Animals of Vineyard Sound*" it is stated that the stomachs of Mackerel taken July 18th twenty miles south of No Man's Land, contained

(1) "On the Seals of Greenland."—Dr. R. Brown.

(2) Sailing Directions.