

show that more individuals were in the middle in the various channels, where Dawson has shown that the water is comparatively stationary, than along the sides. Four of the channel sections show this.

The outflowing Cape Breton current depopulates the gulf to a considerable extent, the older individuals being much less numerous during the second cruise. They are carried by the current along the southern side of the Laurentian channel out into the open Atlantic off the continental shelf for some distance and also into the deeper water on the Breton bank. Such a course for the coastal water is indicated imperfectly by Dickson's charts for surface temperature and salinity for the North Atlantic for the years 1896 and 1897 (Phil. Trans., A, vol. 196, pls. 1-4, 1901), in which can be seen a tongue of water of low salinity, warm in summer and autumn and cold in winter and spring, extending along this course from Cabot strait. This is evidently a very permanent condition. The continuation of this tongue toward the southwest along the outer side of the continental shelf, as appears in fig. 8 at Acadia station 12, may well be a regular course for a part of the coastal water in the colder part of the year. It will connect south of Sable island over the Scotian bank with the band of coastal water along the Nova Scotia shore. This view is supported by the finding of coastal water at the bottom near La Have bank by the *Challenger* in May, 1873, and by the presence of *S. elegans* at Acadia station 54 (see fig. 10) which would be a last remnant for the summer of this current. This current and the more constant one close to the Nova Scotia coast carry the species to the southern end of Nova Scotia and heap it up there as is seen in fig. 10. During the two months between cruises the currents have transferred the centre of abundance from the Laurentian channel to the lower end of Nova Scotia, only a part being left on the Breton bank.

The current along the southern coast of Newfoundland may carry coastal water and with it this species into Cabot strait and possibly into the gulf. That it does not enter to any great extent into the current running in past Cape Ray will appear from the following comparisons. The stations in the northern half of the gulf during both cruises show no large *S. elegans*. The cold intermediate water in which it lives is present in the part of the gulf but will have been formed by the mixture of the inflowing boreal water with the surface water, neither of which contain large *S. elegans*. Consequently few or no large individuals are to be expected in the first part of the water's course that is in the northern half of the gulf. If it were derived from the coastal water south of Newfoundland, this would not be the case.

The loss of large individuals from the gulf through Cabot strait being greater than the gain, the gulf would be depopulated were it not for the yearly swarms of young individuals growing up in the surface layers. These will likewise be carried out, but since they are several times as numerous as the adults, enough will be left to keep up the stock. The more or less stagnant areas in the gulf, for example the Bay of Islands fjord, will aid in repopulating the whole area. The conditions in that fjord are most suitable for this species. The bar at the mouth prevents the egress of the large individuals during the summer at least and yet permits of many of the young escaping. We found only the latter at the mouth in August. In the deepest haul in the bay, where there was over 200 metres of suitable water, seventy large individuals were obtained. This may be considered the upper limit for the number that is normal to an area. More than this would certainly be due to concentration, as for example the areas of abundance shown in figs. 8 and 10. The numerical relation between the adults and young is interesting. At both stations in the Bay of Islands where vertical hauls were made (No 53 stations 57 and 59) the young were about fifteen times as numerous as the adults ($522\frac{1}{2}$ and $1060\frac{1}{10}$). This provides a very considerable surplus to overflow into the neighbouring depopulated part of the gulf.

The areas of distribution of the boreal oceanic and northern coastal waters overlap to a great extent. In the gulf of St. Lawrence where conditions are moderately static they are separated vertically, the boreal water being below. Elsewhere the separation is not so complete, more or less active vertical mixing going on, as is evidenced by the