

Cleve, who looked upon the dispersal of organisms by currents as the chief factor in affecting the character of the plankton, was at first of opinion that he could fix the north-western boundaries of the Gulf Stream by noting the distribution of *Rhizosolenia styliformis*, the guiding form in his Styli-plankton. But he, too, found that its area of distribution extends northwards in the course of spring and summer, and that the swarms of *Rhizosolenia* actually outdistanced the speed of the current. The wider distribution of the algæ was evidently, therefore, due not alone to the increased volume of the current, but also to a rapid propagation produced by summer warmth outside the influence of the current, the algæ apparently having been already present in this area in small quantities.

Bipolarity of  
oceanic  
diatoms.

I may further instance the close agreement between oceanic species in arctic and antarctic waters. *Thalassiothrix longissima* and *Rhizosolenia semispina* (*hebetata*) are the two most characteristic forms among algæ along both the polar boundaries of the Atlantic, though they have also been found in small quantities at various localities in the tropics. I personally came across them on several occasions during the "Michael Sars" Expedition, and it requires, in my opinion, no special theories to account for this "bipolarity." There is quite sufficient connection between the two oceans to enable a few germs which are exceptionally tenacious of life to pass from the one to the other, and this would amply explain the agreement. Characteristically enough there is no similar agreement between arctic and antarctic waters when we come to the neritic forms, and this is probably because they are less adapted to travel over such immense distances. It may be, too, that their tendency to evolve resting-spores is an obstacle to long passive wanderings.

As a means of determining the direction and velocity of currents pelagic algæ will be found of very little use. Their continued existence during the progress of the current must always depend upon their persistence in reproduction, and this again is dependent upon conditions of existence and competition with other species. It is not mere coincidence that the microscopic flora of the warm Atlantic extends farthest north during the dark winter months, when no other species are much inclined to develop, and there is therefore no competition of any consequence, the character of the flora consequently remaining for a long time unaltered. Large animals, such as medusæ and salpæ, or the larvæ of bottom-animals like *Phoronis*, will be found far better indicators of the currents. Ostenfeld