

also notes of three surface-specimens in which the shell-wall was partially double, and of one in which it was partially triple. In no case were the additional layers complete, and they were invariably so thin that they could only be described as films; in point of fact they bore no resemblance to the multiple tests of bottom-specimens. This is as far as I can speak from my own knowledge. I have, however, before me a pencil sketch by Mr. George West of a portion of a double-shelled surface-specimen of which the walls are of measurable thickness, being each rather under  $\frac{1}{1500}$ th inch (.017 mm.), or altogether, including the interspace, about  $\frac{1}{750}$ th inch (.034 mm.); and therefore, like the single specimen first mentioned, as thick as many bottom shells. But under any circumstances such examples are very exceptional, and the great bulk of the surface *Orbulinæ* that have come under my notice are precisely such as I have endeavoured to describe. It is perhaps needless to pursue this portion of the subject further, inasmuch as the general features of the genus are discussed at some length at a later page.

Taken by themselves, the facts that have been brought forward, as well as some others of less significance that might be adduced, tend to the inference that the Foraminifera which are found living in the open ocean have also the power of supporting life on the surface of the bottom-ooze;<sup>1</sup> and further that, so far as our present knowledge goes, there is at least one variety of *Globigerina* which lives only at the sea-bottom. But this is only one side of the story.

It has been suggested, for example, that the presence of bottom-specimens of *Globigerina pachyderma* in the "cold area" of the Farøe Channel, notwithstanding the entire absence of the species from the surface-gatherings, may be explained by the supposition that the former are exclusively dead shells brought by the cold bottom-current from the far north, and that the species will eventually be found leading a pelagic existence in the Arctic Seas. That is, no doubt, a possible solution of the difficulty; and if it were necessary to believe that all *Globigerinæ* live only at the surface, it might be regarded as sufficient; happily it is one of those points which are pretty sure to be cleared up by future investigation.

Under ordinary circumstances there is a close and very obvious relationship between the pelagic fauna and that of the sea-bottom immediately beneath; and it becomes evident on even a slight examination that the distribution of the constituent species of the former, and therefore to a considerable extent of the latter also, is dependent on the temperature of the surface-water.<sup>2</sup>

<sup>1</sup> There is an observation recorded by Dr. Carpenter in the following paragraph that appears too important to be left entirely unnoticed:—

"Of the existence of living *Globigerinæ* in great numbers in the stratum of water immediately above the bottom, at from 500 to 750 fathoms depth, I am able to speak with great positiveness. It several times happened, during the Third Cruise of the "Porcupine" in 1869, that the water brought up by the water-bottle from immediately above the *Globigerina*-ooze was quite turbid; and this turbidity was found (by filtration) to depend, not upon the suspension of amorphous particles diffused through the water, but upon the presence of multitudes of young *Globigerinæ*, which were retained upon the filter, the water passing through it quite clear."—*Proc. Roy. Soc.*, vol. xxiii. p. 235.

<sup>2</sup> See Murray, *Proc. Roy. Soc. Edin.*, vol. x. p. 508, Note.