

floating existence affects the whole structure of these algæ, though it is not always carried out to the same degree in the different genera and species. If we examine into their distribution we shall find that no particular region is distinguished by specially well-equipped species. Genera with the greatest numbers of species have their representatives in both the warmest and the coldest areas of the sea, and no essential difference in the development of their suspension-apparatus is to be found between the species of *Chaetoceras* and *Rhizosolenia* which live near the confines of the polar sea, and their relatives in the tropics. The greatest abundance of forms is to be met with in coastal waters, where, too, the majority of the species have their home. I shall return later on to the special biology of these coast-forms.

Many species of diatoms show variations indicating that within certain limits the algæ can adapt their floating power to the demands made on them. Their tendency to sink increases with a rise of temperature, and decreases with an increase of salinity. It is not alone the specific gravity (density) of sea-water that is here the determining factor; no doubt we must bear specific gravity in mind also, but its variations are comparatively small. Ostwald has shown that the internal friction or viscosity of sea-water is the most important consideration, and this diminishes with an increase of temperature. Other things being equal, sea-water at 25° C. offers only half the resistance that it would at freezing-point. Salinity, on the other hand, is of less account. A rise of 1 per cent in the salinity will produce no more than an increase of 2 to 3 per cent in the internal friction, and as salinity in the open sea is subject to what are after all quite inconsiderable variations, it follows that it is really temperature which indirectly affects the development of the suspension-organs. In areas of the sea where there is a big difference in temperature between summer and winter, we find a number of species with distinct summer and winter forms, that have sometimes even been supposed to belong to totally different species. And the same variation occurs also in species with a wide distribution, the warm-water types corresponding to the summer forms, and the cold-water types to the winter ones. The summer forms have usually thinner cell-walls, and a more slender structure; their excess weight appears to be reduced, though at the same time their surface is comparatively larger. As, however, diatoms vary greatly in their dimensions throughout their life-cycle,

Viscosity
of sea-water.

Summer and
winter forms.