

organisms. The theories and suppositions set forth in the following are based upon abundant material: here, of course, only the main points can be advanced; with regard to all details I may refer to my main work.

1. *Seasonal Variation*.—The plankton organisms of the fresh water may at different seasons have quite a different appearance. This fact is, in my opinion, connected with the above-mentioned regular oscillations in viscosity and specific gravity of the fresh water. As the rate of sinking at 25° C., *i.e.* in the summer, is probably twice as great as in the winter, the organisms, unless they are able to augment their buoyancy in the summer half-year, will sink down into deeper water-layers; thereby they will be shut out from the light and high temperatures which for other reasons form a life-condition for them.

We are now able to show that very many plankton organisms, and especially the perennial, are subject in the course of the year to regular morphological variations which are exactly in accordance with the variations in the bearing power of the fresh water. As far as we are able to understand these variations, it seems as if the organisms, by means of either an increase in the cross-section resistance or an increase in the superficial area by diminution of volume, try to diminish the rate of sinking, and that just in the season (summer) when the rate of sinking is greatest. These variations of the fresh-water plankton organisms we call "*seasonal variations*."

We may now mention some examples.

It has been noticed that the *Hyalodaphniæ* (fig. 52¹) in the summer half-year increase their longitudinal axis to a very high degree. While the distance from the eye to the point of the crest in the winter half-year is only about 100 μ , it is in summer up to 700 μ . The most correct interpretation of this very peculiar fact is probably that the prolongation of the crest causes a shifting of the centre of gravity of the body; the effect of this again is that the original vertical axis, with each beat of the swimmerets, becomes the horizontal, the result of which is an increase in the cross-section resistance. In other Cladocera (*Bosmina coregoni*, fig. 53) the body in the summer half-year is higher than long, in the winter half-year longer than high; in summer the antennæ are more than twice as long as in the winter half-year. In some Rotifers (*Asplanchna*, fig. 54) it is known that the body, which in winter is almost isodiametric, is in summer about five times longer than broad. Here the aim is probably to remove the shape of the body in summer as far as possible from the

¹ With regard to the figs. 52–62 it must be remembered that the size of the figures is quite conventional; the same species is in the different figures drawn in different sizes, and young brood and growth stages are often figured larger than mature animals.