

shells of *Mytilus edulis*, *Littorina littorea*, and *Cyprina islandica*, all boreal forms requiring a higher temperature and not living there now. Again, in northern boreal areas there are sub-fossil deposits of molluscs which require greater warmth than generally prevails in the boreal region (*Tapes decussatus* in Denmark, *Isocardia cor* in Norway, etc.), and it is held in some quarters that they could only have existed there when the temperature of the sea was higher.

Without criticising this theory, I should like to point out that we ought not always to take these finds of sub-fossil shells, belonging to species no longer inhabiting the adjoining seas, as evidence that great hydrographical changes have necessarily taken place in these areas. *Tapes decussatus*, for instance, which is now quite extinct along the coast of Denmark, is still to be found at various places along the west coast of Norway, from Bergen down to the south coast, but only in restricted localities where there are special natural conditions, that is to say, in shallow, well-sheltered, sandy bays, dry at low water, but affording full access to the salt water of the sea. These bays differ greatly from the "pools," which have a layer of fresh water at the surface and a muddy bottom smelling unpleasantly of sulphuretted hydrogen, but one feature they do possess in common, namely, that the sun raises their temperature considerably above the normal, so much so, in fact, that I have sometimes recorded 23° or 24° C. in the shallow water of these "Tapes bays" during the summer. Beyond question this high summer temperature, in combination with favourable bottom-conditions and the salt water, enables *Tapes decussatus* to thrive, and, what is still more important, to reproduce itself. It is not difficult to imagine that these rather limited localities may have been silted up, or cut off from the inflowing of salt water in some way or other, thus giving rise to sub-fossil deposits of *Tapes* shells. Nevertheless, in the case of boreal forms found fossil or sub-fossil in arctic areas, it seems to me that the warmer seawater theory is the only reasonable one, since there is nothing to indicate that other important factors have been instrumental in their extinction.

Effect of
changes of
temperature
upon animal
life.

It is important to ascertain how changes of temperature affect a species, whether they influence chiefly the development and growth of the young stages or the full-grown animals through other physiological processes. This question has not been deeply studied, though we have acquired sufficient knowledge to enable us to draw one or two conclusions. We know, for