

necessary to fit them for vision in air, the compound eye in insects, the simple eye in Batrachians.¹ The original photographic cameras, strange though this may appear to us, were intended for use under water ; but at a very early time they were adapted to work in air.

But we must bear in mind that this early solving of advanced problems in mechanics, optics and physiology was in favour of Crustaceans and cuttles, which were lords of creation in their time. There were in those early days humbler creatures whose structures also present wonderful contrivances.

I have already referred, in the chapter on imperfection of the geological record, to the fossil sponges which have been found in so great number and perfection in some of the oldest rocks of Canada, and which have for the first time enabled us to appreciate the forms and structures of the wonderful silicious sponges which preceded those with which the dredgings of the *Challenger* have made us familiar in the modern seas. Humble sarcodous animals, without distinct muscular or nervous system or external senses, the sponges have at least to live and grow, and to that end they must already, in the dawn of life on our planet,² have perfected those arrangements of ciliated cells in chambers and canals which the microscope shows us driving currents of water through the modern sponges, and thereby bringing to them the materials of food and means of respiration. It is true we know as little as the sponges themselves of the *modus operandi* of those perpetually waving threads which we call cilia or flagella, yet they must have existed with all their powers even before the Cambrian period.³

¹ See *ante*, chapter on Air-breathers.

² I have found spicules of sponges in the chert nodules from the Huronian limestones of Canada.

³ Many species of hexaclinelled sponges have have been described from the upper Cambrian or lower Cambro-Silurian of Canada. See paper by the author in the Transactions of the Royal Society of Canada, 1889.