(" primary animals "), feed upon algæ, bacteria, other protozoa, and even upon rotifers (" wheel-animalcules "), which are minute Histozoa; some imbibe nourishment from nutrient media, such as putrefying substances, infusions, and the juices of higher animals. It is important to state that a typical protozoon is an individual organism equivalent to the whole body of a histozoon, not merely to one cell of the latter, unless we except the fertilized egg-cell; but there are many instructive analogies between tissue cells and protozoa. An excellent brief discussion of this side of the question is contained in a small volume on *Evolution* by Professors Patrick Geddes and J. Arthur Thomson, published about six years ago in the Home University Library series. The three leading divisions of Protozoa, namely, Rhizopoda, Infusoria, and Sporozoa, correspond to the three dominant phases of cell-life: amœboid, flagellate (or ciliate), and encysted (or passive). In the amœboid phase katabolism (biochemical wear and tear, destructive metabolism, proteolysis) and anabolism (biochemical synthesis, constructive metabolism, proteogenesis) are about equal; in the flagellate phase katabolism predominates; in the encysted phase anabolism prevails.

Phases of cell-life

It is not to be supposed that Histozoa have developed out of Protozoa as we know them to-day; both have diverged from a common source. In order to arrive at any degree of clearness on this point, it is necessary to project the mind back to an inconceivably remote period when it is possible to imagine the dawn of animal life on the earth breaking through the mists of eternity. This idea may be figuratively explained thus: Eozoa < Histozoa / Protozoa. There is a singular analogy between such a divergence as is here represented to have taken place during the first æon of earthly time and the segregation of germ-cells which takes place regularly during the development of a higher organism. The male and female germ-cells, being destined for each other, are known as gametes; when they unite to produce a fertilized egg-cell, the latter is a zygote; when the zygote develops by repeated cell-division into a new individual there ensues a differentiation between the tissue cells which form the *soma* or body, and the germ-cells, which carry on the hereditary processes: Zygote < Somatic cells / Germ cells. In a sense, therefore, we might regard the Protozoa as persistent germ cells.

Divergence of Protozoa and Histozoa

Gametes

Paramecium is a type of ciliate infusorian, easy to obtain amongst pond-weeds, and convenient to study. Though strictly unicellular, the nuclear apparatus consists of two portions lying side by side: a meganucleus, which presides over the vegetative life of the organism, and a much smaller micronucleus, which controls reproduction. *Paramecium* multiplies, under favourable conditions of food, light and temperature, at a great rate by simple binary fission. The two nuclei divide and the daughter nuclei separate towards opposite ends of the slipper-shaped body; then a constriction appears across the middle and soon two new paramecia break apart. At the optimum temperature (20° C.), *Paramecium* will divide twice in twenty-four hours (Maupas, 1888). By calculating the mean rate of binary fission from actual countings, under somewhat defective laboratory conditions, Balbiani (C. R. Ac. Paris, t. 50, 1860), found that a single *Paramecium* could give rise in forty-two days to 1,384,416 descendants. Putting the average length at 0.2 mm., these, placed in line, would

Division of Paramecium