*Amoebocytes.—*These are amoeboid cells closely resembling the leucocytes or white blood corpuscles of higher animals. They commonly have blunt, lobose pseudopodia and the cytoplasm is generally more or less densely charged with refractive granules. They have the power of wandering from place to place through the mesogloea (fig. 34, 3-5).

*Germ-Cells.—*The ova (fig. 34, 6) are formed from amoebo­cytes, which grow to a large size and finally withdraw their pseudopodia and acquire a rounded form. They have large nuclei with a very distinct nuclear membrane and commonly a conspicuous nucleolus. The spermatozoa (fig. 37) closely resemblc those of higher animals, consisting each of a small “ head,” composed chiefly of chromatin material, and a slender vibratile “ tail ” composed of cytoplasm. In this case the amoebocyte gives rise to a single sperm mother-cell (spermato­cyte) sometimes enclosed in one or two covering cells. The nucleus of the spermatocyte undergoes repeated mitosis and a “ sperm-ball ” is produced which is either enclosed in the covering cell or in a special endothelium similar to that which surrounds the segmenting ovum. The germ-cells occur scat­tered through the mesogloea and are not aggregated in gonads, so that we cannot speak of “ ovaries ” and “ testes ” as in higher types.

*Reproduction.*

Reproduction in sponges may be effected in one of three ways: (1) The first is by vegetative budding, followed by separation of the buds and thus differing from the ordinary budding which leads merely to increase in the size of the sponge-colony. This process has been observed in many cases (e.g. *Leucosolenia, Oscarella, Lophocalyx, Aplysilla).* (2) The second way is by the formation of specialized repro­ductive bodies known as *gemmules.* This process is best known in the fresh-water sponges (Spongillinae), where it has been developed as a special means of tiding over unfavourable periods during which the parent sponge is liable to be destroyed by cold or drought. Each gemmule consists of an aggregation of amoeboid cells (statocytes) densely charged with nutrient granules and enclosed in a protective horny envelope which may be strengthened by a layer of special spicules. The ripe gemmule is very resistant to adverse conditions and is capable of remaining dormant for a lengthened period, and of develop­ing into a new sponge on the return of favourable conditions. In temperate climates the gemmules remain dormant through­out the winter and develop in the spring, the development being very similar to that of an ordinary fertilized ovum except that it begins at the “ morula ” stage, with the numerous statocytes representing the blastomeres. (3) The third way is by the union of ova and spermatozoa to form *zygotes,* which undergo segmentation and develop into the adult through a more or less complex series of ontogenetic stages. Previous to fertilization the ovum undergoes a process of maturation accompanied by the extrusion of two polar bodies, as in higher animals. Very little is known about the actual process of fertilization, but it appears probable that this is effected in the inhalant canals of the parent sponge, where the ova have been observed suspended from the epithe­lial lining of the canal *(e.g.* in *Ute,* fig. 34, 6).. After fertiliza­tion they appear, usually at any rate, to migrate back into the mesogloea, where they become surrounded by endothelial cap­sules and undergo segmentation. In *Stelospongus flabelliformis* the cells of the capsule are of gigantic size and are attached to the superficial blastomeres of the developing.embryo by protoplasmic processes, through which, no doubt, nutriment is passed from the parent to the embryo.

*Embryology.*

The segmentation of the ovum appears to be in all cases complete or holoblastic, and the young sponge usually leaves the parent in

the form of a free-swimming ciliated larva, which, after fixing itself to some object, undergoes a metamorphosis and then grows into the adult form. The details of development appear to differ widely in different species and various interpretations have been placed upon somewhat limited and discrepant observations.

One of the best-known cases is that of the calcareous genus *Sycon* (fig. 38). The fertilized ova develop into ciliated larvae within the parent sponge, embedded in the walls of the radial chambers, in their endothelial capsules. Each divides first into two, then into four, and then into eight equal and similar blastomeres by successive vertical clefts. The eight-celled stage (fig. 38, *b, c,)* has the form of a somewhat flattened cushion, with an axial cavity which is the beginning of the blastocoel or segmentation cavity. A horizontal cleft now divides each blastomere into a somewhat smaller upper and a somewhat larger lower portion, and the sixteen blastomeres arrange themselves in the form of a hollow sphere surrounding the blastocoel. The smaller cells multiply rapidly and become columnar, while still remaining as a single layer. Each one presently acquires a flagellum (“ cilium ”) at its. outer end. The larger cells multiply more slowly and are characterized by their coarsely granular appear­ance. They are destined to give rise to the dermal layer and its derivatives (including archaeocytes ?) and never become flagellated.@@1 The blastosphere or blastula (fig. 38, *d, e,)* is now complete, the blastocoel being completely surrounded by a single layer of cells differentiated, however, into two groups, gastral and dermal. The large granula (dermal) cells now become invaginated, but this

is only a temporary condition, probably to be explained as the mechanical result of the pressure of the spicules of the parent sponge. The so-called “ pseudogastrula ” thus formed escapes by rupture

@@@1 According to E. A. Minchin, the first-formed granular cells are “ archaeocytes,” which migrate into the interior of the larva while their place is taken by granular cells formed by modification of the neighbouring flagellated cells. The later-formed granular cells are destined to give rise to the dermal layer of the adult, while the remaining flagellated cells form the gastral layer.