through a wide vent or osculum at the upper extremity of the sponge. The thin wall is also pierced by numerous small inhalant pores or prosopyles. The inhalant pores, the gastral cavity and the vent constitute the canal-system, through which a stream of water can be kept flowing by the activity of the collared cells which line practically the whole of the gastral cavity. Each collared cell consists of an oval nucleated body surmounted by a filmy proto­plasmic collar, in the middle of which the whip- like flagellum projects into the water. They are placed close together, side by side, and thus form a continuous layer, extending almost up to the vent and interrupted only by the inhalant pores. The outer surface of the sponge is covered by a single layer of flattened pavement-epithelium or epidermis. Some of these cells, distinguished as porocytes, become perforated by the inhalant pores, around which they form contractile diaphragms capable of opening and closing, and thus regulating the supply of water. Between the outer protective, dermal epithelium, and the inner gastral epi­thelium of collared cells, lies the mesogloea, a layer of gelatinous material containing cells of at least two kinds, amoebocytes and sclero­blasts. The former closely resemble the amoe­boid white blood corpuscles, or leucocytes, of higher animals, and have the power of wan­dering about from place to place in the sponge-wall. They probably serve to distribute food material and carry away waste products, and some of them undoubtedly give rise to the ova and spermatozoa. The scleroblasts are derived from cells of the dermal epith­elium which migrate inwards into the gela­tinous ground-substance and there secrete the spicules of which the skeleton is composed. These spicules are composed of transparent crystalline carbonate of lime (calcite), and may be of three fundamental forms: triradiate, quadriradiate and monaxon. It has been shown by E. A. Minchin, however, that the triradiate and quadriradiate types are not simple spicules but spicule-systems, each formed of three or four primary spicules, originating from as many mother-cells and only secondarily united. In fig. 1 only triradiate spicules are represented, but very often all three kinds are present in the same sponge (cf. fig. 24). The triradiates lie in the mesogloea with their three rays extended in a plane parallel to the surfaces of the sponge-wall, and form a kind of loose scaffolding upon which the soft tissues are supported. The quadri radiates resemble the triradiates in form and position, but a fourth ray is developed which projects through the layer of collared cells into the gastral cavity, where it serves as a defence against internal parasites. The monaxon spicules have one end embedded in the mesogloea while the other projects outwards and upwards and serves as a defence against external foes.

Although all species of the genus *Leucosolenia* agree, essentially in structure, yet they exhibit very great diversity in external form. This is due to the habit of budding and colony formation. All start life after the metamorphosis of the larva in the simple sac-shaped condition which we have just described, and to which the name "Olynthus-type ” is sometimes applied. This is indeed the simplest type of sponge organization known to us and we must look upon the Olynthus as representing a primary sponge-individual or "person." By a simple process of budding, in which

Fig. 2.—*Leucosolenia (Clathrina) clathrus,* natural size; showing reticulate form of colony, expanded and with open oscula on the left, contracted and with closed oscula on the right.

*osc,* Osculum. *ph,* Sphincter of osculum.

*cl. osc,* Closed osculum. *diy,* Diverticula.

*contr. osc,* Closed oscula in con- *osc. div,* Diverticula from which tracted part of colony. new oscula arise. the buds all remain united together by their bases, we get a branched colony in which the persons or zooids are still easily recognizable, each with its own vent or osculum. Very frequently, however, the zooids become elongated into slender cylindrical tubes which branch in an extremely complex manner and anastomose with one another in many places to form networks, in which it is no longer possible to recognize the component individuals (fig. 2). This is known as the “ Clathrina ” type of. structure, and we may look upon a Clathrina colony as an individual of a higher order, which may assume a definite external form and even acquire a secondary internal cavity (pseudogaster), opening to the exterior through a secondary vent (pseudosculuιn), while the outer tubes of the colony may give rise to a protective skin (pseudoderm), perforated by secondary inhalant pores (pseudopores) which are obviously quite distinct in nature from the primary inhalant pores or prosopyles of the Olynthus.

Other types of colony-formation, in the genus *Leucosolenia* will be discussed when we come to deal with the canal-system in general.

*Plakina.—*The genus *Plakina* includes some of the simplest of the siliceous sponges. Just as in the Calcarea the most primitive 44 person ” or individual is represented by the Olynthus type, so in the non-calcareous sponges we may recognize a primitive or fundamental form of individual to which the name "Rhagon ” has been applied. This is the first stage reached after the meta­morphosis of the larva in certain species, and the little sponge consists of a cushion-shaped sac, attached below by a broad flattened base and terminating above in a single vent or osculum (fig. 3). There is a large gastral cavity lined by pavement-epithelium and surrounded by a number of more or less spherical "flagellated chambers,” lined by collared cells. These chambers open into the gastral cavity by wide mouths (apopyles) and communicate with the exterior by smaller inhalant pores. The entire outer surface of the sponge is covered with pavement-epithelium and there is a well-developed mesogloea which may contain spicules. This Rhagon may be compared to an Olynthus which has become flattened out from above downwards and from which a number of small buds (the flagellated chambers) have been given off all round, except from the attached basal portion; so that the whole forms a small colony, in which the collared cells have become restricted to the buds. We may, therefore, perhaps, look upon the Rhagon as an individual or person of a higher order than the Olynthus. Like the Olynthus the Rhagon occurs as a transient stage in the development of certain sponges, but we do not know any non- calcareous sponge which remains in such a simple condition through­out life. In *Plakina monolopha,* for example, the entire wall of the Rhagon becomes thrown into folds (fig. 4) so that a system of inhalant and exhalant canals is formed between the folds, through which the water has to pass on its way to and from the chambers. The inhalant canals lead down between the folds from the outer surface of the sponge. In *P. monolopha* they are wide and ill defined. In another species, *Plakina dilopha,* they become con­stricted to form perfectly definite, narrow canals, by the develop­ment of a thick layer of mesogloea (and pavement-epithelium) which covers the outer surface of the sponge in such a manner that the folded character is no longer visible externally. The external openings of the inhalant canals now form definite dermal pores. In such a sponge as this the folded chamber-layer of the sponge-wall is sometimes called the choanosome, while the external layer of mesogloea and pavement-epithelium is called the ectosome. In a third species, *Plakina trilopha,* further folding of the "choano- somal lamella ” takes place and we thus get a still more complex canal-system.

In *Plakina* the spicules are composed of colloidal silica. The fundamental spicule form is the primitive tetract or calthrops, consisting of four sharp-pointed rays diverging at equal angles from a common centre (fig. 5, *a-e).* Modifications of this form occur in two directions: in the first place some of the tetracts, by branching of one ray, give rise to "candelabra,” while others, by suppression of rays, give rise to forms with three or even two rays only, triacts and diacts, the latter sometimes termed oxeate (fig. 5, *f-l*). The arrangement of the spicules is very irregular; the candelabra alone are definitely arranged (at the surface of the sponge), the other forms are thickly scattered without any sort of order throughout the mesogloea.

*Euspongia.—*The genus *Euspongia,* to which belong all the finer bath sponges, is a typical example of the true "horny ” sponges or *Euceratosa,* characterized especially by the fact that the skeleton is not composed of spicules but of so called horny fibres. A living