skeleton which characterizes the majority of the so-called Monax- onellida. This is derived from the former by the establishment of secondary spicule-bundles connecting the primary or radial bundles together, and the transition is usually accompanied by loss of the cladi of the triaenes and by the development of a massive irregular form on the part of the entire sponge. An intermediate condition is found in some of the massive species of *Tetilla (e.g. T. limicola),* in which the spicule-bundles are very well defined and form distinct primary “ fibres ” in the interior of the sponge, but no distinct secondary or connecting fibres are yet developed.

In the Sigmatomonaxonellida, derived from the Tetillidae, the reticulate type of skeleton is almost universal, and in this group an entirely new element is introduced into the skeleton with the development of a “ horny" cementing material (spongin) which unites the spicules together in the fibres. At first small in quantity *(Reniera,* fig. 32, A), the spongin cement gradually increases in proportion to the spicules until in many Chalininae (fig. 32, B, C) ana *Desmacidcnidae* the spicules become completely embedded in it, and the fibres may be formed chiefly of spongin, with only a core of spicules. The complete enclosure of the spicules by spongin at a very early stage cuts off their food supply and causes arrest of development. Finally, in some Chalininae (fig. 32, D) and *Desmacidonidae* the spicules entirely disappear from the interior of the fibre, and if at the same time they happen to be absent from the intervening mesogloea we get a skeleton composed exclusively of horny matter or spongin, to which the term *pseudoceratose* may be applied. In the sub-family *Ectyoninae* the skeleton be­comes modified in an interesting manner by the development of “ echinating ” spicules, usually acanthostyles or acanthotylostyles, whose basts are cemented on to the fibre by spongin while their apices project into the surrounding soft tissues. These doubtless serve as a defence against internal parasites. In *A gelas* these echinating spicules may persist after the spicules have entirely disappeared from the interior of the strongly developed horny fibre. In the Axinellidae all the spicules in the fibres are typically more or less echinating in character and the fibres become plume-like.

Very frequently a special dermal skeleton is developed in the ectosome altogether distinct from that formed by the cladi of the triaenes (when these are present). Thus in the Geodiidae (fig. 23) the thick cortex is almost filled with densely packed sterrasters. In many forms there is a dense layer of small radially arranged monaxons at the surface of the sponge, whose projecting apices form an efficient protection. In the reticulate forms the ectosome is usually a thin dermal membrane supported by a reticulate dermal skeleton of slightly different structure from the “ main ” skeleton. In cases where a special stalk or a root-tuft is developed we also find a special and appropriate skeleton in connexion there­with.

In the so-called Lithistida alone amongst the Tetraxonida do we find the spicules (desmas) united together by silica to form a coherent skeleton, sometimes of stony hardness, very different from the elastic, flexible skeleton resulting from the development of spongin, and analogous to the condition met with in the Dictyo- nine Hexactinellids.

The microscleres usually play quite a subordinate part in the formation of the skeleton, being scattered irregularly throughout the mesogloea, though sometimes *(Geodiat Tethya)* the asters may form a definite cortical layer.

*Euceratosa.—*In the true horny sponges, if we neglect for the moment the presence of foreign bodies, we may say that the skeleton consists from the first exclusively of spongin, secreted (by special spongoblasts) in concentric layers to form very well defined fibres. In the most primitive forms (Aplysillidae) this horny skeleton is dendritic in arrangement (fig. 33), composed of fibres which rise vertically upwards from the base of the sponge (where they may be expanded to form a horny basal cuticle which serves for attach­ment) and ramify towards the surface, where their apices push against the dermal membrane and cause it to project in the form of “ conuli.” No reticulation is formed in the simplest cases *(Aplysilla, Dendrilla),* but in *Megalopastas* secondary connecting fibres are established (in relation, doubtless, to the increase in size and massive form of the sponge), and the skeleton thus simulates the pseudoceratose reticulate type of the Sigmatomonaxonellida. In *Darwinella* we have, in addition to the dendritic skeleton, isolated “ spicules ” of spongin scattered irregularly through the mesogloea. The presence of these spicules, which are sometimes, though by no means always, hexactinellid in form, has given rise to much specu­lation as to the possible relationship of the Aplysillidae to the siliceous Hexactinellida. Until we know more about their origin, however, we may perhaps best regard them simply as detached portions of the general skeleton secreted by isolated groups of spongoblasts. The genus *Megalo pastas* forms a natural transition to the Spongeliidae, in which the reticulation of the horny skeleton is an almost constant feature, and in which the tendency to supple­ment or replace the spongin by foreign bodies (sand broken spicules) is very strongly marked. In extreme cases the skeleton is composed almost exclusively of sand *(e.g. Psammopemma),* and the whole sponge looks like a mass of sand stuck together by a minimum of soft tissues arid spongin cement. Such “arenaceous” sponges also occur in other groups (*e.g*. *Desmacidonidae).* The culminating point in the development of the true horny skeleton is found in the Spongiidae (*e.g*. *Euspongia),* but even in the bath sponge (fig. 6) we commonly find sand grains or other foreign matter in the in­terior of the primary fibres. The value of the sponge for domestic purposes depends upon the softness and elasticity of the fibre, the closeness of the meshes, and the relative absence of sand.

*Histology.*

There are two primary tissue-forms in sponges, the flat pavement epithelium and the epithelium composed of choanocytes or collared cells. The former covers the whole of the external surface of the sponge and, except in the simpler Calcarea Homocoela, it also lines a considerable portion of the canal-system. The latter lines practically the whole of the primitive gastral cavity in the Calcarea Homocoela, but in all higher types becomes restricted to well- defined “ flagellated chambers.” A gelatinous “mesogloea,” which must be regarded primarily as an intercellular substance, appears between the primitive outer and inner layers of the sponge-wall. This contains primitive amoeboid wandering cells (arcnaeocytes),