eurypylous Rhagon type, but the aphodal is not unknown. The *Ceratosa* contain all sponges with a horny skeleton, except those in which the homy fibres are cored or spined with silicious spicules secreted by the sponge (“proper” spicules) ; these are arbitrarily assigned to the *Monaxona.* There is convenience in this proceed­ing, for horny matter is widely disseminated throughout the *Demo­spongiæ,* occurring even in the *Lithistida,* and it frequently serves to cement the oxeate spicules of the *Monaxona* into a fibre, without at the same time forming a preponderant part of the skeleton. It would be wellnigh impossible to say where the line should be drawn between a fibre composed of spicules cemented by spongin and one consisting of spongin with embedded spicules, while there is com­paratively no difficulty in distinguishing between fibres containing spicules and fibres devoid of them. That the distinction, however, is entirely artificial is shown by the fact that, after spicules have disappeared from the horny fibre, they may still persist in the mesoderm; thus Von Lendenfeld announces the discovery of micro­scleres (cymba) in an Aplysillid sponge and of strongyles in a *Cacospongia,* both horny sponges. (A form intermediate between this Aplysillid and the *Desmacidonidæ* would appear to be *Toxo- chalina,* Ridley.) The *Ceratosa* frequently enclose sand, *Fora­minifera,* deciduous spicules of other sponges and of compound Ascidians, and other foreign bodies within the horny fibres of their skeleton ; they also sometimes attach this material, probably by a secretion of spongin, to their outer surface, and thus invest them­selves in a thick protective crust. In some *Ceratosa* no other skeleton than that provided by foreign enclosures is present. The canal system is syconate or eurypylous in the simpler forms and diplodal in the higher. The *Monaxonida* make their earliest ap­pearance in the Silurian rocks (*Climacospongia,* Hinde), and are now found in all seas at all depths. The only sponges inhabiting fresh water belong to this group. The *Tetractinellida* adhere to the *Monaxonida* at more than one point, and one of these groups has probably been a fruitful parent to the other, but which is offspring and which parent is still a subject for discussion. The *Choristida* in its simplest forms presents a eurypylous Rhagon system, in the higher an aphodal system. It is in this group that the most highly complex cortex is met with ; in the *Geodinidæ,* for instance, it consists usually of at least five distinct layers. Thus, proceeding outwards, next to the choanosome is a layer of thickly felted desmachyme, passing into Collenchyme on its inner face ; then follows a thick stratum of sterrasters united together by desmacytes ; this is succeeded by a layer of cystenchyme or other tissue of variable thickness ; external to this is a single layer of small granular cells and associated dermal asters ; and finally, the surface is invested by a layer of pavement epithelium. The *Lithistida,* like the *Ceratosa,* are possibly of polyphylitic origin ; in one group (*Tctracladina)* the articulated scleres are evidently modified calthrops spicules (see fig. 14 *e),* and associated with them are free triænes, which support the dermis and resemble precisely the triænes of the *Choristida.* In another group (*Rhabdocrepida)* the scleres are moulded on a Monaxonid base (see fig. 13 *q-s) ;* but, associated with them, triænes sometimes occur similar to those of the *Tctracladina.* Both these groups are in all probability derived from the *Choristida,* and a distinct passage can be traced from the Tetracladose to the Rhabdocrepid group. In the *Rhabdocrepida* we find forms without triænes ; these may possibly be degenerate forms. The third group of Lithistids is derived from the *Rhabdo­crepida,* the Anomocladine desma being derivable from the Rhabdo­crepid by a shortening of the main axis into a centrum. The thick centrum, from which the arms, variable in number, ori­ginate, is hollowed out by a cavity, which appears during life to have been occupied by a large nucleus, like that of a scleroblast, and it is quite conceivable that the scleroblast, which in the Tetracladine Lithistids lies in an angle between the arms, may have become enclosed in an overgrowth of silica, from which addi­tional arms were produced. The constancy with which spicules in other sponges maintain their independence is very striking. When once a persistent character like this is disturbed, excessive variability may be predicted, as in the Anomocladine scleres.

The classification of the sponges into families is shown in the following scheme.

Class *CALCAREA.*

Order 1. Homocœla, Pol.

Family 1. Asconidæ, Hk.—*Homocœla* which are simple or com­posite, but never develop radial tubes. Examples : *Ascetta,* Hk. (fig. 1) ; *Lcucosolenia,* Bwk.

Family 2. Homodermidæ, Lfd.—*Homocœla* with radial tubes. Example : *Homoderma,* Lfd. (figs. 3, 4).

Order 2. Heterocœla, Γol.

Tribe *a.* †Syconaria.@@1

The flagellated chambers are either radial tubes or cylindrical sacs.

Family 1. Sycoxidæ.—The radial tubes open directly into the paragastric cavity.

Sub-family *a.* Syconina.—The radial tubes are free for their whole length, or at least distally. Examples : *Sycetta,* Hk. ; *Sycon,* O.S.

Sub-family *b.* Uteina, Lfd.—The radial tubes are simple and entirely united. The ectosome is differentiated from the choanosome and sometimes develops into a cortex. Examples : *Grantissa,* Lfd. ; *Ute,* O.S. (fig. 5); *Sycortusa,* Hk.; *Amphoriscus,* Pol.

Sub-family *c*. Grantina, Lfd.—The radial tubes are branched. The incurrent canal system is consequently complicated. An ecto­some is present. Examples : *Grantia,* Fl. ; *Heteropegma,* Pol. (fig. 4); *Anamaxilla,* Pol.

Family 2. Sylleibidæ, Lfd.—The choanosome is folded. The flagellated chambers (which are partly rhagose in *Vosmaeria)* communicate with the paragastric cavity by excurrent canals. Examples : *Polejna,* Lfd. (fig. 6) ; *Vosmaeria,* Lfd.

Family 3. Teichonellidæ, Carter.—Composite *Sylleibidæ* with the oscules and pores occurring on different parts of the surface. Example : *Teichonella,* Crtr.

Tribe *b.* †Leucoxaria,

The canal system belongs to the eurypylous Rhagon type.

Family 1. Leucoxidæ, Hk.—The outer surface is not differentiated into osculiferous and poriferous areas. Examples : *Leucetta,* Hk. ; *Leucaltis,* Hk. ; *Leucortis,* Hk.

Family 2. Eilhardidæ, Pol.—Composite *Leuconaria,* with the outer surface differentiated into special osculiferous and poriferous areas. Example : *Eilhardia,* Pol.

The arrangement adopted above is founded on Von Lendenfeld’s revision (*11*) of the classification propounded by Polejaeff (*16*), who in a masterly survey has thrown an unexpected light on the struc­ture and inter-relationships of a group which Haeckel has rendered famous. It should not be overlooked that Vosmaer (*31*) had pre­viously explained the structure of the Leucones. However errone­ous in detail, Haeckel’s views are confirmed in their broad outlines, and it was with true insight that he pronounced the *Calcarea* to offer one of the most luminous expositions of the evolutional theory. In this single group the development in general of the canal system of the sponges is revealed from its starting-point in the simple Ascon to its almost completed stage in the Leucon, with a complete­ness that leaves little further to be hoped for, unless it be the re­quisite physiological explanation.

Class *MYXOSPONGLÆ.*

Order 1. Halisarcina.

Family 1. Halisarcidæ, Lfd.—The flagellated chambers are syconate. Examples: *Halisarca,* Duj. (with branched chambers); *Bajal·us,* Lfd. (with simple chambers).

Family 2. Oscarellidæ, Lfd.—The flagellated chambers are eurypylous and rhagose. Example : *Oscarella,* Vosm.

Order 2. Chondrosina.

Family 1. Choxdrosiidæ.—With the characters of the order. Example: *Chondrosia,* O.S.

Class *SILICISPONGIÆ.*

Sub-class I. HEXACTINELLIDA.

Order 1. †Lyssacina.

Family 1. Euplectellidæ.—The spicules of the dermal mem­brane are “daggers” (fig. l5 *a).* Examples: *Euplectella,* Owen; *Holascus,* E. Sch. ; *Habrodiclyum,* W. T.

Family 2. Ascoxematidæ.—The dermal spicules are “pinnuli ” (fig. 15 *b, c).* Examples: *Asconema,* S. Kent; *Sympagella,* O.S.; *Caulophæus,* Schulze.

Family 3. Hyalonematidæ.—The dermal spicules are pinnuli and amphidisks (fig. l5 *d).* Example : *Hyalonema,* Gray.

Family 4. †Rosselidæ.—The dermal spicules are gomphi, stauri (fig. 15 *f*), and oxeas. Examples: *Rossella,* Crtr. ; *Crateromorpha,* Gray ; *Aulochoma,* E. Sch.

Family 5. \*Receptaculidæ, Hinde.—The distal ray of the dermal spicules is expanded horizontally into a polygonal plate. Example : *\*Receptaculites,* Defr.

Order 2. †DICTYONINA.

Sub-order 1. *UNCIN1TARIA.*

Uncinate spicules are present.

Tribe *a.* Clavularia.

Clavulæ (fig. 16 c) are present.

Family 1. Farreidæ.—Characters those of the tribe. Example : *Farrea,* Bwk.

Tribe *b.* Scopularia.

The dermal spicules are scopulariæ (fig. 16 *b).*

Family 1. †Euretidæ.—Branched anastomosing tubes, or goblet-shaped, with lateral outlets. Examples : *Eurete,* Marshall ; *Peri- phragella,* Marshall ; *Lefroyella,* Schulze.

Family 2. †Mellittonidæ.—Tubular or goblet-shaped, with honeycomb-like walls. Example : *Aphrocallistcs,* Gray.

@@@1 An \* indicates that the group is only known in the fossil state, a † that it is both recent and fossil.