*Classification.*

The phylum *Parazoa* or *Spongiæ* consists of two main branches, as follows :—

Branch A. — MEGAMASTIC- Branch B. — MICROMASTIC­TORA. TORA.

Class Calcarea, Grant. Class I. — Myxospongiæ,

Order 1.—*Homocœla,* Pol. Haeckel.

Order 2.—*Heterocœla,* Pol. Order 1.—*Halisarcina.*

Order 2.—*Chondrosina.*

Class II.—Silicispongiæ. Sub-class i.—Hexactinellida,

O. Schmidt.

Order 1.—*Lyssacina,* Zittel. Order 2.—*Dictyonina,* Zittel.

Sub - class ii. — Demospongiæ, Sollas.

Tribe *a.—*Monaxonida.

Order 1.—*Monaxona.*

Order 2.—*Ceratosa,* Grant.

Tribe *b. —* Tetractinellida, Marshall.

Order 1.—*Choristida,* Sollas. Order 2.—*Lithislida,* O.S.

By the possession of both sexual elements and a complex histo­logical structure, and in the character of their embryological devel­opment, the sponges are clearly separated from the *Protozoa* ; on the other hand, the choanoflagellate character of the endoderm, which it retains in the flagellated chambers throughout the group without a single exception, as clearly marks them off from the *Metazoa.* They may therefore be regarded as a separate phylum derived from the choanoflagellate *Infusoria,* but pursuing for a certain distance a course of development parallel with that of the *Metazoa.*

Different views have been propounded by other authors. Savile Kent regards the sponges as *Protozoa* (*10*) ; Balfour suggested that they branched off from the Metazoan phylum at a point below the *Cœlentera,* and considered them as intermediate between *Protozoa* and *Metazoa ;* Schulze regards them as derived from a simple ancestral form of *Cœlentera* (*23*) ; Marshall advocates the view that they are degraded forms derived from Cœlenterates which were already in possession of tentacles and mesenteric pouches (*14*).

As a phylum the *Spongiæ* are certainly divisible into two branches, one including the *Calcarea* and the other the remaining sponges, which Vosmaer has termed *Non-Calcarea,* and others *Plethospongiæ.* Since, however, the choanocytes of the *Calcarea* are usually, if not universally, larger than those of other sponges, we may make use of this difference in our nomenclature, and distinguish one branch as the *Megamastictora (μaστίκτωp,* “scourger”) and the other as the *Micromastictora.*

Branch A. *—MEGAMASTICTORA.*

Sponges in which the choanocytes are of comparatively large size, 0·005 to 0·009 mm. in diameter (Haeckel, ό).

Class Calcarea.

*Megamastictora* in which the skeleton is composed of calcareous spicules.

Order 1. Homocœla.—*Calcarea* in which the endoderm consists wholly of choanocytes. Examples : *Leucosolenia,* Bwk. ; *Homo­derma,* Lfd.

Order 2. Heterocœla.—*Calcarea* in which the endoderm is dif­ferentiated into pinnacocytes, which line the paragastric cavity and excurrent canals, and choanocytes, which are restricted to special recesses (radial tubes or flagellated chambers). Examples : *Sycon,* O.S.; *Grantia,* Fl.; *Lcuconia,* Bwk.

Branch B. *—MICRΟMASTICTORA.*

*(Non-Calcarea,* Vosmaer; *Plethospongiæ,* Sollas.) Sponges in which the choanocytes are comparatively small, 0·003 mm. in diameter.

Class I. MYXOSPONGIÆ.

*Micromastictora* in which a skeleton or scleres are absent.

Order 1. Halisarcina.—*Myxospongiæ* in which the canal system is simple, with simple or branched Sycon or eurypylous Rhagon chambers. An ectosome sometimes and a cortex always absent. Examples: *Halisarca,* Duj.; *Oscarella,* Vosm.; *Bajalus,* Lfd.

Order 2. Chondrosina.—*Myxospongiæ* in which the canal system is complicated, with diplodal Rhagon chambers and a Well-developed cortex. Example : *Chondrosia,* O.S.

The *Halisarcina* are evidently survivals from an ancient and primitive type. The simplicity of the canal system is opposed to the view that they are degraded forms ; we may therefore regard the absence of scleres as a persistent primary and not a secondary acquired character. They are as interesting, therefore, from one

point of view (absence of scleres) as the Ascons are from another (undifferentiated endoderm). With the *Chondrosina* the case is different ; they differ only from *Chondrilla* and its allies by the absence of asters ; these differ only from the *Tethyidæ* by the absence of strongyloxeas ; and we may very reasonably assume that in these three groups we have a series due to loss of characters, the *Chondrillæ* being reduced *Tethyidæ* and the *Chondrosina* reduced *Chondrillæ.* Still, as Huxley has well remarked, “classification should express not assumptions but facts ” ; and therefore till we are in possession of more direct evidence it will be well to exclude the *Chondrosina* from the *Silicispongiæ.*

Class IL Silicispongiæ.

*Micromastictora* possessing a skeleton or scleres which are not calcareous.

Sub-class i. HEXACTINELLIDA.

*Silicispongiæ* characterized by Sexradiate silicious spicules. Canal system usually simple, with Sycon chambers. Sponge differentiated into ecto-, choano-, and endo-some.

Order 1. Lyssacina.—*Hexactinellida* in which the skeleton is formed of separate spicules, or, if united, then by a subsequent not a contemporaneous deposit of silica. Examples : *Euplectella,* Owen ; *Asconema,* S. Kent ; *Hyalonema,* Gray ; *Rossella,* Crtr.

Order 2. Dictyonina. *—Hexactinellida* in which Sexradiate spicules are cemented together by a silicious deposit into a con­tinuous network *pari passu* with their formation. Examples : *Farrea,* Bwk. ; *Eurete,* Marshall ; *Aphrocallistcs,* Gray ; *Myliusia,* Gray ; *Dactylοcalyx,* Stutchbury.

The *Hexactinellida* are a very sharply defined group, impressed with marked archaic features. No other *Silicispongiæ* possess, so far as is known, so simple a syconate canal system. The oldest known fossil sponge is a member of the *Lyssacina* (7 and *24),* viz., *Protospongia,* Salter, from the Menevian beds, Lower Cambrian, St David’s Head, Wales. The group is almost world-wide in distri­bution, chiefly affecting deep water, from 100 to 300 fathoms, but often extending into abyssal depths ; occasionally, however, though rarely, it frequents shallow water (*Cystispongia superstes* dredged off Yucatan in 18 fathoms).

Sub-class ii. DEMOSPONGIÆ.

*Silicispongiæ* in which Sexradiate spicules are absent.

Tribe *a*. *MONAXONIDA.*

*Demospongiæ* in which the skeleton consists either of silicious spicules which are not quadriradiate, or of horny scleres or in­cluded foreign bodies, or of one or more of these constituents in conjunction.

Order 1. Monaxona.—The skeleton is characterized by either uniaxial or polyaxial spicules. Examples : *Amorphina,* O. S. (“crumb of bread” sponge); *Spοngilla,* Lmk. (“freshwater” sponge) ; *Chalina,* Bwk. ; *Tethya,* Link.

Order 2. Ceratosa.—The skeleton consists of horny scleres which never include “proper” spicules, or of introduced foreign bodies, or of both these in conjunction. Examples : *Darwinella,* F. Miiller; *Euspongia,* Bronn (the “ bath ” sponge).

Tribe *b. TETRACTINELLIDA.*

*Demospongiæ* possessing quadriradiate or triæne spicules or Lithistid scleres (desmas).

Order 1. Choristida. — *Tetractinellida* with quadriradiate or triæne spicules, which are never articulated together into a rigid network. Examples: *Tetilla,* O.S. ; *Thenea,* Gray ; *Geodia,* Lmk. ; *Dercitus,* Gray.

Order 2. Lithistida.—*Tetractinellida* with branching scleres (desmas), which may or may not be modified tetrad spicules, arti­culated together to form a rigid skeleton. Triæne spicules may or may not be present in addition. Examples : *Theonella,* Gray ; *Coral- listes,* O.S. ; *Azorica,* Crtr. ; *Velulvna,* O.S.

This large sub-class embraces the great majority of existing sponges. Its external boundaries are fairly well defined, its internal divisions much less so, as its various orders and families pass into each other at many points of contact. Although there does not appear to be much resemblance between a Lithistid sponge, such as *Theonella,* a Monaxonid such as *Amorphina,* and an ordinary "bath ” sponge (*Euspongia),* yet between these extremes a long series of inter­mediate forms exists, so nicely graduated as to render their dis­ruption into groups by no means an easy task. If the delimitation of orders is difficult, that of genera is often impossible, so that they are reduced to assemblages depending on the tact or taste of the author. Thus Polejaeff states that with a single exception “ none of the genera of *Ceratosa* are separable by absolute charac­ters.” The chief spicules of *Monaxona* are uniaxial, often accom­panied by characteristic microscleres. Although distinguished as a group by the absence of quadriradiate or triæne spicules, two ex­ceptions are known in which these occur (*Tricentrion,* Ehlers, and *Acarnus,* Gray) ; these, however, present unusual characters which suggest an independent origin. The canal system of *Monaxona* has not yet been fully investigated ; it appears usually to follow the