

Guide to the families and genera of Calcarea
taken from 'Sponguide' by J.N.A. Hooper
© J.N.A. Hooper 1998

□ **CLASS CALCAREA (Calcareous Sponges).**

DEFINITION: With exclusively calcitic spicules ranging from discrete monoactinal, diactinal, triactinal or tetractinal spicules, to reticulate skeletons composed of fused crystalline calcite spicules; megascleres and microscleres are not differentiated; skeleton and aquiferous system occurs in three grades of construction: (1) asconoid, with simple tubular construction (olynthus), without folding of the body wall, with thin walls pierced externally by ostia, leading to tubular water canals (porocyte canals) opening onto a central choanocyte-line cavity (choanoderm), connected to the exterior, at the apex of the sponge, by a single osculum; (2) syconoid construction produced by folding of both the exterior (pinacoderm) and interior (choanoderm) walls, producing choanocyte chambers to lie within the body wall rather than only lining the central atrium as in more simple asconoid structures, but these chambers open directly onto the atrium; (3) leuconoid, found in most sponges (including the Demospongiae), with complex folding and in which the choanocyte chambers are oval and isolated in a maze of canals within the body wall, with chambers opening onto branching and complex excurrent canals; sexual reproduction in Calcarea is exclusively viviparous.

Two subclasses are now recognised.

REVIEWS: Dendy & Row (1913), Hartman (1958), Burton (1963), Borojevic (1966, 1968, 1977), Vacelet (1970, 1981, 1991), Borojevic & Boury-Esnault (1986), Borojevic, Boury-Esnault & Vacelet (1990).

□ **SUBCLASS CALCINEA.**

DEFINITION: Regular triradiate spicules, equiangular and equiradiate or exceptionally parasagittal or sagittal, and a basal system of quadriradiates; most species have at least some spicules with the rays and angles between the rays being equal, with or without monoactinal or diactinal free spicules; young sponges may have only triradiate spicules; choanocytes basinucleate, nuclei spherical, and basal body of flagellum not adjacent to the nucleus; larvae are entirely ciliated hollow blastula (coeloblastula).

With two orders.

□ **ORDER CLATHRINIDA.**

DEFINITION: Skeleton composed exclusively of free spicules, without hypercalcified non-spicular reinforcements or spicule tracts.

With six families.

□ **FAMILY CLATHRINIDAE MINCHIN, 1900.**

DEFINITION: Essentially tubular organisation, with continuous choanoderm lining all internal cavities; growth is by longitudinal median divisions and anastomosis of tubes to form large units called the cornus; neither a common cortex nor a well-defined inhalant and exhalant aquiferous system.

SCOPE: Two genera (of five named genera) are included in the family.

REVIEWS: Bidder (1898), Minchin (1909), Dendy (1913), Hartman (1958), Borojevic (1968), Borojevic, Boury-Esnault & Vacelet (1990).

GENERA:

Clathrina Gray, 1867 (type species: *Grantia clathrus* Schmidt, 1864) (syn. *Ascetta* Haeckel, 1872; *Ascaltis* Haeckel, 1872; *Leucopsis* Lendenfeld, 1885) - cornus is composed of anastomosing, irregular reticulation of tubes, usually encrusting, sessile, low growing; smooth surface; oscules not apparent; soft texture; choanoderm is flat or rarely raised up into conuli by the apical rays of the quadriradiates, but never forming true folds, at least when the sponge is in the extended state; spicules are regular equiangular and equiradiate triradiate and/or quadriradiates alone, but sometimes also with biradiates or tripod spicules (Burton, 1963; Borojevic et al., 1990).

Guancha Miklucho-Maclay, 1868 (type species: *Guancha blanca* Miklucho-Maclay, 1868) - cornus composed of a peduncle and a clathroid body, often composed of small budded colonies of tubular individuals attached to stipitate base; peduncle may be formed by true tubes with a normal choanoderm, or may be solid with a special skeleton; skeleton composed of regular equiangular and equiradiate spicules, to which parasagittal triradiate spicules may be present at least in the peduncle; in some species only parasagittal spicules are present and their unpaired ray is basipetally oriented (Burton, 1963; Borojevic et al., 1990).

□ **FAMILY SOLENISCIDAE BOROJEVIC, BOURY-ESNAULT & VACELET, 1990.**

DEFINITION: Essentially tubular organisation; a continuous choanoderm lines all internal cavities; spicules are regular triradiates and/or quadriradiates, sometimes with tripods or biradiates; sponges grow in the form of an individual olynthus, with several olynthi growing from the basal stolon-like tubes, or in the form of distally branching tubes radially arranged around a central olynthus tube without any special skeletal differentiation.

SCOPE: Two genera are included.

REVIEWS: Nil.

GENERA:

Soleniscus Haeckel, 1870 (type species: *Leucosolenia stolonifer* Dendy, 1891) - form of an individual erect olynthus, with several olynthi growing from basal stolon-like tubes (tubular spongohiza), or in the form of distally ramified creeping tubes (Borojevic et al., 1990); surface hispid; apical oscules, firm texture; skeleton of regular to slightly sagittal quadriradiates and oxeas (Burton, 1963).

Dendya Bidder, 1898 (type species: *Clathrina tripodifera* Carter, 1886) - Cormus solitary, conical to ovoid, consisting of a large central tube from which smaller radially arranged tubes branch off; surface even, reticulate; oscules apical; texture firm; skeleton of regular and tripodal triradiates and sagittal quadriradiates (Burton, 1963; Borojevic et al., 1990).

□ FAMILY LEVINELLIDAE BOROJEVIC & BOURY-ESNAULT, 1986.

DEFINITION: Cormus composed of a central tube, sometimes ramified, and diverticuli isolated or grouped in clusters; skeleton of central and radial tubes composed of regular equiradiate and equiangular spicules; skeleton of diverticuli composed of regular and/or parasagittal spicules always clearly distinct from spicules composing the skeleton of the central tube; choanoderm either lines all the central cavity or is restricted to the diverticuli.

SCOPE: Two genera are included.

REVIEWS: Borojevic et al. (1990).

GENERA:

Levinella Borojevic & Boury-Esnault, 1986 (type species: *Levinella thalassae* Borojevic & Boury-Esnault, 1986) - with a cormus divided into a central tube and external diverticuli; central tube not ramified; choanoderm lines all internal cavities (Borojevic et al., 1990); spicules are equiangular tetractines in the central tube organised in parallel rows, equiangular and equiradiate tetractines and less common triactines of the diverticula, and slightly curved diactines (Borojevic & Boury-Esnault, 1986).

Burtonulla Borojevic & Boury-Esnault, 1986 (type species: *Burtonulla sibogae* Borojevic & Boury-Esnault, 1986) - with central tube ramified; choanoderm limited to external diverticuli (Borojevic et al., 1990); spicules are equiangular and equiradiate triactines and tetractines with short basal actine in the central tube and lateral walls, equiangular and equiradiate triactines and tetractines with rudimentary apical actine lining the diverticula (Borojevic & Boury-Esnault, 1986).

□ FAMILY LEUCALTIDAE DENDY & ROW, 1913.

DEFINITION: Tubular, branching or regularly anastomosing cormus, either with many oscules or with a large atrium and a single osculum; sponge wall composed of a distinct cortex and choanosome; skeleton of choanosome and atrial wall absent or composed of small and dispersed triradiates and quadriradiates.

SCOPE: There are four named genera (three valid), and a fourth *incertae sedis*.

REVIEWS: Hartman (1958), Burton (1963), Borojevic (1968), Borojevic et al. (1990).

GENERA:

Ascandra Haeckel, 1872 (type species: *Ascandra falcata* Haeckel, 1872) - solitary or compound, subpyriform, clathrate, substipitate; surface minutely hispid; oscules apical; soft texture; choanoderm forms folds inside the choanocoel which isolate radially arranged shallow cavities or true radial tubes; choanosomal folds are supported by apical rays of external quadriradiates only; spicules regular triradiates, regular quadriradiates and sickle-shaped oxeas (Burton, 1963; Borojevic et al., 1990).

Leucaltis Haeckel, 1872 (type species: *Leucaltis clathria* Haeckel, 1872) (syn. *Leucaltusa* Haeckel, 1872; *Artyntis* Haeckel, 1872; *Heteropegma* Poléjoeff, 1884) - body composed of large ramified and anastomosed clathrous tubes; surface even, smooth; oscules small, scattered; texture friable; each tube has a distinct cortex, a choanoderm composed of elongated and ramified choanocyte chambers and central atrium; choanoderm and atrial wall have a secondary skeleton composed of small triradiates and quadriradiates; ectosomal skeleton of several tangential layers of regular triradiates with facial rays of subectosomal regular quadriradiates; chamber layer with centripetally-directed apical rays of subectosomal quadriradiates, regular to sagittal, and small irregularly scattered quadriradiates; choanosomal skeleton with several tangential layers of quadriradiates (Burton, 1963; Borojevic et al., 1990).

Leucettusa Haeckel, 1872 (type species: *Leucetta corticata* Haeckel, 1872) - composed of a clathrate mass of anastomosing tubes; ectosomal skeleton of several tangential layers of regular triradiates; skeleton of chamber layer and of choanosomal surfaces of small sagittal triradiates, with those of inner parts of chamber layer with swollen ends to rays (Burton, 1963); simple tubular body a large atrium and choanocyte chambers which are either elongated, spherical or both (Borojevic et al., 1990).

Leuclathrina Borojevic & Boury-Esnault, 1987 (*incertae sedis*) (type species: *Leuclathrina asconoides* Borojevic & Boury-Esnault, 1987) - skeleton restricted to the ectosomal cortical region, and the choanosome lacks spicules completely (Borojevic et al., 1990); globular growth form, apical oscules with slightly raised fringe; smooth, porous surface; ectosomal cortex supported by equiangular and equiradiate triactines; choanosome without mineral skeleton; leuconoid aquiferous system (Borojevic & Boury-Esnault, 1987).

□ FAMILY LEUCASCIDAE DENDY, 1893.

DEFINITION: Body differentiated into cortex and choanosome reminiscent of a clathroid body composed of anastomosed tubes; cortex composed of large triradiates and/or quadriradiate spicules; choanocyte chambers tubular, often highly ramified and anastomosed; choanoskeleton restricted to walls of the choanocyte chambers, maintaining a distinctly tubular organisation.

SCOPE: The four nominal and two valid genera included in this family.

REVIEWS: Dendy (1893), Bidder (1898), Dendy & Row (1913), Burton (1963), Borojevic (1968), Borojevic et al. (1990).

GENERA:

Aulorrhiza Haeckel, 1869 (type species: *Leucosolenia lamarckii* Haeckel, 1869, sen. syn. of *Aulorrhiza intestinalis* Haeckel, 1869) (syn. *Ascoleugetta* Dendy & Frederick, 1924; *Ascaltis*, sensu Borojevic, 1968; Borojevic et al., 1990) - with a massive cormus composed of ramified and anastomosed tubes covered by a common cortex; the inhalant aquiferous system is represented by spaces delimited by the cortex and the walls of choanosomal tubes; the exhalant aquiferous system is reduced to the osculum or to a secondary atrial cavity formed by the calyciform growth of the cormus (Borojevic et al., 1990); rounded mass of anastomosing tubes; skeleton of equiradiate triradiates and quadriradiates with regular facial rays (Burton, 1963).

Leucascus Dendy, 1893 (type species: *Leucascus simplex* Dendy, 1892) - with copiously branched and anastomosed choanocyte tubes; exhalant aquiferous system is represented by a well-developed atrium delimited by a specific wall within the choanoderm (Borojevic et al., 1990); solitary, irregularly massive to spherical; surface even, smooth, small scattered oscules, firm texture; skeleton of regular triradiates or occasionally quadriradiates with incipient apical rays (Burton, 1963).

□ FAMILY LEUCETTIDAE DE LAUBENFELS, 1936.

DEFINITION: Solid body; aquiferous system always leuconoid; choanoskeleton well-developed forming regular network composed of triradiates and/or quadriradiates; cortex thin and composed of spicules similar to those in the choanoskeleton.

SCOPE: The family includes six generic names, of which two are valid genera and one *incertae sedis*.

REVIEWS: Borojevic (1968), Borojevic et al. (1990).

GENERA:

Leucetta Haeckel, 1872 (type species: *Leucetta primigenia* Haeckel, 1872) (syn. *Sycothamnus* Haeckel, 1869; *Leucetta* Haeckel, 1872; *Teichonella* Carter, 1878) - a homogeneous organisation of the wall and a typical leuconoid aquiferous system; there is no clear distinction between the cortex and the choanoskeleton, nor the presence of a distinct layer of subcortical inhalant cavities; the atrium is frequently reduced to a system of exhalant channels that open directly into the osculum (Borojevic et al., 1990); solitary or compound, tubular, clathrate with tubular oscules, or lobate; surface even, harsh; oscules apical; firm texture; skeleton of regular to subregular triradiates arranged tangentially in ectosomal and choanosomal region, irregularly arranged in chamber layer (Burton, 1963).

Pericharax Poléjaeff, 1884 (type species: *Pericharax heterorhaphis* Poléjaeff, 1884) - with a large central cavity, probably a pseudogaster, surrounded by a thick wall; the wall is divided into a choanoderm and a thin subcortical layer of inhalant cavities supported by a peculiar skeleton partially composed of the centripetal rays of the special cortical triradiates (Borojevic et al., 1990); solitary or compound, cup-shaped, subspherical or massive lobose; surface even, smooth, harsh often thrown into irregular folds in places; apical oscule, with or without margin; firm texture; ectosomal skeleton a tangential layer of subregular triradiates; skeleton of chamber layer of large and small regular triradiates irregularly scattered; choanosomal skeleton a tangential layer of regular quadriradiates (Burton, 1963).

Leucomalthe Haeckel, 1872 (*incertae sedis*) (type species: *Leucomalthe bomba* Haeckel, 1872) - with a solid body and a large central cavity; choanocyte chambers greatly elongated, tubular and copiously branched; skeleton consists of regular triradiates and microbiradiates in the cortical skeleton, regular triradiates in the choanoskeleton and sagittal quadriradiates both in the atrial skeleton and in the exhalant channels; large longitudinal biradiates present throughout the body (Borojevic et al., 1990); solitary, spherical; surface even; apical oscule with well developed fringe; texture firm; ectosomal skeleton of tangential layers of microxeas and regular triradiates; skeleton of chamber layer of regular triradiates and longitudinally placed oxeas, with larger canals lined with subregular quadriradiates; choanosomal skeleton a tangential layer of sagittal quadriradiates (Burton, 1963).

□ ORDER MURRAYONIDA.

DEFINITION: Reinforcement of the skeleton composed of either spicule tracts, calcareous plates or a rigid aspicular skeleton; canal system leuconoid; diapasons (tuning-fork shaped triradiates) or modified biradiates present and generally fasciculated.

There are 3 families and only 3 known species..

□ FAMILY MURRAYONIDAE KIRKPATRICK, 1910.

DEFINITION: Choanosomal skeleton composed of a rigid calcareous aspicular network; cortex composed chiefly of overlapping calcareous scales, with tuning-fork spicules below.

SCOPE: Single genus.

REVIEWS: Dendy & Row (1913), Hartman (1958), Vacelet (1970), Brien et al. (1973), Hartman (1980), Vacelet (1981), Borojevic et al. (1990).

GENERA:

Murrayona Kirkpatrick, 1910 (type species: *Murrayona phanolepis* Kirkpatrick, 1910) - with a definite pore-zone whose ectosomal (cortical) skeleton consists of small triradiates; diapasons (tuning-fork shaped spicules) are present beneath the ectosomal scales (Burton, 1963; Borojevic et al., 1990); subspherical to pyriform; surface even, imbricated; oscules small, lateral, pores in equatorial groove; texture hard; ectosomal skeleton a layer of subcircular scales, with an ectosomal layer of irregular triradiates and irregular tuning-fork spicules, regular triradiates of the poral groove, and a main skeleton composed of a stout reticulation of calcareous fibres (Burton, 1963).

□ FAMILY PARAMURRAYONIDAE VACELET, 1967.

DEFINITION: Choanosomal skeleton composed of bundles of diapasons (tuning-fork triradiates) without any rigid structure; cortical skeleton composed chiefly of a superficial layer of overlapping calcareous scales and an internal layer of free calcareous plates.

SCOPE: Single genus.

REVIEWS: Borojevic et al. (1990).

GENERA:

Paramurrayona Vacelet, 1967 (type species: *Paramurrayona corticata* Vacelet, 1967) - as for family.

□ FAMILY LELAPIELLIDAE BOROJEVIC, BOURY-ESNAULT & VACELET, 1990.

DEFINITION: Choanosomal skeleton composed of bundles of biradiates without any rigid structure; cortical skeleton composed chiefly of a tangential layer of tripods (triradiates) and curved oxeotes (biradiates).

SCOPE: Single genus.

REVIEWS: Vacelet (1977, 1981), Hartman (1982).

GENERA:

Lelapiella Vacelet, 1977 (type species: *Lelapiella incrustans* Vacelet, 1977) - cortex reinforced by large equiangular triradiates ornamented on the external convex side with mamelons, and also with cortical diactinal spicules curved at 120° at the center. The basal layer, in contact with the substrate, is made up of a dense network of curved oxeas. Tracts of oxeas run from the cortex diagonally through the choanosome to the basal layer of spicules (Hartman, 1982).

□ SUBCLASS CALCARONEA.

DEFINITION: Calcarea with incubated amphiblastula larvae flagellated only on the anterior half; nuclei of choanocytes apical, and the flagellum arises directly from the nucleus; spicules are triradiate and sagittal (two rays are paired and the third ray is longer than the others), as well as free monaxonic (monactinal or diactinal) forms; aquiferous system ranges from asconoid to leuconoid grades of construction.

Two orders recognized.

□ ORDER LEUCOSOLENIIDA.

DEFINITION: Only with free spicules, without calcified non-spicular reinforcements.

With seven families.

□ FAMILY LEUCOSOLENIIDAE MINCHIN, 1898.

DEFINITION: Asconoid, erect growth forms, with long, individual, clustered, oscular tubes arising from stolon-like system of basal tubes; tubes may have diverticular and often arborescent; monaxon spicules always present; triradiates, if present, typically bilateral, sagittal, inequangular in form (where two of the rays form a pair, while the third differs in some way), and with the crystalline optic axis never vertical but always inclined to the facial plane of the rays; choanocytes with flagellum arising directly from the pear-shaped nucleus, situated at or near the apex of the cell; choanocytes line central cavity (spongocoele) of the individual tubes; larvae are amphiblastula.

SCOPE: About 90 generic names are included in this family, but only three of these are now recognised.

REVIEWS: Bidder (1898), Minchin (1909), Dendy & Row (1913), Hartman (1958), Burton (1963).

GENERA:

Acute Dendy & Row, 1913 (type species: *Leucosolenia uteoides* Dendy, 1893) - compound, tubular, sessile, surface even, minutely hispid, striated; oscules apical; firm texture; ectosomal skeleton has large diacts (oxeotes), of one or two sizes, echinating surface and/or lying longitudinally within the ectosome; choanosomal skeleton composed of sagittal quadriradiates (Burton, 1963).

Ascyssa; Haeckel, 1872 (type species: *Ascyssa acufera* Haeckel, 1872) - tubular, colonial; smooth surface; apical oscules; skeleton a tangential layer of irregularly arranged oxeote and microxeote spicules (Burton, 1963).

Leucosolenia Bowerbank, 1861 (type species: *Spongia botryoides* Ellis & Solander, 1786) (syn. *Nardosa* Wright, 1868; *Olynthium* Haeckel, 1870; *Olynthus* Haeckel, 1870; *Prosyncum* Haeckel, 1870; *Leucaria* Haeckel, 1870; *Leucelia* Haeckel, 1870; *Leuceria* Haeckel, 1870; *Leucilia* Haeckel, 1870; *Leuciria* Haeckel, 1870; *Leucoria* Haeckel, 1870; *Tarroma* Haeckel, 1870; *Tarrus* Haeckel, 1870; *Nardopsis* Haeckel, 1870; *Clystolynthus* Haeckel, 1870; *Sycorrhiza* Haeckel, 1870; *Auloplegma* Haeckel, 1870; *Thecometra* Haeckel, 1870; *Ascettaga* Haeckel, 1872; *Ascettopa* Haeckel, 1872; *Ascettusa* Haeckel, 1872; *Ascometra* Haeckel, 1872; *Nardorus* Haeckel, 1872; *Solenula* Haeckel, 1872; *Tarropsis* Haeckel, 1872; *Ascilla* Haeckel, 1872; *Ascillaga* Haeckel, 1872; *Ascillopa* Haeckel, 1872; *Ascaltaga* Haeckel, 1872; *Ascaltopa* Haeckel, 1872; *Ascuris* Haeckel, 1872; *Ascortaga* Haeckel, 1872; *Ascortopa* Haeckel, 1872; *Ascortusa* Haeckel, 1872; *Asculmis* Haeckel, 1872; *Ascandra* Haeckel, 1872; *Ascandropa* Haeckel, 1872; *Olynthella* Haeckel, 1872; *Nardoma* Haeckel, 1872; *Solenidium* Haeckel, 1872; *Olynthaltus* Haeckel, 1872; *Olynthandrus* Haeckel, 1872; *Olynthettus* Haeckel, 1872; *Olynthortus* Haeckel, 1872; *Olynthillus* Haeckel, 1872; *Olynthulmus* Haeckel, 1872; *Olynthandrium* Haeckel, 1872; *Olynthandra* Haeckel, 1872; *Olynthelletta* Haeckel, 1872; *Clistolynthus* Haeckel, 1872; *Clistolynthaltis* Haeckel, 1872; *Clistolynthandra* Haeckel, 1872; *Clistolynthetta* Haeckel, 1872; *Clistolynthilla* Haeckel, 1872; *Soleniscetta* Haeckel, 1872; *Soleniscilla* Haeckel, 1872; *Soleniscyssa* Haeckel, 1872; *Solenicaltis* Haeckel, 1872; *Solenicortis* Haeckel, 1872; *Soleniculmis* Haeckel, 1872; *Soleniscandra* Haeckel, 1872; *Solenidandra* Haeckel, 1872; *Solenulandra* Haeckel, 1872; *Solenuletta* Haeckel, 1872; *Nardoralis* Haeckel, 1872; *Nardorandra* Haeckel, 1872; *Nardoretta* Haeckel, 1872; *Nardorilla* Haeckel, 1872; *Nardorortis* Haeckel, 1872; *Nardomandrum* Haeckel, 1872; *Nardopsandra* Haeckel, 1872; *Nardopsetta* Haeckel, 1872; *Nardopsortis* Haeckel, 1872; *Tarraltis* Haeckel, 1872; *Tarrandra* Haeckel, 1872; *Tarretta* Haeckel, 1872; *Tarrilla* Haeckel, 1872; *Tarromandra* Haeckel, 1872; *Tarropsandra* Haeckel, 1872; *Tarropsetta* Haeckel, 1872; *Auloplegmaltis* Haeckel, 1872; *Auloplegmetta* Haeckel, 1872; *Auloplegmilla* Haeckel, 1872; *Auloplegmandra* Haeckel, 1872; *Auloplegmortis* Haeckel, 1872; *Ascaltometra* Haeckel, 1872; *Ascandrometra* Haeckel, 1872; *Ascettometra* Haeckel, 1872; *Homandra* Lendenfeld, 1891; *Nardoris* Delage, 1899; *Aulorhiza* Dendy & Row, 1913) - encrusting network of more or less erect asconoid tubes which may branch, or throw out lateral diverticula, but seldom anastomose except occasionally at base of main tubes; surface minutely hispid; texture soft; skeleton of sagittal triradiates and sagittal quadriradiates, with apical rays projecting into cloacal cavity, and oxeas with lanceolate distal ends (Burton, 1963).

□ FAMILY SYCETTIDAE DENDY, 1892.

SYNONYM: [Syconidae] Haeckel [*nomen oblitum*].

DEFINITION: Tubular, spherical, flask-shaped, ovoid and branching growth forms, either solitary or in groups; ectosomal cortex is continuous and strengthened by tangential spicules, but these do not cover the choanocyte chamber layer; choanosomal spicules, supporting choanocyte chambers, have an articulated arrangement of overlapping sagittal triradiates, with the angle between the paired rays larger than the angles between each paired ray and the long, unpaired ray; sagittal triradiates have the longest ray pointing to the exterior of the sponge, and form a layer beneath the spongocoele lining (referred to as the subgastral position); choanocytes usually confined to the radial chambers in the adult, and probably always with apical nuclei; choanocyte chambers asconoid, arranged radially around a central cavity (spongocoele), with ends of chambers projecting into ectosomal surface.

SCOPE: There are only four valid genera included in this family although there are approximately 60 other generic names included in synonymy with these.

REVIEWS: Dendy (1893), Dendy & Row (1913), Tanita (1943), Hartman (1958), Burton (1963), Borojevic (1967).

GENERA:

Sycandra Haeckel, 1870 (type species: *Sycandra utriculus* Haeckel, 1872) - with an atrial cavity partially obstructed by a column sustained by parallel diactines (Borojevic, Boury-Esnault & Vacelet, in prep.).

Sycetta Haeckel, 1872 (type species: *Sycetta primitiva* Haeckel, 1872) (syn. *Sycyssarium* Haeckel, 1872; *Sycissa* Lendenfeld, 1886) - tubular, stipitate; surface minutely papillate, non-hispid; oscule simple, apical; texture soft; tubar and choanosomal skeletons composed of regular triradiates; species lack tufts of oxeas at the distal ends of the radial chambers, and the radial chambers are always completely separate from one another, otherwise similar to *Sycon* (Burton, 1963).

Sycodorus Haeckel, 1872 (type species: *Sycandra (Sycodorus) hystrix* Haeckel, 1872) (syn. *Sycodorussa* Haeckel, 1892; *Utella* Dendy, 1892) - tubular, sessile; even surface prominently hispid; apical oscule with fringed margin; firm texture; ectosomal skeleton of several tangential layers of regular triradiates, with oxeas of two sizes projecting beyond the surface; tubar skeleton with several rows of sagittal triradiates and sagittal quadriradiates and basal rays of subgastral sagittal triradiates and sagittal quadriradiates; choanosomal skeleton of paired rays of subgastral sagittal triradiates, with longitudinal oxeas and a tangential layer of sagittal triradiates and sagittal quadriradiates (Burton, 1963).

Sycon Risso, 1826 (type species: *Spongia ciliata* Fabricius, 1780) (syn. *Scypha* Gray, 1821; *Calcispongia* Blainville, 1830; *Calcepongia* Lamarck, 1836; *Dumstervillia* Bowerbank, 1845; *Coniasterium* Ehrenberg, 1861; *Artynes* Gray, 1867; *Syconella* Schmidt, 1868; *Sycum* Haeckel, 1870; *Artynella* Haeckel, 1870; *Sycarium* Haeckel, 1870; *Artynas* Haeckel, 1870; *Sycodendrum* Haeckel, 1870; *Sycidium* Haeckel, 1870;

Artynium Haeckel, 1870; *Sycocystis* Haeckel, 1870; *Artynophyllum* Haeckel, 1870; *Sycophyllum* Haeckel, 1870; *Sycometra* Haeckel, 1870; *Sycetopa* Haeckel, 1870; *Sycettaga* Haeckel, 1870; *Sycurus* Haeckel, 1870; *Sycaltaga* Haeckel, 1870; *Sycuraltis* Haeckel, 1870; *Sycocarpus* Haeckel, 1870; *Sycocerus* Haeckel, 1870; *Sycocubus* Haeckel, 1870; *Sycostrobos* Haeckel, 1870; *Sycodorilla* Haeckel, 1870; *Sycodoranna* Haeckel, 1870; *Leukartea* Miklucho-Maclay in Haeckel, 1872; *Leucandropa* Haeckel, 1872; *Sycuretta* Haeckel, 1872; *Sycuranda* Haeckel, 1872; *Sycurortis* Haeckel, 1872; *Syconellortis* Haeckel, 1872; *Sycortarium* Haeckel, 1872; *Sycandrarium* Haeckel, 1872; *Syconellandra* Haeckel, 1872; *Syconcystandra* Haeckel, 1872; *Sycocystortis* Haeckel, 1872; *Sycothamnandra* Haeckel, 1872; *Sycodenandrum* Haeckel, 1872; *Sycinulandra* Haeckel, 1872; *Sycandrophyllum* Haeckel, 1872; *Leucandrometra* Haeckel, 1872; *Sycandrometra* Haeckel, 1872; *Sphenophorus* Breiffuss, 1898; *Sphenophorina* Breiffuss, 1898; *Hozawaia* de Laubenfels, 1936; *Homoderma* Lendenfeld, 1885; *Sycantha* Lendenfeld, 1891; *Hypodictyon* Jenkin, 1908; *Streptoconus* Jenkin, 1908; *Tenthrenodes* Jenkin, 1908) - tubular, spherical to elongate and cylindrical; surface minutely papillate and hispid; apical oscule with or without fringe; texture soft to firm; tubular skeleton of basal rays of subgastral sagittal triradiates and several rows of tubular sagittal or subregular triradiates, and ectosomal surface with distal cones ornamented with oxeas; choanosomal skeleton of paired rays of subgastral sagittal triradiates and choanosomal sagittal or subregular triradiates and quadriradiates; skeleton of chamber layer typically articulate and showing no marked differences in size between radiates of ectosome, chamber layer and choanosome except where tubular skeleton is reduced to sagittal subgastral radiates (Burton, 1963).

□ FAMILY HETEROPIIDAE DENDY, 1893.

SYNONYM: [Djeddeidae] de Laubenfels (*nomen vanum*).

DEFINITION: Massive, tubular, pear-shaped and branching growth forms, occurring as solitary sponges or in groups; continuous cortex, pierced by ostia and reinforced by asymmetrical triradiate spicules with unequal angles, covers the entirely choanocyte chamber layer; inarticulated or articulated tubular skeleton characterised by a distinct subcortical zone formed by pseudosagittal triactines, but articulated choanosomal spicule skeleton may be present or absent; cortical triradiate spicules probably originate from articulate chamber skeleton, through reorientation of the spicules, so that one of the paired rays becomes the sagittal ray and the latter pairs up with the remaining ray; choanocyte chambers asconoid, elongate and radially arranged, or spherical and irregularly scattered in the choanosome (leuconoid).

SCOPE: Six genera are included in this family (of 8 generic names).

REVIEWS: Dendy (1893), Dendy & Row (1913), Hartman (1958), Burton (1963), Borojevic (1966), Borojevic, R. (1967).

GENERA:

Sycetusa Haeckel, 1872 (type species: *Leucaltis bathybia* Haeckel, 1872) (syn. *Djeddea* Miklucho-Maclay in Haeckel, 1872; *Sycothamnetta* Haeckel, 1872) - tubular, substipitate; surface even, minutely hispid; apical oscule; firm texture; ectosomal skeleton a distinct tangential layer of sagittal triradiates, with oxeas projecting at right angles to surface; skeleton of chamber layer composed of centrifugally directed rays of sagittal triradiates and centripetally directed rays of subgastral pseudosagittal triradiates, supplemented or partially replaced by confused triradiates; choanosomal skeleton a tangential layer of sagittal tri- or quadriradiates (Burton, 1963).

Grantessa Lendenfeld, 1885 (type species: *Grantessa sacca* Lendenfeld, 1885) - sac shaped or cylindrical; surface even but bearing isolated tufts of oxeas; texture firm; ectosomal skeleton a sparse layer of tangential triradiates with unequal rays, paired rays of subectosomal pseudosagittal triradiates, and tufts of oxeas projecting from the surface; tubular skeleton of basal rays of subectosomal pseudosagittal and subgastral sagittal triradiates with numerous intermediate rows of subregular triradiates; choanosomal skeleton of paired rays of subgastral sagittal triradiates and several layers of choanosomal quadriradiates (Burton, 1963).

Grantilla Dendy & Row, 1913 (type species: *Grantilla quadriradiata* Row, 1909) - with syconoid organisation; the skeleton of the tubes are inarticulate and composed of subatrial triactines and subcortical pseudosagittal triactines and tetractines (Borojevic, Boury-Esnault & Vacelet, in prep.).

Heteropia Carter, 1886 (type species: *Aphroceras ramosa* Carter, in Higgin, 1886) - ramose, sessile; surface even, non-hispid; oscules apical, terminal; firm texture; ectosomal skeleton with a tangential layer of small sagittal triradiates and large ("colossal") longitudinally-placed oxeas; skeleton of chamber layer of sagittal triradiates; choanosomal skeleton a tangential layer of small triradiates and larger sagittal quadriradiates, the latter near the gastral cavity and oscule (Burton, 1963).

Paraheteropia Borojevic, 1966 (type species: *Paraheteropia ijimai* (Hozawa, 1916) - with syconoid organisation and with cortical and atrial skeleton sustained by longitudinal diactines (Borojevic, Boury-Esnault & Vacelet, in prep.).

Vosmaeropsis Dendy, 1893 (type species: *Heteropia macera* Carter, 1886) - tubular to sacciform, compound; even hispid or non-hispid surface; apical oscules; firm texture; ectosomal skeleton of several layers of triradiates together with paired rays of subectosomal pseudosagittal triradiates and microxeas, with or without oxeas projecting at the surface; skeleton of the chamber layer of basal rays of subgastral and subchoanosomal triradiates; choanosomal skeleton of paired rays of subgastral triradiates and several layers of triradiates (Burton, 1963).

□ FAMILY GRANTIIDAE DENDY, 1892.

SYNONYM: Leuconiinae Haeckel.

DEFINITION: Encrusting, lobate, tubular, sac-shaped, ovoid, spherical, vase-shaped and many other growth forms, either solitary or grouped and sessile, substipitate, or stipitate; surface with a distinct dermal cortex and a proper cortical skeleton of tangential radiates, sometimes supplemented by, and occasionally replaced by, oxeas; ectosomal cortex sometimes with quadriradiates in association with choanosomal triradiates; skeleton of the chamber layer ranging from regularly articulate to irregularly scattered, and typically with subgastral sagittal radiates; some subdermal pseudosagittal triradiates may occur but these are derived from normal choanosomal spicules, and do not form a continuous distinct layer as in the Heteropiidae; subgastral quadriradiates, if present, always associated with chamber-layer skeleton containing confused triradiates; nuclei of collared cells probably always apical; choanocyte chambers asconoid, elongate and radially arranged, or small, spherical and irregularly scattered in the choanosome (leuconoid).

SCOPE: This family contains 80 generic names, of which 21 are recognised here.

REVIEWS: Lendenfeld (1885d, 1885m), Dendy (1893a), Dendy & Row (1913), Tanita (1943), Borojevic (1966).

GENERA:

Amphiute Hanitsch, 1894 (type species: *Amphiute paulini* Hanitsch, 1894) - tubular, solitary or compound, apical oscule with fringe; ectosomal skeleton of large longitudinally arranged oxeas, microxeas set at right angles to surface, a tangential layer of triradiates and paired rays of subectosomal pseudosagittal triradiates; tubar skeleton of basal rays of subectosomal pseudosagittal triradiates and subgastral sagittal triradiates; choanosomal skeleton of paired rays of subectosomal sagittal triradiates and a tangential layer of large oxeas and choanosomal quadriradiates (Burton, 1963).

Anamixilla Poléjaeff, 1884 (type species: *Anamixilla torresi* Poléjaeff, 1884) - colonial tubular, apical oscule; ectosomal skeleton a tangential layer of triradiates; tubar skeleton of centrifugally-directed basal rays of subgastral sagittal triradiates, with irregularly arranged tubar triradiates; choanosomal skeleton of paired rays of subgastral sagittal triradiates and a tangential layer of triradiates and quadriradiates (Burton, 1963).

Aphroceras Gray, 1858 (type species: *Grantia ensata* Bowerbank, 1858) (syn. *Leucogypsia* Bowerbank, 1864; *Cyathiscus* Haeckel, 1870; *Leucandrena* Haeckel, 1872; *Artynandrus* Haeckel, 1872) - tubular, elongate, apical oscule; skeleton of chamber layer ranging from more or less confused to articulate, with subgastral or other sagittal radiates; ectosomal skeleton of tangentially placed triradiates supplemented typically by colossal oxeas placed longitudinally, or less commonly projecting from the surface (Burton, 1963).

Ebnerella Lendenfeld, 1891 (type species: *Ebnerella schulzei* Breitfuss, 1898) - with syconoid organisation; choanosomal skeleton reduced to the unpaired actine of the subatrial spicules; cortex devoid of longitudinal diactines (Borojevic, Boury-Esnault & Vacelet, in prep.).

Eilhardia Poléjaeff, 1884 (type species: *Eilhardia schulzei* Poléjaeff, 1884) - solitary cup-shaped, stipitate, sub-papillate oscules on outer surface of cup only; with large triradiates irregularly arranged in chamber layer, large triradiates and oxeotes in the ectosomal layer, with a tangential layer of smaller radiates, and with microxeas or trichodragmata scattered in one or other of principal layers (Burton, 1963).

Grantia Fleming, 1828 (type species: *Spongia compressa* Fabricius, 1780) (syn. *Sycortis* Haeckel, 1872; *Sycortusa* Haeckel, 1872; *Vosmaeria* Lendenfeld, 1885; *Dermatreton* Jenkin, 1908; *Teichonopsis* Dendy & Row, 1913; *Paragrantia* Hozawa, 1940) - solitary, sac-shaped, laterally compressed, hispid, apical or marginal oscule; ectosomal skeleton a tangential layer of triradiates, with tufts of oxeas projecting beyond surface; tubar skeleton of centripetally-directed basal rays of subgastral sagittal triradiates and numerous rows of tubar triradiates; choanosomal skeleton of paired rays of subgastral triradiates and a tangential layer of choanosomal triradiates and quadriradiates (Burton, 1963).

Hypograntia Carter, 1886 (type species: *Hypograntia infrequens* Carter, 1886) (syn. *Grantiopsis* Dendy, 1893; *Hippograntia* Breitfuss, 1898) - tubular, roughened, apical oscule; with ectosomal cortex as thick as the chamber layer, with many layers of tangential triradiates; tubar skeleton articulate, composed of the basal rays of subgastral quadriradiates with which are associated sagittal triradiates practically reduced to the basal ray by suppression of the paired rays; choanosomal skeleton of the paired and apical rays of the subgastral quadriradiates together with a tangential layer of choanosomal quadriradiates; without colossal longitudinal oxeotes (Burton, 1963).

Jenkinia Brondsted, 1931 (type species: *Jenkinia cirrata* (Jenkin, 1908)) - with a sylleibid or leuconoid organisation; choanosomal skeleton reduced to the unpaired actine of subatrial spicules; cortex without longitudinal diactines (Borojevic, Boury-Esnault & Vacelet, in prep.).

Lamontia Kirk, 1894 (type species: *Lamontia zona* Kirk, 1894) - tubular, hispid, apical oscule with fringed margin; pores in special area usually subterminal equatorial, but may be irregular longitudinal; skeleton of chamber layer consisting of small scattered oxeotes; ectosomal cortex with triradiates in addition to oxeotes; choanosomal quadriradiates present; sponge consisting of a single olynthus with a specialised pore-zone below the terminal vent (Burton, 1963).

Leucandra Haeckel, 1872 (type species: *Leucandra egedii* (Schmidt, 1870) - with a leuconoid organisation; internal diactines go through the cortex and keep their free part outside the sponge (Borojevic, Boury-Esnault & Vacelet, in prep.).

Leuconia Grant, 1832 (type species: *Spongia nivea* Grant, 1826) (syn. *Medon* Duchassaing & Michelotti, 1864; *Sycinula* Schmidt, 1868; *Dyssyconella* Haeckel, 1870; *Dyssycum* Haeckel, 1870; *Coenostomella* Haeckel, 1870; *Dyssiconella* Wright, 1870; *Leucortis* Haeckel, 1872; *Leucaltaga* Haeckel, 1872; *Mlea* Haeckel, 1872; *Leucandraga* Haeckel, 1872; *Leucandrusa* Haeckel, 1872; *Dyssycarium* Haeckel, 1872; *Coenostomium* Haeckel, 1872; *Dyssycortus* Haeckel, 1872; *Dyssycandrus* Haeckel, 1872; *Dyssycaltella* Haeckel, 1872; *Dyssycandrella* Haeckel, 1872; *Dyssycandrium* Haeckel, 1872; *Lipostomaltis* Haeckel, 1872; *Lipostomandra* Haeckel, 1872; *Lipostomortis* Haeckel, 1872; *Amphoriscandra* Haeckel, 1872; *Amphoricortis* Haeckel, 1872; *Amphoriulandra* Haeckel, 1872; *Amphoriidandra* Haeckel, 1872; *Coenostomandra* Haeckel, 1872; *Coenostomandium* Haeckel, 1872; *Coenostomellium* Haeckel, 1872; *Coenostomortis* Haeckel, 1872; *Artynandrium* Haeckel, 1872; *Artynellandra* Haeckel, 1872; *Artynortus* Haeckel, 1872; *Aphrocerandra* Haeckel, 1872; *Aphrocerortis* Haeckel, 1872; *Leucortmetra* Haeckel, 1872; *Leucania* Lendenfeld, 1885; *Dyssycarium* Delage, 1899) - encrusting, smooth surface, small scattered oscules; friable texture; ectosomal skeleton of several tangential layers of triradiates; skeleton of chamber layer supported by large irregularly scattered radiates and diacts (microxeas) irregularly arranged; choanosomal skeleton and linings of exhalant canals a tangential layer of sagittal quadriradiates (Burton, 1963).

Leucopsila Dendy & Row, 1913 (type species: *Leuconia stilifera* Schmidt, 1870) - tubular, laterally compressed, single or colonial, apical oscule with thin undulating margin; smooth conulose or even surface; soft texture; ectosomal skeleton of several layers of tangential triradiates with numerous microxeas; skeleton of chamber layer a confused mass of microxeas with large quadriradiates scattered between; choanosomal skeleton a dense layer of microxeas (Burton, 1963).

Leucyssa Haeckel, 1872 (type species: *Leucyssa spongilla* Haeckel, 1872) - clathrate mass of anastomosing tubes; even surface, non-hispid; apical oscules with strongly fringed margins; skeleton of body of oxeas only, with larger oxeas surrounding oscules (Burton, 1963).

Paraleucilla Dendy, 1892 (type species: *Leucandra cucumis* Haeckel, 1872) - ovate body, even surface, non-hispid, apical oscules, naked or fringed margins; ectosomal skeleton a tangential layer of triradiates and oxeas; subectosomal skeleton of two layers of quadriradiates with apical rays oppositely directed; skeleton of chamber layer of scattered quadriradiates; choanosomal skeleton a tangential layer of triradiates (Burton, 1963).

Sycophractus Haeckel, 1872 (syn. *Sycurandra* Haeckel, 1872; *Ute*, of authors) (type species: *Ute glabra* Schmidt, 1864) - [based on *S. spenceri* (Dendy, 1892:94): spherical or subspherical; uneven surface, roughened, apical oscule; firm; ectosomal skeleton of longitudinal oxeas, tangential triradiates and groups of microxeas; skeleton of chamber layer of an outer tubar skeleton of triradiates and an inner irregular layer of triradiates and quadriradiates of exhalant canals; choanosomal skeleton of several tangential layers of quadriradiates, and sparsely scattered microxeas (Burton, 1963).

Sycute Dendy & Row, 1913 (type species: *Sycon dendyi* Kirk, 1895) - tubular, hispid surface in tufts; apical oscule with fringed margin; ectosomal skeleton of longitudinally placed oxeas, with tufts of small oxeas; skeleton of chamber layer of triradiates; choanosomal skeleton of quadriradiates (Burton, 1963).

Sycyssa Haeckel, 1872 (type species: *Sycyssa huxleyi* Haeckel, 1872) - oval, even surface strongly hispid; apical oscule with fringed margin; ectosomal skeleton a tangential layer of oxeas, with a palisade of oxeas set at right angles to the surface, and with large oxeas projecting beyond; skeleton of chamber layer of proximal parts of large oxeas; choanosomal skeleton a tangential layer of oxeas and a subgastral layer of large oxeas (Burton, 1963).

Synute Dendy, 1892 (type species: *Synute pulchella* Dendy, 1892) - with a cornus constituted by completely fused units with a syconoid organisation, surrounded by a common cortex with a skeleton of giant longitudinal diactines (Borojevic, Boury-Esnault & Vacelet, in prep.).

Teichenopsis Dendy & Row, 1913 (type species: *Teichonella labyrinthica* Carter, 1878) - caliculate growth form when small, becoming infundibular and compressed, to lamellate and much folded, stipitate in all but early stages; even surface, non-hispid; oscules small and numerous on inner surface; texture firm and brittle; ectosomal skeleton of several layers of triradiates, with microxeas set at right angles to surface; tubar skeleton of sugastral sagittal triradiates and numerous rows of tubar triradiates; choanosomal skeleton of paired rays of subgastral triradiates, a tangential layer of quadriradiates and microxeas set at right angles to surface (Burton, 1963).

Trichogypsia Carter, 1871 (type species: *Trichogypsia villosa* Carter, 1871) (syn. *Dyssycyssus* Haeckel, 1872; *Amphoriscyssa* Haeckel, 1872; *Aphroceryssa* Haeckel, 1872; *Sycolepis* Lendenfeld, 1885) - encrusting to irregular massive growth forms; surface uneven, irregular, minutely hispid; oscules small, scattered; with skeleton composed entirely of distally spined diactines (oxeas) only; canal system leuconoid (Burton, 1963).

Ute Schmidt, 1862 (type species: *Ute glabra* Schmidt, 1864) - with leuconoid organisation; cortex sustained by giant longitudinal diactines; choanosomal skeleton articulated; no radial fascicules of diactines (Borojevic, Boury-Esnault & Vacelet, in prep.).

Uteopsis Dendy & Row, 1913 (type species: *Ute argentea* Poléjaeff, 1883) - solitary, tubular, substipitate; smooth surface, striated; apical oscule; firm texture; ectosomal cortex well developed, with skeleton composed of triradiates and containing oxeotes and microxeas arranged tangentially; tubar skeleton of

centrifugally-directed basal rays of subgastral sagittal triradiates, tubar quadriradiates and bundles of distally directed oxeas; choanosomal skeleton of paired rays of subgastral sagittal triradiates, an inner layer of choanosomal triradiates and quadriradiates, and an outer layer of choanosomal quadriradiates, with microxeas irregularly scattered (Burton, 1963).

□ FAMILY AMPHORISCIDAE DENDY, 1892.

DEFINITION: Massive, tubular, ovoid and spherical growth forms, grouped together, never solitary (one genus (*Syculmis*) has a root-like tuft of oxeas and anchoring quadriradiates); ectosomal cortex is distinct and supported by tangentially placed radiates, with or without oxeas; ectosomal radiates may have the large arm directed inwards, forming the main part of the choanosomal skeleton; no articulated choanosomal skeleton present, but leuconoid forms may have quadriradiates scattered in the choanosome and large quadri- or triradiates below the atrium (subgastral spicules); nuclei of choanocytes probably always apical; choanocyte chambers asconoid, elongate and radially arranged, or small, spherical and irregularly scattered in the choanosome (leuconoid).

SCOPE: Nineteen generic names, of which only seven are valid, are currently included in this family.

REVIEWS: Dendy (1893a, 1893c), Dendy & Row (1913), Hartman (1958)

GENERA:

Amphoriscus Haeckel, 1869 (type species: *Ute chrysalis* Schmidt, 1864) (syn. *Sycilla* Haeckel, 1872; *Leuculmis* Haeckel, 1872; *Dyssycillus* Haeckel, 1872; *Sycurilla* Haeckel, 1872; *Dyssyculmus* Haeckel, 1872; *Syculmarium* Haeckel, 1872; *Lipostomella* Haeckel, 1872; *Leoculmis* Ganin, 1879; *Rhabdodermella* Urban, 1902; *Lenculmis* Allemand, 1907) - solitary, tubular, stipitate; smooth surface; terminal oscule; ectosomal skeleton of tangentially arranged facial rays of large sagittal quadriradiates; tubar skeleton of apical rays of ectosomal sagittal quadriradiates and subgastral sagittal quadriradiates; choanosomal skeleton of facial rays of subgastral sagittal quadriradiates and choanosomal sagittal quadriradiates; skeleton of the chamber layer typically composed of the centripetally and centrifugally directed apical rays of subgastral and subchoanosomal quadriradiates, but choanosomal sagittal triradiates and confused chamber layer quadriradiates may be present while choanosomal quadriradiates may be absent (Burton, 1963).

Baeria Miklucho-Maclay, 1870 (type species: *Baeria ochotensis* Miklucho-Maclay, 1870) - ovate, globular, villose surface, apical oscule; ectosomal skeleton a tangential layer of regular triradiates, with oxeas and microxeas set at right angles to the surface; skeleton of chamber layer of scattered quadriradiates; choanosomal skeleton a tangential layer of quadriradiates (Burton, 1963).

Kuarrhaphis Dendy & Row, 1913 (type species: *Leucyssa cretacea* Haeckel, 1872) - encrusting to massive, low growing, surface even, non-hispid, oscules not seen; skeleton of needle-eye spicules (Burton, 1963).

Leucettaga Haeckel, 1872 (type species: *Leucetta pandora* var. *loculifera*) - leuconoid aquiferous system, sponge spherical, non-hispid, apical oscule; skeleton composed of a confused mass of triradiates, which are mostly irregular and which form a cortical skeleton as well as the skeleton of the chamber layer; gastral cavity traversed by numerous endogastric septa which possess a special skeleton of their own in the form of minute radiates (Dendy & Row, 1913; Burton, 1963).

Leucilla Haeckel, 1872 (type species: *Leucilla amphora* Haeckel, 1872) (syn. *Polejna* Lendenfeld, 1885) - tubular, sessile; surface even, non-hispid; oscule apical; ectosomal skeleton of facial rays of ectosomal quadriradiates; skeleton of chamber layer of apical rays of quadriradiates similar to those in ectosomal layer but more irregular, and basal rays of subgastral sagittal quadriradiates, with small irregular quadriradiates scattered between them; choanosomal skeleton of paired and apical rays of subgastral sagittal quadriradiates and the facial rays of a tangential layer of choanosomal sagittal quadriradiates (Burton, 1963).

Syculmis Haeckel, 1872 (type species: *Syculmis synapta* Haeckel, 1872) - tubular, sessile, with root tuft; surface even, non-hispid; apical oscule with marginal fringe; ectosomal skeleton of facial rays of subregular to sagittal quadriradiates; skeleton of chamber layer of apical rays of ectosomal quadriradiates and basal rays of subgastral sagittal quadriradiates; choanosomal skeleton of paired and apical rays of subgastral sagittal quadriradiates and a tangential layer of choanosomal subregular quadriradiates; skeleton of root tuft of oxeas and anchoring radiates (Burton, 1963) [*incertae sedis*].

□ FAMILY LEPIDOLEUCONIDAE VACELET, 1967.

DEFINITION: Minute rounded sponges; ectosomal skeleton (exopinacoderm) consists of several layers of overlapping (not fused) triangular or rounded scales, derived from triradiate spicules; surface has a single osculum surrounded by several layers of quadriradiate spicules and diactines, and ostia surrounded by triradiates and microdiactinal spicules; choanosome lacks megascleres but has microquadriradiates scattered; basopinacoderm region (at the base of the sponge) has scales and triactines; tuning fork spicules or sagittal triactines never present; choanocytes with apical nuclei; larvae are amphiblastula.

SCOPE: A single genus.

REVIEWS: Nil.

GENERA:

Lepidoleucon Vacelet, 1967 (type species: *Lepidoleucon inflatum* Vacelet, 1967) - as for family.

□ FAMILY STAUORRHAPHIDAE JENKIN, 1908.

DEFINITION: Solitary, tubular sac-shaped growth forms with well-developed spicule fringe around terminal oscule; continuous cortex covers the choanosome, perforated by ostia; ectosomal tetractines never present, and tangential atrial skeleton present only in oscular region; subatrial quadriradiates ('chiactines') present and equiangular; symmetrical and asymmetrical triradiates and oxeas scattered freely within choanosomal skeleton, projecting through cortex; aquiferous system is syconoid or leuconoid.

SCOPE: Two genera.

REVIEWS: Dendy & Row (1913), Burton (1963) and Borojevic (1968).

GENERA:

Achramorpha Jenkin, 1908 (type species: *Achramorpha truncata* Topsent, 1907) - thin-walled tubular, apical oscule with well developed marginal fringe; skeleton of chamber layer composed of basal rays of choanosomal radiates and, usually of proximal parts of radial oxeas; choanosomal skeleton of paired and apical rays of subgastral triradiates and quadriradiates, with sometimes a tangential layer of quadriradiates (or triradiates); ectosomal skeleton, when present, a tangential layer of triradiates or quadriradiates (Burton, 1963).

Megapodon Jenkin, 1908 (types species: *Leuconia crucifera* Poléjaeff, 1883) - unknown shape, hispid surface; ectosomal skeleton a tangential layer of triradiates, with oxeas and trichoxeas projecting from the surface; skeleton of chamber layer of centrifugally-directed basal rays of subgastral sagittal quadriradiates, together with scattered triradiates; choanosomal skeleton of quadriradiates (Burton, 1963).

□ ORDER LITHONIDA.

DEFINITION: Generally restricted to shaded habitats such as caves and tunnels; massive reinforced calcitic (hypercalcified) skeleton, together with tuning fork spicules and sagittal tetractines as free spicules; larvae are amphiblastula; choanocytes are apinucleate.

Three families.

□ FAMILY MINCHINELLIDAE DENDY & ROW, 1913.

DEFINITION: Encrusting and lamellate growth forms; oscules may be supported by di-, tri- and tetractinal spicules; choanosome with a rigid skeleton of fused quadriradiate spicules cemented together, or formed by intertwined rays of the triradiate and quadriradiate spicules at the base of the sponge; free spicules may include tri- and quadriradiates, monactinal or diactinal and tuning fork spicules, some or all of in the ectosomal skeleton; subgastral sagittal radiates apparently absent; nuclei of choanocytes are apical; larvae are amphiblastula; canal system in all known forms is leuconoid.

SCOPE: Five extant genera are recognised.

REVIEWS: Hartman (1958), Vacelet (1970, 1981), Brien et al. (1973), Hartman (1980).

GENERA:

Petrostoma Döderlein, 1892 (type species: *Petrostoma schulzei* Döderlein, 1892) - digitate processes arising from a common base; surface even, texture hard; oscules not obvious; subregular to sagittal quadriradiates of the chamber layer fused together laterally by calcareous cement into a network; ectosomal skeleton of separate quadriradiates and triradiates and bunches of tuning-fork spicules (Burton, 1963).

Minchinella Kirkpatrick, 1908 (type species: *Minchinella lamellosa* Kirkpatrick, 1908) - flabellate; even surface, minutely hispid; oscules papillate, pores on fistular processes; texture hard; main skeleton of fused quadriradiates; ectosomal skeleton a palisade of microxeas, with microxeas of several sizes, triradiates and quadriradiates with paired rays, and tuning-fork spicules in pore and ocular processes (Burton, 1963).

Monoplectroninia Pouliquen & Vacelet, 1970 (type species: *Monoplectroninia hispida* Pouliquen & Vacelet, 1970) - choanosomal skeleton composed of a basal layer made of one category of small tetractines cemented together by their basal actines, while their apical actine remains free and pointed. Cortical skeleton composed of free spicules (Borojevic, Boury-Esnault & Vacelet, in prep.).

Plectroninia Hinde, 1900 (type species: *Plectroninia halli* Hinde, 1900 [fossil form]) - quadriradiates of the main skeleton with their facial rays truncated or expanded terminally and fused at the end with facial rays of adjacent spicules, while the apical rays remain free and pointed; ectosomal skeleton of separate radiates, including tuning fork spicules and oxeas (Burton, 1963); *P. hindei* Kirkpatrick - encrusting; surface even, granular, oscules not seen; texture hard; main skeleton of fused quadriradiates, with a basal layer of sagittal triradiates, and with irregular triradiates, spined microxeas, tuning-fork spicules, spined pin-shaped spicules (Burton, 1963).

Tulearinia Vacelet, 1977 (type species: *Tulearinia styliifera* Vacelet, 1977) - encrusting; hispid surface; ectosomal skeleton with long styliiform diactines both tangential to and erect on the basal skeleton; large sagittal triactines form a cortex laying parallel to the surface; within the choanosome are also numerous microdiactines; basal skeleton composed of fused tetractines having basal actines bound together by interlamellar cement without suture, and the beds under the rays of triactines have the same form of union (Vacelet, 1977).

□ FAMILY PETROBIONIDAE BOROJEVIC, 1979.

DEFINITION: Hemispherical or conical growth forms; ectosomal skeleton contains sagittal triradiates, tuning fork spicules and quadrirradiates, some of which also extend into the mesohyl; basal skeleton composed of

spherulitic units of calcite, fused together to form hemispherical mass, each unit with terminal osculum surrounded by collars of quadriradiates; living tissue penetrates into the calcitic mass only for short distances, and free spicules in the mesohyl include microdiactines; triradiates, with a rudimentary fourth ray, also occur at the base of living tissue; nuclei of choanocytes are apical; larvae are amphiblastula.

SCOPE: A single genus.

REVIEWS: Nil.

GENERA:

Petrobiona Vacelet & Lévi, 1958 (type species: *Petrobiona massiliana* Vacelet & Lévi, 1958) - as for family.

□ FAMILY LELAPIIDAE DENDY & ROW, 1913.

DEFINITION: Tubular, sessile growth forms; surface even, non-hispid; apical oscule with fringed margin; ectosomal skeleton of tangential sagittal triradiates and microxeas set at right angles to surface; skeleton of the chamber layer composed of large scattered oxeotes, loose bundles of tuning-fork spicules and more rarely bundles of slender oxeas, and subgastral sagittal triradiates; choanosomal skeleton composed of tangential sagittal triradiates and more rarely sagittal quadriradiates.

SCOPE: Three genera of which two are valid.

REVIEWS: Hartman (1958), Burton (1963), Vacelet (1970), Brien et al. (1973), Vacelet (1977a), Vacelet (1981), Hartman (1982).

GENERA:

Kebira Row, 1909 (type species: *Kebira uteoides* Row, 1909) - choanosomal skeleton with spicular tracts constituted by triactines with rudimentary paired actines; atrial and cortical skeleton composed of triactines and diactines (Borojevic, Boury-Esnault & Vacelet, in prep.).

Lelapia Gray, 1867 (type species: *Lelapia australis* Gray, 1867) (syn. *Paralelapia* Hozowa, 1923) - choanosomal skeleton has spicular tracts constituted by diapasons (tuning-fork spicules) (Borojevic, Boury-Esnault & Vacelet, in prep.).

Index:

[Djeddeidae]	6	<i>Burtonulla</i>	2
[Syconidae]	5	CALCAREA	1
<i>Achramorpha</i>	10	CALCARONEA	4
<i>Amphiute</i>	7	<i>Calcepongia</i>	6
<i>Amphoricortis</i>	8	CALCINEA	1
<i>Amphoriidandra</i>	8	<i>Calcispongia</i>	6
<i>Amphoriscandra</i>	8	<i>Clathrina</i>	1
AMPHORISCIDAE	9	CLATHRINIDA	1
<i>Amphoriscus</i>	9	CLATHRINIDAE	1
<i>Amphoriscyssa</i>	9	<i>Clistolynthaltis</i>	5
<i>Amphoriulandra</i>	8	<i>Clistolynthandra</i>	5
<i>Anamixilla</i>	7	<i>Clistolynthetta</i>	5
<i>Aphrocerandra</i>	8	<i>Clistolynthilla</i>	5
<i>Aphroceras</i>	7	<i>Clistolynthus</i>	5
<i>Aphrocerortis</i>	8	<i>Clystolynthus</i>	5
<i>Aphroceryssa</i>	9	<i>Coenostomandium</i>	8
<i>Artynaltis</i>	2	<i>Coenostomandra</i>	8
<i>Artynandrium</i>	8	<i>Coenostomella</i>	8
<i>Artynandrus</i>	7	<i>Coenostomellium</i>	8
<i>Artynas</i>	6	<i>Coenostomium</i>	8
<i>Artynella</i>	6	<i>Coenostomortis</i>	8
<i>Artynellandra</i>	8	<i>Coniasterium</i>	6
<i>Artynes</i>	6	<i>Cyathiscus</i>	7
<i>Artynium</i>	6	<i>Dendya</i>	2
<i>Artynophyllum</i>	6	<i>Dermatreton</i>	8
<i>Artynortus</i>	8	<i>Djeddea</i>	7
<i>Ascaltaga</i>	5	<i>Dunstervillia</i>	6
<i>Ascaltis</i>	1, 3	<i>Dysscaltella</i>	8
<i>Ascaltometra</i>	5	<i>Dyssicarium</i>	8
<i>Ascaltopa</i>	5	<i>Dyssiconella</i>	8
<i>Ascandra</i>	2	<i>Dyssycandrella</i>	8
<i>Ascandra</i>	2	<i>Dyssycandrium</i>	8
<i>Ascandraga</i>	5	<i>Dyssycandrus</i>	8
<i>Ascandrometra</i>	5	<i>Dyssycarium</i>	8
<i>Ascandropa</i>	5	<i>Dyssycillus</i>	9
<i>Ascetta</i>	1	<i>Dyssyconella</i>	8
<i>Ascettaga</i>	5	<i>Dyssycortus</i>	8
<i>Ascettometra</i>	5	<i>Dyssyculmus</i>	9
<i>Ascettopa</i>	5	<i>Dyssycum</i>	8
<i>Ascettusa</i>	5	<i>Dyssycyssus</i>	9
<i>Ascilla</i>	5	<i>Ebnerella</i>	8
<i>Ascillaga</i>	5	<i>Eilhardia</i>	8
<i>Ascillopa</i>	5	<i>Grantessa</i>	7
<i>Ascoleucetta</i>	3	<i>Grantia</i>	8
<i>Ascometra</i>	5	GRANTIIDAE	7
<i>Ascortaga</i>	5	<i>Grantilla</i>	7
<i>Ascortopa</i>	5	<i>Grantiopsis</i>	8
<i>Ascortusa</i>	5	<i>Guancha</i>	1
<i>Asculmis</i>	5	<i>Heteropegma</i>	2
<i>Ascuris</i>	5	<i>Heteropia</i>	7
<i>Ascute</i>	4	HETEROPIIDAE	6
<i>Auloplegma</i>	5	<i>Hippograntia</i>	8
<i>Auloplegmaltis</i>	5	<i>Homandra</i>	5
<i>Auloplegmandra</i>	5	<i>Homoderma</i>	6
<i>Auloplegmetta</i>	5	<i>Hozawaia</i>	6
<i>Auloplegmilla</i>	5	<i>Hypodictyon</i>	6
<i>Auloplegmortis</i>	5	<i>Hypograntia</i>	8
<i>Aulorhiza</i>	5	<i>Jenkina</i>	8
<i>Aulorrhiza</i>	3	<i>Kebira</i>	12
<i>Baeria</i>	10		

<i>Kuarrhaphis</i>	10	<i>Monoplectroninia</i>	11
<i>Lamontia</i>	8	<i>Murrayona</i>	4
<i>Lelapia</i>	12	MURRAYONIDA	3
<i>Lelapiella</i>	4	MURRAYONIDAE	3
LELAPIELLIDAE	4	<i>Nardoma</i>	5
LELAPIIDAE	11	<i>Nardomandrum</i>	5
<i>Lenculmis</i>	10	<i>Nardopsandra</i>	5
<i>Leoculmis</i>	10	<i>Nardopsetta</i>	5
<i>Lepidoleucon</i>	10	<i>Nardopsis</i>	5
LEPIDOLEUCONIDAE	10	<i>Nardopsortis</i>	5
<i>Leucaltaga</i>	8	<i>Nardortalis</i>	5
LEUCALTIDAE	2	<i>Nardorandra</i>	5
<i>Leucaltis</i>	2	<i>Nardoretta</i>	5
<i>Leucaltusa</i>	2	<i>Nardorilla</i>	5
<i>Leucandra</i>	8	<i>Nardoris</i>	5
<i>Leucandraga</i>	8	<i>Nardortis</i>	5
<i>Leucandrena</i>	7	<i>Nardorus</i>	5
<i>Leucandrometra</i>	6	<i>Nardosa</i>	5
<i>Leucandropa</i>	6	<i>Olynthaltus</i>	5
<i>Leucandrusa</i>	8	<i>Olynthandra</i>	5
<i>Leucania</i>	8	<i>Olynthandrium</i>	5
<i>Leucaria</i>	5	<i>Olynthandrus</i>	5
LEUCASCIDAE	3	<i>Olynthella</i>	5
<i>Leucascus</i>	3	<i>Olynthelleta</i>	5
<i>Leucelia</i>	5	<i>Olynthettus</i>	5
<i>Leuceria</i>	5	<i>Olynthillus</i>	5
<i>Leucetta</i>	3	<i>Olynthium</i>	5
<i>Leucettaga</i>	10	<i>Olynthortus</i>	5
LEUCETTIDAE	3	<i>Olynthulmus</i>	5
<i>Leucettusa</i>	2	<i>Olynthus</i>	5
<i>Leucilia</i>	5	<i>Paragrantia</i>	8
<i>Leucilla</i>	10	<i>Paraheteropia</i>	7
<i>Leuciria</i>	5	<i>Paralelapia</i>	12
<i>Leuclathrina</i>	2	<i>Paraleucilla</i>	9
<i>Leucogypsia</i>	7	<i>Paramurrayona</i>	4
<i>Leucomalthe</i>	3	PARAMURRAYONIDAE	4
<i>Leuconia</i>	8	<i>Pericharax</i>	3
<i>Leuconiinae</i>	7	<i>Petrobiona</i>	11
<i>Leucopsila</i>	8	PETROBIONIDAE	11
<i>Leucopsis</i>	1	<i>Petrostoma</i>	11
<i>Leucoria</i>	5	<i>Plectroninia</i>	11
<i>Leucortis</i>	8	<i>Polejna</i>	10
<i>Leucortmetra</i>	8	<i>Proscycum</i>	5
<i>Leucosolenia</i>	5	<i>Rhabdodermella</i>	10
LEUCOSOLENIIDA	4	<i>Scypha</i>	6
LEUCOSOLENIIDAE	4	<i>Solenicaltis</i>	5
<i>Leuculmis</i>	9	<i>Solenicortis</i>	5
<i>Leucyssa</i>	9	<i>Soleniculmis</i>	5
<i>Leukartea</i>	6	<i>Solenidandra</i>	5
<i>Levinella</i>	2	<i>Solenidium</i>	5
LEVINELLIDAE	2	<i>Soleniscandra</i>	5
<i>Lipostomaltis</i>	8	<i>Soleniscetta</i>	5
<i>Lipostomandra</i>	8	SOLENISCIDAE	1
<i>Lipostomella</i>	9	<i>Soleniscilla</i>	5
<i>Lipostomortis</i>	8	<i>Soleniscus</i>	2
LITHONIDA	11	<i>Soleniscyssa</i>	5
<i>Medon</i>	8	<i>Solenula</i>	5
<i>Megapodon</i>	11	<i>Solenulandra</i>	5
<i>Minchinella</i>	11	<i>Solenuletta</i>	5
MINCHINELLIDAE	11	<i>Sphenophorina</i>	6
<i>Mlea</i>	8	<i>Sphenophorus</i>	6

STAURORRHAPHIDAE	10
<i>Streptoconus</i>	6
<i>Sycaltaga</i>	6
<i>Sycandra</i>	6
<i>Sycandrarium</i>	6
<i>Sycandrometra</i>	6
<i>Sycandrophyllum</i>	6
<i>Sycantha</i>	6
<i>Sycarium</i>	6
<i>Sycetta</i>	6
<i>Sycettaga</i>	6
SYCETTIDAE	5
<i>Sycettopa</i>	6
<i>Sycettusa</i>	7
<i>Sycidium</i>	6
<i>Sycilla</i>	9
<i>Sycinula</i>	8
<i>Sycinulandra</i>	6
<i>Sycissa</i>	6
<i>Sycocarpus</i>	6
<i>Sycocerus</i>	6
<i>Sycocubus</i>	6
<i>Sycocystis</i>	6
<i>Sycocystortis</i>	6
<i>Sycodenandrum</i>	6
<i>Sycodendrum</i>	6
<i>Sycodoranna</i>	6
<i>Sycodorilla</i>	6
<i>Sycodorus</i>	6
<i>Sycodorussa</i>	6
<i>Sycolepis</i>	9
<i>Sycometra</i>	6
<i>Sycon</i>	6
<i>Syconcystandra</i>	6
<i>Syconella</i>	6
<i>Syconellandra</i>	6
<i>Syconellortis</i>	6
<i>Sycophractus</i>	9
<i>Sycophyllum</i>	6
<i>Sycorrhiza</i>	5
<i>Sycortarium</i>	6
<i>Sycortis</i>	8

<i>Sycortusa</i>	8
<i>Sycostrobos</i>	6
<i>Sycothamnandra</i>	6
<i>Sycothamnetta</i>	7
<i>Sycothamnus</i>	3
<i>Syculmarium</i>	9
<i>Syculmis</i>	10
<i>Sycum</i>	6
<i>Sycuraltis</i>	6
<i>Sycuranda</i>	6
<i>Sycurandra</i>	9
<i>Sycuretta</i>	6
<i>Sycurilla</i>	9
<i>Sycurortis</i>	6
<i>Sycurus</i>	6
<i>Sycute</i>	9
<i>Sycyssa</i>	9
<i>Sycyssarium</i>	6
<i>Synute</i>	9
<i>Tarraltis</i>	5
<i>Tarrandra</i>	5
<i>Tarretta</i>	5
<i>Tarrilla</i>	5
<i>Tarroma</i>	5
<i>Tarromandra</i>	5
<i>Tarropsandra</i>	5
<i>Tarropsetta</i>	5
<i>Tarropsis</i>	5
<i>Tarrus</i>	5
<i>Teichenopsis</i>	9
<i>Teichonella</i>	3
<i>Teichonopsis</i>	8
<i>Tenthrenodes</i>	6
<i>Thecometra</i>	5
<i>Trichogypsia</i>	9
<i>Tulearinia</i>	11
<i>Ute</i>	9
<i>Utella</i>	6
<i>Uteopsis</i>	9
<i>Vosmaeria</i>	8
<i>Vosmaeropsis</i>	7