

ON THE PRESUMED DIMORPHISM WITHIN HALYSITES COLONIES

P.L. DE BOER¹⁾

ABSTRACT

Dimorphism does not exist in *Halysitidae*. The mesocorallites as defined by Buehler (1955) and the microcorallites and mesocorallites as defined by Hamada (1958) are considered filling structures; the author prefers the more descriptive term tubules for these skeletal features. The taxonomic importance of the distribution of these tubules in the corallum is questioned.

Between the normal corallites of the late Ordovician and Silurian *Halysitidae*, much smaller hollow structures, tubules, are found which are characteristic of the subfamily *Halysitinae*, as redefined by Hamada (1957). Referring to these structures, Buehler (1955), Hamada (1958) and other authors presumed that dimorphism or polymorphism occurred within the colonies of this subfamily. Some authors did not express themselves on this matter, such as Fischer-Benzon (1871) who used the term "zelliger Zwischenwand" for the tubules in *Cystihalysites* and "gekammerter Zwischenwand" for the tubules in *Halysites*. Thomas and Smith (1954) used the term tubule "as a pure descriptive with no implication of function". The name tubule was introduced by Lambé (1899).

Halysitid tubules are hollow, tubular structures that are superficially similar to corallites although smaller in size. In cross sections, their outline has mostly concave sides. Tabulae are present in both corallites and in tubules, but they are more closely spaced in the latter. Septal spines, seen in the corallites of some specimens, are lacking in the tubules.

In specimens provided with tubules, one single tubule is usually found between two corallites as well as in the middle of three or more, i.e. on a place where three or more chains meet, although in the latter case two tubules were occasionally noted.

Various names accorded to these tiny tubular structures were based on the resemblance between corallites and adjacent tubules: microcorallites (Amsden 1949), mesocorallites (Hamada 1957). When the term autopore is used for corallite, the tubules are called mesopores (McCoy

1851, cit. Etheridge 1904). Nicholson (1849) used the term interstitial tube.

Etheridge (1904) introduced the term gonopore ($\gamma\acute{o}\nu\omicron\sigma$ = offspring) for tubules that are found in the middle of three or more corallites, i.e. where three or more chains meet.

The terms autopore and mesopore are used mainly with respect to bryozoans. This and the dimorphism demonstrated in recent cheilostome bryozoans may have influenced some investigators of halysitids. Their use of these terms suggests that tubules were formed by organisms which, to a certain extent, led an independent life within the colony.

Durden (1966) was the first to take a stand against the idea of dimorphism. He published his view in the summary of a lecture without further data. The present author studied the collection of erratic Ordovician and Silurian halysitids from The Netherlands at the Geological Institute in Groningen. Specimens in situ were investigated in the Silurian of Gotland, Sweden.

During the study, it became evident that tubules are not the remnants of independent creatures. They are considered now as hollow parts in the lime fabric formed by the organisms that lived in the corallites. The formation of tabulae in the tubules provided bridges across the space between the corallites. In that way excessive lime secretion was not required to separate the corallites.

These contentions are based on the following seven arguments:

a. Stasinska (1967) described and figured early stages of tubules. Sometimes two small openings appear in the wall between two corallites (fig. 1, I and II). Subsequently these two openings fuse into a tubule (fig. 1, III and IV).

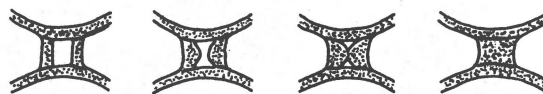


Fig. 1
Formation of tubules in *Halysites junior* Klaamann. (redrawn after Stasinska 1967)

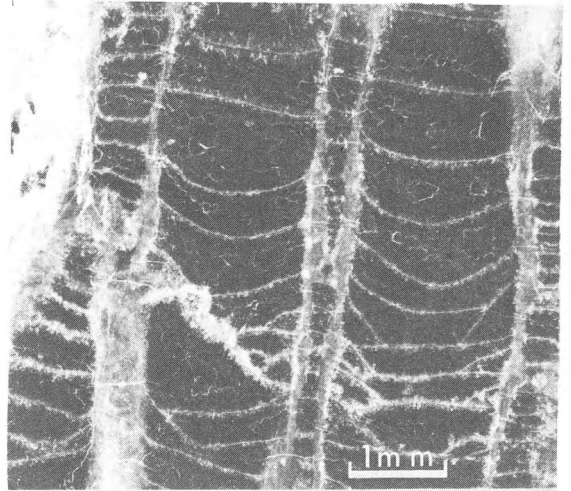
¹⁾ Geologisch Instituut der Rijksuniversiteit, Melkweg 1, Groningen, The Netherlands.

b. The diameter of the tubules varies greatly. The larger ones have seldom more than half the diameter of the corallites in the same corallum; the smaller ones tend to become hardly visible. In a longitudinal cross section small tubules sometimes alternate with a massive intercorallite wall. This has been noted in thin sections that intersect the corallites and tubules vertically (pl. 1). There are no indications that tubules have a more irregular, winding form than the adjoining corallites. In transverse sections from the same coralla, tubules are not always present between the corallites (pl. 2).

c. The shape of the tubule is determined by the adjoining corallites. This is clearly visible in specimens with corallites which have relatively thin walls. Other coralla were found in which tubules are present only where three or more corallites meet. Tubules may be found moreover at the convex sides of curved rows of corallites (pl. 2).

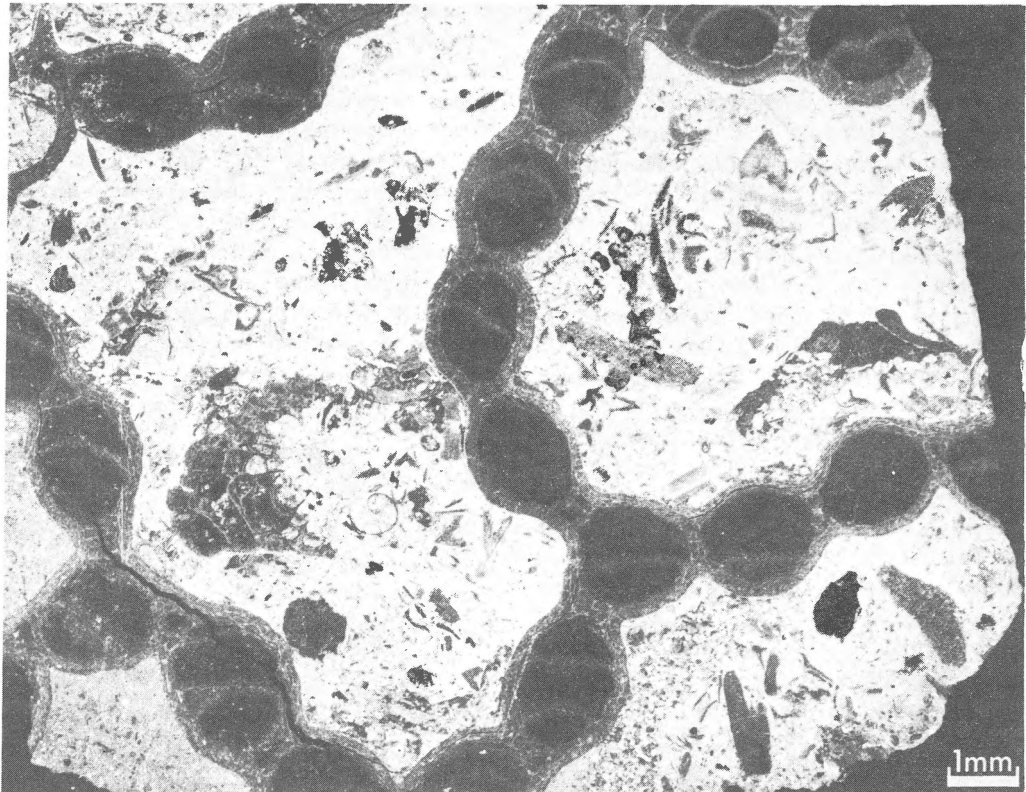
Hamada (1957, 1958) considers this phenomenon characteristic for his subfamily *Schedohalysitinae* with the genera *Schedohalysites* Hamada 1957 (type species *Halysites orthopteroides* Etheridge 1904) and *Falsicatenipora* Hamada 1958 (type species *Halysites japonicus* Suyama 1940).

The present author gives the following explanation: At the point where three or more corallites meet, more space was necessary to provide the polyps that lived in and built these corallites sufficient freedom of movement outside the



Pl. 1
Constriction of tubule in *Halysites* cf. *catenularius* (Linnaeus). nr. 1889, collection Geol. Inst. Groningen. Erratic boulder from Groningen.

corallites. For this reason tubules in these places are larger than those between two corallites. When the row of corallites is twisted, the diameter of the tubules along the outside curve is greater because there the round or oval corallites are further apart.



Pl. 2
Relationship between corallites and shape of tubules in *Halysites* cf. *catenularius* (Linnaeus). nr. 1927, collection Geol. Inst. Groningen. Erratic boulder from Groningen.

d. Tubules appear only when adjacent corallites have reached their final diameter. *Webb* and *Semeniuk* (1969) investigated the way in which new corallites were formed. When a new corallite developed between two other ones, already existing, the tubule widened into a corallite. As this corallite attained its final size at a slightly higher level, new tubules arose on either side of it.

If a new corallite developed at the end of a row, it came first; only when this new corallite attained its final size a tubule arose between it and the adjacent corallite (fig. 2).

This is in full agreement with the assumption that tubules serve to bridge the gap between corallites.

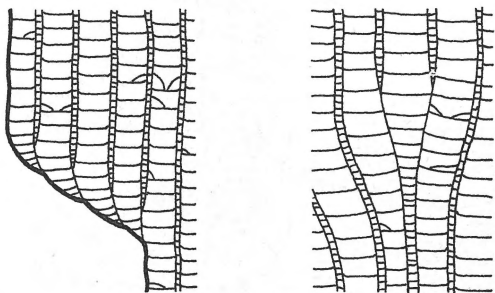
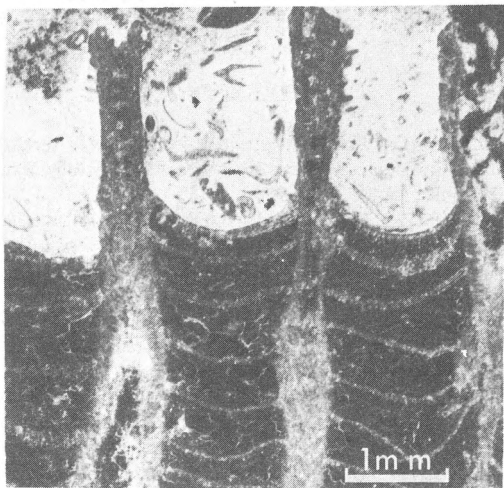


Fig. 2
Diagram showing the nature of interstitial and peripheral budding in *Halysites*. (redrawn after *Webb* & *Semeniuk* 1969)

e. In halysitid fossils where the intact surface of the colony is preserved, the living space of the polyp is as much as three or four times larger than the space between two successive tabulae.

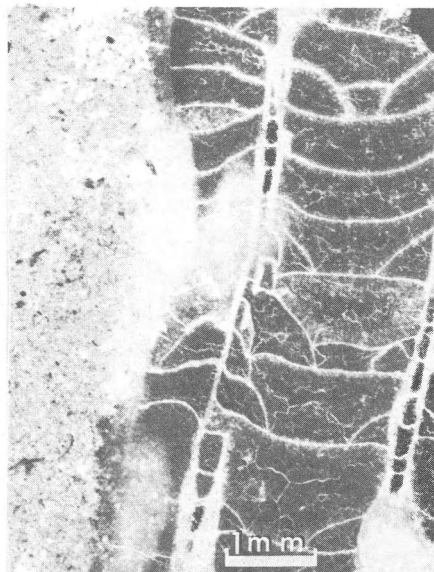
In the tubules the space above the highest tabula to the upper rim of the wall between corallite and tubule is never larger than the space between two successive tabulae (pl. 3).



Pl. 3
Intact surface of *Halysites agglomerata* Hall with protruding tubules. Nr. 1291, Klinteberg, Gotland, Sweden.

f. The tabulae in the corallites are almost always concave upwards; in the tubules they are mostly flat or convex, sometimes slightly concave.

g. Ingression of a tubule from a corallite is sometimes observed. In plate 4 a longitudinal cross section of part of a corallum is presented. At first the polyps living in the two corallites constructed together the tubule. At a given moment construction of the wall between the corallite on the right and the tubule was stopped. Subsequently the space of the tubule was occupied by the right hand polyp. Afterwards, tubule formation started again.



Pl. 4
Ingression of tubule by corallite in *Halysites labyrinthicus* (Goldfuss). Nr. 1914, collection Geol. Inst. Groningen. Erratic boulder from Groningen.

The arguments that are discussed above give rise to a new reconstruction of a part of a halysitid colony, rendered in figure 3.

This point of view might imply a different insight into the taxonomy of the halysitids. *Hamada* (1957) defined the subfamily *Schedohalysitinae*, that would occupy an intermediate position between the *Halysitinae* and the *Cateniporinae*, because sometimes tubules are present between the corallites and sometimes they are not. Two genera would belong to this subfamily: *Schedohalysites* *Hamada* 1957 with tubules only in some parts of the corallum and *Falsicatenipora* *Hamada* 1958 with tubules only between three or more corallites (where three or more chains meet).

Hamada calls the tubules between two corallites microcorallites and the tubules between three or more corallites mesocorallites; the latter term is synonymous with gonopore as used by *Etheridge* (1904). *Etheridge* assumed a differentiation between a gonopore and other tubules since he believed that a gonopore always produces a new row and

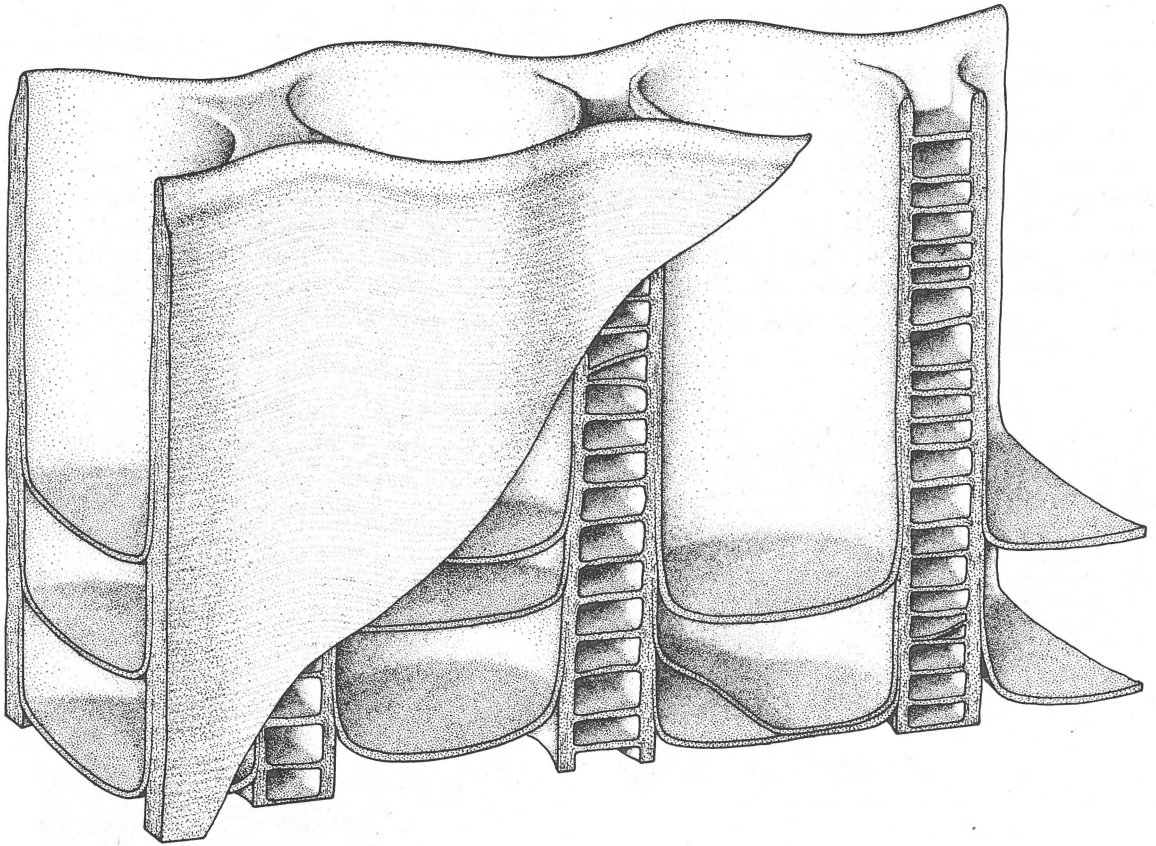


Fig. 3
Reconstruction of the surface of a colony of *Halysites*.

because a gonopore is larger than the tubules between two corallites. Hamada suggests the possibility that Etheridge supposed this structure to be a relic of a reproductive organism, that caused the start of a new chain.

It is curious, however that Etheridge did not write anything about the function of a "gonopore" located at the junction between a newly originated row and an already existing one.

According to the present author, cause and effect are confounded in this reasoning as demonstrated by the dependence of the shape of the tubule on the adjoining corallites. This phenomenon is dealt with in argument c., earlier in this paper.

Because tubules are not the relics of creatures that produced only these tubules and because the environmental factors were disregarded up till now, it seems inadvisable to distinguish besides *Halysitinae* and *Cateniporinæ* this third subfamily, the *Schedohalysitinae*.

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