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Note on the genera *Alveolophragmium* and *Reticulophragmium* (Foraminifera)

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Abstract. A number of specimens of *Alveolophragmium orbiculatum* STSCHEDRINA and of its varieties *caraensis* and *ochotonensis* could be briefly examined during the XV International Congress of Zoology in London (July, 1958). Contrary to the statement of Drs. A. R. and H. LOEBLICH-TAPPAN (1953), *Alveolophragmium* positively shows an alveolar wall structure and the presumed identity of *Alveolophragmium orbiculatum* STSCHEDRINA with *Haplophragmium crassimargo* NORMAN and the proposed synonymy of the genera *Labrospira* and *Alveolophragmium*, respectively, cannot be accepted. It is proposed to restrict the genus *Alveolophragmium* to those forms of the Haplophragmoidinae which are endowed with an alveolar wall structure and which show an interio-areal position of their aperture. The other representatives of the same subfamily which are characterized by an alveolar wall structure and an interio-marginal aperture, should on the other hand be included in the genus *Reticulophragmium*.

Résumé. A l'occasion du XV^e Congrès International de Zoologie à Londres (1958), l'auteur a pu examiner un nombre d'individus de l'espèce *Alveolophragmium orbiculatum* STSCHEDRINA (et de ses deux variétés *caraensis* et *ochotonensis*). L'examen a révélé que la structure des parois du genre *Alveolophragmium* est nettement alvéolaire. Ce fait nous oblige à rejeter l'identité de *Haplophragmium crassimargo* NORMAN avec *Alveolophragmium orbiculatum* STSCHEDRINA aussi bien que la synonymie entre les genres *Labrospira* et *Alveolophragmium*, proposée par A. R. et H. LOEBLICH-TAPPAN en 1953. Il est suggéré que toutes les formes des Haplophragmoidinae munies d'une parois alvéolaire et d'une ouverture simple intério-aréale soient incluses dans le genre *Alveolophragmium* tandis que les Haplophragmoidinae à parois alvéolaire et à ouverture intério-marginale seront placées dans le genre *Reticulophragmium*.

Zusammenfassung. Anlässlich des 15. Internationalen Zoologen-Kongresses in London (Juli 1958) zeigte Frau Z. STSCHEDRINA dem Verfasser einige Präparate von *Alveolophragmium orbiculatum* STSCHEDRINA sowie der Varietäten *caraensis* und *ochotonensis*. Es zeigte sich ohne Zweifel, dass *Alveolophragmium*, trotz gegenteiliger Behauptungen (LOEBLICH & TAPPAN, 1953), eine typisch alveoläre Wandstruktur besitzt. Aus diesem Grunde müssen die vermeintliche Identität (LOEBLICH & TAPPAN, 1953) zwischen *Alveolophragmium orbiculatum* STSCHEDRINA und *Haplophragmium crassimargo* NORMAN sowie die Synonymie der Gattungen *Labrospira* und *Alveolophragmium* abgelehnt werden. Es wird vorgeschlagen, in Zukunft die Gattung *Alveolophragmium* auf diejenigen Vertreter der Haplophragmoidinae zu beschränken, die eine alveoläre Wandstruktur sowie eine einfache, interio-areale Mündung aufweisen, und die übrigen alveolären Formen derselben Unterfamilie mit interio-marginaler Mündung im Genus *Reticulophragmium* unterzubringen.

The genus *Alveolophragmium* was established in 1936 by Mrs. Z. STSCHEDRINA, Leningrad, for a number of arenaceous tests that externally resemble *Haplophragmoides* or *Cribrostomoides* (= *Labrospira*) but differ from the latter in so far as the inner side of the wall is endowed with an alveolar layer which corresponds with a number of tubular channels traversing the wall below the imperforate epidermal coating (STSCHEDRINA, 1936). The recent form *Alveolophragmium orbiculatum* STSCHEDRINA was chosen as type of the new genus which is represented in the two

varieties *caraensis* and *ochotonensis* from the Kara Sea and the Okhotsk Sea, respectively.

In 1952, the writer recorded a *Haplophragmoides*-like form from the Oligo-Miocene of Venezuela which – on account of its alveolar wall structure – was referred to the genus *Alveolophragmium* and described as *A. venezuelanum* (MAYNC, 1952 b). In view of the presence of channels and alveoles in their wall structure, two other forms were then placed in the genus *Alveolophragmium*: *Ammobaculites cf. foliaceus* CUSMAN & STONE (non BRADY) from the Upper Eocene Verdun formation of the Piura basin in western Peru was differentiated as *Alveolophragmium peruvianum* MAYNC, and *Haplophragmoides reticulatus* BOOMGART, from the Miocene Rembang beds of Java, was renamed *Alveolophragmium reticulatum* (BOOMGART) (MAYNC, 1952).

In their paper on Arctic Foraminifera, A. R. LOEBLICH and H. LOEBLICH-TAPPAN presented a discussion on the genus *Alveolophragmium* and its relationship with *Labrospira*, *Cribrostomoides*, and *Haplophragmoides* (LOEBLICH & TAPPAN, 1953).

It may be remembered that *Haplophragmium crassimargo* NORMAN had been selected as genotype of the genus *Labrospira* HÖGLUND, 1947. *Lituola subglobosa* SARS was also included in *Labrospira* and *i. a.* placed in synonymy with *Cribrostomoides bradyi* CUSHMAN (HÖGLUND, 1947), a species which had previously been chosen as type of the genus *Cribrostomoides* CUSHMAN. Being a junior synonym of *Cribrostomoides*, the genus *Labrospira* has been rejected (ELLIS & MESSINA, 1949; FRIZZELL & SCHWARTZ, 1950; MAYNC, 1952 a).

A. R. LOEBLICH and H. LOEBLICH-TAPPAN object that *Labrospira* and *Cribrostomoides* are synonyma but postulate another synonymy, viz. that between *Labrospira* HÖGLUND and the genus *Alveolophragmium* STSCHEDRINA. As will be seen, this concept is founded on the wrong premise that *Alveolophragmium orbiculatum* STSCHEDRINA is identical with *Haplophragmium crassimargo* NORMAN, both Arctic forms. Furthermore, it is flatly denied, without having verified the original or topotype material, that the genus *Alveolophragmium* possesses an alveolar interior structure (LOEBLICH & TAPPAN, 1953).

In 1955, the writer published a short note wherein he introduced the new name *Reticulophragmium* as a substitute of *Alveolophragmium* STSCHEDRINA, 1936, *pars* (MAYNC, 1955). This nomenclatural change was believed to be necessary because of the identity of *Alveolophragmium orbiculatum* with *Haplophragmium crassimargo* (= *Labrospira* HÖGLUND), claimed by A. R. LOEBLICH and H. LOEBLICH-TAPPAN (1953)¹). At that time, only the inadequate illustrations of *Alveolophragmium* given by its author were available and the broken up tests figured by Mrs. Z. STSCHEDRINA (1936, figs. 1 b and 3 c) fail to show the typical honeycomb structure on the interior surface of the wall. On the other hand, the hypotype specimens of *Haplophragmium crassimargo* which Drs. A. R. and H. LOEBLICH-TAPPAN kindly sent me some years ago for examination, clearly reveal a simple wall structure (MAYNC, 1955). However, as the Tertiary representatives *Alveolophragmium venezuelanum* MAYNC, *A. peru-*

¹) It was especially stressed by the writer "that the above conclusions rest on the assumption that *Haplophragmium crassimargo* NORMAN and *Alveolophragmium orbiculatum* STSCHEDRINA are identical" (MAYNC, 1955, p. 557).

vianum MAYNC, and *A. reticulatum* (BOOMGART) prove to possess an alveolar wall structure (MAYNC, 1952 b), an accommodation with the supposedly non-alveolar genus *Alveolophragmium* STSCHEDRINA evidently seemed impossible and the new genus *Reticulophragmium* was, therefore, proposed for the forms with an alveolar wall structure (MAYNC, 1955).

During the XV International Congress of Zoology, London (July, 1958), the writer had the opportunity to examine some foraminiferal material represented in the exhibit of the Soviet expedition on the "Vitjaz". Among the displayed material were specimens of *Alveolophragmium orbiculatum* STSCHEDRINA and of its two varieties *A. orbiculatum caraensis* STSCHEDRINA and *A. orbiculatum ochotonensis* STSCHEDRINA. There, the author had the opportunity to see and discuss said forms with Mrs. Z. STSCHEDRINA herself. There is not the slightest doubt that a truly alveolar wall structure (distinct honeycomb pattern of the walls of the lumina) is developed in *Alveolophragmium* and thin-sections will be made as soon as the material of *Alveolophragmium* (which Mrs. Z. STSCHEDRINA promised to send the writer) will be received. Suffice it to say here that the blunt statement "the writers do not regard the alveoles in the wall as true alveolar structures, but merely the gaps between the coarse fragments used in constructing the test" (LOEBLICH & TAPPAN, 1953, p. 29) is positively void.

Conformable with the fact that the wall structure of *Alveolophragmium orbiculatum* is genuinely alveolar as originally described, the identity between that species and *Haplophragmium crassimargo* as postulated by A. R. LOEBLICH & H. TAPPAN does not hold true and we refute the proposed synonymy of *Labrospira* with *Alveolophragmium*. Neither is it admissible to list *Nonionina jeffreysi* WILLIAMSON, 1858 (synonym with *Haplophragmoides canariense* (D'ORB.) CUSHMAN, and with *Labrospira jeffreysi* (WILL.) HÖGLUND; *vide* LOEBLICH & TAPPAN, 1953) as *Alveolophragmium jeffreysi* as no alveolar interior structure seems to be developed.

In accordance with DON L. FRIZZELL & E. SCHWARTZ, we favor the concept that *Labrospira* HÖGLUND, 1947, is a junior synonym of *Cribrostomoides* CUSHMAN, 1910, and therefore reject its use (FRIZZELL & SCHWARTZ, 1950; MAYNC, 1952 a). *Alveolophragmium* STSCHEDRINA in its original sense, on the other hand, is a valid genus which – on account of its alveolar interior structure – cannot be aligned with *Cribrostomoides-Labrospira*.

According to its author, the aperture of *Alveolophragmium* is a slightly curved narrow semilunar slit between the last-formed chamber and the preceding coil. The brief examination of some specimens of *A. orbiculatum* confirms the statement of Mrs. Z. STSCHEDRINA that the apertural slit is bordered by distinct lips (STSCHEDRINA, 1936, p. 315). These two statements are thus at variance: If the apertural opening lies between the last-formed chamber and the precedent whorl, it is interio-marginal as in *Haplophragmoides* and only an upper lip can then be developed; in the few studied specimens, however, the aperture is enclosed by an upper and lower lip which means that its position is not interio-marginal but interio-areal (within the apertural face) as in the genus *Cribrostomoides* (= *Labrospira*). In the Tertiary species *Alveolophragmium venezuelanum* and *A. reticulatum*, on the other hand, forms which were subsequently placed in the new genus *Reticulophragmium*, there is no indication whatsoever of an interio-areal apertural slit encircled by lips

but, where kind of an aperture is recognizable, it lies exclusively between the last-formed chamber and the preceding coil and is, in other words, interio-marginal²⁾. It is, therefore, proposed to place only those forms of the Haplophragmoidinae in the genus *Alveolophragmium* which show an *alveolar wall structure* and have an *interio-areal aperture* (generally with lips). All the other representatives of the same subfamily which also display an *alveolar structure* of the wall but possess an *interio-marginal aperture* (like *Haplophragmoides*), are to be included in the genus *Reticulophragmium*.

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²⁾ Nothing is known as yet with respect to the apertural character in *Alveolophragmium peruvianum* MAYNC (= *Ammobaculites cf. foliaceus* CUSHMAN & STONE, 1949, non BRADY).