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Remarks on the Foraminiferal Genus *Sornayina*

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With 2 Plates (I and II)

Abstract. A few remarks on the external morphology and an analysis of the interior structure of the foraminiferal genus *Sornayina* MARIE, 1960, are submitted as a supplement to the original definition.

The pulverization into three different species (*S. foissacensis*, *S. schlumbergeri*, and *S. munieri*) is refuted the differences being too insignificant to warrant specific distinction among the coexistent forms. The concept of test trimorphism is taken into consideration to account for the slight morphological dissimilarities.

INTRODUCTION

The new foraminiferal genus *Sornayina*, recently established and figured (MARIE, 1960), occurs in the Lower Senonian (Middle Coniacian) of Foissac, Department of Gard (southern France).

In his recent paper, P. MARIE has described and discussed at some length the generic features of *Sornayina* as well as the three species recognized, *viz. Sornayina foissacensis*, *S. schlumbergeri*, and *S. munieri*. We feel, however, that the given description is inadequate in so far as no analytical comments on the interior structure were made. We fully share the view of those who deem any modern definition and diagnosis of an arenaceous complex genus incomplete unless its interior structure is analyzed in detail. More than ever have thin-sections proved to be of cardinal importance for the generic determination of these tests which externally often show a great resemblance. Any vague and ambiguous remarks as «interior labyrinthic» or «complex interior structure» fall short of the aspirations claimed by modern micropaleontology, especially when no figures or photomicrographs of sectioned specimens are presented which enable a subsequent interpretation. In order to fill this gap, the writer herewith endeavours to complete the original description.

A number of specimens of *Sornayina* had been kindly given us by our friend and colleague P. MARIE considerably more than one year before the genus was actually established and described, and several tests were immediately thin-sectioned in order to check the relationship or even generic identity with *Spirocyclina* MUNIER-CHALMAS on which form a revision was under way at that time (MAYNC, 1959). However, as P. MARIE intended to describe the new genus from Foissac, we refrained from making comments until the publication of his paper. For having given us some of his material on *Sornayina* we wish to express herewith our sincere thanks to P. MARIE.

Sornayina Marie, 1960

With regard to the external morphology of *Sornayina*, P. MARIE's explicit description speaks for itself, but we wish to lay emphasis on one feature. The faintly oligoplectoid coiling (deviation from a strictly planispiral convolution) on account of which *Sornayina* may have a bilaterally asymmetric «trochoid» aspect, is rather exceptional. The external shape of *Sornayina* shows a considerable variability (Pl. I). Among the available tests, there do occur more or less planispiral forms the «ventral» and «dorsal» side of which hardly show any differences reflecting a non-planispiral mode of coiling. The chosen genoholotype, too, is nearly symmetrical on the two sides (MARIE, 1960, Pl. XIXb, fig. 1a–c). Moreover, there also occur uncoiled forms with flaring adult chambers. Other tests show a lateral twisting and are, accordingly, not throughout planispiral. The very same feature can be observed in many genera of the Lituolidae (*Choffatella*, *Pseudocyclammina*, *Spirocyclina*, *Iberina*). It may be stressed that there exist all intergradations between the tests displaying a bilateral symmetry and the plano-convex ones which disclose a flattened dorsal side and a subconical ventral side. Therefore, we do not put much weight on these deviations from a truly planispiral type of coiling which have led P. MARIE to consider *Sornayina* to be possibly a member of the Trochamminidae. As pointed out above, the same phenomenon, although to a lesser extent, applies to other lituolid genera. Besides, the cribrate aperture is incontestably alien to the Trochamminidae and favors the assignment of *Sornayina* to the Lituolidae.

The interior structure of *Sornayina* as illustrated by the accompanying photomicrographs (Pl. II) reveals the following characteristics.

Below the imperforate epidermal layer follows a reticulate zone displaying a network pattern of regular meshes, such as is present, e.g. in *Choffatella*, *Spirocyclina*, etc. (Pl. I, figs. 1–4; Pl. II, figs. 2–11). This subepidermal alveolar zone is underlain by a zone which shows a subdivision of the primary chambers by transverse partitions normal to the septa. These septula are rather irregular, sometimes even bifid, and farther inward they become rudimentary-discontinuous (pillar-like) to be soon reduced to small knobs projecting inward from the interapertural segments of the main septa into the preceding chamber. Accordingly, the chambers are largely open in this deeper zone. The centre, finally, is marked by the presence of a more or less continuous median partition dividing the test in two equal parts (axial sections) (Pl. II, figs. 8–11).

In principal, the interior structure of *Sornayina* agrees, therefore, well with that of *Spirocyclina* (MAYNC, 1959). In the latter genus, however, the secondary septula are more regular and evenly spaced. Owing to the fact that only 12–20 rather broad chambers form the last whorl in *Sornayina* whereas it comprises 25–30 narrow, strongly arcuate chambers in *Spirocyclina*, the entire interior structure of *Sornayina* is considerably coarser. The test of *Sornayina* is, moreover, nautiloid, thick, and relatively small not exceeding 2,7 mm (Pl. I), that of *Spirocyclina*, on the other hand, peneropline, strongly compressed and of larger size (2–5 mm) (Pl. II, figs. 1, 12). In either genus the adult chambers may occasionally uncoil. Last but not least, the two genera differ in the character of their aperture, *Sornayina* having a truly cribrate one while in *Spirocyclina* it consists of two parallel vertical series of pores.

When erecting the new genus *Sornayina*, P. MARIE simultaneously established three new species, *viz. S. foissacensis*, *S. schlumbergeri*, and *S. munieri*, all of them being associated in the same population in the Middle Coniacian of Foissac, southern France (MARIE, 1960).

The three «species» distinguished by P. MARIE differ from one another with respect to size and external morphology (different number of chambers in the last-formed whorl, different mode of coiling, difference of peripheral outline and of the apertural section). According to P. MARIE, *Sornayina foissacensis* which is reported to be much more common than the two other forms attains on an average a maximum diameter of 2,15 mm whereas *S. schlumbergeri* and *S. munieri* reach an average size of only 1,2 mm and 0,9 mm, respectively. The external differences between *S. foissacensis* and the smaller forms are greater than those between *S. schlumbergeri* and *S. munieri*, and the dissimilarities between the latter two do not appear to be such to justify the creation of different species. The test of *S. munieri* as drawn by P. MARIE (p. 321, fig. 1, D c) seems to represent a distorted specimen, at least in comparison with the form illustrated on his Plate XIX b, fig. 3 b. Be this as it may, we feel that a taxonomic discrimination of *Sornayina schlumbergeri* and *S. munieri* is hardly warranted and that it would be hard to assign the intermediate forms to either species. Some of the apparent dissimilarities might be due to different ontogenetic growth stages, an unambiguous distinction between a juvenile individual and a small adult within a poorly known specific category being nearly impossible.

To sum up, the three «species» of *Sornayina* are based on rather surbordinate differences in the external morphology of their tests. Hence the question is raised whether not much more weight should be placed on the fact of their mutual association, not only in one horizon at one locality but in the very same rock sample? The writer at least is incapable of visualizing the coexistence of three different yet related species in a given population and he is thus forced to disagree with the viewpoint of P. MARIE.

It could be argued whether the morphologically slightly different tests of *Sornayina foissacensis*, *S. schlumbergeri*, and *S. munieri* might not simply reflect the existence of reproductive and asexual generations within one single species. The entity *S. schlumbergeri-munieri* could represent the gamont generation A2, the larger tests being the microspheric generation. Although there occur a few megalospheric tests showing a small proloculus (90–140 microns in diameter) among the thin-sectioned specimens ascribed to *Sornayina foissacensis* (Pl. II, figs. 6–7), by far the greater part represents B forms.

To support this argument, a thorough study of thin-sectioned tests of the «*schlumbergeri-munieri* group» would have to be made. Unfortunately, tests similar to *S. schlumbergeri-munieri* are extremely rare in the *Sornayina* association available to us. With a total diameter of 1,77 mm, one of these specimens is somewhat larger than the average ones are reported to be but its shape, contour, and thickness (0,68 mm across the apertural face) agree with the forms described by P. MARIE. This specimen was thin-sectioned and actually revealed a very large proloculus (210 microns in diameter) such as is typical for the A2 generation (Pl. II, fig. 11). Therefore, *Sornayina* represents another one of the lituolid genera which disclose

the phenomenon of *trimorphism*, hitherto proved to exist in the externally similar genera *Iberina*, *Pseudocyclammina*, and *Choffatella* (MAYNC, 1959, 1960; SIGAL, 1960). It thus seems to be justified to unite the three «species» established by P. MARIE under the single name *Sornayina foissacensis* MARIE.

P. MARIE has ventilated the possibility that *Sornayina* might be a forerunner of *Spirocyclina* but there are actually no facts which could be cited pro or con this assumption. The alignment of phylogenetic relationships and evolutionary lineages is nearly always a delicate construct and as a rule ends in subjective speculations. According to P. MARIE, the difference in age of the two genera speaks in favor of an evolutionary lineage *Sornayina-Spirocyclina*, the former being limited to the Coniacian, the latter to the Santonian. It is, however, not excluded that *Sornayina* might be found in days to come also in higher stratigraphical levels. As to the vertical range of *Spirocyclina choffati* MUNIER-CHALMAS, it may be pointed out that it is by no means confined to the Santonian but occurs in the Cenomanian and Turonian as well (MUNIER-CHALMAS, 1887). As a matter of fact one specimen kept in the collection SCHLUMBERGER, Paris, is derived from the Cenomanian of Ile Madame, Charente-Maritime.

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Plate I

Figs. 1–11. *Sornayina foissacensis* MARIE; Coniacian Foissac (Gard), southern France. External views showing variability of the species; × 27.

1a, 1b: Side views of a nearly planispiral specimen.
2: Side view of a peneropline test.
3: Side view of a specimen uncoiled in the adult.
4a: Side view of a flaring test.
4b: Apertural view of the specimen shown in Fig. 4a.
5–11: Apertural views of tests disclosing a different shape.

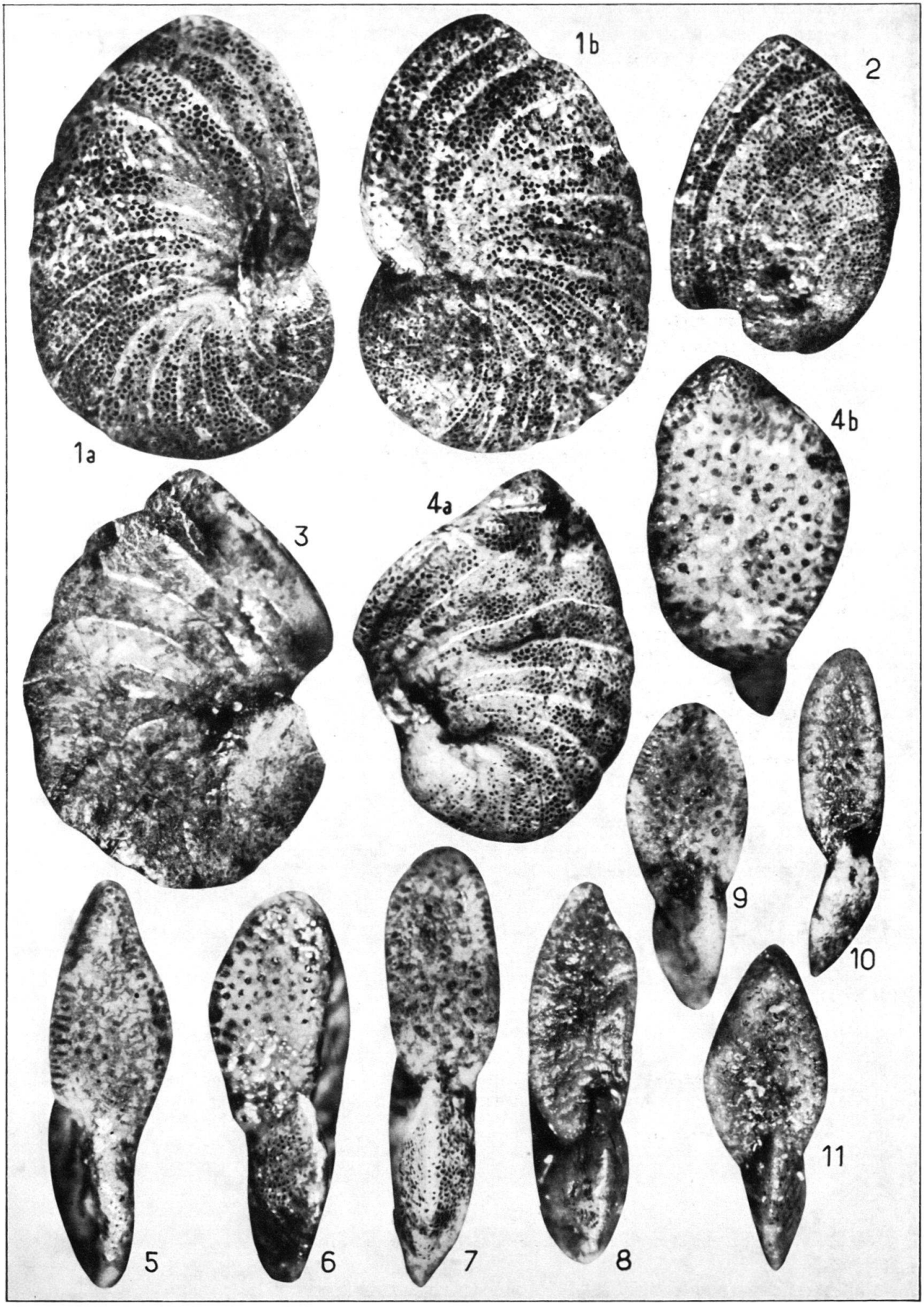
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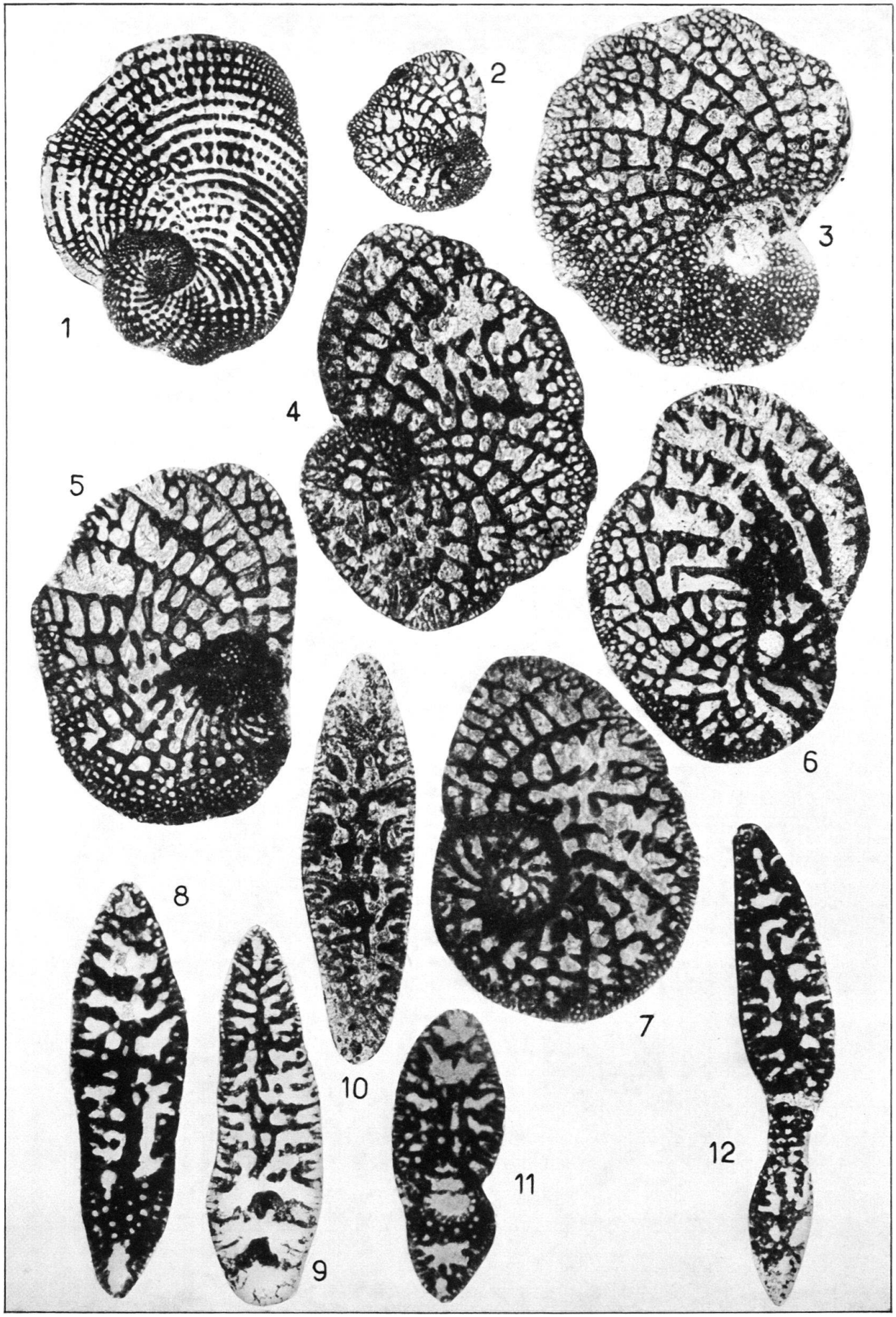
Plate II

Figs. 1, 12: *Spirocyclina choffati* MUNIER-CHALMAS; Santonian Les Martigues near Marseille, southern France.

1: Median section of a microspheric test, × 13,5.
12: Subaxial section, × 27.

Figs. 2–11: *Sornayina foissacensis* MARIE; Coniacian Foissac (Gard), southern France. Interior structure.

2–5: Subequatorial oblique sections showing subepidermal alveolar layer and subdivision of the primary chambers by secondary septula in the deeper zone, × 27 (Fig. 2: × 13,5).
6–7: Median sections of megalospheric tests (A1 generation) showing subepidermal reticulate layer, zone with subdivided primary chambers, and zone with open chambers, × 27.
8–10: Subaxial sections displaying central median partition, × 27.
11: Axial section of a megalospheric (A2) form (*Sornayina «schlumbergeri»* MARIE) showing voluminous proloculus, × 27.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