Bollettino della Società Paleontologica Italiana - Vol. 20, n. 2, 1981, pp. 163-168, pls. 1-2.

Spiraloconulus giganteus n. sp., a new lituolid foraminifer from the Dogger of NW Sardinia (Italy)

Antonietta CHERCHI
Institute of Geology and Paleontology
University of Cagliari

Rolf SCHROEDER
Institute of Geology and Paleontology
University of Frankfurt

(*manuscript received January 28, 1982*
accepted February 18, 1982)

KEY WORDS — Foraminifera, Dogger, Sardinia, Systematic.

ABSTRACT — Spiraloconulus giganteus *n. sp., a new lituolid foraminifer from the Dogger of NW Sardinia (Italy) is described, figured and compared with the type of this genus*: S. perconigi (*Allemann & Schroeder*) 1972.

RIASSUNTO — [*Spiraloconulus giganteus,* nuova specie di foraminifero lituolide del Dogger della Sardegna NW] — *Viene descritta e figurata una nuova specie di Lituolidae* — Spiraloconulus giganteus — *proveniente dal Dogger della Nurra. La popolazione è composta da forme macrosferiche e microsferiche, mostranti un'accentuata differenziazione morfologica e strutturale. Il guscio agglutinato è caratterizzato dalla presenza di grosse ooidi, distribuite irregolarmente, che provocano forti irregolarità nella superficie del guscio. La nuova specie viene confrontata con* S. perconigi, *tipo del genere* Spiraloconulus, *che finora rappresentava l'unica specie di questo genere.*

INTRODUCTION

In 1972, Allemann & Schroeder described under the name *Spiroconulus perconigi* n. gen. n. sp. a new Middle Jurassic lituolid foraminifer which was recorded from two widely separated localities: Northern Oman and Southern Spain.

In 1980, Allemann & Schroeder pointed out that *Spiroconulus* is a junior homonym of *Spiroconulus* v. Martens 1892, a genus of recent Gastropoda (Euthyneura, Stylomatophora) from Central America and the West Indies, and consequently has to be renamed (ICZN Art. 53). For that reason the new name *Spiraloconulus* was introduced to replace *Spiroconulus* Allemann & Schroeder 1972.

During recent geological investigations in the Mesozoic of NW Sardinia (Alghero region) we found a second species of this genus which will be described below as *Spiraloconulus giganteus* n. sp.. The type locality is situated at the eastern shore of Porto Agra, a small bay immediately to the west of Capo Galera (exact coordinates see below). The rock sample containing the new species is a well washed brownish biooosparite. *Spiraloconulus giganteus* is accompanied by the following foraminifera:

Valvulinidae
Haurania amiji Henson
Miliolidae
Nautiloculina sp.
Nubecularia reicheli Rat
Trocholina gr. *palastiniensis* Henson
Trocholina sp. div.

Haurania amiji ranges from Pliensbachian to Callovian (Bassoulet & Fourcade 1979, p. 70; Septfontaine 1981, p. 192). *Nubecularia reicheli* occurs in the Bajocian and Lower Bathonian of Bourgogne region (NE France) (Rat 1966, p. 82). *Nubecularia* aff. *reicheli* was cited by Peybernes (1976, p. 40) from Upper Aalenian - Lower Bajocian of Eastern Pyrenees.

The stratigraphic range of these two species indicates that the age of the sample with *Spiraloconulus giganteus* is Dogger. A more precise age determination is not possible at present because of the absence of characteristical markers and the tectonically isolated position of the beds containing *S. giganteus.*

All thin sections described and figured in this paper are deposited at the Institute of Geology and Paleontology of Frankfurt University (Cherchi & Schroeder collection).

DESCIRPTION OF *SPIRALOCONULUS GIGANTEUS* N. SP.

Fam. LITUOLIDAE De Blainville 1825
Gen. SPIRALOCONULUS Allemann & Schroeder 1980
[nom. nov. pro SPIROCONULUS
Allemann & Schroeder 1972]

SPIRALOCONULUS GIGANTEUS n. sp.
Pl. 1, Figs. 1-7; Pl. 2, Figs. 1-7

Derivatio nominis — *giganteus* (lat.) = gigantic; the name indicates the great dimensions of the microspheric forms.

Holotype — Axial section of a macrospheric specimen, figured on pl. 1, fig. 4; coll. Cherchi & Schroeder 117/25.

Locus typicus — Porto Agra, SW of Fertilia (Alghero, NW Sardinia); map 192 I SW, Alghero; 40°34'12" Lat. N., 4°12'46" Long. W. (Monte Mario).

Stratum typicum — Dogger.

Material — 25 rock sections containing about 80 random sectioned specimens.

Diagnosis — A species of *Spiraloconulus* showing strong morphological and structural dimorphism.

Macrospheric forms: small, consisting of a globular proloculus, a short initial spiral and a following relatively long subcylindrical stage. Septa coarsely agglutinated. Marginal zone of chambers show a subepidermal cellular layer; central zone not subdivided by interseptal structures.

Microspheric forms: very large, first chambers arranged in a pronounced spiral, followed by a very long irregularly cylindrical stage. Subepidermal cellular layer well developed; septa coarsely agglutinated. Central zone of chambers partly or completely filled with ooids connected to each other or with the septa mainly by short irregularly directed walls.

General remarks — The *Spiraloconulus* population of Porto Agra is composed of two groups of specimens having vastly identical internal structures and arrangement of chambers, however very different external dimensions. We interprete these two groups as different generations of the same species:

— the very small macrospheric specimens have a large proloculus which is followed by a short initial spiral and a relatively small number of uniserially arranged and not subdivided chambers.

— the relatively large microspheric specimens have a well developed initial spiral which is followed by a relatively large number of uniserially arranged and subdivided chambers.

These two generations will be described separately.

Macrospheric specimens

The test of adult macrospheric specimens is in the form of a small turret with a height of ca. 1,4-1,8 mm (max. 2,4 mm) and a basal diameter of 0,7-0,8 mm (max. 0,9 mm). The oldest part of the test (the first third of adult specimens) is irregularly conical; later on tests become more or less cylindrical (pl. 1, fig. 4; pl. 2, fig. 1). The coiling of the initial chambers results in a flattening of the apex (pl. 1, fig. 4). The basis of the tests is clearly convex.

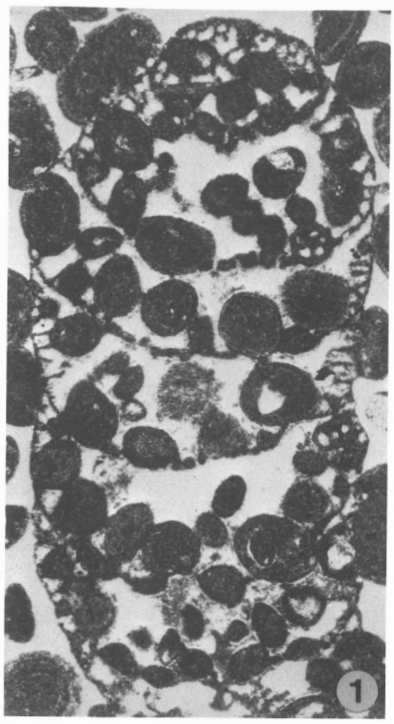
Adult tests are composed of 10-12 chambers. The subspherical proloculus (P in pl. 1, fig. 4; diameter 0,2 mm) and the following 3-4 chambers are arranged in a small trocho- or planispiral; the chambers of the cylindrical part of the test show rectilinear arrangement.

The chambers with a height of 0,12-0,2 mm in the cylindrical part of the test are separated by relatively thin septa (0,02-0,04 mm) which are strongly vaulted and often sickle-shaped in axial sections (pl. 2, fig. 1; last chambers).

The septa are composed by minute foreign parti-

EXPLANATION OF PLATE 1

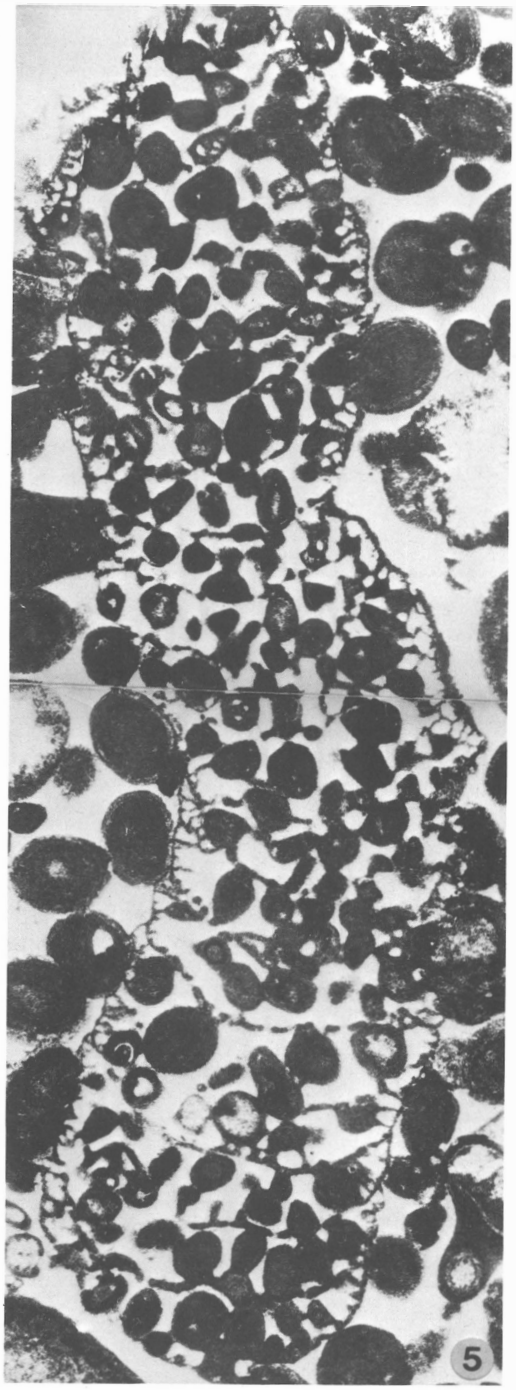
Figs. 1-7 - *Spiraloconulus giganteus* n. sp.. Porto Agra, SW of Fertilia (Alghero, SW Sardinia). Dogger.
1) Vertical section (microspheric form). 117/9 (x 28); 2) Vertical section (microspheric form). 117/20 (x 28); 3) Tangential section (microspheric form). 117/9 (x 44); 4) Axial section showing the proloculus (P) at the beginning of a small spiral. Holotype (macrospheric form). 117/25 (x 44); 5) Vertical section (microspheric from); 117/21 (x 28); 6) Oblique horizontal section (microspheric form). 117/23 (x 28); 7) Vertical section (microspheric form); detail of fig. 5. Small black arrows indicate apertures of a septum; large black arrow indicates a wall connecting an ooid with a septum; white arrows: ooids connected to eachother; x: ooid touching preceeding septum; y: ooid in the interior of a chamber connected with a septum. 117/21 (x 110).

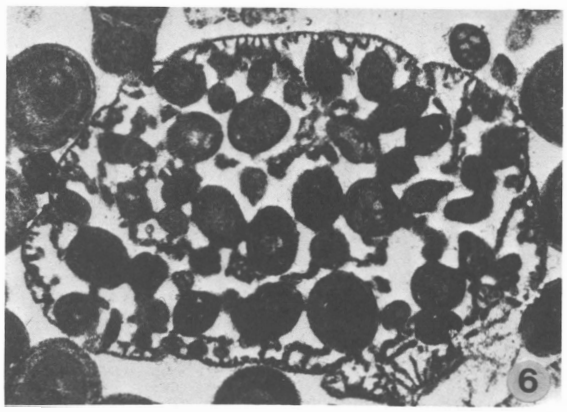

1

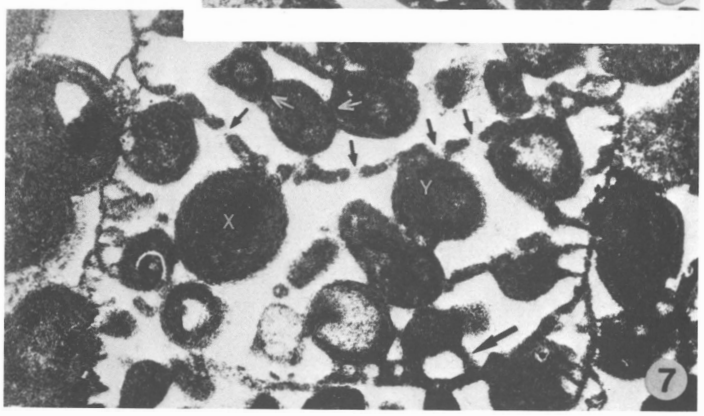

2


3


P
4


5


6


X
Y
7

cles which are agglutinated by a calcareous cement (pl. 1, fig. 4). Very characteristical is the presence of relatively big and irregularly distributed agglutinated ooids of different size attaining a diameter of 0,64 mm (pl. 1, fig. 4; pl. 2, figs. 1, 4, 5). These coarse particles may cause irregularities of internal structures as well as of external shape of the tests. So the distances between adjacent septa become sometimes larger or shorter in places where coarse particles are agglutinated. Big ooids situated in the marginal zone of septa produce more or less accentuated irregular knobs in the surface of tests (pl. 1, fig. 4, right margin; pl. 2, fig. 5). Coarse particles may be present already in the initial spiral part of the test (pl. 1, fig. 4; septum between proloculus P and the first postembryonic chamber).

The marginal zone of each chamber is subdivided into chamberlets, limited by short septula which are placed perpendicular to the test surface. These chamberlets with a diameter of 0,05-0,1 mm are polygonal in tangential sections; the larger ones are subdivided in their outer part by a short partition plate (pl. 2, fig. 4, lower margin). They are generally opened in direction to the center of the test, but sometimes closed by adjacent ooids situated in the marginal part of the test (pl. 2, fig. 4, upper left corner). In the cylindrical test stage, chamberlets are arranged in 2-3 horizontal rows per chamber laying one upon another.

Axial sections through the holotype (pl. 1, fig. 4) and other macrospheric specimens show clearly that this marginal « subepidermal cellular layer » (*sensu* Henson 1948, p. 38) of chambers with a strongly curved basis is partially or completely covered by the following chamber.

Microspheric specimens

This generation is mainly characterized by its remarkably great dimensions (pl. 1, fig. 5; pl. 2, figs. 6, 7) which justify the specific name. Adult tests attain normally a height of 5-8 mm; the greatest specimen, moreover incomplete, was 9,6 mm in height! The basal diameter ranges between 1,4 and 1,8 mm (max. 2,4 mm; pl. 1, fig. 6).

Microspheric tests are in the form of an irregular, more or less twisted cylinder whose diameter increase slightly during ontogenesis (pl. 1, fig. 5; pl. 2, fig. 6). First chambers are arranged in a pronounced spiral; this coiling effect results in strong inclination of the apex to one side (pl. 2, fig. 2). The exact number of chambers building up this spiral is unknown but in any case greater than in macrospheric specimens. The proloculus was not observed.

The cylindrical part of the test is composed of approx. 20-30 chambers (max. more than 37) showing rectilinear arrangement (pl. 1, figs. 1, 2, 5; pl. 2, figs. 3, 6, 7). These are 0,25-0,35 mm in height and separated by thin septa (0,04-0,05 mm) vaulted not always so regularly as in macrospheric specimens. Specially in the youngest part of adult specimens septa are irregularly curved in vertical sections (pl. 1, fig. 5).

Each septum is pierced by numerous small apertures of about 0,04 mm diameter, apparently irregularly distributed (pl. 1, fig. 7, small black arrows in the upper part).

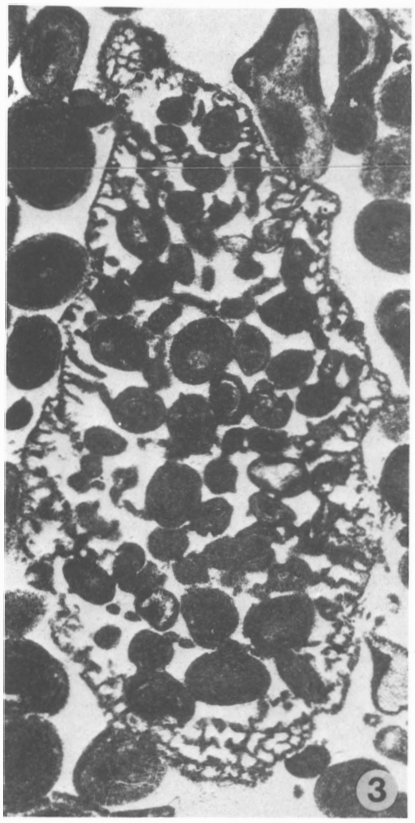
Microspheric specimens contain a high quantity of agglutinated ooids of different size (in a few cases also small Trocholinas, Nautiloculinas and miliolid foraminifera) which are restricted not only to the septa but can be found also in the interior of chambers (pl. 1, figs. 2, 5; pl. 2, figs. 3, 6-7). In the first case, ooids can reach sometimes such a large size that they touch the preceding septum (big ooid marked by a white x in pl. 1, fig. 7). In the second case, ooids situated in the interior of a chamber are connected to each other (white arrows in the upper part of pl. 1, fig. 7) or with the preceding respectively the following septum either directly (y in pl. 1, fig. 7) or by short irregularly directed walls (big arrow in the lower part of pl. 1, fig. 7).

Ooids in the chamber interior which are connected with the septa by small walls have never been found in macrospheric forms and seem to be limited to the large chambers of rectilinear stage of microspheric specimens. The two generations of *S. giganteus* are therefore characterized not only by different size of tests

EXPLANATION OF PLATE 2

Figs. 1-7 - *Spiraloconulus giganteus* n. sp.. Porto Agra, SW of Fertilia (Alghero, NW Sardinia). Dogger.
1) Subaxial section (macrospheric form). 117/24 (x 28); 2) Axial section through the initial spiral of a microspheric form. 117/9 (x 44); 3) Vertical section (microspheric form). 117/20 (x 28); 4) Oblique horizontal section (macrospheric form). 117/25 (x 44); 5) Vertical section (macrospheric form). 117/16 (x 44); 6) Vertical section (microspheric form). 117/24 (x 28); 7) Vertical section (microspheric form). 117/1 (x 28).

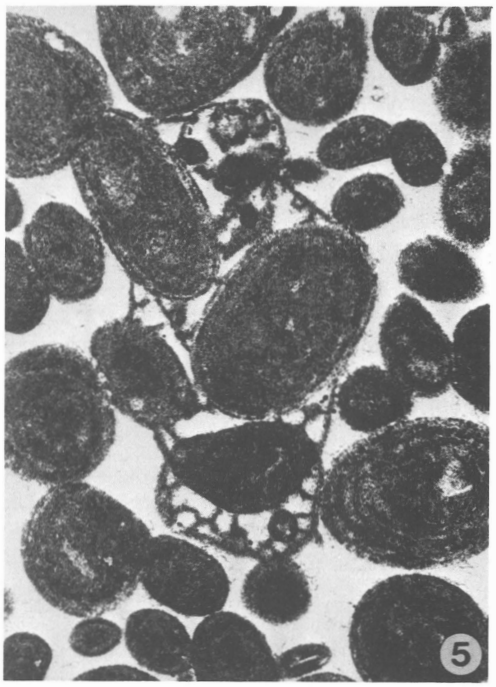
Fig. 8 - *Spiraloconulus perconigi* (Allemann & Schroeder) 1972.
Axial section. Holotype. Well Cerro Gordo (Prov. of Cádiz, S Spain), core 31, depth 1758-1767 m. Dogger. 11/1 (x 44).

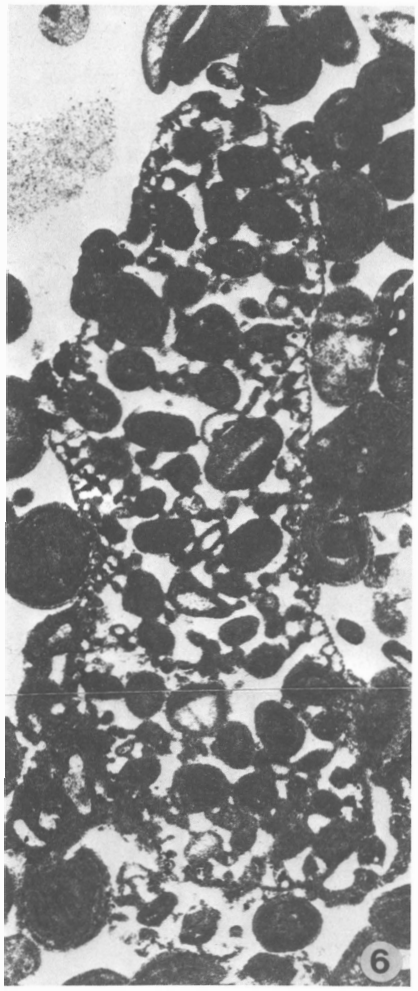

3

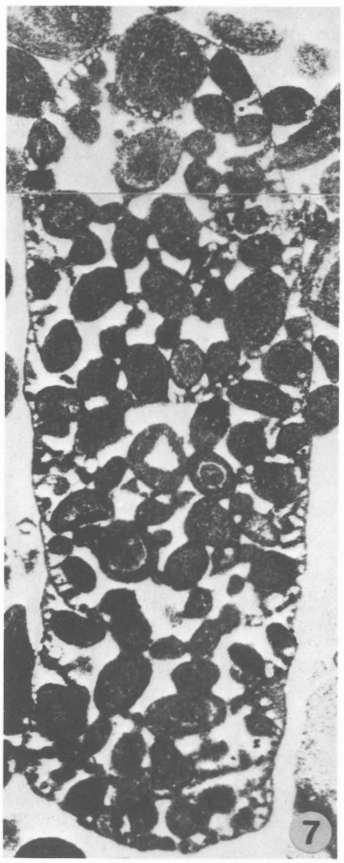

1

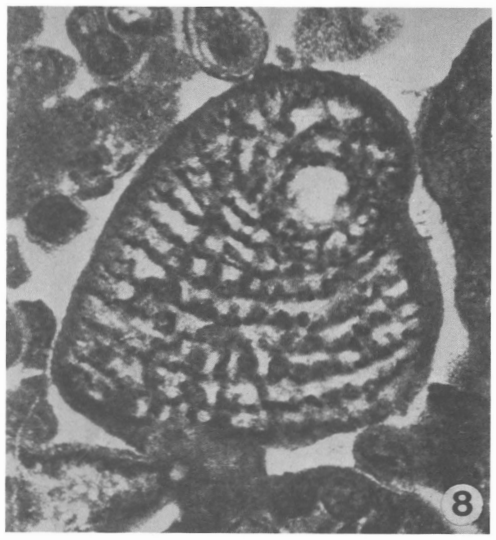

2


4


5


6


7


8

but also by different internal structures in the central part of the chambers.

Tangential sections through the marginal zone (pl. 1, fig. 3) show a well developed layer of chamberlets with polygonal or rounded outline which have a diameter of 0,06-0,08 mm. Larger chamberlets are generally subdivided by a short secondary plate.

This cellular layer is also very rich in small agglutinated particles which are situated above all in the junctions of marginal plates (pl. 1, fig. 3). Sporadic big ooids being present within this zone are partly surrounded by marginal chamberlets (pl. 1, fig. 2, uppermost part).

Comparison with *Spiraloconulus perconigi* (Allemann & Schroeder).

Spiraloconulus perconigi (Allemann & Schroeder), the only species of this genus known till now, is distinguished from *S. giganteus* by shape as well as dimensions.

Also in *S. perconigi* two morphological groups are distinguishable which were interpreted as different generations (Allemann & Schroeder 1972, p. 204).

The macrospheric specimens are mainly conical with a height of 1-1,2 mm (max. 1,5 mm) and a diameter of 0,8-1,1 mm. They are clearly broader but not so high as macrospheric *S. giganteus* (height: 1,4-1,8 mm, max.: 2,4 mm; diameter 0,7-0,8 mm, max.: 0,9 mm). The initial spiral part of macrospheric *S. perconigi* is much more pronounced than in *S. giganteus* and consists of 9-12 chambers (3-4 in *S. giganteus*); a cylindrical stage is not always present and relatively short. Late-ontogenetic chambers of *S. perconigi* are only 0,1 mm in height (*S. giganteus*: 0,12-0,2 mm). A bilocular embryo being present in the holotype of *S. perconigi* (pl. 2, fig. 8) could not be observed in *S. giganteus,* but this presumed difference may also depend on different position of thin section cutting only one embryonic chamber in *S. giganteus*.

Microspheric specimens of *S. perconigi* (Allemann & Schroeder 1972, pl. 1, figs. 3,4, 13) are strongly conical and always broader (1,8-2,0 mm) than high (0,9-1,6 mm). They have a well developed initial spiral, but a late-ontogenetic cylindrical stage is completely lacking. On the contrary, microspheric specimens of *S. giganteus* are always much higher (5 - approx. 10 mm) than broad (1,4-2,4 mm) and show a very pronounced cylindrical stage.

BIBLIOGRAPHY

Allemann, F. & Schroeder, R., 1972, *Spiroconulus perconigi* n. gen. n. sp., a new Middle Jurassic foraminifer of Oman and Spain: Rev. española Micropaleont., num. extraord., pp. 199-209, 3 pl., 1 text-fig., Madrid.

—, —, 1980, *Spiraloconulus* nom. nov. for *Spiroconulus* Allemann & Schroeder 1972 (Foraminiferida): Rev. española Micropaleont., vol. 12, n. 3, p. 358, Madrid.

Bassoulet, J.-P. & Fourcade, E., 1979, Essai de synthèse de répartition de Foraminifères benthiques du Jurassique carbonaté mésogéen: C. r. somm. Soc. géol. France, vol. 1979, n. 2, pp. 69-71, 1 text-fig., Paris.

Henson, F.R.S., 1948, Larger imperforate foraminifera of South-West Asia. Families Lituolidae, Orbitolinidae and Meandropsinidae: p. 1-127, 16 pl., 16 text-fig., London (British Museum).

Peybernes, B., 1976, Le Jurassique et le Crétacé inférieur des Pyrénées franco-espagnoles: Thèse Doct. Sc. nat., 459 pp., 42 pl., 149 text-fig., Toulouse.

Rat, P., 1966, *Nubecularia reicheli* nov. sp., Foraminifère constructeur de fausses oolithes dans le Bajocien de Bourgogne: Ecl. geol. Helv., vol. 59, n. 1, pp. 73-86, 1 pl., 5 text-fig., Basel.

Septfontaine, M., 1981, Les Foraminifères imperforés des milieux de plate-forme au Mésozoique: détermination pratique, interprétation phylogénétique et utilisation biostratigraphique: Rev. Micropaléont., vol. 23, n. 3/4, pp. 169-203, 3 pl., 10 text-fig., Paris.