The PLASTER JACKET is a newsletter. Questions, announcements, and other communications are solicited from all readers. Information of general interest will be included in future issues.

It is our intent to produce this series at the rate of six issues per year. We hope to add as many genuinely interested paleontologists as possible to our mailing list. If you are interested, please send your name and address to the PLASTER JACKET. These issues are distributed free of charge to all interested people.

This public document was promulgated at an annual cost of $2500 or $0.17 per copy to circulate authoritative material on Florida paleontology and to foster communication among enthusiasts of this subject.

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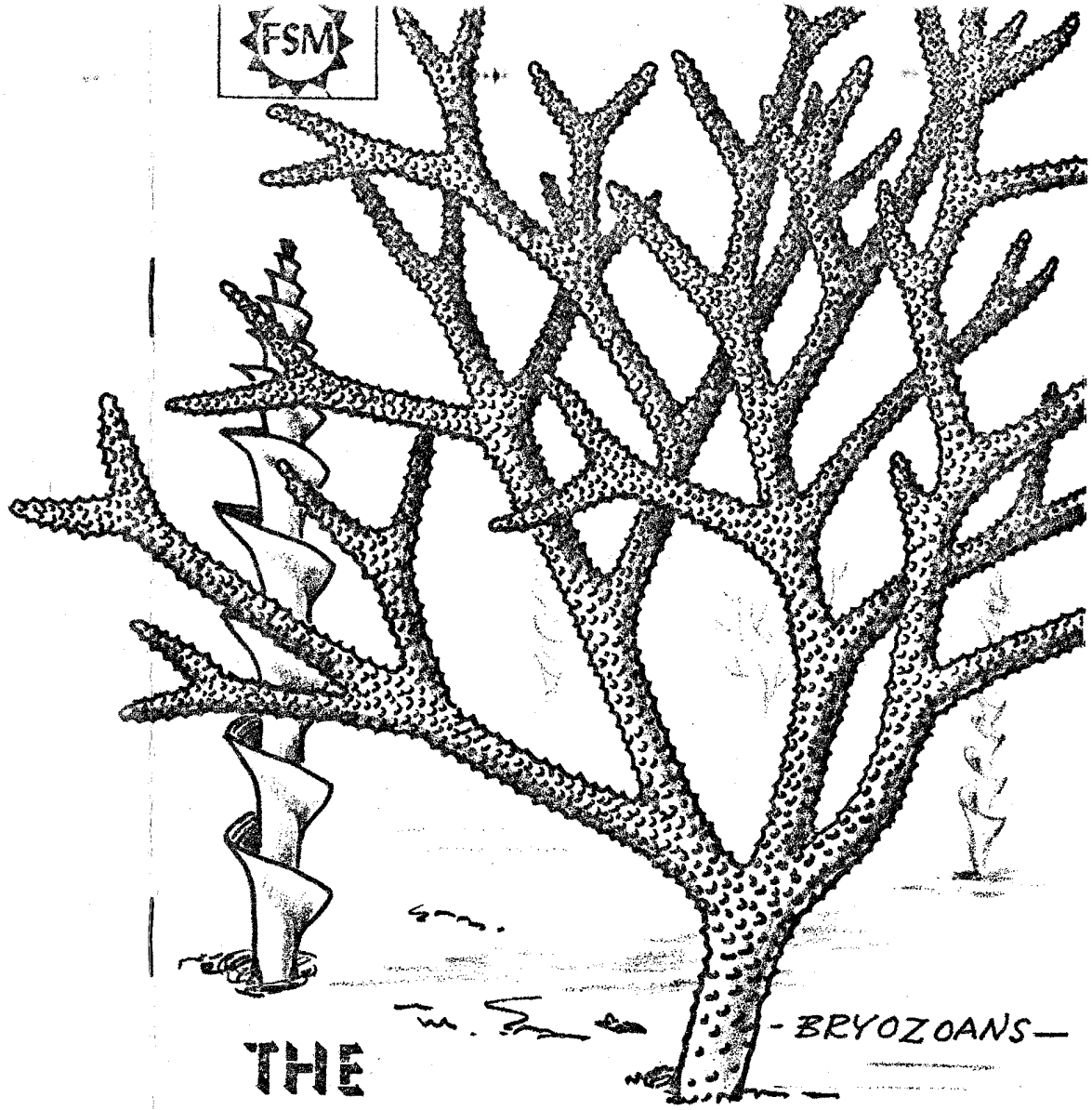

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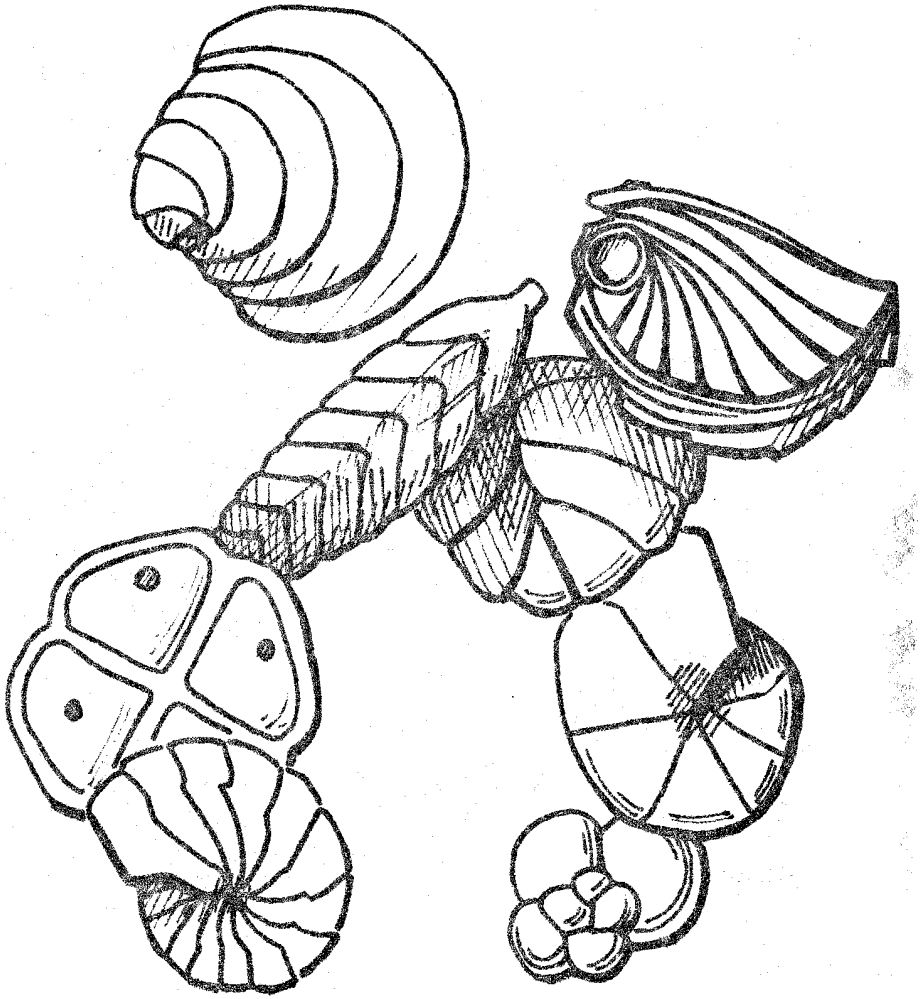
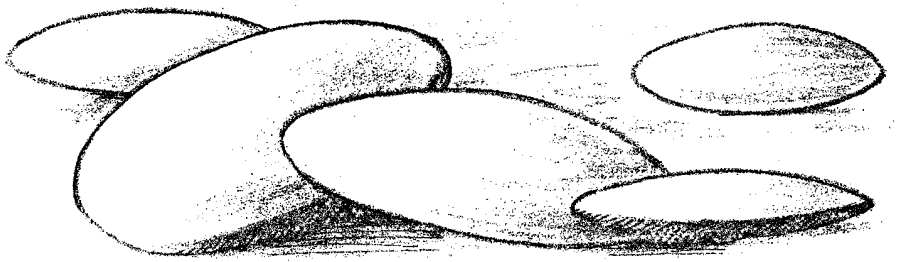


SOME OF THE MANY FORMS OF FORAMINIFERA

COIN FOSSILS and STONE LENTILS in the EOCENE ROCKS of FLORIDA

GRAIG D. SHAAK
Assistant Curator
in Invertebrate Paleontology



COIN FOSSILS AND STONE LENTILS IN THE EOCENE ROCKS OF FLORIDA

This short pamphlet is the first of a series of planned articles on invertebrate fossils as part of the widened scope of the PLASTER JACKET. The title refers to huge coin-shaped foraminifers found in Eocene rocks of Florida.

Although applied micropaleontology is less than a century old, among the first fossils described by the Greek natural philosophers were the huge coin-shaped foraminifers from the Eocene Gizeh limestone used for building the Egyptian pyramids. The Greek philosophers, among them Herodotus (fifth century B.C.) and Pliny the Elder (first century A.D.), called these foraminifers Nummulites, meaning "coin fossil." When Strabo (7 B.C.) saw these peculiar fossils he concluded they were actually the petrified remains of lentils, a common food plant, dropped there by the Egyptian workmen building the pyramids. That these coin fossils or "stone lentils" were the fossil remains of organisms was not recognized until 1558 by Agricola.

Anton Leeuwenhoek's discovery of the microscope in 1660 led to the description of many tiny fossil foraminifers by the early micropaleontologists, who regarded the microfossils as minute worms, cephalopods, or gastropods.

When Linne published his monumental classification of the known plants and animals (Systema Naturae) in 1756, he included the microfossils and assigned them generic and specific names.

Lamarck's zoological treatise of 1812 referred to the foraminifers as either corals or cephalopods. Many of the genera listed in his catalog are still valid although his original assumptions were incorrect.

Dujardin first demonstrated the protozoan nature of the organisms in 1835. Yet after general acceptance of this relationship, some species and even genera now placed in the Foraminifera were originally described as gastropods, corals, bryozoans, worms, and even algae.

Alcide d'Orbigny, the father of modern micropaleontology, proposed the name Foraminifera in 1826 in his huge, classic systematic work in which he recognized 5 families, 52 genera, and 544 species. Most of d'Orbigny's types are housed in the Museum National d'Histoire Naturelle, Paris, and recent comparative studies have documented the reliability and accuracy of his observations. His genus and species descriptions included their geologic occurrence, thus his early systematic work also represents the first biostratigraphic work incorporating foraminifers.

The Protozoa represent 5 percent of all known animals, being equivalent in number to all known vertebrates. Foraminifers represent about half of all known Protozoa, or 2.5 percent of all known organisms. The Foraminifera contain 95 families, of which 62 are extant. The number of recognized genera and subgenera as of 1964 exceeded 1,225.

Foraminifers, as representatives of Protozoa, are unicellular shelled organisms of the class Rhizopodea. As in the Amoebida, the protoplasm is differentiated into outer, clear ectoplasma and an inner, darker colored endoplasm. The foraminifer (pore-bearing) shell or test is secreted by the cytoplasm (protoplasm exclusive of the nucleus). Pseudopodia are

extended through the pores and aperture (s) of the test for locomotion and food capture.

Reproduction is accomplished through an alternation of sexual and asexual generations. The asexual type of generation is prevalent, but is periodically replaced by sexual reproduction. Asexual reproduction is simple fission of the cell. Sexual reproduction is accomplished through the union of gametes. This dual reproduction (dimorphism) results in two types of foraminifer tests: 1) the megalospheric test (asexual) which is small, with a large first-formed chamber or proloculous; and 2) the microspheric test (sexual) which is large, with a small proloculous. The ratio of megalospheric to microspheric tests ranges from 2:1 to 20:1 in various genera. In most cases the larger microspheric test has been identified and named. This concept of dimorphism has complicated taxonomy of the foraminifers, because many of the smaller megalospheric tests have been assigned generic and specific names different from those of the larger microspheric forms.

The fundamental unit of a foraminifer test is the chamber. The contact between chambers is a wall or septum. The external expression of a septum is a suture. Some simple forms are single chambered (unilocular), but most forms have many chambers (multilocular) that can be arranged in a multitude of growth patterns away from the proloculus.

Test composition can be chitinous, which is rare in the fossil record; agglutinated, which is composed of detrital sand-sized grains cemented together; siliceous, which is rare; and calcareous, the most abundant type of test in foraminifers.

Nummulites and Lepidocyclina are two of the coin-shaped foraminifers common in the Eocene rocks of Florida. Both reach maximum diameters in excess of 2.5 cm, about the size of a quarter, quite an accomplishment for a single-celled organism. Surficially both genera look like thin, flattened discs; internally they are strikingly different. These large foraminifers are studied principally in thin section. The two most common cuts or views are: equatorial, in which the cut is perpendicular to the axis or growth or in the plane of coiling, or equatorial layer; and axial, in which the cut is through the axis of coiling, or along the axis of growth (Fig. 1).

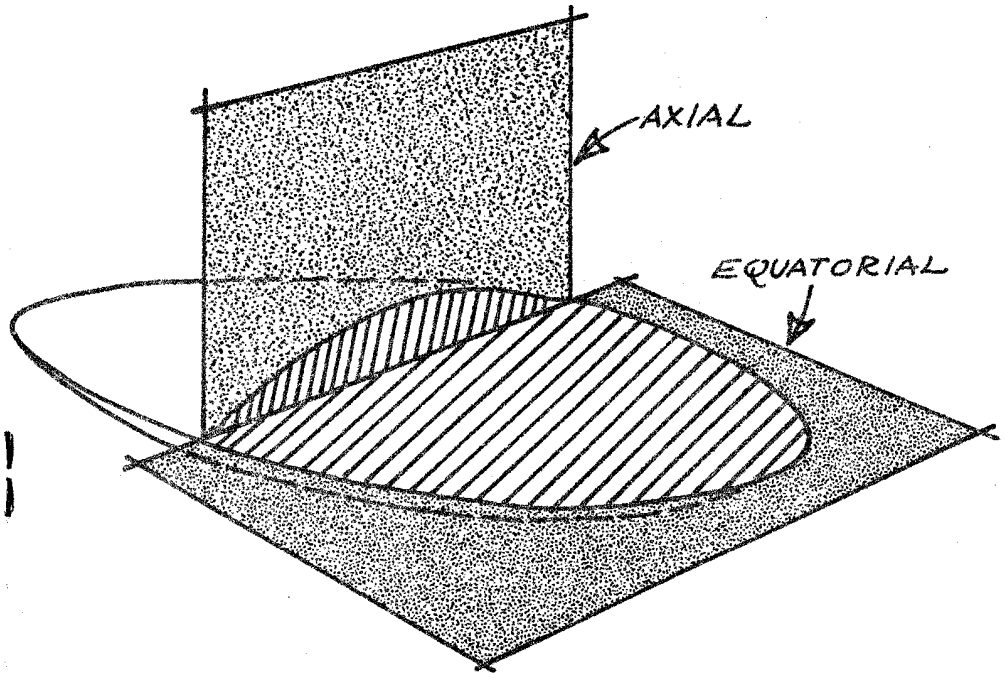


FIGURE 1. Schematic equatorial and axial sections.

The purpose of these cuts is to view the test from two different angles, through the proloculous.

In equatorial view Nummulites (Fig. 2) is distinctly spiral whereas Lepidocyclina (Fig. 3) is initially spiral but subsequent growth is circular or annular, in which chambers are added in concentric rings.

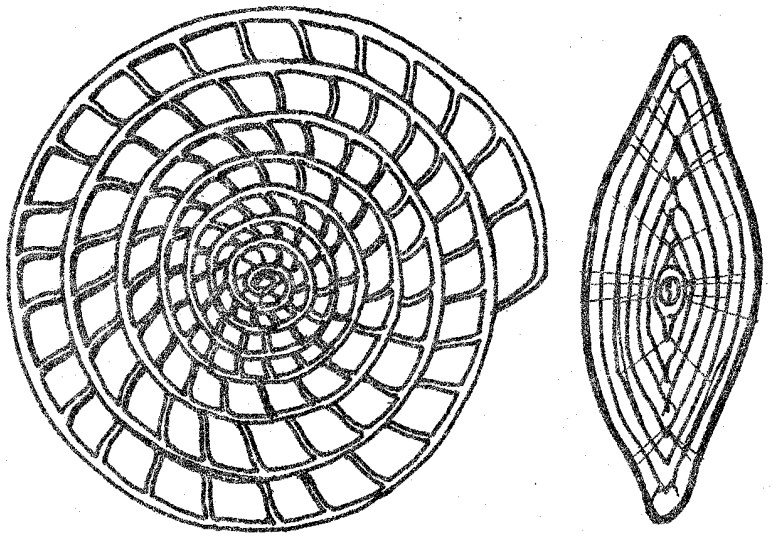


FIGURE 2. Nummulites in equatorial and axial section.

The axial sections of these genera (Figs. 2, 3) are somewhat less informative. Lepidocyclina has a more distinct ring of equatorial chambers caused by the concentric growth. Nummulites shows an equatorial demarcation but more inflated than Lepidocyclina produced by the spiral envelopment of the chambers.

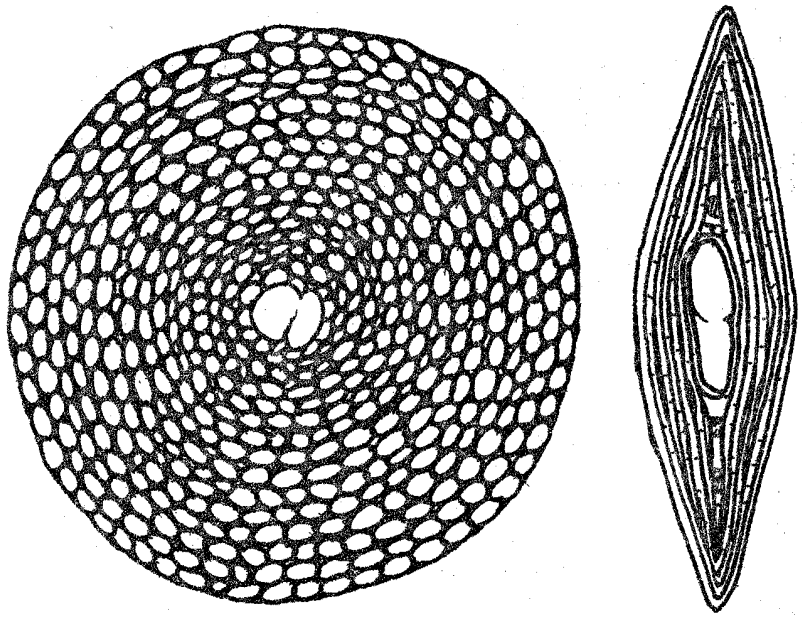


FIGURE 3. Lepidocyclina in equatorial and axial view.

Nummulites ranges from Paleocene to Oligocene with its acme in the Eocene. Lepidocyclina ranges from Eocene to Miocene with its acme in the Oligocene. Both are Tertiary index fossils of the Tethyan region (Europe to the East Indian Archipelago) and adjacent seas.

These large foraminifers are found in organic limestones in association with other large foraminifers, bryozoans, echinoids, coralline algae, and molluscs. Foraminiferal limestones are formed as shallow or moderately shallow deposits in warm ocean environments in relatively clear water. Foraminiferal limestones generally contain 15 percent or more of foraminifers. The limestones are usually pure, with only small amounts of silica. Many of the foraminiferal limestones are friable with fine-grained calcite as cement.

An excellent example of this type of limestone and the entombed fossils is found in the limestone cave in the exhibit hall of the Florida State Museum. The cave is representative of the limestones of the Ocala Group (Eocene) of Florida. In several sections of the cave, fossils and replicas are in the same orientation as would be found in outcrop. Careful examination of these invertebrate fossil areas will reveal molluscs, crabs, and numerous specimens of the coin fossil Lepidocyclina.

(NOTE: Dr. Shaak has called to our attention the fact that we inadvertently listed him as a member of the Zoology Department -- not true, he will be an Assistant Professor in the Department of Geology at the University. Sorry for the error, Graig.)

NEWS

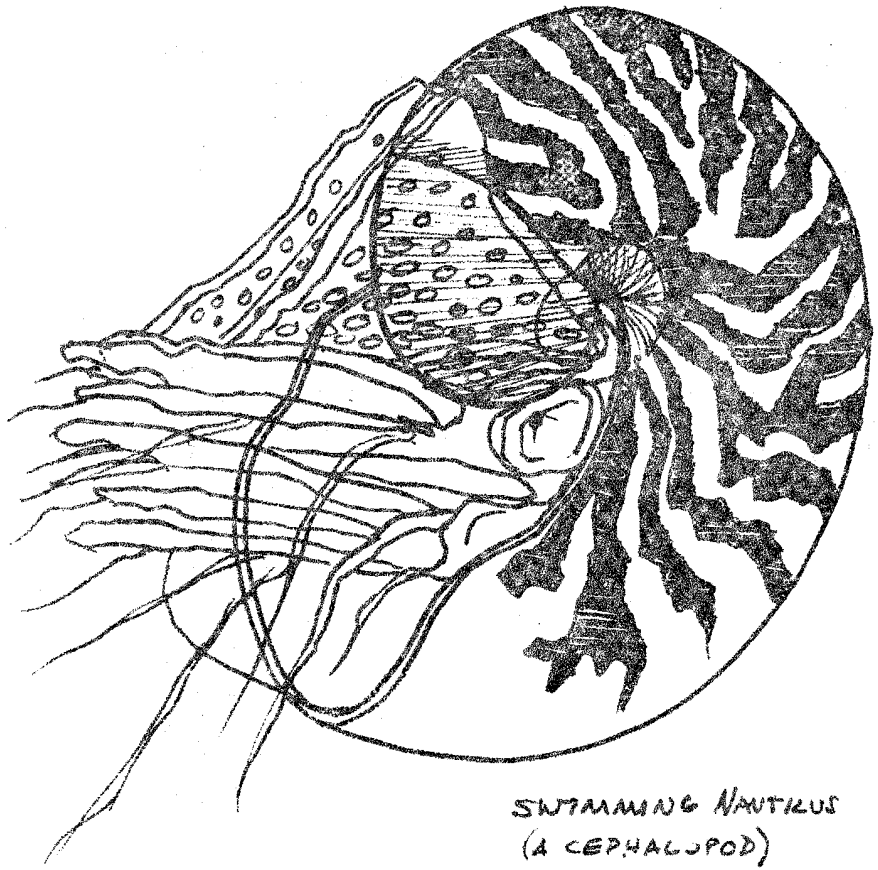
Following are people who were mistakenly left out of last month's "News Notes" -- our apologies to each.

Kenneth Campbell. Associate in Natural Sciences, Florida State Museum, Gainesville.

Although Ken is studying the Pleistocene avifauna of Peru and preparing for his Ph.D., he recently joined our staff full time. Currently he divides his time to work on projects with Dale Guthrie, Tom Patton, and Graig Shaak.

Margaret "Peg" Estey. Illustrator, Department of Natural Sciences, Florida State Museum, Gainesville.

Peg, a long-time member of the Society of Vertebrate Paleontologists, joined our staff shortly after our move to the new building. The PJ covers for the last couple of years and the artwork in the last two issues are her handiwork. You will be seeing much more of it in the future.



SWIMMING NAUTILUS
(A CEPHALOPOD)