

NEW ARENACEOUS FORAMINIFERA FROM THE PHILIPPINES.

By JOSEPH AUGUSTINE CUSHMAN,
Of the Boston Society of Natural History.

The following genus and ten species belonging to the arenaceous group of the Foraminifera are believed to be new. They were obtained, among numerous other species, by the Bureau of Fisheries steamer *Albatross* in the Philippine expedition of 1907-1910. The species usually have been frequent or even abundant at the station where they were found and in some cases seem to have a general distribution in many parts of the archipelago. Except for fig. 7, the figures are from photographs taken at the U. S. National Museum.

SAGENINA DIVARICANS, new species.

Description.—Test attached, tubular, very slender, uniform in size, branching at nearly regular intervals with a wide angle, sometimes anastomosing; walls of coralline mud, somewhat roughened; apertures at the ends of the tubes; color, white.

Diameter of the tubes 0.05 to 0.1 mm.



FIG. 1.—SAGENINA DIVARICANS. $\times 10$. FROM PHOTOGRAPH.

Type-specimen.—Cat. No. 8229, U.S.N.M., from *Albatross* station 5145, vicinity of Jolo, Jolo Archipelago, 23 fathoms; attached to hardened coral sand on the interior of a bivalve shell.

REOPHAX PSEUDOBACILLARIS, new species.

Description.—Test elongate, arcuate, composed of a linear series of chambers; chambers shorter than broad in surface view, except the one last formed, which appears nearly spherical, numerous, sixteen to twenty or more; wall arenaceous, fairly coarse for the size of the test, slightly rough on the exterior; aperture small, in the middle of the terminal face of the chamber; color, dark reddish brown.

Length up to 2 mm.

Type-specimen.—Cat. No. 8226, U.S.N.M., from *Albatross* station 5236, off the eastern coast of Mindanao, Philippines; 494 fathoms.

FIGS. 2, 3.—REOPHAX PSEUDOBACILLARIS. \times 20. FROM PHOTOGRAPH.



This species, while it has somewhat the appearance of *R. bacillaris* H. B. Brady, is much smaller, more arcuate, and has a dark reddish brown color.

REOPHAX SPICULOTESTUS, new species.

Description.—Test of medium size, composed of a linear series of elongate chambers, oval, in a straight or more often slightly curved line, contracted at the ends of each chamber, increasing rapidly in size toward the apertural end; perfect adult specimens with six or more chambers; wall thin, composed largely of siliceous sponge spicules, for the most part laid lengthwise of the test and firmly cemented; some sand grains present, usually neatly cemented; aperture fairly large; color, grayish.

Length up to 2 mm.

Type-specimen.—Cat. No. 8227, U.S.N.M., from *Albatross* station 5236, off the eastern coast of Mindanao; 494 fathoms.

This differs much in form and size from *R. spiculifer* H. B. Brady, as well as in the very different appearance of the test. Occurring as it does in company with an abundance of arenaceous species, it shows its selective power in the composition of its test.



FIG. 4.—REOPHAX SPICULOTESTUS. \times 20. FROM PHOTOGRAPH.

HORMOSINA OVALIFORMIS, new species.

Description.—Test composed of a straight or slightly curved series of chambers closely joined to one another; chambers evenly tapering at either end, or slightly oval; aperture small, rounded; walls of fine

sand and a brownish cement, slightly roughened on the outside; color, yellowish brown, white about the aperture.

Length up to 2.5 mm.

Type-specimen. Cat. No. 8221, U.S.N.M., from *Albatross* station 5236, off the eastern coast of Mindanao; 494 fathoms.

This differs from other species of the genus in its oval, closely connected chambers, in its small aperture, and rather pointed apertural end.

HORMOSINA ELONGATA, new species.

Description.—Test elongate, nearly straight, composed of a series of elongate chambers; largest diameter near the base of each chamber, thence gradually narrowing toward the apertural end; wall rather thick, composed of fine material with much cement, smoothly finished; aperture rather small, elliptical; color, reddish brown, lighter about the aperture.

Length 5 to 10 mm.

Type-specimen.—Cat. No. 8263, U.S.N.M., from *Albatross* station 5236, off the eastern coast of Mindanao; 494 fathoms.

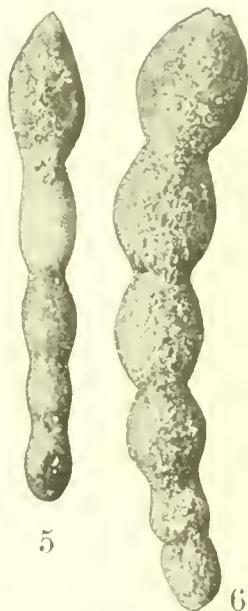
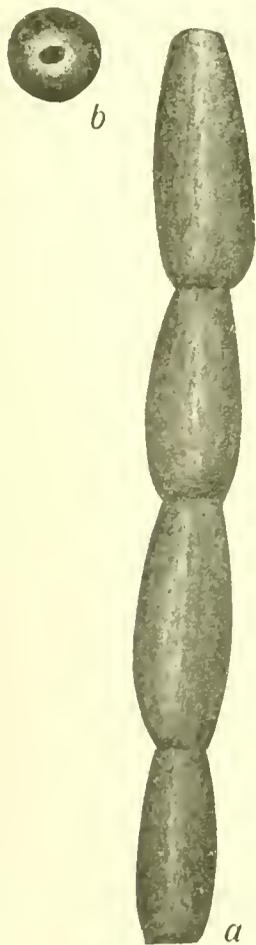
This species is much more elongate in regard to its entirety and in its individual chambers than other species of the genus. Its nearest related species seems to be *Hormosina carpenteri* H. B. Brady, but the curvature of the test and the shape of the chambers is very different.

SPHÆRAMMINA, new genus.

Description.—Test composed of a series of chambers, the one last formed completely enveloping the preceding ones, but the axis straight; wall arenaceous.

Type of the genus.—*Sphærammina ovalis*, new species.

FIG. 7.—HORMOSINA ELONGATA. X 15. a, SIDE VIEW; b, APERTURAL VIEW.



FIGS. 5, 6.—HORMOSINA OVALIFORMIS. X 15. FROM PHOTOGRAPH.

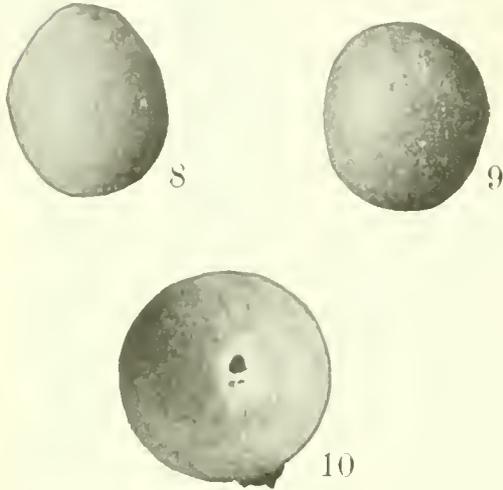
This genus strongly reminds one of *Ellipsoidina*, but there is an arenaceous wall, and the connections between the apertural ends of the chambers are indistinct or wanting. With its straight axis it belongs to the *Reophaeinae* and holds a relation to *Reophae* and *Hormosina* similar to that which *Glandulina* holds to *Nodosaria*.

SPHÆRAMMINA OVALIS, new species.

Description.—Test oval or spherical, composed of a series of chambers, with a straight axis, each chamber as added extending back and enveloping the preceding; chambers oval or nearly spherical; wall of fine sand firmly cemented; aperture elliptical or rounded; color, grayish or yellowish brown.

Diameter 1 to 2 mm.

Type-specimen.—Cat. No. 8223, U.S.N.M., from *Albatross* station 5236, off the eastern coast of Mindanao; 494 fathoms.



FIGS. 8-10.—SPHÆRAMMINA OVALIS. $\times 15$.
FROM PHOTOGRAPH. FIGS. 8 AND 9, SIDE
VIEW; FIG. 10, APERTURAL VIEW.

rather coarse sand grains with a considerable proportion of yellowish-brown cement, somewhat rough on the exterior; aperture an elongate, curved slit at the base of the apertural face of the chamber; color, light brown.

Diameter, about 3 mm.

Type-specimen.—Cat. No. 8217, U.S.N.M., from *Albatross* station 5152, near the Tawi Tawi group; 34 fathoms.

This is a large species somewhat resembling *H. canariense*, but involute with broad low chambers.

AMMOBACULITES REOPHACIFORMIS, new species.

Description.—Test free, elongate-fusiform; early portion consisting of chambers arranged in a close-coiled planospiral series, much compressed, later portion straight, *Reophaex*-like, consisting of a linear series of chambers progressively increasing in size; wall coarsely arenaceous, rough, fairly thick;

This species in many ways resembles the Miocene *Ellipsoidina ellipsoides*. The characters of the wall are similar to those of *Hormosina*.

HAPLOPHRAGMOIDES GRANDIFORMIS, new species.

Description.—Test free, involute, planospiral; chambers low and broad, seven to nine in the last-formed coil, inflated; peripheral line of the test in side view considerably depressed at the sutures; wall composed of

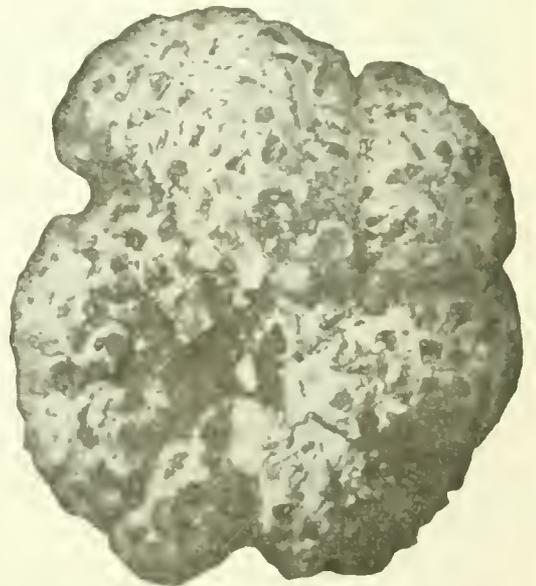


FIG. 11.—HAPLOPHRAGMOIDES GRANDIFORMIS
 $\times 25$. FROM PHOTOGRAPH.

aperture circular, in the middle of the terminal face, often on a projecting, neck-like portion; color variable, usually white or gray.

Length, up to 3.5 mm., diameter, 0.4 to 1.0 mm.

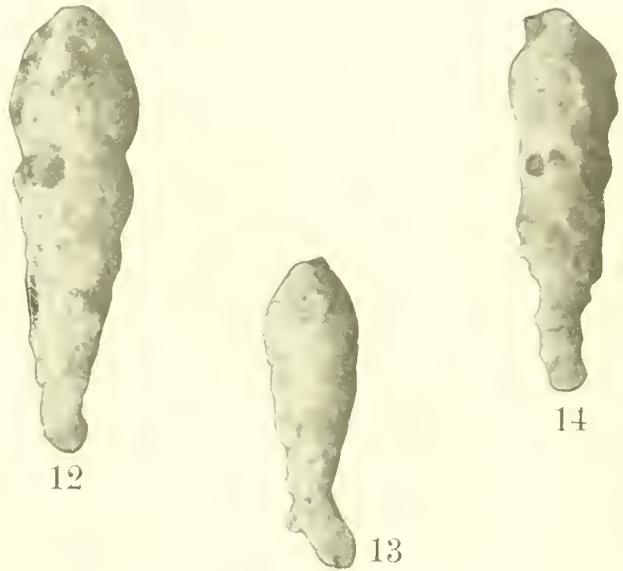
Type-specimen.—Cat. No. 8207, U.S.N.M., from *Albatross* station 5156.

This is typically a shallow-water coral reef species, and has been found abundantly in the Philippine material from such stations, between 16 and 78 fathoms.

The early coiled portion separates it from *Rcophax*, but the later portion alone would be described as belonging to that genus. At first I took it to be the microspheric form of some species of *Rcophax*, but it is very abundant and when perfect seems always to have the coiled early development.

Rcophax scorpiurus, which it

in some ways resembles, is a common species in the same locality, but in the material examined was not seen to have a true close-coiled young in any case, although the young portion is often curved.



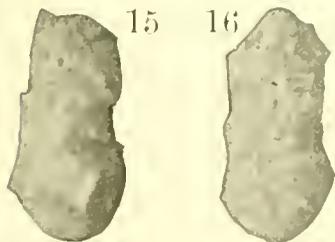
FIGS. 12-14.—AMMOBACULITES REOPHACIFORMIS. $\times 25$.
FROM PHOTOGRAPH.

AMMOBACULITES CYLINDRICUS, new species.

Haplophragmium calcareum (part), H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 23, fig. 6.

H. agglutinans FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 275, pl. 19, fig. 2 (not *Spirolina agglutinans* d'Orbigny).

Description.—Test free, elongate, cylindrical; early chambers planospiral, completely involute, with five to six chambers in each volution; later portion uncoiled, cylindrical, made up of a linear series of chambers; wall coarsely arenaceous, but the surface rather smoothly finished; aperture in the middle of the terminal face in the uncoiled portion simple; color, gray.



FIGS. 15, 16.—AMMOBACULITES
CYLINDRICUS. $\times 20$. FROM
PHOTOGRAPH.

Length, 2 mm., diameter, 0.5 to 0.75 mm.

Type-specimen.—Cat. No. 8205, U.S.N.M., from *Albatross* station 5201.

This species differs from the ordinary form of *A. calcareus* in its cylindrical shape and from *A. agglutinans* in the greater proportion of coiled chambers, which are completely involute.

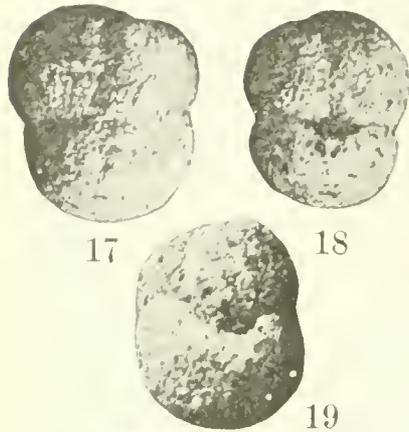
AMMOSPHAEROIDINA GRANDIS, new species.

Description.—Test large, globular, in adults usually made up of three visible chambers, one large one and two smaller ones on the opposite side; wall coarsely arenaceous, but with a fairly smooth exterior; aperture at the base of the largest chamber crescentic or semicircular, nearly opposite the suture marking the juncture of the walls of the two smaller chambers; color, grayish-brown.

Diameter, up to 3 mm.

Type-specimen.—Cat. No. 8209, U.S.N.M., from *Albatross* station 5236, off the eastern coast of Mindanao; 494 fathoms.

FIGS. 17-19.—AMMOSPHAEROIDINA GRANDIS. $\times 8$. FROM PHOTOGRAPH. FIGURES AT UPPER RIGHT AND BELOW ARE APERTURAL VIEWS.



This species differs from the allied *A. sphaeroidiniformis* (H. B. Brady) in its much larger size, more regular form, and smooth surface. It was abundant at the above station.