Palaeontology. — *Foraminifera from the upper cretaceous of Habana, Cuba.* By G. H. VOORWIJK. (Communicated by Prof. L. RUTTEN.) (Communicated at the meeting of January 30, 1937).

The collection of foraminifera, which is being described in this paper, has kindly been put at my disposal by the “Bataafsche Petroleum Maatschappij”. The Hague, Holland. The material has been collected by Dr. PALMER, Palembang, who has been so kind as to look over some species and who gave me some valuable remarks about them.

Larger foraminifera from the cretaceous of Cuba have been described by D. K. PALMER, M. G. RUTTEN and others but, as far as I know, there is no literature on the smaller foraminifera from the cretaceous of this country.

Thanks to the kindness of the Dr. PALMER, who has been so kind as to look over some species and who gave me some valuable remarks about them, I am able to reproduce a map showing the different localities of the samples. The collection of foraminifera, which is being described in this paper, is not marked on the map; it is 3.6 km North of Calabazar.

A diagram, showing the localities and the different foraminifera found on them, follows below.

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A few species are new or give rise to special remarks. In the description of species that are already known, I have sometimes cited one author only. In these cases further literature is given by that author.

**Nodosaria** sp. 3. Pl. I, fig. 1. The only specimen I found is figured. It is from loc. 79.

**Nodosaria affinis** REUSS. Pl. I, fig. 2. Lit. No. 3, p. 38, No. 4, p. 305. The only specimen I found is figured. It is from loc. 79.

**Lageni apiculata** REUSS, forma ovalis WHITE. Lit. No. 1, p. 210. The average measures are: 0.27 × 0.5 mm. The specimen figured by WHITE is 0.4 × 0.65 mm.

**Camerina dickersoni** PALMER, Pl. II, fig. 11—16, Pl. III, fig. 3, 6, Lit. No. 10, p. 243—245.

Miss PALMER has separated *C. dickersoni* and *C. cabensis*: A. THIADENS has given a third name — *C. vermunti* — to a small form of the Upper Cretaceous of S. Clara, Cuba (In litt.). The three species are separated from each other by the following main characteristics: (1) from (2) by the occurrence of a single large central knob in (1) and the occurrence of a small central knob, surrounded by a spiral of smaller knobs in (2). In the specimens from Habana I found transitions between these two forms. (3) Is separated from (1) and (2) by the occurrence of a groove in the spiral suture. In the thin-sections I made of specimens of (1) and (2)
I found the same groove which can also be seen in the pictures Miss Palmer gives of these two species, though she does not mention this feature.

Further differences between these three species are of too little importance to justify their separation, and the very typical groove they all have in common makes it desirable to take them together; the description of this species then becomes:

Test small, circular, generally not exceeding 2 mm in diameter. Nearly bilaterally symmetric, involute, three to four whorls, the last one with a maximum of 23 chambers. Aperture a small inverted V. The initial microspheric chamber measures 0.016 mm in diameter, the megalospheric one 0.023 mm. There are true canals within the septae; moreover, the wall has a complex system of partially divering canals which run towards the periphery (Pl. III, fig. 6). The spiral suture has a groove that forms the most conspicuous feature of this species. The ornamentation of the test consists of a central knob, a spiral of smaller knobs, or of inflated sutures with transitions from one to another. The megalospheric forms seem to have straighter sutures than the microspheric ones, the central knob is smaller and the sutures are less inflated.

The figured specimens are from loc. 54.

Gämbelina nuttalli Voorwijk n. sp. Pl. II, fig. 1—9.

I am not sure if this material corresponds with White's Gämbelina elegans, as he does not give the range of variation of his specimens. The fossil he figures as G. elegans is more flattened than the average of the Habana material. M. P. White, 1929, has not proved that his fossils correspond with Gämbelina elegans (Rzeihak), because it is not certain that Rzeihak, 1891, was wrong in giving his material the name of Cuneolina elegans, or at least that he was wrong in reckoning it to the Textularidae. Besides, Rzeihak's material is of Tertiary age. Whether White's material corresponds with Plummer's fig. 1, Pl. 2, is uncertain too, though the fossils resemble each other. Plummer's picture is from a smaller specimen and comes from the Upper Cretaceous (Navarro) of Texas.

Typical for this species is the flattening of the test in a direction opposite to most forms of this genus, so that the broad side shows one, and the narrow side two series of chambers. The great change in the ratio of length, breadth and width is remarkable and can be seen on Pl. II, fig. 1—9. The figured specimens are from different localities.

Gümbelina tessera (Ehr.) Pl. I, fig. 3, 4. Lit. No. 5, p. 338, No. 6, p. 418.

The average measures equal those of the specimens figured by Cushman and are about 0.44 × 0.4 × 0.22 mm. The figured specimen is from loc. 35.

Gümbelina ultimatumida WHITE. Pl. I, fig. 5, 6. Lit. No. 1, No. 2, p. 27.

In Jour. Pal. 1929, Vol. 3, p. 312. K. Carman calls this species of White a doubtful one, saying that it is a form of G. globifera or a young stage of Ventilabrella. In this she must be wrong, as White's G. ultimatumida is larger than G. globifera and much larger than young Ventilabrella's.

The average measures of the Cuban specimens are: 0.35 × 0.24 × 0.21 mm, which is less than those of White's material: 0.6 × 0.3 × 0.25 mm, but more than those of Jennings's fossils: 0.2 × 0.12 mm. The figured specimen is from loc. 52.

Gümbelina exolata Cushman. Pl. I, fig. 7, 8. Lit. No. 1, p. 34.

The average measures are: 0.37 × 0.24 × 0.13 mm, which is smaller than those given by other authors. White: 0.5 × 0.25 × 0.1 mm, Cushman: 0.45 × 0.3 × 0.18 mm. The figured specimen is from loc. 64.

Gümbelina striata (Ehr.) Pl. I, fig. 9, 10. Lit. No. 5, p. 338, No. 6, p. 418.

The average measures equal those of the specimens figured by Cushman and are about 0.44 × 0.4 × 0.22 mm. The figured specimen is from loc. 35.

Gümbelina sp. Pl. I, fig. 11, 13.

Test V-shaped, except the last two chambers that are narrower and give an inward nod to the arms of the V. The wall is rather roughly perforated, the chambers are globular with depressed sutures and do not exceed the number of five in one row. The figured specimen is from loc. 64. Its measures are: 0.44 × 0.35 × 0.22 mm.


The average measures are: 0.47 × 0.37 mm. The measures of the specimen figured by White are: 0.75 × 0.5 mm. The figured specimen is from loc. 33.


The average measures are: 0.37 × 0.55 × 0.29 mm. The measures of the specimen figured by White are: 0.8 × 0.55 × 0.33 mm. The figured specimen is from loc. 51.

The average measures are those of the figured specimens only, whereas the measures of the Cuban material are averages.


The average measures are: 0.48 × 0.44 × 0.33 mm. The measures of the specimen figured by White are: 0.7 × 0.6 × 0.3 mm. The figured specimen is from loc. 104.


The average measures are: 0.35 × 0.13 mm. The measures of the specimen figured by White are: 0.6 × 0.1 mm. The figured specimen is from loc. 35.

Ventilabrella carseyae Plummer. Lit. No. 11, p. 178.

I found only one specimen: it is probably a young form of this species.

Ventilabrella sp. Pl. I, fig. 20.

The fragments I found resemble V. ornatissima Cushman and Church 1929. Proc. Cal. Acad. Sc. 4, 18, No. 16, p. 512, Pl. 29, fig. 12—15, but whether they belong to this sp. or to a new one is uncertain. The figured specimen is from loc. 50.

Bolivinita sp. Pl. I, fig. 21, 22.

I found only fragments of this form. The figured specimen is from loc. 67.


Lack of well preserved specimens makes the determination of the species uncertain.


Only two specimens were found. They resemble G. depresaa, but are smaller, the diameter being 0.26 mm. The diameter of the specimen figured by Sandide is 0.35 mm.

Globigerina cretacea d'Orr. Lit. No. 9, p. 198, etc.

The measures correspond with those given by other authors.

Globigerina bulloides d'Orr. Lit. No. 1, p. 192.

The measures correspond with those given by other authors.

Globigerinella aspera (Ehr.) Lit. No. 8, p. 315.

The measures correspond with those given by other authors.


This species has some characteristics in common with G. arca (Cushman), for which I took it at first. At the suggestion of the paleontologists of the Bataviaanse Petroleum Maatschappij I compared my specimens with G. linnaeana (d'Orr.). Though this species has only been found in the coastal sands of Cuba, there is little doubt about its origin from cretaceous sediments. There is a great variation in size, but the diameter does not exceed 0.7 mm. The figured specimen is from loc. 64.

Globotruncanana havanensis Voorwijk n.sp. Pl. I, fig. 25, 26, 29.
Test trochoid, dorsal side convex, ventral side concave. Ventral side showing only the last formed whorl with four to five chambers. The chambers are rather compressed and each chamber is partly overlapped by the preceding one. The periphery has no keel. Umbilicus on the ventral side.

I had some difficulty in tracing the generic position of this species. According to Thalmann, however, it is a primitive form of *Globotruncana* and corresponds with *Globigerina cretacea* d’Orb. in Sandidge, 1932, Amer. Midland Nat. 13, No. 6, p. 366, pl. 23, fig. 13—15, that has nothing in common with the original form of d’Orbigny.

The figured specimen is from loc. 64.

*Anomalina bentonensis* MORROW, var. Pl. I, fig. 30, 31, Lit. No. 9, p. 201.

Test small, periphery broadly rounded. The earlier whorls are partly exposed on both sides, but are generally hidden by foreign material filling up the depressed part of the test. The impression of the sutures is deeper than in Morrow’s form. The chambers increase rapidly in size as added, and their position nearly in one plane gives an almost symmetrical form to the test. The measures of the figured specimen, that is from loc. 81, are: 0.44 X 0.18 mm.

*Anomalina pseudopapillosa* CARSEY. Pl. I, fig. 32, 33, Lit. No. 12, p. 47; No. 11, p. 200.

According to Thalmann these specimens belong to *A. pseudopapillosa*, though they have less sutures. The figured specimen is from loc. 51. The large initial chamber that can be seen on the figured specimen is generally not so pronounced in most specimens.

*?Meandropsina rutteni* PALMER. Pl. II, fig. 10, Lit. No. 10, p. 252.

Only some fragments of this species were found. The figured specimen is from loc. 54.


Pl. III, fig. 1 shows clearly the initial chambers (a), the spiral with large chambers (b), the undivided equatorial tube (c), overlain by radial plates, and some lateral chambers (d). Numerous cribriform perforations can be noticed on Pl. III, fig. 4.

The figured specimens are from loc. 44, 51, 54.

The fauna described in this paper is of typically Upper-Cretaceous age. *Camerina dickersani*, *Vaughanina cubensis* and *Orbitoides browni* are widespread in Cuba, and they occur in strata which also contain Upper-Cretaceous rudists; moreover, *Orbitoides* is typical for the Upper-Cretaceous. The species of the genera *Pseudotextularia*, *Planoglobulina*, *Giumbelina*, and *Ventilabella* are characteristic of many Upper-Cretaceous deposits in the Tampico Embayment and in the United States.

It is remarkable that many of the forms described above are smaller than
the specimens of the same species from other localities. For details I refer to the descriptions of the species.

BIBLIOGRAPHY.


Anatomy. — Experimental Anatomical Studies of the Topical Localization within the Thalamus of the Chimpanzee 1). By A. Earl Walker. (Fellow of the Rockefeller Foundation.) (Communicated by Prof. B. Brouwer.)

(Communicated at the meeting of January 30, 1937.)

It is generally agreed that the cellular groups of the thalamus between the external and internal medullary lamina, the ventro-lateral nucleus or perhaps better termed for the present the lateral nuclear mass, are the primary thalamic centres for somatic sensibility. The parts of the body must be represented in a specific manner within this nuclear mass for clinical experience has taught that a single lesion of the thalamus may produce sensory disturbances of the face and arm, or arm and leg, but never the face and leg alone. Von Monakow (5) from his long series of clinico-anatomical studies concluded that the localization within the thalamus was a vertical one, that the face was represented in the ventral nucleus of the thalamus, the arm in the mid-portion and the leg in the dorsal part. Le Gros Clark (1) on theoretical grounds was the first to suggest that this was not in accord with the knowledge of the ascending somatosensory systems of the thalamus, for all investigators agree that the medial lemniscus and spinothalamic tracts end in the ventral part of the lateral nuclear mass.

In 1934 on the basis of experimental studies on the macaque monkey, I came to the conclusion that the topical localization was a medio-lateral or horizontal one (6). The most medial part of the nuclear mass projects to the face area of the cerebral cortex; the middle part to the arm area and the lateral part along the external medullary lamina, to the leg area (Fig. 1). These findings have since been fully confirmed by the physiological studies of Dusser de Barenne and Sager (3). Such a projection of the thalamus upon the cortex suggested that the ascending afferent systems might have a topical localization in the lateral nuclear mass of the thalamus.

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