Deformed Orbitoids

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Deformed Orbitoids.

By WILLARD BERRY[1]).

Read Before The Geological Society of America, Dec. 31, 1930.

With 1 plate (V).

Contents.

Introduction.

Among the great numbers of orbitoids described and figured over a period extending back to the days of Gümbel and his contemporaries I find only one reference to deformed or aberrant specimens. In my own work on orbitoids during the last five years I have handled more than five thousand individuals and have so far found only two orbitoids which have suffered deformation. This lack of reference to the deformation of the group and the sparceness of aberrant forms in my material leads me to think that such accidental deformations must be extremely rare. The importance of deformation while yet alive may be of great importance in the studies of the evolution and development of the "Larger Foraminifera".

[1]) Work carried out under a grand from the National Research Council, Washington, D. C., U. S. A.

Review of previously mentioned deformed Orbitoids.

In 1920 Dr. CUSHMANN[1]) described and figured *Lepidocyclina supera* (CONRAD) H. Douvillé from the lower Oligocene of Mississippi and Alabama. One figure is normal, the other two he labels aberrant specimens but does not mention them in the text. From the figures one is irregular and wavy, not in a plane. The other has a deep re-entrant in the periphery cutting back about one fourth the diameter of the test and about one half as wide as deep. There are no sections of these forms.

New Forms discovered.

In a collection of about one thousand specimens of Eocene age from Peru, South America, I have found two and only two forms which show deformation and survival afterwards.

One specimen, which I have called *Lepidocyclina deforma*, has had a part of the periphery broken out and has healed over it and continued to live. The portion broken back is about one fifth of the diameter of the test and is about one third of the diameter of the test in length. The wound, if such it may be called, is rounded off and smooth. In vertical section the equatorial chambers which usually reach the periphery fail to do so, and the lateral chambers which usually decrease in number to none at the periphery here are carried around the edge of the equatorial chambers connecting with those on the other side. This would seem to indicate that the specimen survived whatever accident broke it and managed to heal up but not regenerate the lost portion.

The other specimen which I have called *Lepidocyclina triplani*, has suffered a still more peculiar deformation. It constitutes what should be termed a monstrosity in the orbitoid world. In this specimen there is a well developed discoidal test with half of a nearly similar test rising at right angle from one side of the complete test. This first appeared to be a broken test stuck to the complete test. However a vertical section proves it to be one individual. In the usual Lepidocyclina the equatorial chambers are distributed in a more or less even layer along the medial plane of the test. Here they are undulating and there is a second layer of these chambers rising at right angles from the main layer. The lateral chambers run evenly from one margin to the other on the normal side but on the side with the projection they rise up on it and end at the margin as they should in any normal specimen.

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[1]) CUSHMAN, J. A. The American Species of Orthophragmina and Lepidocyclina — U. S. Geol. Survey Prof. Paper 125 p. 69, pl. XXVI, figs. 5—7.

Both these forms are microspheric and are fairly large. Both are from the same locality and both are of fair size (over 4 mm.).

Discussion.

As I have noted, these forms may have been broken in the environment in which they lived. However if such was the case why did they not desert their tests, as is done in the less complete foraminifera;[1]) and secrete a new and complete test? Yet again if this is a healed break or wound why did they not regenerate a perfect, or at least a more nearly perfect test than they did? Regeneration is characteristic among many of the lower forms of life and certainly should be very well developed among uni-cellular animals.

This irregular development might be due to pathologic conditions. However, if such was the case, why were only two out of some thousand individuals attacked? An accident of preservation might have given us these few deformed specimens but I doubt it.

These two species are both microspheric and as such are the result of a conjugation or sexual process. One of these grew up with arrested development on one portion of its test and does not have the importance of the other one. The other developed two individuals or more exactly into one and one half individuals, a sort of Siamese twin or monstrosity. Now this Siamese twin is the result of conjugation or sexual process, and such being the case if the organism is unicellular how can we account for the twin?

It may be the result of fusion of two cells at the very start, where one developed more fully than the other or it may be that the organism is not unicellular but bi- or multicellular.

If the first is the case why does it not happen more often? We would expect to see it happening among the less complete foraminifera and more especially among the complex species, but it is extremely rare. It is not likely that it would be developed by the attached growth of one of the nuclei of the microspheric form for then the addition would be megalospheric and have the megalospheric embryonic apparatus which is definitively lacking. However, if the Lepidocyclina were bi- or multicellular such a twin would not be impossible but should be extremely rare.

Conclusions.

From this brief review of points I think that these two species were not broken and healed so as to produce their deformation because they could either shed their tests and secrete new ones or else regenerate the lost chamberlets.

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[1]) CUSHMAN, J. A. Shallow Water Foraminifera of the Tortugas Region, Carnegie Institution Wash. pub. No. 331, 1922, p. 8.

Second, I cannot see why a pathologic condition would cause deformation because of the reasons given for accidental breakage and healing.

Therefore the cause must be that, in the case of *Lepidocyclina triplana*, two or more individuals from the same conjugation became fused together at the start or else that the *Lepidocyclina* are not unicellular and should not be included in the *Foraminifera*.

Description of species.

Lepidocyclina deforma W. BERRY n. sp.

Plate V, figs. 1–5.

Test discoidal, inequilateral, fairly large, 4.75 mm. in diameter, 1.4 mm. thick, ratio of diameter to thickness 3.4:1. Test thins evenly from center to the periphery except in one portion about 1 mm. from the center where it is rounded and undeveloped. Surface rough but not papillated. The lateral chambers at the surface are 66.8 microns in diameter and have walls 33.4 microns thick.

In equatorial section the initial chamber is not discernible but the form is microspheric. The equatorial chambers are arcuate and are arranged in circles; these chambers are 42.2 microns in diameter radially and 39 microns in diameter tangentially with walls 23 microns thick. They commnunicate with each other by openings at the place where one chamber top approaches the additional chamber base. These openings are of two types, one fairly large, about 5 microns in diameter and the other type seeming to connect a series of chambers and very small, less than 1 micron in diameter.

In vertical section the walls between the equatorial chambers and the lateral chambers are 40 microns thick. The vertical diameter of the equatorial chambers is 116.9 microns at the center and they decrease slightly in diameter to 100.2 microns at the periphery. The lateral chambers are arranged in very definite columns; in the center near the periphery they are 33.4 microns in vertical diameter and have walls 19 microns thick. There is a total of 18 lateral chambers on the sides of the equatorial layer near the center of the test. Where the periphery is grown back the equatorial chambers do not reach the periphery but are grown around by the lateral chambers which are 9 deep over the edge of the equatorial layer. The lateral chambers connect evenly with those on the other side.

Type — Collection of Willard Berry.

Occurrence — Saman Sandstone (?), Lagunitos, Peru. Associated with *L. triplana*.

L. deforma does not seen to be related to any described species I have given it specific rank because of its odd development and

apparently important bearing on the phylogenic bearing of the larger foraminifera.

Lepidocyclina triplana W. BERRY n. sp.

Plate V, figs. 6, 7, 8.

Test deformed, partly equilateral, large, 5 mm. in diameter and 1.50 mm thick exclusive of twin. Ratio of diameter to thickness about 3.3:1. Twin, half diameter about 2.4 mm., thickness about same as other (1.50 mm.). Plane side of test thins evenly to within about 1.75 mm. of periphery where it thins more rapidly giving rise to a slight flange 1.75 mm. in diameter. The central boss is 1.5 mm. in diameter. Surface papillated, pillars polygonal in shape and 116.9 microns in diameter. Lateral chambers at the surface are 83.5 microns in diameter with walls 18 microns thick. The pillars are present on the other surfaces and are of the same dimentions.

In equatorial section the equatorial chambers are extremely small being about 10 microns in diameter in both the entire and the partly developed part. The form is microspheric. The equatorial chambers of both parts are arcuate and are arranged in circles, these chambers are 20 microns in diameter radially and 15.8 microns in diameter tangentially with walls 13 microns thick at the center and 35 microns in diameter tangentially with walls 17 microns thick at the periphery. The same measurments apply to both parts.

In vertical section the equatorial plane is undulating in the entire part and flat in the twin. The thickness of the walls between the equatorial and lateral chambers is 34 microns in both parts. The vertical diameter of the equatorial chambers at the center is 66.8 microns and they increse evenly in diameter to 83.5 microns at the periphery in both parts. The lateral chambers are arranged in columns. In the center near the periphery these chambers are 33.4 microns in vertical diameter with walls 18 microns thick. There are 14 lateral chambers on the complete side of the test and about 14 to 16 on either side of the twin or other part.

Type — Collection of Willard Berry.

Occurrence — Saman sandstone (?), Lagunitos, Peru. Associated with *L. deforma.*

L. triplana does not seem to be closely related to any described *Lepidocyclina,* and is given a specific name because of its importance in the development and classification of the genus.

Note. — The technic developed to get more than one section from the same orbitoid will be described shortly in another paper.

Since these forms were described I have found another deformed Orbitoid from the Bryam Calcareous Marl of Mississippi, U. S. A.

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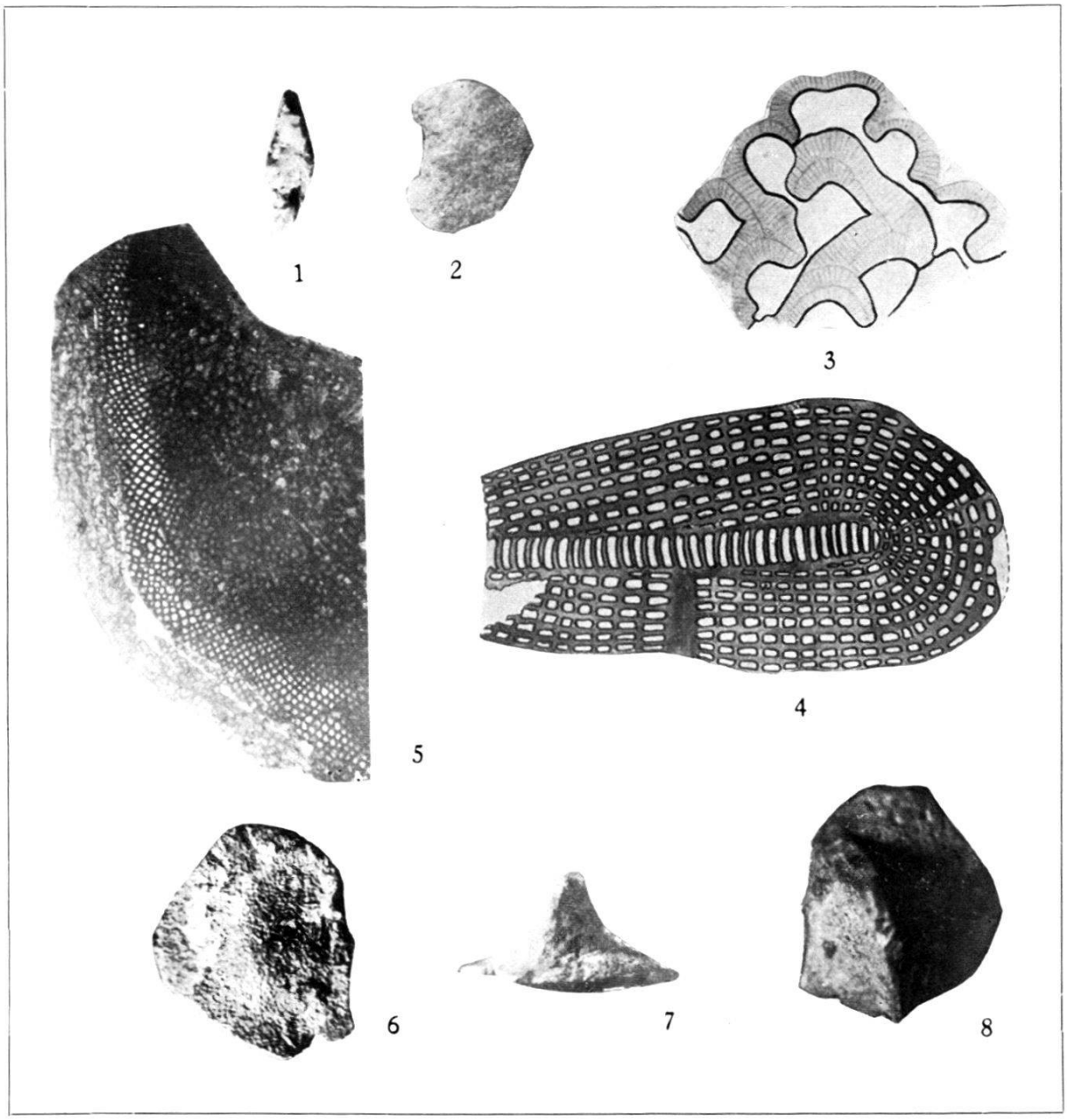

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Figs. 1—5. *Lepidocyclina deforma* W. Berry.

1. — Edge view × 3.4.
2. — Side view × 3.4.
3. — Equatorial chambers showing connections between chambers, × 200.
4. — Vertical section showing how lateral chambers go around the end of the equatorial chambers, × 30.
5. — Equatorial section of half of test, × 14.

Figs. 6—8. *Lepidocyclina triplana* W. Berry.

6. — View of normal side × 5.
7. — View showing twin rising up from normal portion, × 5.
8. — Looking down on twin × 5.