

ON
THE RETICULARIAN RHIZOPODA
OF
THE CARIBBEAN SEA

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WITH TWELVE PLATES.

COMMUNICATED TO THE ROYAL SWEDISH ACADEMY OF SCIENCES THE 9TH OF MAY 1881.

STOCKHOLM, 1882.
KONGL. BOKTRYCKERIET.
P. A. NORSTRÖM & SÖNER.

Among the Lesser Antilles steep banks slope down to considerable depths either directly from the shores, or from the edges of the supporting basis, sunk plateaus of varying extent, usually in forty fathoms water. These banks exhibit within a limited area a remarkable diversity in the conditions offered to animal life, resulting chiefly from the rapid sinking of the temperature from the surface downwards. For, while the littoral zone enjoys an average temperature of $+26^{\circ}$ C., the bottom at 300 fathoms has $+14^{\circ}$ C., and at 600 fathoms the reading of the thermometer is not more than about $+5^{\circ}$ C.

Thus within a very restricted space a bottom is found, which exhibits in great variety representatives of the different areas. Of course, these areas cannot be defined by exact boundary lines. Many of the inhabitants of the cold zone have their outposts high up in the temperate regions and *vice versa*. The denizens of the warm zone however seem to confine themselves to a limited range not reaching lower than 100 fathoms. In profusion of animal life this zone equals or even surpasses localities in other seas which in this respect have become famous. Every spot is teeming with organisms, from masses of Corallines invading and destroying all the vacant shells and calcareous skeletons of every description, and transforming them into amorphous lumps and rocks, to the powerful reef-building Madreporaria with their associated forests of Alcyonaria, and their immense crowds of lodgers and parasites of Crustacea, Annelida, Mollusca, Echinodermata and Protozoa. But it should be borne in mind, that the common dredge seldom affords proof of this abundance, which is hidden in the crevices and tunnels of hard, dead coral-stems and incrustations of Corallines. When however a more muddy and loose bottom is met with, the dredge often becomes choked to the jaws with masses of specimens, particularly clusters of byssiferous Mollusca: *Arca*, *Spondylus* etc. sheltering an innumerable host of other Evertbrates.

Already at from 90 to 150 fathoms a fauna begins to appear, the elements of which are different from those of the littoral zone. Here the kingdom of brightly coloured Spongiæ displays its splendour of yellow, orange, red and brown, imparting to most of their cohabitants a higher glow than is generally acquired even in the zone above. This Spongia-zone is very narrow, often disappearing at 200 fathoms, sometimes earlier, particularly where the bottom slopes more gradually and affords more favourable conditions for the deposition of chalk-ooze, which appears in some way to prejudice the growth of the coloured Spongiæ.

The next and third zone may appropriately be designated as the region of Rhizopods, or the real chalk bottom, as nowhere else in this sea this class becomes more prevalent and conspicuous in high development of forms and abundance of specimens than here. It usually commences at from 200 to 300 fathoms. Here many denizens of the deep cold area already present themselves, and it is very probable, that a painstaking and prolonged investigation even in this shallow water would bring to light most of the members of the abyssal fauna.

The constituents of this bottom deposit are chiefly:

1. Very fine amorphous chalk-ooze together with fragments of various exuvia in great abundance, forming the bulk of the deposit and causing it to be peculiarly heavy and tough.

2. A large quantity of small (0,25 mm.) ovoid-shaped bodies, whose surface is slightly impressed with coarse reticulation. These are composed of tightly compressed or agglutinated chalk-ooze and are of a darker gray hue than the rest of the ooze. Unquestionably they have been formed in the intestines of some lower organisms and represent in a small way the coprolites of the cretaceous strata.

3. Shells of pigmy and young reticularian Rhizopods presenting themselves in great quantity and belonging chiefly to Planorbulina, Pulvinulina, Textularia-formed Bulimina, Orbiculina, Cornuspira, Miliolina etc.

4. Larger reticularian Rhizopods often in great abundance, chiefly Nodosarina, Globigerina, Pulvinulina, Planorbulina, Textularia, Amphistegina, Valvulina and Lituolina.

5. Exuvia of Molluscs of many descriptions, particularly of the pelagic Pteropoda: Creseis, Hyalea, Cuvieria etc., besides a number of the inhabitants of the ooze.

6. Spongia-spicules, but in very limited quantity, as also a few skeletons of radiolarian Rhizopods and of Diatomaceæ; silicious substances being, in general, very scarce.

There is also another sort of bottom with Rhizopods met with on the very declivities of the banks, where the deposit seemingly consists of an aggregation of dead corallines, calcareous skeletons and worms-nests, all transformed into rough masses and lumps resembling old hardened mortar and gravel. This bottom yields a quantity of shell-sand abounding in large and fine Rhizopods. A nearly similar formation, but on a more level bottom, was met with by Count DE POURTALES off Florida and was called after its eminent explorer *Pourtales' Plateau* (Report by L. AGASSIZ; *Bullet. Mus. Harv. College* I. p. 367). This kind of bottom I have provisionally distinguished as *Coralline-gravel*.

The high development of the reticularian Rhizopods both on this bottom and in the real ooze is remarkable, not being surpassed even by the same forms which are so much admired in the cretaceous and tertiary strata. *Nodosarina communis* D'ORB. attains here a length of 20 mm.; *Nod. complanata* DEFR. the size of a small fingernail, while *Orbiculina*, *Cornuspira* and *Miliolina*, *Discorbina*, *Pulvinulina* attain a size far superior to those of the littoral zone. *Textularia trochus* D'ORB. assumes a labyrinthic structure and becomes compressed nearly in the same way as a *Cuneolina* D'ORB. Large

bigenerine Textulariæ associated with very large *nodosarine Lituolinæ*, *Valvulinæ* and *Uvigerinæ* present themselves in great abundance. The *Nummulinidæ* are represented by strongly developed *Amphisteginæ*.

Polymorphina, *Rotalina*, *Orbitolites*, *Operculina* are strikingly absent; *Polystomella* is scanty and stunted.

The want of silicious sand in the ooze may account for the fact, that agglutinating forms, which in other places generally construct their shells of such matter, on this sea-bed usually build them up of *calcareous* fragments. Some species seem to choose for their building-materials the finest mud, which imparts to the shell a fine grain and a certain degree of smoothness. As a substitute for silicious sand others again make use of available sponge-needles intermixing them with calcareous debris. Only a few forms succeed in conglutinating their shells entirely of silicious sand-grains.

It is however somewhat surprising to meet with *Lituolina*- and *Valvulina*-forms constructed of such sand, and associated with them their nearest kindred or even the same species incased in calcareous sand and greatly differing in outward shape.

This association on a bottom so deficient in silicious sand, and the apparently decided predilection for that material found among these *silicious* forms, as well as their difference in shape from their calcareous congeners, leave the systematist in some suspense as to the true relation that one set bears to the other. For the present I am inclined to consider their differences to be but of varietal importance.

Some twenty years ago Professor v. REUSS assigned to the agglutinating reticularian Rhizopods a separate place in his system by establishing the suborder *arenaceo-silicious*. To this group were referred by its author both those genera the forms of which are not invariably arenaceous, as *Valvulina*, *Bulimina*, *Textularia*, and those genera which are considered as constantly agglutinating, as *Lituolina*, *Trochammina* etc. Of these agglutinating genera *Lituolina*, *Trochammina* and *Valvulina* only were at the same period, or rather somewhat before, placed by CARPENTER in the »arenaceous» sub-order, (Introduct. p. 140.) Thus the two authors differ widely as to the compass of this group. Besides, the German naturalist seems not to have recognised other agglutinating forms than »silicious», whilst the English authors state that at least some forms of this sub-order construct their tests of foreign materials of any description — both silicious and calcareous, (CARP., Introd. p. 143; BRADY, Carbonif. and Perm. Foramf., Palæont. Soc. 30, p. 9.)

The impropriety of splitting up such genera as *Textularia*, *Bulimina* etc. in order to get their agglutinating forms ranged within the silicious group, is manifest; and as an illustration of the impropriety of the character itself — »silicious» — may serve not only the *Lituolinæ* and *Valvulinæ* just mentioned, from my own dredgings, but also the bigenerine multiserial forms of *Textularia*, which all were referred to this sub-order by its author, but which often have been found »calcareous». TERQUEM also states, that he met with *Verneuilina* from the Oolitic strata both of calcareous and of silicious construction. (Les Foramf. du Syst. oolit.; Bullet. Soc. hist. nat. Département de la Moselle, 1868, 11, p. 39.)

Consequently, since Prof. v. REUSS' definition of this group has proved to be misleading, the limitation of the »arenaceous» suborder laid down by the British naturalists, particularly by CARPENTER and BRADY, must provisionally be adopted as more or less consistent with nature. Still it should not be overlooked, that of late some few evidences have been adduced, which tend to weaken the confidence in the stability of those prominent characteristics, on which the two sub-orders: »arenaceous» and »vitreous» have been established. Thus, when a whole assemblage of arenaceous species are met with, each assuming the identical shape with that of the corresponding form in the vitreous group, the suggestion is easy, that in as much as a species of Textularia or Bulimina is considered likely to appear in the two conditions, the same sort of identity may also exist in other cases, where a similar kind of dimorphism has been met with. At present science is acquainted with not a few forms amongst the vitreous group, which have their corresponding isomorphs within the arenaceous. Nodosarina, Globigerina, Rotalina, besides the forms just mentioned, afford a fair illustration of this isomorphism. It would therefore be but just to give some credit to the suggestions of several able observers, such as DAWSON¹⁾, WALLICH²⁾ and SOLLAS³⁾, in regard to the near relation between and even the identity of many arenaceous and vitreous forms, which have been hitherto kept far asunder.

Rash and unphilosophical differentiation of varieties, which have specific unity, as also generic distinctions based on trifling and not even constant characters, is an evil long complained of to descriptive biology in general, and, as to this class in particular, the trespassing in this respect — begun by the founder of systematic Rhizopodology and continued up to this very day — has passed beyond the boundaries of logic and common sense.

Those who have been engaged in the laborious task of throwing light upon the nomenclature of this class, may in many instances have been struck at finding their lists of synonyms swelled to hundreds by different names having been conferred on forms without even varietal distinction, founded upon quite accidental or individual diversity or on no differentiating characters whatever. In this way names have been heaped upon names for one and the same thing, rendering any attempt to arrange all those synonyms the most unremunerative and time-wasting kind of scientific labour. Such proceedings, resulting from want of discernment and judiciousness, would, if not checked by careful and philosophical researches, produce perpetual confusion and render any view of the generic and specific affinity between the forms obscure.

In the midst of this *rudis indigestaque moles* of descriptive biology the scrupulous and ingenious investigations of the eminent and well-known British naturalists: Professors W. C. WILLIAMSON, W. K. PARKER, W. B. CARPENTER and H. BRADY have established a good deal of clearness and systematic order, based on a thorough expe-

¹⁾ Foramf. of St. Lawrence: Canad. Naturalist (n. s.) 5, p. 176; An. M. N. H. (4) 7, p. 86.

²⁾ Deep-sea researches on the Biology of Globigerina; Lond. 1876, pp. 62 et seq.

³⁾ On the perforated character of the genus Webbinæ; Geol. Mag. dec. 2, 4 p. 105. (Those »Webbinæ» seem to be irregular Planorbulinæ).

rience of the value of the different characters afforded by this class. It has been objected that the trinomial nomenclature introduced by some of these authors, according to which most of the forms are ranked as varieties under a few species, would involve some inconvenience in dealing with a systematic arrangement of the forms, and on this account it has been of late recommended to return to the method of D'ORBIGNY, v. REUSS and others, which claims a separate designation of specific value for the slightest modification of characters — even when accidental — a method quite out of classical custom and not consistent with ontogenetic biology, the aim of which is to attain a delineation of the origin, descent and affinity of the forms, as true and natural as possible. With this end in view the true notion of »species», that is to say certain eminent points or landmarks within the masses of modifications, should not be given up.

The amount of difference between forms that warrants their establishment as »species» must always be liable to a more or less arbitrary determination; but it may reasonably be asked of careful observers, who cannot but be interested in keeping the system free from the encumbrance of overcrowding with insignificant distinctions, that they should use some discrimination in valuing the characters for specific distinction.

If a model plan of arrangement for this and other classes of organisms were to be ventured on, it ought to take the shape of a somewhat regular network, where the nodes would indicate the »species», the nearly equal amount of diversity between which and relation to one another would be marked by the converging and diverging internodes, while the more conspicuous varieties were to be placed on short lines radiating from the nodes. It would then be disturbing to ones sense of natural order, if a form of minor and inconstant divergence should be placed on a node.

Thus I am fully convinced of the propriety of the plan introduced into descriptive biology by LINNÆUS and to a larger extent than ever re-established by those before mentioned English philosophers, considering it a most valuable and suggestive step forward. As for the »varieties» or modifications of minor deviation, the more conspicuous only should be designated in the usual Linnæan way, and those which present merely an individual or accidental difference should not be allowed to become an encumbrance to the system, but mentioned only *en passant*.

In a system founded on true morphological characters it must be quite improper to distinguish one stage of growth by one appellation and institute a new genus for another stage of the same species. Such names should be discarded as generic and used merely to indicate a certain plan of growth. As such illegitimate genera must be regarded: *Clavulina*, *Bigenerina*, *Dimorphina*, *Sagrina* etc., as has been fully demonstrated by PARKER and JONES.

As for the synonyms appended to most of the species in this paper, the list is so far incomplete as merely those created and used by D'ORBIGNY and his successors are referred to, while those of his predecessors, with a few exceptions, are passed over, their nomenclature having been so thoroughly treated of by the unsurpassed investigations of PARKER and JONES, that, for the present at least, it lies beyond my purpose and even power again to review that part of Rhizopodology. Although in ar-

ranging these synonymic lists the shrewd and expert indications of those authors have in great measure been consulted, still a great deal of incorrectness and incompleteness may be found by further criticism, for if oftentimes it becomes almost impossible to identify stunted and deformed specimens of this class, it is a still more arduous task to recognize more or less defective delineations of them. Other designations of species besides those represented by figures are not touched upon, as those which are merely recorded, usually lie beyond the limits of scientific jurisdiction. This review is intended to give a synopsis of the principal varieties and at the same time a statement of the range of their geographical and geological distribution.

Not many years ago the Caribbean sea-bed was little more than a *terra incognita* to biological science. While staying for a few years in the Island of St. Bartholomew, one of the Lesser Antilles, I took the opportunity during 1866 and 1869 to make several dredging excursions. But being provided with only a very scanty and primitive equipment I was not able to explore greater depths than 400 fathoms. The principal stations were between St. Bartholomew and St. Eustatius; to the leeward of St. Martin and Angvilla; and windward off the eastern keys of the Virgin Islands. The bottom-deposit designated as Globigerina- or Chalk-ooze was met with between 250 and 400 fathoms chiefly at the second station, the rough Coralline gravel at the first and third stations in 300 fathoms.

In 1868 the United States began to extend their coast-survey into the Caribbean sea and on several occasions since have renewed their exploring expeditions on a large scale combined with researches on the fauna of the sea-bed. The beautiful results of these explorations, for which we are indebted chiefly to the unremitting exertions of the lamented eminent American naturalist Count de POURTALÈS, have been made known during the last decade principally through the Catalogue and Bulletin of the Muscum of Comparative Zoology, Harvard College, Cambridge Massachusetts.

The »Challenger's» famous expedition has also largely contributed to our knowledge of these localities.

My own more modest collections have been partly reviewed by Professor S. LOVÉN, Professor G. LINDSTRÖM, Dr. A. LJUNGMAN and Professor G. O. SARS.

The following are the more important papers dealing with this local fauna:

- 1870—71: *Crustacea* by W. STIMPSON: Bulletin Mus. compar. zool. Harvard College. 2. p. 109.
- 1871: *Deep-sea Corals* by DE POURTALÈS. Illustr. Catalogue Mus. compar. zool. Harvard College, N:o 4.
- » *Brachiopoda* by W. H. DALL: Bullet. Mus. compar. zool. Harv. Coll, 3. p. 1.
- » *Ophiuridea* by A. LJUNGMAN: Öfversigt af Kgl. Vet. Ak. Handlingar p. 615.
- » *Cumacea* by G. O. SARS, *ibid.* p. 803.
- » *Bryozoa* by F. A. SMITT: Kgl. Vet. Ak. Handl. (n. s.) 10, N:o 11; 11, N:o 4.
- 1874: *Études sur les Echinoïdées* par S. LOVÉN: Kgl. Vet. Ak. Handl. (n. s.) 11, No: 7.
- » *Echini, Crinoids, Corals* by AL. AGASSIZ and DE POURTALÈS: Illustr. Catal. Mus. comp. zool. Harv. Coll. N:o 8. 1.

- 1875: *Ophiuridæ, Astrophytidæ* by LYMAN. Illustr. Catalogue Mus. compar. zool. Harvard College N:o 8. 2.
- 1876: *Actinology* of the Atlantic Ocean by G. LINDSTRÖM. Kgl. Vet. Ak. Handlingar (N. S.) 14, N:o 6.
- 1877: *Hydroida* by GEORGE ALLMAN: Mem. Mus. comp. zool. Harvard Coll. 5, N:o 2.
- 1878: *Echini* by AGASSIZ, *Corals* and *Crinoideæ* by POURTALÈS, *Ophiuridæ* by LYMAN: Bull. Mus. comp. zool. Harvard College 5, N:o 9.
- 1879: *Hydroida* by S. F. CLARKE: Bull. Mus. comp. zool. Harvard College 5, N:o 10.

In 1868 Professor FR. A. SMITT and Dr. A. LJUNGMAN were fortunate enough to be authorized to accompany as naturalists His Swed. Majesty's ship »Josephine» on her cruise in the Atlantic. At several stations, particularly off the Azores, they succeeded, with their most simple apparatus and without steam, in touching the bottom with the dredge at from 700 to 900 fathoms. Their extensive collection incorporated with that of the State Museum at Stockholm contains a great many interesting and highly developed Reticularian Rhizopods. I have availed myself of this collection in studying the Caribbean forms.

To acknowledge my great obligations to a few gentlemen for their assistance in the preparation of this paper is to me only a pleasant duty.

To Professor S. LOVÉN I am greatly indebted for the liberality, with which he placed the collections of the State Museum at my disposal for examination as also for his generous, instructive and encouraging support throughout the course of the work.

Thanks to the able and disinterested painstaking of my esteemed friend Professor G. LINDSTRÖM I have obtained ample information concerning much of the multifarious and scattered literature on the subject.

To my learned and sensible friend J. A. AHLSTRAND, Custos of the library of the Royal Academy of Sciences, it is but due that I should render thanks for his obliging and unwearied assistance in amply furnishing me with such papers and books as were required.

Lagenæ

are but scantily represented on our localities. As the more remarkable forms I have noted:

L. lævis MONTAG. (*L. vulgaris* WILL.) appears in two forms, one highly developed with a long neck, and another stunted, starved and with a short neck or with a thick-edged mouth, nearly without neck; such pigmy forms are often somewhat compressed and sometimes two-chambered;

L. lævis var. **desmophora** RYM. JONES (Java deep-sea Lagenæ; Trans. Lin. Soc. 30, p. 54, t. 19, figg. 23—24). Our form differs in having the chain-like ornamentation wound in a whole spiral from the bottom to the middle of the neck; the Java specimens being furnished with several longitudinal garlands or chains. It is one of the finest forms, well developed, but very scarce, from the ooze;

L. lævis var. **marginata** WALK & JAC; it is of the same shape as *Entosolenia marginata* var. *lagenoides* WILL. (Brit. rec. Formf. p. 11, fig. 25), *L. lagenoides* Rss. (Lagenoid: Wien. Ak. S. Ber. l. 46, p. 324, t. 2, figg. 27—28) and *L. vulgaris* var. *alato-marginata* RYM. JONES (loc. cit. p. 60, t. 19, fig. 44); it occurs in the ooze, scarce and in a pigmy state;

L. lævis var. **tetragona** PARK. & JONES (Phil. Trans. 155, l. t. 18, fig. 14), pretty well developed, but scantily represented in the ooze.

L. squamosa MONTAG., scarce and starved.

L. distoma polita PARK. & JONES (N. Atl. and Arct. Oc.; Phil. Trans. 155, l. p. 357, t. 13, fig. 21). It may be considered as a variety of *L. lævis*; is found in the ooze well developed but scarce;

The insignificant part that the Lagenæ seem to take in the formation of the chalk-ooze and our scanty supply of specimens may sufficiently excuse my passing over their synonymy, for which, *in amplissima forma*, I refer the student to Messrs PARKERS', JONES' and BRADY'S admirable treatise on the Crag-Foraminifera (Palæont. Soc. 19).

Nodosarina radicula LIN.

Tab. I, fig. 1—2.

If *Nod. radicula* L. and *Nod. scalaris* BATSCH, both having the same simple plan of growth — their chief difference being the smoothness or striation of the shell — are to be considered as the original types of this genus, two series of forms would be derived from them. Each of these series would then comprise:

1. a *Nodosarina* type = *apertura rotundata, testa recta, teres vel subteres, cameris in seriem dispositis*: *Nod. radricula* LIN. + *Nod. scalaris* BATSCH.
2. a *Dentalina* type = *apertura rotunda, testa arcuata, teres, cameris in seriem dispositis*: *Nod. communis* D'ORB. + *Nod. obliqua* LIN.
3. a *Orthocerina* type (*Rhabdogonium* Rss.) = *apertura rotundata, testa tri-tetragona*: *Nod. quadrilatera* D'ORB. + O.
4. a *Vaginulina* type = *apertura rotundata, testa plus minusve compressa, plerumque arcuata, cameris in seriem plerumque dispositis*: *Nod. legumen* LIN. + *Nod. linearis* MONT.
5. a *Cristellaria* type = *apertura rotundata vel trigona, testa plus minusve helicoidea*: *Nod. calcar* LIN. + *Nod. costata* FICHT. & MOLL.
6. a *Glandulina* type = *apertura rotundata, testa recta, teres, cameris equitantibus vel amplectentibus*: *Nod. lævigata* D'ORB. + *Nod. glans* D'ORB.
7. a *Fronicularia* type = *apertura plerumque rotundata, testa compressa, cameris equitantibus*: *Nod. complanata* DEFR. + *Nod. striata* D'ORB.
8. a *Lingulina* type = *apertura rimæformis, testa plerumque recta, compressa, cameris in seriem plerumque dispositis*: *Nod. (Lingulina) carinata* D'ORB. + *Nod. (Lingulina) costata* D'ORB.

Such would be a sketch of this genus in a systematic and descriptive sense. But we must be prepared to find, that this mode of arrangement answers but imperfectly to the natural order of things, for between each of these 15—16 species or types we shall meet with a host of varieties and intermediate forms. For their place in the system many of these depend mostly on the tact and discrimination of the systematist.

The list of synonyms is a fair exhibition of the links, which exist between the typical »species».

In the same way we meet with intermediate links between the smooth species and the corresponding striated ones of both series. And we shall therefore get into no less embarrassment, if we look out for specific characters in the condition of the surface of the shell. For every »species» of the *scalaris*-series will sometimes be found to lose its ornamentation by age, the later chambers becoming smooth (= »semistriatæ», »seminudæ»); or the chambers are only partially marked with ribs and lines (= »intermittentes») or very slightly striated (= »sublæves»). It is for this reason more consistent with the usual conception of »species», and also more agreeing with a philosophical and less confusing method of arrangement, after all, to consider the striated and ribbed *Nodosarinæ* as too closely allied with their corresponding smooth forms for to rank them as distinct species. In this respect we readily accept the method followed by Professor WILLIAMSON in his classical treatise »*On the recent Foraminifera of Great Britain*».

Between *Nod. radricula* LIN. and *Nod. monile* SOLD. there seems at the first glance to be a wide interval of difference and yet it will be found impossible to claim for the latter the rank of species. Neither can *N. radricula* be well distinguished from *Nod.*

(*Glandulina*) *laevigata* D'ORB., nor from *Nod. (Lingulina) carinata* D'ORB. We meet also with the strongest affinities to *Nod. (Dentalina) communis* D'ORB., *Nod. legumen* LIN. och *Nod. (Cristellaria) crepidula* FICHT. & MOLL.

Some forms of *Fronicularia* (= *Nodos. complanata* DEFR.), which have been described as such, are but slightly compressed varieties of *Nod. radícula*.

Nod. semistriata D'ORB. shows its near relation to *Nod. scalaris*.

Our form is not commonly met with in the chalk-ooze; the pigmy form is not seldom more or less compressed.

Fig. 1: The typical form of *N. radícula* LIN. or *Nod. humilis* RÖM. It is a pigmy form, not common in the chalk-ooze. 1 b: The same more magnified.

Fig. 2: has enclosed narrow necks, which are transversely rippled, showing its affinity to *N. scalaris*. Were it not for its smooth surface and stout growth, it would have been placed with the latter.

Syn. Nautilus	radícula	MONTAGU 1803, Test. Britann. p. 197, t. 6, fig. 4.
Nodosaria	humilis	ROEM. 1841, Verstein. nordd. Kreidegebirg. p. 95, t. 15, f. 6.
"	"	JONES & PARKER 1860, For. fr. Chellaston; Quart. Journ. geol. Soc. 16, p. 453, t. 19, f. 6.
"	aspera	Rss. 1845, Böhm. Kreide 1, p. 26, t. 13, figg. 14—15 (spinosa).
"	conferta	Rss. ibid. p. 26, t. 13, f. 10.
"	radícula	PARKER & JONES 1865, Northatl. and Arct. Oceans; Phil. Transact. 155, 1, p. 341, t. 13, figg. 2—7.
"	radícula var. Jonesi	BRADY 1866, Carbon. and Perm. Foram.; Pal. Society 30, p. 126, t. 10, fig. 13.
Glandulina	mutabilis	Rss. 1862, Nordd. Hils u. Gault, Wien. Ak. Sitz. Ber. 1, 46, p. 58, t. 5, figg. 7—11.
"	aperta	STACHE 1865, Tert. Mergel d. Whaingaroa Haf; Nov. Reise, geol. 1, 2, p. 188, t. 22, fig. 11.
"	erecta	STACHE ibid. p. 189, t. 22, fig. 12.
"	immutabilis	SCHWAG. 1863, Jurass. Sch.; Würtemb. Nat. Verein Jhresheft. 21, p. 114, t. 4, figg. 13—14, 18.
"	cylindrica	ALTH, 1849, Umgeb. Lemberg, Haid. Nat. Abh. 3, 2, p. 271, t. 13, fig. 30.
"	discreta	Rss. 1849, neue For. Österr. tert. Beck.; Wien. Ak. Dkschr. 1, 1, p. 366, t. 46, fig. 3.
"	cylindracea	Rss., 1845, Böhm. Kreidef. 1, p. 25, t. 13, figg. 1—2; 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4, 1, p. 23, t. 1, fig. 5.
Nodosaria	Kingi	RICHT., 1861, Geinitz' Dyas, p. 121, t. 20, fig. 29.
"	radícula var. Kingi	BRADY, 1876, Carbonif. and Perm. foramf.; Pal. Soc. 30, t. 10, fig. 12.
Vaginulina	clavata	COSTA, 1855, Marna terz. Messina, Mem. Nap. 2, p. 145, t. 2, fig. 18.
Nodosaria	subulata	Rss., 1845, Böhm. Kreidef. 1, p. 26, t. 13, fig. 11.
"	clava	CORNUEL, 1848, nouv. foss. microscop.; Mém. Soc. geol. France (2) 3, p. 250, t. 1, figg. 16—17.
"	Kirkbyi	RICHT. 1861, Geinitz' Dyas p. 121, t. 20, fig. 30.
"	Kirkbyi	SCHMID 1867, Kleine organische Form. Zechsteinkalk d. Selters Wetterau; Leonh. und Bronn Jhb. 1867, p. 586, t. 6, fig. 55.
"	radícula var. Kirkbyi	BRAD., 1876, Carbonif. and Perm. foramf.; Pal. Soc. 30, p. 126, t. 10, fig. 11.
"	oblonga	COSTA, 1854, Pal. Nap. 2, t. 13, fig. 13. (<i>N. communi</i> propinqua).
"	Naumanni	Rss., 1873, Geinitz' Elbthal. Geb. Sachsen. 2, p. 82, t. II. 20, fig. 11.
"	radícula	BRAD. 1876, Carb. and Perm. foram.; Pal. Society 30, p. 124, t. 10, figg. 7—10.
"	Geinitzi	Rss. 1851—53, Jahresb. Wetterau Gesellsch. 1, p. 77, fig. 12.
"	"	RICHT., Ztschr. deutsch. geol. Gesellsch. 1855, 7, p. 532, t. 26, fig. 26.
"	"	RICHT. 1861, Geinitz' Dyas p. 121, t. 20, fig. 28.

- Syn. **Nodosaria radicula** var. **Geinitzi** BRADY, 1876, Carb. and Perm. foranf., Pal. Soc. 30, p. 124, t. 10, fig. 6.
 » **Neugeboreni** HANTK., 1875, Clav. Száb. Sch. t. 2, fig. 5.
 » **pupa** KARRER 1878, Foram. Luzon; Bolet. Comis. Mapa geol. Esp. 7. 2, p. 16, t. E, fig. 9.
Dent. subrecta, Nod. lepida, concinna REUSS, 1859, Westph. Kr.; Wien. Ak. Sitz.-Ber. 40, p. 182, t. 1, figg. 10, 2, 3.
Glandulina elongata REUSS, 1859, Westph. Kr., ibid. p. 190, t. 4, fig. 2.
 » **elegans, Reussi, Nod. incerta, Nod. Beyrichi, Nod. ambigua** NEUGEB., For. Stichost. Ob. Lapugy; Wien. Ak. Dkschr. 1, 12, 2, t. 1, figg. 5—11, figg. 13—16.
Nodosaria tornata SCHW., 1866, For. Kar-Nikobar; Nov. Reise, geol. 2, 2, p. 223, t. 5, fig. 51.
 » **insolita** SCHW., ibid. p. 230, t. 6, fig. 63.
 » **glandigena** SCHW., ibid. p. 219, t. 5, fig. 46.
 » **tuberosa** SCHW., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrshft. 21, p. 97, t. 4, fig. 19.
Glandulina pupiformis GÜMB. 1869, For. Cassian-Raibler Sch.; Österr. geol. Reichsanst. Jhb. 19, p. 177, t. 5, figg. 7—8.
Lingulina intumescens GÜMB., ibid. p. 182, t. 6, fig. 27.
Nodosaria radicula JONES & PARK. 1860, For. fr. Chellaston; Quart. Journ. geol. Soc. 16, p. 453, t. 19, figg. 1—5.
Dent. spec. indet. HANTK., For. Clav. Száb. Sch. p. 34, t. 12, fig. 18.
Nodosaria cylindracea, N. clava COSTA, 1854, Pal. Nap. 2, p. 146, 147, t. 12, figg. 12—14; t. 13, figg. 6, 7.
Dentalina Leubeana GÜMB., 1871, Ulmer Cem. Merg; Münch. Ak. Sitz.-Ber. 1, p. 64, t. 1, fig. 5.
Nodosaria marginata MARSS., 1877, Rüg. Schreibekr.; Greifsw. Nat. Verein. Mittheil. 1877—78, p. 126, t. 1, fig. 5.
Lingulina rimosa STACHE, 1865, tert. Mergel. Whaingar. Haf.; Novara Reise, geol. 1. 2, p. 192, t. 22, fig. 16.
Gland. inæqualis, candela EGG., 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 304, 305, t. 15, fig. 26—27; 28—29.

b) in *Nodosarinam lævigatam* (Glandulinam) D'ORB. transgrediens:

- Glandulina strobilus** Rss., 1865, Sept. Thon.; Wien. Ak. Dkschr. 1. 25, p. 136, t. 2, fig. 24.
 » **parallela** MARSS., 1877, Rüg. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 124, t. 1, fig. 4.
 » **nummularia** GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. 1, 10. 2, p. 628, t. 1, fig. 50.
 » **pigmæa** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jahresh. 21, p. 115, t. 4, fig. 12.
 » **subconica** ALTH., 1849, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 270, t. 13, fig. 32.
 » **manifesta** Rss., 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 23, t. 1, fig. 4.
 » **elliptica** Rss., 1863, Sept. Thon. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 47, t. 3, fig. 29—31.
 » **æqualis** Rss., 1863, ibid. p. 48, t. 3, fig. 28; Steinsalzablag. Wieliczka, Wien. Ak. Sitz.-Ber. 1. 55, p. 83, t. 3, fig. 4.
 » **gracilis** Rss., 1865, deut. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 137, t. 2, figg. 25—27.
 » **oblonga** COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 141, t. 2, fig. 1.
 » **discreta** Rss., 1849, neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 366, t. 46, fig. 3.
 » **discreta** HANTK., 1775, For. Clav. Száb. Sch. p. 4, t. 13, fig. 16.
 » **solita** SCHWAG., 1866, For. Kar-Nikob.; Nov. Reise, geol. 2. 2, p. 237, t. 6, fig. 78.
 » **Haidingerana, mamilla, incisa, lævigata** NEUGEB., 1852, 1856, Siebenbürg. Verein. Mittheil. 1850—52, t. 1, figg. 2, 3, 7; Wien. Ak. Dkschr. 1. 12. 2, p. 67, t. 1, figg. 3—4.

c) in *Nodosarinam carinatum* (*Lingulinam*) *transiens*:

Syn. Lingulina rotundata	D'ORB., 1846, Bass. tert. Vienne, p. 61, t. 2, figg. 48—51 (<i>Lituolinæ</i> similis).
» nodosaria	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 59, t. 5, fig. 12.
» tuberosa	GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 629, t. 1, fig. 52.
» papillosa	NEUGEBO., 1856, For. Stichostr. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 97, t. 5, fig. 6.
» bohemica	Rss., 1845, Böhm. Kreidef. 2, p. 108, t. 43, fig. 10.
» ovalis	SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhft. 21, p. 116, t. 4, figg. 21—24.
» elisa	SCHWAG., <i>ibid.</i> p. 115, t. 4, fig. 20.
» propinqua	STACHE, 1865, tert. Merg. Whaingar. Haf.; Nov. Reise, geol. 1. 2. p. 191, t. 22, fig. 15.

d) in *Nodosarinam complanatum* (*Frondiculariam*) *transiens*:

Frondicularia peregrina	Rss., 1845, Böhm. Kreide 2. p. 108, t. 24, fig. 45.
» bicuspidata	Rss., <i>ibid.</i> 1. p. 32, t. 13, fig. 46.
» pupa	D'ORB., 1826, Tab. meth., Acad. Sc. Nat. 7, p. 256, N:o 4.
» digitata	D'ORB., <i>ibid.</i> p. 256, N:o 6.
» venusta	NEUGEBO., 1856, For. Stichostr. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 94, t. 5, fig. 5.
» lævis	MARSS., 1876, Rüg. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 136, t. 2, fig. 16.
» Stachei	KARR., 1870, Kreide. Leitzerdorf; Oesterr. geol. Reichsanst. Jhb. 20, t. 11, fig. 2.
» spathulata	BRAD., 1879, Notes on Ret. Rhizop.; Qu. Journ. Micr. Sc. (n. Ser.) 75, p. 270, t. 8, figg. 5 a - b.

Appendix.

Forma »*Rhabdogonii*» sive »*Orthocerinae*» REUSS, D'ORB.

Rhabdogon. acutangulum, articulatum, insigne, Strombecki, Märteni	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 55, 56; t. 4, fig. 14; t. 5, figg. 1—4.
» excavatum	Rss., <i>ibid.</i> p. 91; t. 12, fig. 8.
» Römeri, anomalum	Rss., 1859, Westph. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 201, t. 6, fig. 7, t. 7, fig. 1.
» debile	GÜMB., 1871, Ulm. Cem. Merg.; Münch. Ak. Sitz.-Ber. 1. 1, p. 66, t. 1, fig. 8.
» budense	HANTK., 1875, Clav. Száb. Sch. p. 42, t. 13, fig. 12.
Triplasia Murchisonii	Rss., 1854, Kreide Ostalp.; Wien. Ak. Dkschr. 1. 7, t. 25, figg. 1—3.
Rhabdogon. minutum	Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 84, t. 5, figg. 4—5.
» hæringense	GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 631, t. 1, fig. 55.
Orthocerina quadrilatera	D'ORB., 1839, Cuba, p. 18, t. 1, figg. 11—12; Bass. tert. Vienne, p. 41, t. 21, figg. 3—4.

Nodosarina radricula LIN. var. **monile** SOLD.

Tab, I, fig. 3—7.

The shape of the chambers varies from globular and ovoid to cylindrical, sometimes produced and extenuated nearly to the same diameter as the necks. In such cases the limits of them and the chambers become nearly effaced and the shell becomes cane-shaped with slight impressions at the joints.

By some intermediate varieties, on which many names have been bestowed by different authors — as *Nod. limbata* D'ORB., *Nod. grandis* Rss., *Nod. insecta* SCHW., *Nod. subnodosa* Rss., *Nod. globifera* Rss., *Nod. punctata*, *glabra*, *rugosa* D'ORB. etc., all provided with more or less globular, short-necked, tightly joined chambers — *N. monile* passes over in its type *N. radricula*.

On the other hand the straw- or cane-shaped varieties — as *N. longiscata*, *ovicula* D'ORB., *N. Ewaldi*, *trichostoma* Rss., *N. arundinacea* SCHWAG., *N. Czizechiana* NEUGEB. — link *N. monile* very closely to the slender forms of *Nod. communis* D'ORB. — that is to say: *Dental. Bouéana*, *consobrina*, *Lorneiana* D'ORB. — which are scarcely distinguishable from these forms of *N. monile*.

Nod. inflexa Rss., *N. guttifera* D'ORB. and some others with globular chambers and somewhat constricted joints are also such intermediate forms between *N. monile* and *N. communis*.

The length of the visible necks between the chambers is of no specific value; for in the same shell we often meet with the chambers of the first stage closely connected, but those which come last are often separated by long necks. The shape of the neck and its being inclosed more or less by a subsequent chamber occasion the the greatest inconstancy in the shape of this variety.

Such specimens as are covered with spines, prickles or short bristles, should not be distinguished by particular names — as has been done by some authors. The production of these appendages is probably quite occasional, and in most cases they are broken off remains of pseudopodial tubes, their generation and preservation having been promoted by the locality and the mode of life of the animals. A pelagic life seems to be favourable to the growth of such a development of shell-substance.

Fig. 3 represents a variety near to *Dent. soluta* Rss.

Fig. 4 is the same as *Nod. inversa* NEUGEB.

Fig. 5 is *Nod. stipitata* Rss. or *N. semirugosa* D'ORB.

Fig. 6 belongs to the same variety, coming very near to the straw-shaped *Nod. monile*.

Fig. 7 represents an »aulostoma» form. The chambers are compressed, vial-shaped, somewhat triangular in the vertical section and set alternately, the broad diameter of one chamber being placed at right angle to the same diameter of the next.

Like other »aulostoma»-monstrosities — not uncommon in *Nodosarinae* and *Poly-morphinae* and sometimes also in *Planorbulinae* and *Globigerinae* (in *Carpenteria* it is nearly the rule) — its chambers in their upper part are provided with a few short,

wide tubes. It is not improbable, that such forms have given rise to RUP. JONES' genus *Ramulina*. See WRIGHT'S »List of the cretac. Microzoa of the North of Ireland», Rep. and Proc. of Belfast Nat. Field Club 1873—74, Append. p. 88, t. 3, figg. 19—20; compare also: *Ramulina globulifera* BRADY: »Notes on some of the Retic. Rhizop. of the Challenger Exped.; Quart. Journ. Micr. Science 1879 (n. ser.) 75, p. 272, t. 8, figg. 32—33).

a) a radícula typica vix distinguenda:

Syn.	Nodosaria Radicula	D'ORB. 1826, Tabl. method.; Ann. Sc. Nat. 7, p. 252, N:o 3, Mod. 1.
»	rugosa	D'ORB., 1839, Cuba, p. 13, t. 1, figg. 2—3 (aspera).
»	verruculosa	NEUGEB., 1852, Foram. Ober. Lapugy; Mittheil. Siebenbürg. Verein 1852, t. 1 fig. 43.
»	brevicula	SCHWAG., 1866, Foss. Foramf. Kar.-Nikobar; Nov. Reise, geol. Th. 2. 2, p. 234, t. 6, fig. 71.
»	calomorpha	RSS., 1866, deutsch. Septarienthon; Wien. Ak. Dkschr. 1. 25. 1, p. 129, t. 1, figg. 15—19.
»	Geinitziana	NEUGEB., 1852, For. Ob. Lapugy; Mittheil. Siebenbürg. Verein. 1852, t. 1, fig. 1.
»	glandulinoides	NEUGEB., 1852, ibid. t. 1, fig. 2.
»	glabra	D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 253, N:o 12.
»	punctata	D'ORB., 1839, Cuba, p. 14, t. 1, figg. 4—5.
»	spec. indet.	COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, t. 1, fig. 5.
	Frondicularia nodosaria	EHRENB., 1854, Microgeol. t. 25, fig. 7.
	Nodosaria Jonesi	RSS., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 89, t. 12, fig. 6.
»	Koina	SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 220, t. 5, fig. 47.
»	conica	NEUGEB., 1852, For. Ob. Lapugy; Mitth. Siebenb. Verein. 1852, t. 1, fig. 4 (scabriuscula).
»	fistuca	SCHWAG., 1866, Foss. For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 216, t. 5, figg. 36—37 (hispidi).
»	granulata	KARR., 1878, Foramf. Luzon.; Bolet. Comis. Mapa geol. del España 7. 2, t. E, fig. 10.
»	subtertenuata	SCHWAG., 1866, Foss. For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 235, t. 6, fig. 74.
	Dentalina oligosphærica	RSS., 1864, deutsche Oberoligoc.; Wien. Ak. Sitz.-Ber. 1. 50, p. 454, t. 4, fig. 9 (N. communi propinqua).
»	subnodosa	RSS., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4, 1, p. 24, t. 1, fig. 9.
	Nodosaria prægnans	RSS., 1865, Kreide Kanara See bey Küstendsche; Wien. Ak. Sitz.-Ber. 52, p. 450, fig. 4.
»	tumidiuscula	GÜMB., 1868, For. nordalp. Eocän.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 610, t. 1, fig. 14.
»	insecta	SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 224, figg. 53—54.
»	monile	HAGENOW, 1842, Rügens Kreideverst.; Leonh. u. Bronns, Jhrb. 1842, p. 568.
	Dentalina monile	ALTH, 1849, Umgeb. Lembergs; Haid. Nat. Abh. 3. 2, p. 269, t. 13, fig. 28.
	Nod. granitocalcareo, pycnostyla	GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 613, t. 1, figg. 19—20.
	Dentalina piluligera	SCHWAG., 1863, Jurass. Schicht.; Würtemb. Nat. Verein. Jhrhft. 21, p. 107, t. 3, figg. 14—15.
»	dolioligera	SCHWAG., 1863, ibid. p. 109, t. 3, figg. 26, 32.
	Nodosaria anomala	RSS., 1865, deutsch. Septarienthon; Wien. Ak. Dkschr. 1. 25. 1, p. 129, t. 1, figg. 20—22.
»	grandis	RSS., 1865, ibid. p. 131, t. 1, figg. 26—28.
»	culminiformis	GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 614, t. 1, fig. 23.

- Syn. **Nodosaria conferta** SCHMID, Zechsteinkalk von Selters Wetterau, Leonh. u. Bronn., Jhrb. 1867, p. 585, t. 6, fig. 49.
- » **radicula** var. **conferta** BRAD., 1876, Carbonif. a. Perm. For.; Pal. Soc. 30, p. 126, t. 10, fig. 14.
- » **citriformis** SCHMID, l. cit. p. 586, t. 6, figg. 52—53.
- » **radicula** var. **citriformis** BRAD., 1876, l. c. p. 126, t. 10, fig. 16.
- » **ovalis** SCHMID, l. cit., p. 585, t. 6, figg. 50—51.
- » **radicula** var. **ovalis** BRAD., 1876, l. cit. p. 126, t. 10, fig. 14.
- » **duplicans** RICHT., 1861, Geinitz' Dyas, p. 120, t. 20, fig. 26.
- » **tumescens** EHRENB., 1854, Microg., t. 24, fig. 7.
- » **acus** EHRENB., *ibid.*, t. 32, fig. 3; **N. lævis, subulata, turgescens** EHRENB., *ibid.*, t. 25, figg. 4, 5, 6.
- Nautilus spinulosus** MONTAGU, 1808, Testac. Brit. Suppl., p. 86, t. 19, fig. 5.
- Dentalina spinescens** BORNEM., 1855, Septarienthon. Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 324, t. 13, fig. 5.
- Nodosaria fliformis** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 253, N:o 14.
- » **ovicula** D'ORB., 1826, *ibid.* p. 252, N:o 6.
- » **antennula** COSTA, 1854, Pal. Nap. 2, p. 140, t. 16, fig. 3; t. 12, fig. 25 sup.
- » **spec. indet.** COSTA, 1855, Marna terz. Messina, Mem. Nap. 2, t. 1, figg. 15, 19, 20.
- Dentalina retrorsa** REUSS, 1863, Septarienthon. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 46, t. 3, fig. 27 (*spinescens*).
- » **globuligera** NEUGEUB., 1856, For. Stichost. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 81, t. 2, fig. 10.
- » **Cassiana** GÜMB., 1869, For. etc. Cassian und Raibler Sch.; Österr. geol. Reichsanst. Jhrb. 19, p. 177, t. 5, fig. 16.
- Nodosaria deformis** COSTA, 1854, Pal. Nap. 2, p. 161, t. 13, fig. 19.
- » **oligostegia** Rss., 1845, Böhm. Kreide 1, p. 27, t. 13, figg. 19—20; 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 25, t. 1, fig. 10.
- » » COSTA, 1854, Pal. Nap. 2, p. 145, t. 16, fig. 6 (*hispida*).
- » **dubiosa** STACHE, 1865, tert. Mergel Whaingar. Hafen, Novara Reise, geol. Theil, 1. 2, p. 202, t. 22, fig. 27.
- Dentalina Lilli** Rss., 1850, Kreidemergel Lemberg; Haid. Nat. Abh. 4. 1, p. 25, t. 1, fig. 11.
- Nodosaria gramen** COSTA, 1855, For. Marna blu d. Vaticano; Mem. Nap. 2, p. 117, t. 1, fig. 3.
- » **interrupta** D'ORB., 1826, Tabl. meth.; An. Sc. Nat. 7, p. 252, N:o 11.
- » **limbata** D'ORB., 1839, Craie blanche Paris; Mem. Soc. geol. Fr. (1) 4, t. 1, fig. 1.
- » » COSTA, 1854, Pal. Nap. 2, p. 136, t. 12, fig. 25 (*inf.*).
- » **antipodium** STACHE, 1865, tert. Mergel d. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 194, t. 22, fig. 19.
- » **pumilis, N. Kressenbergensis** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 608, t. 1, figg. 11—12.
- » **ovularis** COSTA, 1855, Marna tert. Messina, Mem. Nap. 2, p. 141, t. 1, figg. 8—9.
- » **spec. indet.** COSTA, 1855, *ibid.* t. 1, fig. 11.
- Glandulina cylindracea** Rss., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 190, t. 4, fig. 1.
- Dentalina abbreviata** NEUGEUB., 1856, For. Stich. Felső Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 86, t. 3, fig. 18.
- Nodosaria adpersa** REUSS, 1863, Sept. Thon. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 43, t. 2, fig. 13.
- » **subinflata** COSTA, 1854, Pal. Nap. 2, t. 27, figg. 6—7.
- » **maculata** SCHWAG., 1866, For. Kar-Nikob.; Novara Reise, geol. Th. 2. 2, p. 214, t. 5, fig. 33.
- » **alpigena** GÜMB., 1868, For. Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 610, t. 1, fig. 13.
- » **Flurli** GÜMB., 1868, *ibid.* p. 614, t. 1, fig. 22; **N. resupinata** GÜMB., *ibid.* t. 1, fig. 24.
- » **monile** EHRENB., 1854, Microgeol., t. 19, fig. 81.
- Margin. armata** Rss., 1859, Westph. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 209, t. 7, fig. 7.
- Dentalina setosa** HEN., 1875, For. Clavul. Száb. Sch., p. 39, t. 13, fig. 9 (*Nod. communem approximans*).

- Syn. **Nodosaria conspurcata** Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Gesellsch. 3, p. 59, t. 3, fig. 3; 1863, Sept. Thon v. Offenbach, Wien. Ak. Sitz.-Ber. 1. 48, p. 43, t. 2, figg. 10—12.
- » **setosa** SCHWAG., 1866, For. Kar-Nikob.; Novara Reise, geol. Th. 2. 2, p. 218, t. 5, fig. 40.
- » **triloculata** KARR., 1867, For. fauna Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 367, t. 3, fig. 9.
- » **holosericea** SCHWAG., 1866, For. Kar-Nikob.; Novara Reise, geol. Th. 2. 2, p. 221, t. 5, fig. 49.
- » **aculeata** D'ORB., 1846, For. tert. Vienne, p. 35, t. 1, figg. 26—27.
- » **verruculosa** NEUGE., 1852, For. Stich. Felsö Lapug.; Siebenbürg. Ver. Mittheil. 1852, t. 1, fig. 43.

b) magis constricta vel stipitata:

- Dentalina soluta** Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Gesellsch. 3, p. 60, t. 3, fig. 4.
- » » STACHE, 1865, tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 203, t. 22, fig. 29.
- » » HKEN., 1875, Clav. Száb. Sch., p. 29, t. 3, figg. 2, 14.
- Nodosaria soluta** Rss., 1866, For. deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 131, t. 2, figg. 4—8.
- » » BORNEMAN, 1855, Sept. Thon Hermsdorff; Ztschr. deutsch. geol. Gesellsch. 7, p. 322, t. 12, fig. 12.
- » **appendiculata** COSTA, 1854, Pal. Nap. 2, p. 142, t. 12, fig. 22.
- » **Fichteliana, asperula**, NEUGE., 1852, For. Felsö Lapugy; Siebenb. Verein. Mittheil. 1852, t. 1, figg. 39—41.
- » **pyrula** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 253, N:o 13.
- Dentalina peregrina** Rss., 1860, Crag. Antwerp.; Wien. Ak. Sitz.-Ber. 42, p. 356, t. 1, fig. 6. (N. communini propinqua.)
- Nodosaria rudis** D'ORB., 1846, For. tert. Viennes p. 33, t. 1, figg. 17—19.
- » **monile** EHRENB., 1854, Microgeol., t. 24, fig. 6.
- » **hirsuta** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 252, N:o 7.
- Dentalina floscula** D'ORB., 1846, For. tert. Vienne, p. 50, t. 2, figg. 16—17.
- Nodosaria siphonostoma** Rss., 1867, Steinsalzablager. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 81, t. 3, fig. 3.
- » **spec. indet.** COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, t. 1, fig. 14 et 30.
- » **lepidula** SCHWAG., 1866, For. Kar-Nikob.; Novara Reise, geol. Th. 2. 2, p. 210, t. 5, figg. 27—28 (spinescens).
- » **hispida** D'ORB., 1846, For. tert. Vienne, p. 35, t. 1, figg. 24—25.
- » » COSTA, 1854, Marna terz. Messina; Mem. Nap. 2, p. 140, t. 1, fig. 10; Pal. Nap., p. 151, t. 11, figg. 27—40 (partim).
- » **Mariae** D'ORB., 1846, For. tert. Vienne, p. 33, t. 1, figg. 15—16.
- » **stipitata** Rss., 1849, Neue Foramf. Österreich. tert. Becken; Wien. Ak. Dkschr. 1. 1, p. 366, t. 46, fig. 4; Sept. Thon Kreuznach, Wien. Ak. Sitz.-Ber. 1. 48, p. 65, t. 7, fig. 88.
- » **semirugosa** D'ORB., 1846, For. tert. Vienne, p. 34, t. 1, figg. 20—23 (cameris semi-lineatis).
- Dentalina expansa** Rss., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 188, t. 3, fig. 4.
- Nodosaria pyrula** WILLIAMS., 1858, Brit. rec. For. p. 17, fig. 39.
- » » SCHWAG., 1866, For. Kar-Nikob.; Novara Reise, geol. Th. 2. 2, p. 217, t. 5, fig. 38.
- » **intertenuata** SCHWAG., 1866, ibid. p. 226, t. 6, fig. 58.
- » **resupinata, hectica** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Wiss. Abh. 1. 10. 2, p. 615, t. 1, figg. 24—25.
- » **dacrydium** Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25, p. 128, t. 1, figg. 13—14.

- Syd. *Dentalina spec. indet.* STACHE, Mergel d. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 204, t. 22, fig. 30.
- Nodosaria recta* SCHWAG., 1866, *ibid.* 2. 2, p. 216, t. 5, fig. 35.
- » *inversa, Haueriana, lagenifera, Bruckenthaliana, Orbignyana* NEUGEBO., 1852, For. Felsö Lapugy; Siebenbürg. Verein. Mittheil. 1852, t. 1, figg. 5—15.
- Lagena ulmensis* GÜMB., 1871, Ulmer Cement. Mergel, Münch. Ak. Sitz.-Ber. 1, p. 65, t. 1, fig. 7.
- Nodosaria Czizechiana, Haidingeriana, Bronniana, Bielziana* NEUGEBO., l. cit. t. 1, figg. 30—37 (ad »a» potius pertinet).
- Dentalina vorticalis* STACHE, 1865, tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 202, t. 22, fig. 28 (ad »a» potius pertinent).
- Dentalina Benningseni* Rss., 1863, Sept. Thon Offenbach, Wien. Ak. Sitz.-Ber. 1. 48, p. 44, t. 2, fig. 14.
- Nodosaria pygmæa* Rss., deut. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 133, t. 2, fig. 9.
- » *Knihnitziana* KARR., 1877, Hochquell-Wasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 379, t. 16, fig. 22.

c) culmiformis:

- Nodosaria longiscata* D'ORB., 1846, For. tert. Vienne, p. 32, t. 1, figg. 10—12.
- » *arundinea* SCHWAG., 1866, For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 211, t. 5, figg. 43—45.
- » *irregularis* D'ORB., 1846, For. tert. Vienne, p. 32, t. 1, figg. 13—14.
- » *Buchiana, Ackneriana, Römeriana, nodifera, capillaris, exilis, gracilis, claviformis* NEUGEBO., 1852, Siebenb. Verein. Mittheil. 1852, t. 1, figg. 16—29, fig. 38.
- » *exilis* Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 130, t. 2, fig. 17.
- » *spec. indet.* COSTA, 1855, Marn. terz. Messina; Mem. Nap. 2, t. 1, figg. 25—26; *ibid.* t. 2, fig. 10.
- » *Ewaldi* Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Gesellsch. 3, p. 58, t. 3, fig. 2; Wien. Ak. Dkschr. 1. 25. 1, p. 129, t. 2, fig. 18.
- » » BORNEMANN, 1855, Sept. Thon Hermsdorff; Ztschr. deutsch. geol. Ges. 7, p. 321, t. 12, fig. 10.
- » *gracillima* COSTA, 1854, Pal. Nap. 2, t. 16, fig. 22.
- » *tympanipectriformis* SCHWAG., 1866, For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 215, t. 5, fig. 34.
- » *polystoma* SCHWAG., *N. exilis* SCHWAG., *ibid.* p. 217, 223, t. 5, figg. 39, 52 (»a» approximatæ).
- » *myrmecoides* COSTA, 1854, Pal. Nap. 2, p. 160, t. 13, fig. 18.
- » *marsupifera, Nod. tornata, Dent. spec. indet.* SCHWAG., 1863, Jurass. Sch; Würtemb. Nat. Verein. Jhrshft. 21, p. 96—112; t. 2, fig. 9; tt. 3. 4, figg. 27, 7. 9; t. 4, figg. 2—5 (ad »a» potius pertinent).
- » *culmen* COSTA, 1854, Pal. Nap. 2, p. 158, t. 13, fig. 15.
- Dentalina rudiuscula* COSTA, *ibid.*, p. 170, t. 12, fig. 13.
- Nodosaria cannæformis* Rss., 1860, For. Dingel. Westphal. (miocæn.); Wien. Ak. Sitz.-Ber. 42, p. 364, t. 1, fig. 2.
- » *siphunculus* COSTA, 1854, Pal. Nap. 2, p. 143, t. 12, fig. 11.
- » *internodifera* GÜMB., 1868, Nordalp. Eocæn.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 611, t. 1, fig. 15.

d) in Nod. communem transiens:

- Dentalina acuticauda* GÜMB., 1868, Nordalp. Eocæn.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 624, t. 1, fig. 40.
- » *gliricauda* GÜMB., *ibid.* p. 624, t. 1, fig. 41.
- » *globulicauda* GÜMB., *ibid.* p. 623, t. 1, fig. 38.
- » *annulifera* GÜMB., *ibid.* p. 614, t. 1, fig. 21.

Syn. <i>Dentalina annulata</i>	Rss., 1845, Böhm. Kreide, p. 27, t. 13, fig. 21; t. 8, figg. 4 et 67.
»	ALTH., 1849, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 269, t. 13, fig. 29.
<i>Nodosaria scabriuscula</i>	COST., 1854, Pal. Nap. 2, p. 140, t. 16, fig. 1.
<i>Dentalina scabra</i>	REUSS., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 367, t. 46, figg. 7—8 (hispidata).
<i>Nodosaria monile</i>	Rss., 1845, Böhm. Kreide 1, p. 27, t. 8, fig. 7.
<i>Dentalina spinescens</i>	Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 62, t. 3, fig. 10.
» <i>globifera</i>	Rss., 1855, tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 223, t. 1, fig. 3.
» <i>permiana</i>	JONES, RICHT. 1855, Thür. Zechstein.; Zeitschr. deutsch. geol. Ges. 7, p. 532, t. 26, fig. 27.
» <i>laxa</i>	Rss., 1865, deut. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 132, t. 2, figg. 2—3.
<i>Nodosaria distorta</i>	COSTA, 1854, Pal. Nap. 2, p. 173, t. 16, fig. 17.
» <i>hispidata</i>	SCHWAG., 1866, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 231, t. 6, fig. 65.
» <i>alternans</i>	COSTA, 1854, Pal. Nap. 2, p. 139, t. 13, fig. 16 (hispidata, costulata).
<i>Dentalina pauperata</i>	HKE., 1875, For. Clav. Száb. Sch., p. 31, t. 3, fig. 6.
» <i>trichostoma</i>	Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 367, t. 46, fig. 6.
» <i>monile</i>	CORNUEL, 1849, nouv. foss. microsc.; Mem. Soc. geol. France (2), 3, p. 250, t. 1, fig. 18.
» <i>elongata</i>	COSTA, 1854, Pal. Nap. 2, t. 16, fig. 19.
» <i>spec. indet.</i>	HKE., 1875, For. Clav. Száb. Sch., p. 34, t. 3, fig. 11.
» <i>aculeata</i>	D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France 4, p. 13, t. 4, fig. 2 (hispidata).
<i>Nodosaria aculeata</i>	REUSS., 1845, Böhm. Kreide 1, p. 28, t. 12, fig. 29 (hispidata).
» <i>inflexa</i>	Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 131, t. 2, fig. 1.
<i>Dentalina guttifera</i>	D'ORB., 1846, For. tert. Vienne, p. 49, t. 2, figg. 11—13.
» <i>guttifera</i>	PARK. and JONES, 1865, For. N. Atl. and Arct. Oceans; Phil. Transact. 155. 1, p. 343, t. 13, fig. 11.
» <i>communis</i>	PARK. and JONES, 1857, For. Coast. of Norway; Ann. Mag. Nat. Hist. (2) 19, p. 282, t. 10, figg. 3—4.
<i>Dentalina Adolphina</i>	D'ORB., 1846, For. tert. Vienne, p. 51, t. 2, figg. 18—20.
»	GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 623, t. 1, fig. 39.
<i>Nodosaria</i>	SCHWAG., 1866, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 235, t. 6, fig. 72.
<i>Dentalina subspinosa</i>	NEUGEB., 1856, For. Stichosteg.; Wien. Ak. Dkschr. 1. 12. 2, p. 88, t. 4, fig. 7.

Nodosarina radicularia LIN. var. *raphanus* LIN.

Tab. I, fig. 9—10.

Our form comes pretty near to *Nod. multicosta* NEUGEB., *Nod. striata* STACHE etc. The long and narrow forms are by some authors designated as *Nod. raphanistrum*, but it is in vain to distinguish these forms from one another.

It has been found only on the coralline-gravel bottom.

Nodosarina radricula LIN. var. **scalaris** BATSCH.

Tab. I, fig. 8.

Is the pigmy-form of the preceeding and too closely related to that, to attain the rank of species. Such forms as *Nod. inflata* Rss., *Nod. nana* REUSS, *Nod. badenensis* D'ORB., *Nod. tenuicostata* COSTA, etc. have the character of both.

Its characteristic distinguishing feature should be the thinness of the shell and the prolongation and slenderness of the chamber-necks. But such marks are no longer recognised as being of any distinctive importance in this class, where each species seems to have its dwarfish, tiny forms, which during their whole life remain in a sort of juvenile stage.

It has been stated above, that the shape of the necks cannot be of any specific importance.

This form occurs both on the chalkbottom and in the coralline-gravel. It attains seldom more than 1—1,5 mm. in length.

Nodosarina radricula var. **Raphanus**.

- Syn. **Nodosaria lamellosa** D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 253, N:o 17, t. 10, figg. 4—6.
 » **scalaris** D'ORB., ibid., p. 253, N:o 18.
 » **badenensis** PARK. and JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16, p. 453, t. 19, figg. 8—9.
 » **tenuicostata** COSTA 1854, Pal. Nap. 2, p. 156, t. 12, fig. 5; t. 16, figg. 8—13.
Dentalina bifurcata HKE., 1875, Clav. Száb. Sch. p. 35, t. 3, figg. 18, 21.
Nodosaria pachycephala, latejugata GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 616, 619, t. 1, figg. 27, 32.
 » **Raibliana** GÜMB., 1869, For. Cassian u. Raibler Sch.; Österr. geol. Reichsanst. Jhrb. 19, p. 181, t. 6, fig. 28.
 » **Vásárhelyii, latejugata** HKE., 1875, Clav. Száb. Schicht., p. 36, t. 4, fig. 4; t. 2, figg. 6 a. b. c.
Amphimorphina striata Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 57, t. 5, fig. 5.
Nodosaria multicosta NEUGEB., 1856, For. Stichosteg. ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 78, t. 1, fig. 12.
 » **subradicula** SCHWAG., ibid. p. 222, t. 5, fig. 50 (ad *N. scalarem* vergens).
 » **columella** KARR., 1877, Hochqu. Wasserl.; österr. geol. Reichsanst. Abh. 9, p. 379, t. 16, figg. 21—22.
 » **annulata, spinulosa** COSTA, 1855, Mar. terz. Messina; Mem. Nap. 2, p. 139, t. 1, figg. 16, 28.
 » **Ludwigi** Rss., 1865, Sept. Thon Deutschl.; Wien. Ak. Dkschr. 1. 25. 1, p. 135, t. 2, fig. 23.
Nodosarina-Nodosaria Raphanus PARKER and JONES, 1866, Crag. For.; Pal. Soc. 19, p. 49, t. 1, figg. 4, 5, 22, 23.
Crist. semituberculata KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 355, t. 1, fig. 7.
Nodosaria semicostata COSTA, 1854, Pal. Nap. t. 27, figg. 8, 10.
 » **manubrium** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Wiss. Verein. Jhrb. 21, p. 99, t. 2, fig. 14.
 » **Raphanus** PARK. and JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16, p. 453, t. 19, fig. 10.

- Syn. *Dentalina crassula* Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 24, t. 1, fig. 8.
- Nodosaria inops* Rss., ibid. p. 24, t. 1, fig. 7.
- » *proboscidea* Rss., ibid. p. 23, t. 1, fig. 6.
- » *crassa* HKE., 1875, Clav. Száb. Sch., t. 13, fig. 4.
- » *inflata* COSTA, 1855, Marn. terz. Messina; Mem. Nap. 2, p. 139, t. 1, fig. 18.
- » *inflata, intermedia* COSTA, 1854, Pal. Nap. 2, p. 153, 154, t. 13, fig. 4; t. 16, fig. 4.
- » *striatissima* STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 199, t. 22, fig. 25; p. 208, t. 22, fig. 38.
- » *Rapa* D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 253, No 27.
- » *obscura* Rss., 1845, Böhm. Kreide 1, p. 26, t. 13, figg. 7—9.
- » » REUSS, 1873, Geinitz, Elbthalgeb. Sachs. 2, p. 81, t. II. 20, fig. 1—4.
- » *obsolescens* REUSS, ibid. p. 83, t. II. 20, fig. 14.
- » *undecimcostata, septemcostata* GEIN., 1839, Sächs. Kreidegeb. p. 69, t. 17, figg. 19—20.
- Nautilus costatus* MONTAGU, 1803, Test. Brit. p. 199, t. 14, fig. 5; 1808, ibid. Supplem. p. 83, t. 19, fig. 2.
- Nodosaria raphanistrum* PARK. and JONES, 1866, Crag. For.; Pal. Soc. 19, p. 50, t. 1, figg. 6—8.
- » *pentecostata* COSTA, 1854, Pal. Nap. 2, p. 161, t. 16, fig. 15.
- » *mutabilis, propinqua, turgidula, Rhegina, Dentalina irregularis* var. COSTA, ibid., t. 13, figg. 1—3; t. 27, figg. 9, 11, 15.
- » *mutabilis, sulcata* COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 134, 140, t. 1, figg. 1—2; t. 1, fig. 29.
- » *affinis, bacillum* D'ORB., 1846, For. tert. Vienne, p. 39, 40; t. 1, figg. 36—47.
- » *tenuicosta, affinis* Rss., 1845, Böhm. Kreidef. 1, p. 25, 26, t. 13, figg. 5—6, 16.
- » *affinis* Rss., 1873, Gein. Elbthalgeb. Sachs. 2, p. 83, t. II. 20, fig. 12.
- » *Paueri, subalpina, eocaena, Helli, bacillum, sceptriformis, capitata, fissicostata* GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 612—626; t. 1, figg. 18, 26, 28, 29, 30, 33, 42, 46.
- » *Maximiliana, nummulina* GÜMB., ibid. p. 619, 626; t. 1, figg. 31, 45.
- » *bacilloides, budensis* HKE., 1875, Clav. Száb. Sch., t. 2, figg. 8, 10.
- » *bacillum* var. *minor, acuminata* HKEN., ibid. p. 26, t. 2, figg. 7, 9; t. 13, fig. 5.
- » *Hochstetteri* SCHWAG., 1866, For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 214, t. 5, fig. 32.
- » *perversa, deceptoria, inconstans, gomphiformis, crassitesta, Skobina* SCHWAG., 1866, For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 212, t. 5, figg. 29—31; p. 220—224, t. 5, figg. 48, 55, 56.
- » *subsimilis, substrigata, callosa, obliquecostata, striatissima, scarificata* STACHE, 1865, tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 1, p. 195—197, 208, t. 22, figg. 21—24, 38, 40.
- » *elugypha, turbiformis* SCHWAG., 1863, Jurass. Sch.; Württemberg. Nat. Verein. Jhrhft. 21, p. 96, 98, t. 2, figg. 8, 13.
- » *bacillum, contracta, dehiscens, excentrica, spec. indet.* COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 134—137, t. 1, figg. 1, 3, 6, 21; t. 2, fig. 14.
- » *plicata, cylindrum* COSTA, 1854, Pal. Nap. 2, p. 152, t. 12, fig. 4; t. 27, fig. 1.
- » *paupercula* Rss., 1845, Böhm. Kreide. 1, p. 26, t. 12, fig. 12; 1873, GEINITZ, Elbthalgeb. Sachsen 2, p. 81, t. II. 20, figg. 5—7.
- » *amphioxus, fusula, oligotoma* Rss., 1871, ibid. 1, p. 82, 135, t. II. 20, figg. 8, 9; t. 33, fig. 16.
- » *bactridium* Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 130, t. 1, figg. 24—25.
- » *intercostata, duplicostata, prismatica* Rss., 1859, Westphal. Kreidef.; Wien. Ak. Sitz.-Ber. 40, t. 1, figg. 4—5, t. 2, fig. 2.
- » *sceptrum, tubifera, bactroides, lamello-costata, prismatica, Dent. inepta, Marg. aequivoca, Marg. acuticostata* Rss., 1862, Nordd. Hils u. Gault, Wien. Ak. Sitz.-Ber. 1. 46, p. 37, t. 2, figg. 3—7, 13; t. 5, fig. 17; t. 6, fig. 3.
- » *polygona* Rss., 1855, Kreidegeb. Meklenb.; Ztschr. deutsch. geol. Ges. 7, p. 265, t. 8, figg. 7—8.
- » *majuscula, laticosta, clausa* MARS., 1877, Rügen. Schreibekr.; Greifswald. Nat. Verein. Mittheil. 1877—78, p. 130, 131, t. 1, figg. 7—9.

- Syn. **Nodosaria decemcostata** EGG., 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 306, t. 15, figg. 24—25.
 » **Bolli** Rss., 1855, Kreideg. Meklenb.; Ztschr. deutsch. geol. Ges. 7, p. 265, t. 8, fig. 6.
 » **tetragona** Rss., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 40, t. 2, fig. 1.
 » **orthopleura** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 89, t. 12, fig. 5.
 » **tetragona** COSTA, 1855, Marna blu Vaticano; Mem. Nap- 2, p. 116, t. 1, fig. 1.
 » **compressiuscula, Dent. carinata** NEUGEBO., 1856, For. Stichost. Ob. Lapugy; Wien. Ak. Dkschr. 1. 12. 2, p. 79, 91, tt. 2, 4, figg. 1—7; 17.

b) moniliformis:

- Nodosaria nitida** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 254, N:o 33.
 » **Boueana** D'ORB., 1846, For. tert. Vienne, p. 37, t. 1, figg. 30—31.
 » **quadrata, Lingulina mutabilis** D'ORB., ibid. p. 36, 61, t. 1, fig. 28; t. 2, fig. 52.
 » **subrhombica** STACHE, 1865, Tert. Merg. Whaingar. Hafen, Novara Reise, geol. Th. 1. 2, p. 201, t. 22, fig. 26.
 » **Zippei** Rss., 1845, Böhm. Kreide 1, p. 25, 26; t. 8, figg. 2—3.
 » **distans** Rss., 1855, Kreideg. Meklenburg; Ztschr. deutsch. geol. Ges. 7, p. 264, t. 8, fig. 5.
 » **coarctata** HKE., 1875, Clav. Száb. Sch., t. 12, fig. 15.
 » **coccoptycha** GÜMB., 1868, Nordalp. Eocän; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 611, t. 1, fig. 16 (verrucosa).

c) semistriata:

- Nodosaria semistriata, Soldanii** D'ORB., 1826, Ann. Sc. Nat. 7, p. 252, 254, N:ris 9, 30 (an N. scalaris).
 » **tholigera** SCHWAG., 1866, Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 218, t. 5, fig. 41.
 ? » **ambigua** COSTA, 1854, Pal. Nap. 2, p. 137, t. 12, figg. 9—10.

d) compressa: in Nodos. (Frondicul.) complanatam DEFR. var. striatam D'ORB. transiens:

- Amphimorphina Haueriana** NEUGEBO., 1850, For. Felsö Lapug.; Siebenb. Ver. Mittheil. 1850, p. 127, t. 4, figg. 13—14 (vide **Nod. compressiuscula** NEUGEBO. p. 23).
 » » KARRER, 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 705, t. 1, fig. 6.
 » » FRICS, Modell., N:o 51.
Frond. digitalis, affinis, Bielzana, rostrata, semicostata, diversicostata, tenuicostata, cultrata, irregularis, Ackneriana, pulchella, lapugyensis NEUGEBO., 1850, For. Felsö Lapug.; Siebenb. Ver. Mittheil. 1850, p. 119, 120, t. 3, figg. 3—10; t. 4, figg. 11—12; t. 3, figg. 1—2.
 » **bicostata** KARRER, 1878, Foram. Luzon; Bolet. Comis. Mapa geol. del España, 7. 2, p. 17, t. E, fig. 13.
 » **mucronata** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 354, t. 1, fig. 6.

e α) Frondicul. Archiaciana D'ORB. quæ inter Nod. radiculam frondiculariæformem et Raphanum tenet medium, camera primordiali solum costata, (additis paucis Nod. (Frond.) striatæ D'ORB. proximis):

- Frond. Archiaciana, ornata, angulosa** D'ORB., 1839, For. Craie blanc. Par.; Mem. Soc. geol. Fr. 4, p. 20—22, t. 1, figg. 34—39.
 » **Archiacina** Rss., 1845, Böhm. Kreide 1, p. 31, t. 13, fig. 39.

- Syn. **Fron.** **Archiaciana** WILLIAMS., 1858, Brit. rec. For. p. 24, fig. 51.
 » **angulosa** Rss., 1845, Böhm. Kreide 1, p. 31, t. 13, fig. 40; 2, p. 107, t. 24, fig. 42.
 » **tenuis** Rss., ibid. 1, p. 30, t. 8, fig. 25; 1873, GEIN., Elbthalgeb. Sachsen, 2, p. 94, t. II. 20, fig. 3.
 » **turgida** Rss., ibid. 2, p. 107, t. 24, figg. 41—44; 1873, GEIN., Elbthalgeb. Sachs. 2, p. 97, t. II. 21, figg. 17—18.
 » **marginata, canaliculata** Rss., 1845, Böhm. Kreide 1, 2, p. 30, 107; t. 12, fig. 9; t. 24, fig. 39; t. 8, figg. 20—21.
 » **Decheni, apiculata, marginata, canaliculata, Marg. ornatissima** Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 191—209, t. 4, fig. 3; t. 5, figg. 2—3; t. 6, fig. 1; t. 7, fig. 2.
 » **elegans, Verneuiliana** D'ORB., 1839, Craie bl. Paris; Mem. Soc. geol. Fr. 4, p. 19, 20, t. 1, figg. 29—30, 32—33.
 » **Ungeri** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 54, t. 4, fig. 11.
 » **Sedgvicki** Rss., 1854, Kreide. Ostalpen; Wien. Ak. Sitz.-Ber. 7, p. 66, t. 25, fig. 4.
 » **angusta** Rss., 1845, Böhm. Kreide 1, t. 8, fig. 14.

e β) magis expansa:

- Fron.** **Fuchsii** KARR., 1870, Kreide Leitzendorf; Jhrb. k. k. geol. Reichsanst. 20, p. 174, t. 11, fig. 1. (**Fr. Stachei** KARR., p. 15, huc potius referenda).
 » **Goldfussi, microdisca, gaultina** Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 192—195, t. 4, fig. 7; t. 5, fig. 4; t. 5, fig. 5.
 » **Speyeri** Rss., 1864, Oberoligoc.; Wien. Ak. Sitz.-Ber. 1. 50, p. 458, t. 4, fig. 8.
 » **Althii, pyrum** KARR., 1870, Kreidef. Leitzendorf; Jhrb. k. geol. Reichsanst. 20, p. 172, 175, t. 10, fig. 1, t. 11, fig. 4.
 » **denticulata, dentic. var. spinosa** COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 371, t. 2, figg. 20, 22—23; t. 3, fig. 4 (in *Nod. striatam* D'ORB. transiens).

f) tricarinata (Rhabdogonii forma):

- Vaginul. tricarinata** D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 258, N:o 4, Mod. 4 (ad *Nod. linearem vel legumen vergens*).
Rhabdogonium pyramidale KARR., 1861, Marin. Tegel; Wien. Ak. Sitz.-Ber. 1. 44, p. 444, t. 1, fig. 5.
Fron. **tricarinata** D'ORB., 1839, For. Craie bl. Par.; Mem. Soc. geol. Fr. 4, p. 21, t. 2, figg. 1—3.
 » **amoena** Rss., 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 29, t. 1, fig. 21.
Dentalina trigona SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrft. 21, p. 111, t. 3, fig. 31.
Dentalinopsis subtriquetra Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 57, t. 5, fig. 5; FRIC's Modell. N:o 52.

g) in *Nod. obliquam* transgrediens:

- Dentalina Münsteri** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 624, t. 1, fig. 43.
Nodosaria tosta SCHWAG., 1866, Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 219, t. 5, fig. 42.
 » **equisetiformis** SCHWAG., ibid. p. 231, t. 6, fig. 66.
 » **spec. indet.** COSTA, 1855, Marna terz. Messina, Mem. Nap. 2, t. 1, figg. 23, 34.
 » **conspurcata** Rss., 186 , For. deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25, t. 2, figg. 19—21 (seminuda).

g α) intermittens:

- Syn. **Nodosaria intermittens** RÖMER, 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 382, t. 3, fig. 2.
- Dentalina cylindrella, capitata, Sandbergeri, Girardana** REUSS, 1855, Tert. Sch. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 222—224, t. 1, figg. 2, 4, 5, 6.
- Nodosaria capitata** BOLL., 1846, Ostseeländ. p. 177, t. 2, fig. 13.
- » » REUSS, 1864, Oligocän.; Wien. Ak. Sitz. Ber. 1. 50, p. 450, t. 1, figg. 8—10.
- » » HKE., 1875, Clav. Száb. Sch., p. 35, t. 3, fig. 16.
- Dentalina Philippi, Buchi** Rss., 1851, Sept. Thon. Berlin; Ztschr. deutsch. geol. Ges. 3, p. 60, t. 3, figg. 5—6.
- » **antennula** D'ORB., 1846, For. tert. Vienne, p. 53, t. 2, figg. 29—30.
- Nodosaria multilineata** MARSS., Rügen Schreibekr., Greifswald. Nat. Verein. Mittheil. 1877—78, p. 131, t. 1, fig. 10.

h) papillosa:

- Glandulina ornatissima** KARR., 1878, For. Luzon; Bolet. Comis. Mapa geol. d. España 7. 2, p. 17, t. E, fig. 12.

Nodosarina radícula var. scalaris.

- Syn. **Nodosaria sulcata, longicauda** D'ORB., 1826, Tabl. meth. Ann. Sc. Nat. 7, p. 253, 254, N:o 21, 28.
- » **Candei, Catesbyi** D'ORB., 1839, Cuba p. 15, 16. t. 1, figg. 6—9.
- » **striaticollis** D'ORB., 1844, Iles Canaries, p. 124, t. 1, figg. 3—4.
- » **spinicosta** D'ORB., 1846, For. tert. Vienne, p. 37, t. 1, figg. 32—33 (an *N. radícula* var. *Raphanus*).
- » **scalaris** PARK. and JONES, 1865, N. atl. and arct. Oc., Phil. Trans. 155. 1, p. 340, t. 16, fig. 2.
- Nodosarina-Nodosaria scalaris** PARK. and JONES, 1866, Crag. For., Pal. Soc. 19, p. 52, t. 4, fig. 8.
- Nodosaria radícula** WILL., 1858, Brit. rec. For., p. 15, figg. 36—38.
- » **Reussiana, variabilis, Ehrenbergiana, elegans** NEUGE., 1852, For. Felső Lapug., Siebenb. Nat. Verein. Mitth. 1850—52; t. 1, figg. 46—53.
- » **inflata** Rss., 1845, Böhm. Kreidef. 1, p. 25, t. 13, figg. 3—4; 1855, Kreide. Meklenb.; Ztschr. deutsch. geol. Ges. 7, p. 263, t. 8, figg. 2, 3, 4.
- » **venusta** Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 367, t. 46, fig. 5.
- » » HKE., 1875, Clav. Száb. Sch. t. 12, fig. 14.
- ? » **nana** Rss., 1859, Westph. Kreide, Wien. Ak. Sitz.-Ber. 40, t. 1, fig. 6.
- » **badenensis** D'ORB., 1846, For. tert. Vienne, p. 38, t. 1, figg. 34—35.
- ? **Dentalina urnula** D'ORB., ibid. p. 54, t. 2, figg. 31—32.
- ? **Nodosaria badenensis** var. EGGER, 1857, Mioc. Ortenb.; Leonh. u. Bronn. Jhrb. 1857, p. 305, t. 15, figg. 17—21.
- » **Reussii** COSTA, 1854, Palæont. Nap. 2, p. 155, t. 16, fig. 5.

b) semistriata:

- Nodosaria semiornata** KARRER, 1878, Foramf. Luzon; Bolet. Comis. Mapa geolog. del España 7. 2, p. 15, t. E, fig. 8.

Nodosarina communis D'ORB.

Tab. I, figg. 11—16.

This wide-spread species has been aptly arranged by PARKER and JONES in four sub-types of varieties. The difference between them is, as usual, much too slight and inconstant to justify their being distinguished as species with a nomenclature of their own.

- a) *crassa, septis horizontalibus*. Nod. radiculæ proxima, (= *Dental. brevis* D'ORB.).
 b) *longa, tenuis, septis horizontalibus*. Nod. radiculæ var. monili propinqua (= *Dent. communis, elegans, Lorneiana, Boueana* etc. D'ORB.).
 c) *crassa, septis obliquis*. Nod. legumini LIN. valde propinqua (= *Dent. obliqua* D'ORB. [non LIN.], *Dent. nana* REUSS.).
 d) *longa tenuis, septis obliquis*; etiam Nod. legumini quam maxime affinis (= *Dent. communis, inornata, badenensis* etc. D'ORB.).

The great affinity between *N. communis* D'ORB. and *N. legumen* LIN. makes it hardly possible to dispose fairly their many names in their resp. lists of synonyms. It is also on reasonable grounds that Professor WILLIAMSON has not kept *N. communis* distinct from *N. legumen*.

It is very commonly met with both among the Coralline-gravel and in the Chalk-ooze; its slender, graceful form, its often pearly lustre and its great size (15 mm. and more in length) distinguish this species as one of attractive beauty.

Fig. 11 is a pygmean form near to *Dent. brevis* D'ORB. It is exactly the same as *Dent. linearis* RÖM., *Dent. inermis* CZJZ. etc., from the Chalk-ooze.

Fig. 12, 12 b comes near to *Dent. Lorneiana* D'ORB. or *Dent. consobrina* D'ORB., it is a pigmy from the Chalkbottom.

Fig. 13—14 are near to *Dent. Boueana et aliis* D'ORB. Both are from the Coralline gravel and the Chalk-ooze.

Fig. 15 represents a highly developed *Nod. communis* from the Coralline-gravel.

Fig. 16 comes nearest to *Dent. badenensis* D'ORB., from the Chalk-ooze.

a) *crassa: septis horizontalibus*; *N. radiculæ propinqua*.

Syn. Nodosaria nuda	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 38, t. 2, figg. 8—9.
Dentalina brevis	D'ORB., 1846, For. tert. Vienne, p. 48, t. 2, figg. 9—10.
" "	PARK. and JONES, 1860, For. Chellast. Qu. Journ. geol. Soc. 16, p. 453, t. 19, fig. 23.
Nodosarina radicula, Dentalina communis subvar. brevis	PARK. and JONES, 1866, Crag. Foram.; Palæogr. Soc. 19, p. 63, t. 4, fig. 10.
Dent. pseudochrysalis	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 40, t. 2, fig. 12.
Dentalina chrysalina	CORN., 1848, Nouv. foss. microsc. cret.; Mem. Soc. geol. Fr. (2) 3, p. 251, t. 1, fig. 21.

- Syn. *Dent. megalopolitana* Rss., 1855, Kreide. Meklenburg; Ztschr. deutsch. geol. Ges. 7, p. 267, t. 8, fig. 10.
- » *nitens* COSTA, 1854, Pal. Nap. 2, p. 165, t. 12, fig. 26 (infer.).
- » *obesa* COSTA, 1854, Pal. Nap. t. 27, fig. 13.
- » *fusiformis, torulosa* SCHWAG., 1863, Jurass. Sch., Würtemb. Nat. Ver. Jhrhft. 21, p. 99—100, t. 2, figg. 16—17 (a *N. radícula vix distincta*).
- » *siliqua, Hilseana, cylindroides* Rss., 1862, Nordd. Hils u. Gault, Wien. Ak. Sitz.-Ber. 1. 46, p. 41, t. 2, figg. 11, 14, 16.
- » *cylindroides, cognata, D. distincta, strangulata, catenula, discrepans* Rss., 1859; Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 184—185, t. 1, fig. 8; t. 1, fig. 9; t. 2, fig. 5; t. 3, figg. 6—7.
- Nautilus rectus* MONTAG, 1803, Test. Britann. p. 197; Supplem. p. 82, t. 19, figg. 4—7.
- Nodosaria radicularis* MÜNST., RÖM., 1838, Nordd. tert. Meeressand, Leonh. u. Bronn. Jhrb. 1838, p. 382, t. 3, fig. 3.
- Dentalina punctata* D'ORB., 1846, For. tert. Vienne, p. 49, t. 2, figg. 14—15.
- » *inermis* CZJZ., 1847, For. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 139, t. 12, figg. 3—7.
- Marginul. contraria* CZJZ., 1847, *ibid.* p. 140, t. 12, figg. 17—20 (*Nod. legumini approxim.*).
- Nodosaria linearis* RÖM., 1842, Verst. nordd. Kreidegeb. p. 95, t. 15, fig. 5.
- Dentalina linearis* Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 42, t. 2, fig. 15.
- » » GÜMB., 1868, Nordalp. Eocän., K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 622, t. 1, figg. 36.
- Nodosaria pupiformis* KARR., 1867, For. Fauna Österreich.; Wien. Ak. Sitz.-Ber. 1. 55, p. 354, t. 1, fig. 5.
- Dentalina Verneuilli* BORNEMANN, 1855, Sept. Thon. Hermsdorf; Ztschr. d. geol. Ges. 7, p. 324, t. 13, fig. 8.
- » *corniculum* COSTA, 1854, Pal. Nap. t. 27, fig. 14.
- » *intermedia* CORN., 1848, Nouv. foss. microsc. cret.; Mem. Soc. geol. Fr. (2) 3. p. 251, t. 1, fig. 20.
- Nodosaria tauricornis* SCHWAG., 1866, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 228, t. 6, fig. 61.
- Dentalina transmontana* GÜMB., 1869, For. St. Cassian u. Raibl.; Österr. geol. Reichsanst. Jhrb. 19, p. 177, t. 5, fig. 17.
- Dentalina gomphoides* COSTA, 1854, Pal. Nap. 2, t. 27, figg. 24—25.
- » *acuminata* Rss., 1859, Westph. Kreide, Wien. Ak. Sitz.-Ber. 40, p. 181, t. 1, fig. 7.
- » *tenuicaudata* Rss., 1859, *ibid.* p. 182, t. 2, fig. 3.
- » *commutata* Rss., 1859, *ibid.* p. 183, t. 2, fig. 4.
- » *Verneuillii* D'ORB., 1846, For. tert. Vienne, p. 48, t. 2, figg. 7—8.
- » *rotundata* STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 205, t. 22, fig. 33.
- » *pomuligera* STACHE, 1865, *ibid.* p. 204, t. 22, fig. 31.
- » *vagina* STACHE, 1865, *ibid.* p. 206, t. 22, fig. 34.
- » *deformis* STACHE, 1865, *ibid.* p. 205, t. 22, fig. 32.
- » *Haidingeri* NEUGEGB., 1856, For. Stichosteg. Felsö Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 85, t. 3, fig. 12.
- » *aequalis* KARR., 1865, For. Grünsandstein N. Zeeland; Novara Reise, geol. Th. 1. 2, p. 74, t. 16, fig. 1.
- » *aherculea* GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Abh. 1. 10. 2, p. 621, t. 1, fig. 34.
- Marginul. torulosa* COSTA, 1854, Pal. Nap. 2, p. 185, t. 12, fig. 15.
- Dentalina Hörnesi* HKE., 1875, For. Clav. Száb. Schichten p. 37, t. 4, fig. 2 (an *Uvigerina*).
- Spec. indet.* COSTA, 1855, Marna terz. Messina, Mem. Nap. 2, t. 1, fig. 36.
- Spec. indet.* SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrhft. 21, t. 4, fig. 31.
- Dentalina pusilla, bullata, Fraasi* SCHWAG., *ibid.* p. 104, 107, 110, t. 3, figg. 3, 23, 24.
- Nodosaria pauperata* PARK. and JONES, 1865, Nordatl. and Acrt. Oceans; Phil. Trans. 155, p. 342, t. 13, fig. 8—9.

b) magis extenuata; septis horizontalibus:

- Syn. **Nodosaria vermiculum** Rss., 1865, For. deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 133, t. 2, figg. 14—15.
- Dentalina fasciata** SEG., 1862, Rhizopod. d. Catania, Acad. Gioenia Atti (2), 18, p. 12, t. 1, fig. 1.
- » **mutabilis** BAILEY, 1850, Examin. of Soundings; Smithson. Contrib. of knowledge 2, Art. 3, p. 10, fig. 7.
- » **gigantea** HKE., 1875, Clav. Száb. Sch. p. 34, t. 3, fig. 15.
- Nodosaria contorta** COSTA, 1854, Pal. Nap. 2, t. 16, fig. 2.
- Dentalina consobrina** BORNEMANN, 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 323, t. 13, figg. 1—4 (ad monile vergens).
- » **obtusata** Rss., 1851, Tert. Sch. Oberschlesien; Zeitschr. deutsch. geol. Ges. p. 151, t. 8, fig. 1.
- » **indifferens** Rss., 1863, Sept. Thon Offenbach, Wien. Ak. Sitz.-Ber. 1. 48, p. 44, t. 2, figg. 15—16.
- » **communis** PARK. and JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16, p. 453, t. 19, fig. 25.
- » **perversa** NEUGEUB., 1856, For. Stichost. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 80, t. 2, fig. 8.
- Marginul. tenuis** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 326, t. 13, fig. 14.
- Dentalina antenna** CORN., 1848, Nouv. foss. microsc.; Mem. Soc. geol. France (2) 3, p. 250, t. 1, fig. 19.
- » **tenuicollis** Rss., 1855, Kreidegeb. Meklenburg; Zeitschr. deutsch. geol. Ges. 7, p. 267, t. 8, fig. 11; 1865, Kreide am Kanara See; Wien. Ak. Sitz.-Ber. 52, p. 452, fig. 6.
- » **Zsigmondyi** HKE., 1875, Clav. Száb. Sch., p. 32, t. 12, fig. 17.
- » **Reitzi** HKE., ibid. p. 33, t. 13, fig. 6.
- » **glandulifera** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 622, t. 1, fig. 37.
- » **pugiunculus** Rss., 1859, Westphäl. Kreide, Wien. Ak. Sitz.-Ber. 40, p. 183, t. 3, fig. 9.
- » " SCHWAG., 1863, Jurass. Sch., Würtemb. Nat. Ver. Jhrft. 21, p. 111, t. 4, fig. 1.
- » **fliiformis** Rss., 1859, Westphal. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 188, t. 3, fig. 8.
- » **perscripta** EGG., 1857, Miocän. Ortenburg; Leonh. u. Bronns Jhrb. 1857, p. 307, t. 15, figg. 30—31.
- » **pauperata** PARK. and JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16, p. 453, t. 19, fig. 22.
- » **fusiformis** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 621, t. 1, fig. 35.
- Nautilus subarcuatus** MONTAG, 1803, Test. Britan. p. 198, t. 6, fig. 5.
- Dentalina farcimen** (SOLD.) Rss., 1863, For. Crag. d'Anwers, Bull. Ac. Belg. (2). 15. p. 146, t. 1, fig. 18.
- » **communis** D'ORB., 1826, Tabl. meth. Ac. Sc. Nat 7, p. 254, N.o 35.
- » " PARK. and JONES, 1866, Crag. For.; Pal. Soc. 19, p. 58, t. 1, figg. 15—17.
- » **?legumen** Rss., 1845, Böhm. Kreide 1. p. 28, t. 13, figg. 23—24; Kreide. Lemberg. Haid. Nat. Abh. 4. 1, p. 36, t. 1, fig. 14 (in N. legumen vergens).
- » **elegans** D'ORB., 1846, For. tert. Vienne p. 45, t. 1, figg. 52—56.
- » " SCHWAG., 1865, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2., p. 233, t. 6, fig. 68.
- » " HKE., 1875, Clav. Száb. Sch. p. 30, t. 3, fig. 7.
- » **scripta** D'ORB., 1846, For. tert. Vienne p. 51, t. 2, figg. 21—23.
- » **intermedia** HKE., 1875, For. Clav. Száb. Sch. p. 30, t. 3, figg. 4, 8.
- » **Verneuilli** HKE., 1875, ibid. p. 32, t. 3, fig. 9.
- » **Gümbeli** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrft. 21, p. 101, t. 2, fig. 20.
- » **emaciata** Rss., 1851, Sept. Thon von Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 63, t. 3, fig. 9.

- Syn. *Dentalina* **Reussi** NEUGEUB., 1856, For. Stichosteg. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 85, t. 3, figg. 6—7; 17.
- » **Scharbergana** NEUGEUB., 1856, ibid. p. 87, t. 4, figg. 1—4.
- » **nodosa** D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France (2) 4, p. 14, t. 1, figg. 6—7.
- Nodosaria nodosa** Rss., 1845, Böhm. Kreide 1, p. 28, t. 13, fig. 22.
- Dentalina nodosa** COSTA, 1854, Pal. Nap. 2, p. 164, t. 12, fig. 8.
- » **praelonga** COSTA, 1854, ibid. p. 163, t. 12, fig. 21.
- » **abbreviata** COSTA, 1854, ibid. t. 27, fig. 21.
- » **adunca** COSTA, 1855, For. Marna blu' Vaticano; Mem. Nap. 2, p. 117, t. 1, fig. 1.
- » **nepos** COSTA, 1855, ibid. p. 117, t. 1, fig. 2'.
- » **subtilis** HKE., 1875, For. Clav. Száb. Sch. p. 33, t. 3, fig. 13.
- » **gracilis** D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France (2) 4. p. 14, t. 1, fig. 5.
- » " ALTH., 1849, Umgeb. Lemb.; Haid. Nat. Abh. 3. 2, p. 269, t. 13, fig. 27.
- » **spec. indet.** COSTA, Pal. Nap. 2, t. 12, fig. 28.
- Nodosaria gracilis** Rss., 1845, Böhm. Kreide 1, p. 27, t. 8, fig. 6.
- Dentalina acuticauda** Rss., 1851, Sept. Thon von Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 62, t. 3, fig. 8.
- » " Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 45, t. 3, fig. 26.
- Nodosaria peracuta** Rss., 1873, GEINITZ, Elbthalgeb. Sachsen 2, p. 86, t. II. 20, fig. 21.
- Dentalina annulata** Rss., 1850, Kreide Lemberg; Haid. Nat. Abh. 4. 1, p. 26, t. 1, fig. 13.
- Nodosaria** " Rss., 1873, GEINITZ, Elbthalgeb. Sachsen 2, p. 85, t. II. 20, figg. 19—20.
- » **Costai** SCHWAG., 1866, For. Kar-Nikobar; Novara Reise, geol. Th. 2. 2, p. 229, t. 6, fig. 62.
- » **stimulea** SCHWAG., 1866, ibid. t. 6, fig. 57.
- » **fustiformis** SCHWAG., 1866, ibid. p. 228, t. 6, fig. 60.
- » **inarticulata** Rss., 1865, Kreide am Kanara See; Wien. Ak. Sitz.-Ber. 52, p. 451, fig. 5.
- » **laevigata** NILSS., 1827, Petrificata Svecana p. 8, t. 9, fig. 2.
- Dentalina pauperata** D'ORB., 1846, For. tert. Vienne, p. 46, t. 1, figg. 57—58.
- » **communis** subvar. **pauperata** PARK. and JONES, 1866, Crag. For.; Pal. Soc. 19, p. 58, t. 1, figg. 13, 20.
- Dentalina pauperata** BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 324, t. 13, fig. 7.
- Nodosaria approximata** Rss., 1865, deutsch. Sept. Thon, Wien. Ak. Dkschr. 1. 25. 1, p. 134, t. 2, fig. 22.
- » " HKE., 1875, Clav. Száb. Sch. p. 31, t. 3, fig. 5.
- Nodosaria clava** KARRER, 1878, Foram. Luzon; Bolet. Comis. Mapa geol. del España, 7. 2, p. 16, t. E, fig. 11.
- Dentalina plebeja** Rss., 1855, Kreidegeb. Meklenburg; Zeitschr. deutsch. geol. Ges. 7, p. 267, t. 8, fig. 9.
- » **Lorneiana** D'ORB., 1831, For. Craie bl. Paris; Mem. Soc. geol. France (2) 4. p. 14, t. 1, figg. 8—9.
- » " REUSS, 1845, Böhm. Kreidef. 1, p. 27, t. 8, fig. 5 (ad N. monile vergens).
- » **Boueana** D'ORB., 1846, For. tert. Vienne p. 47, t. 2, figg. 4—6.
- » " HKE., 1875, For. Clav. Száb. Sch. p. 34, t. 12, figg. 11, 19 (ad N. monile vergens).
- » **consobrina** D'ORB., 1846, For. tert. Vienne, p. 46, t. 2, figg. 1—3 (ad Nod. monile vergens).
- » " REUSS, 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 45, t. 2, figg. 19—23.
- » " NEUGEUB., 1856, For. Stichost. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 86, t. 3, fig. 15.
- » " PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155, 1, p. 342, t. 16, fig. 3.
- » " HKE., 1875, For. Clav. Száb. Sch. p. 30, t. 3, figg. 3, 10.
- » **affinis communi** GÜMB., Ulmer Cementmerg.; Münch. Ak. Sitz.-Ber. 1, p. 65, t. 1, fig. 6.
- » **spinigera, tenuis** NEUGEUB., 1856, For. Stichost. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 84, 86, t. 3, figg. 16, 14.

c) crassa, oblique septata:

- Syn. *Dentalina declivis*, *turgida*, *conferta*, *mutabilis*, *cylindrica*, *aboleta*, *Quenstedti*, *crenata*, *filocincta*, *aequabilis* SCHWAG., 1863, Jurass. Sch.; Württemberg. Nat. Ver. Jhrft. 21, t. 3, fig. 1; t. 1, figg. 6, 11; t. 2, fig. 19; t. 3, fig. 9; t. 2, fig. 24; t. 3, fig. 28; t. 3, fig. 5; t. 3, fig. 22; t. 3, fig. 25; t. 3, fig. 13; t. 4, fig. 6.
- » *abnormis* Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 46, t. 2, fig. 24.
- Marginul. elongata* Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 28, t. 1, fig. 17.
- Dentalina debilis* HKE., 1875, For. Clav. Száb. Sch. p. 33, t. 13, fig. 10.
- » *hamulifera*, *nana* Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 42, 39, t. 2, figg. 17, 10—18.
- » *contracta*, *tarentina*, *phiala* COSTA, 1854, Pal. Nap. 2, t. 27, fig. 12; t. 13, figg. 12; 20—21.
- » *spec. indet.* COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, t. 1, fig. 35; t. 2, fig. 3.
- » *obliquesutura* STACHE, 1865, Tert. Mergel Whaingar. Hafen, Novara Reise geol. Th. 1. 2, p. 207, t. 22, fig. 36.
- » *colligata* REUSS, 1861, Grünsand, N. Jers.; Wien. Ak. Sitz.-Ber. 1. 44, p. 334, t. 7, fig. 4.
- » *Korynephora* GÜMB., 1869, For. St. Cassian u. Raibl. Sch.; österr. geol. Reichsanst. Jhrb. 19, p. 176, t. 5, fig. 1.
- Marginul. duracina* STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise geol. Th. 1. 2, p. 211, t. 22, fig. 42.
- » *inversa* COSTA, 1854, Pal. Nap. 2, p. 139, t. 12, fig. 16.
- » *nuda* SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrft. 21, p. 119, t. 5, fig. 2 (Nod. legumini propinqua).
- Dentalina conferta*, *Roemeri*, *Orbignyana*, *mucronata* NEUGEBO., 1856, For. Stichost. Ob. Lapugy; Wien. Ak. Dkschr. 1. 12. 2, p. 81, t. 2, fig. 11; t. 2, figg. 13—17; t. 3, figg. 1—3; t. 3, figg. 8—11.
- Marginul. apiculata* Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 28, t. 1, fig. 18.
- Dentalina obliqua*, *arcuata* D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 254, N:ris 36, 38; mod. 5.
- » *intermedia* Rss., 1859, Westph. Kreide; Wien. Ak. Dkschr. 40, p. 186, t. 2, fig. 8.

d) angusta, septis obliquis:

- Dentalina carinata* D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 255, N:o 39.
- » *communis* D'ORB., 1839, Craie bl. Paris; Mem. Soc. geol. France (2) 4, p. 13, t. 1, fig. 4.
- Nodosaria* » REUSS, 1845, Böhm. Kreide 1, p. 28, t. 12, fig. 21.
- » *communis* PARK. and JONES, 1865, North. Atl. and Arct. Oceans; Phil. Trans. 155. 1, p. 342, t. 13, fig. 10.
- Dentalina communis* BRAD., 1876, Carbonif. and Perm. foramf.; Pal. Soc. 30, p. 127, t. 10, figg. 17—18.
- » *spec. indet.* COSTA, 1854; Pal. Nap. 2, p. 171, t. 16, fig. 23.
- » *Ferstliana* CZJZ., 1847, Foramf. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 140, t. 12, figg. 10—13.
- » *badenensis* D'ORB., 1846, For. tert. Vienne, p. 44, t. 1, figg. 48—49.
- » » COSTA, 1854, Pal. Nap. 2, p. 171, t. 16, fig. 23.
- » *spec. indet.* COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, t. 1, figg. 32—33.
- » *cingulata* CZJZ., 1847, Foramf. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 139, t. 12, figg. 8—9.
- » *inornata* D'ORB., 1846, For. tert. Vienne, p. 44, t. 1, figg. 50—51.
- » » REUSS, 1865, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 45, t. 2, fig. 18.
- » *gracilis* COSTA, 1854, Pal. Nap. 2, t. 12, fig. 26 sup.

- Syn **Dentalina elegans** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 323, t. 13, fig. 6.
- » **Böttcheri, obliquata** REUSS, 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 44, 46, t. 2, figg. 17, 25.
- » **budensis, simplex** HKE., 1875, For. Clav. Száb. Sch., p. 33, 34, t. 3, 13, figg. 12, 7.
- » **xiphioides, deflexa** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 43, t. 3, fig. 1; t. 2, fig. 19.
- » **acus** Rss., 1850, Kreidemergel Lemberg; Haid. Nat. Abb. 4. 1, p. 27, t. 1, fig. 15. (an N. legumen).
- » **pygmaea, subtilis, Partschi, subulata** NEUGEBOREN., 1856, For. Sticho. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12, 2, p. 80, t. 2, fig. 9; t. 3, figg. 4, 5, 13.
- » **funiculus, extensa, lutigena, sublinearis, imbecilla, geniculosa, Oppelii, Marginul. procera** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Ver. Jhrft. 21, p. 100—118, t. 2, figg. 18, 21, 22, 25, 26, 27; t. 3, figg. 16—17; t. 5, fig. 1.
- Nodosaria Neugeborni, gracilescens** SCHWAG., 1866, For. Kar-Nikobar; Novara Reise, geol. Th. 2. 2, p. 232, 234, t. 6, figg. 67, 70. (an N. legumen).

Nodosarina communis D'ORB. var. **obliqua** LIN.

Tab. I, figg. 17—19.

The line of distinction between *Nod. obliqua* and *raphanus* is just as faint and untraceable as it is between *Nod. communis* and *radicula*.

Slender varieties of *Nod. raphanus* are not distinguishable from *N. obliqua* but by its bended axis.

Figg. 17—19 come near to *Dent. sulcata* and *acuta* D'ORB., *Dent. polyphragma*, *Zippei* (part.) REUSS, *Nod. stiliformis* SCHWAG. etc.

The strength, distance and number of the ridges, which like finished sculpture adorn the shell, are subject to many degrees of variation. It has some propensity to become quite smooth by age as if returning to *Nod. communis*. Sometimes again it becomes very slightly striated. It is not scarce either on the coralline- or on the chalk-bottom and attains a length of 22 mm.

Fig. 19 represents a more finely ridged or rather finely wrinkled form with globular chambers. It resembles most *Nod. Zippei* (part.) REUSS. from the Bohemian chalk. Those wrinkles become sometime very faint.

a) *crassa*, var. *Raphano proxima*:

- Syn. **Nodosaria substriata, Dentalina cornicula** D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 255, N:ris 46—47.
- Dentalina multicostata** D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. Fr. (2) 4, p. 16, t. 1, figg. 14—15.
- » » BRADY, 1876, Carb. and Perm. foramf.; Pal. Soc. 30, p. 129, t. 10, fig. 19.
- » **Kingi** JONES, 1850, Kings monogr. perm. foss. p. 17, t. 6, figg. 2—3. (sec. BRADY.)
- » » RICHT., 1861, Geinitz Dyas, p. 122, t. 20, fig. 33. (sec. BRADY.)
- » **irregularis** COSTA, 1854, Pal. Nap. 2, p. 166, t. 12, figg. 23, 27.
- » **bifurcata** D'ORB., 1846, For. tert. Vienne p. 56, t. 2, figg. 38—39.
- » » REUSS, 1848, Neue Forf. Österr.; Wien. Ak. Dkschr. 1. 1, p. 367, t. 46, fig. 10.
- » » COSTA, 1854, Pal. Nap. 2, p. 162, t. 12, fig. 27.
- » **Marcki** Rss., 1859, Westph. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 188, t. 2, fig. 7.

b) *obliqua vera*:

- Syn. *Nautilus jugosus* MONTAG, 1803, Test. Brit. p. 198, t. 14, fig. 4.
Nodosarina raphanus var. *Dentalina obliqua* PARK. and JONES, 1866, Crag. For.; Pal. Soc. 19, t. 1, fig. 9.
 » *lineolata* REUSS, 1845, Böhm. Kreide 1, p. 27, t. 8, fig. 8.
Dentalina lineolata PARK. and JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16, p. 453, t. 19, figg. 11—12.
 » *pulchra* GABB., 1859, Am. tert. and cret. foss.; Journ. Philad. Ac. Sc. (2), 4, p. 402, t. 69; figg. 40—41.
Nodosaria nodosa D'ORB., 1826, Tabl. Meth.; An. Sc. Nat. 7, p. 254, N:o 31.
Dentalina elegantissima D'ORB., 1846, For. tert. Vienne p. 55, t. 2, figg. 33—35.
Nodosaria acicula PHIL., 1843, Tert. Versteiner. nordw. Deutschl. t. 1, fig. 33.
Dentalina Konincki Rss., 1860, Crag. Antwerp.; Wien. Ak. Sitz.-Ber. 42, p. 356, t. 1, fig. 3.
 » *microptycha, arcuata* Rss., 1860, Dingd., Westphal.; ibid. p. 364, 365, t. 1, figg. 4—5.
Modosaria costellata, Zippei (partim) Rss., Böhm. Kreidef. 1, p. 27, 25, t. 13, fig. 18; t. 8, fig. 1.
Dentalina baltica Rss., 1855, Kreide Meklenb.; Zeitschr. deutsch. geol. Ges. 7, p. 269, t. 8, fig. 15.
 » *Hörnesi, Beyrichana, Lamarcki* NEUGEBO., 1856, For. Stichost. Ob. Lapugy; Wien. Ak. Dkschr. 1. 12. 2, p. 89, 91; t. 4, figg. 10—11, 16.
Nodosaria acuticosta Rss., 1849, Neue For. Österr.; Wien. Ak. Dkschr. 1. 1, p. 368, t. 46, fig. 11.
 » *acuticosta, bifurcata* BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 325, t. 13, figg. 9—11.
Nodosaria hircicornis SCHWAG., 1866, For. Kar-Nikobar; Novara Reise, geol. Th. 2. 2, p. 230, t. 6, fig. 64.
 » *eximia* KARR., 1868, Mioc. For. Kostey; Wien. Ak. Sitz.-Ber. 1. 58, p. 164, t. 4, fig. 1.
 » *sulcata* NILSSON, 1825, Mångrummiga snäckor i kritformat. i Sverige; K. Vet. Ak. Handl. 1825, p. 341; 1827, Petref. svecana p. 8, t. 9, fig. 19.
 » » REUSS, 1845, Böhm. Kreidef. 1, p. 26, t. 13, fig. 17.
 » » D'ORB., 1839, Craie bl. Paris; Mem. Soc. geol. Fr. (2) 4. p. 15, t. 1, figg. 10—13.
Dentalina multilineata BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 325, t. 13, fig. 12.
 » » Rss., 1873, Gein. Elbthalgeb. Sachsen 2, p. 83, t. II. 20, fig. 13.
 » *pungens* Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 64, t. 3, fig. 13.
 » » HKE., 1875, For. Clav. Száb. Sch. p. 36, t. 4, fig. 3.
 » » GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wissensch. Abh. 1. 10. 2, p. 625, t. 1, fig. 44.
 » *acicularis* COSTA, 1854, Pal. Nap. 2, p. 166, t. 12, fig. 24.
 » *acutissima* Rss., 1855, Kreidef. Meklenb.; Ztschr. deutsch. geol. Ges. 7, p. 268, t. 8, fig. 13.
 » *Steenstrupi* Rss., 1855, Kreidef. Meklenb.; Ztschr. deutsch. geol. Ges. 7, p. 268, t. 8, fig. 14 a.
 » *longicauda* Rss., 1855. ibid. p. 267, t. 8, fig. 12.
 » *polyphragma* REUSS, 1859, Wesphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 189, t. 3, fig. 1.
Nodosaria equisetiformis, acuta, Dentalina Ehrenbergana, fissicostata, Gümbeli, contorta, semilaevis HKE., 1875, For. Clav. Száb. Sch. p. 36—39; t. 2, fig. 11; t. 3, figg. 17, 19, 20; t. 4, figg. 1, 5, 6; t. 12, fig. 13.
Dentalina acuta D'ORB., 1846, For. tert. Vienne p. 56, t. 2, figg. 40—43.
Nodosaria siphunculoides COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 135, t. 2, fig. 27.
 » *stiliformis* SCHWAG., 1866, For. Kar-Nikobar; Novara Reise, geol. Th. 2. 2, p. 233, t. 6, fig. 59.
Dentalina obscura STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 208, t. 22, fig. 37.
 » *paucicostata* COSTA, 1854, Pal. Nap. t. 27, fig. 20.
Nodosaria elegans v. MÜNSTER, 1838; RÖMER, Leonh. u. Bronn Jhrb. 1838, p. 382, t. 3, fig. 1.
Dentalina Münsteri Rss., 1855, Tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 225, t. 1, fig. 8.

- Syn. **Dentalina Schwartzii** KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 705, t. 1, fig. 5.
 » **confluens** Rss., 1861, Grünsand N. Jersey; Wien. Ak. Sitz.-Ber. 1. 44, p. 335, t. 7, fig. 5.
 » **Ehrenbergana, crebricosta** NEUGE., 1856, For. Stichost. Ob. Lapugy; Wien. Ak. Dkschr. 1. 12. 2, p. 90, t. 4, figg. 12—14.
 » **truncana** GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 627, t. 1, fig. 47.
Nodosaria grossecostata COSTA, 1854, Pal. Nap. 2, p. 148, t. 12, figg. 1—3.
Dentalina Cuvieri D'ORB., 1826, Tab. Meth.; An. Sc. Nat. 7, p. 255, N:o 45.
 » **spinosa** D'ORB., 1846, For. tert. Vienne p. 55, t. 2, figg. 36—37.

c) obliquestriata:

- Dentalina obliquestriata** Rss. (partim) 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 63, t. 3, fig. 12.
 » **strigosa** COSTA, 1854, Pal. Nap. 2, p. 168, t. 12, fig. 6.
 » **Geinitziana** NEUGE., 1856, For. Stichost. Lapugy; Wien. Ak. Dkschr. 1. 12. 2, p. 91, t. 4, fig. 15.
 » **divergens** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 456, t. 4, fig. 10.
Nodosarina-Dentalina obliquestriata PARK. and JONES, 1866, Crag. For.; Pal. Soc. 19, p. 56, t. 1, fig. 19.

d) seminuda:

- Nodosaria seminuda** Rss., 1849, Neue For. Österr.; Wien. Ak. Dkschr. 1. 1, p. 367, t. 46, fig. 9.
Dentalina semilaevis HKE., 1875, For. Clav. Szab. Sch. p. 39, t. 12, fig. 13.
 » **Konincki** Rss., 1863, For. Crag. d'Anwers; Bull. Ac. Belg. (2) 15, p. 146, t. 1, fig. 19.
Marginul. corniculum COSTA, 1854, Pal. Nap. 2, p. 186, t. 13, fig. 14.

e) intermittens:

- Dentalina aciculata** D'ORB., 1826, Tabl. Meth.; An. Sc. Nat. 7, p. 255, N:o 41.
 » **flexuosa** D'ORB., 1826, ibid. p. 254, N:o 32.
 » **lineata** Rss., 1864, Oligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 456, t. 4, fig. 11.
Nodosaria filiformis Rss., 1845, Böhm. Kreide 1, p. 28, t. 12, fig. 28.
Dentalina intermittens Rss., 1858, Tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 224, t. 1, fig. 7.
 » **semiplicata, semicostata** D'ORB., 1846, For. tert. Vienne p. 52—53, t. 2, figg. 24—28.
Nodos. subcanaliculata NEUGE., 1856, For. Stichost. Ob. Lapugy; Wien. Ak. Dkschr. 1. 12. 2, p. 87, t. 4, figg. 5—6.
Dentalina interlineata Rss., 1855, Kreidegeb. Meklenburg; Zeitschr. deutsch. geol. Ges. 7, p. 287, t. 11, fig. 2.
 » » MARSSON, 1878, Rügen. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 132, t. 1, fig. 11.
 » **obliquestriata** Rss., 1851 (partim), Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 63, t. 3, fig. 11.
 » **subornata** Rss., 1865, Feuerstein Kreide Kanara See; Wien. Ak. Sitz.-Ber. 52, p. 459, figg. 9—10.
 » **proteus** Rss., 1861, Kreidestuff Maastricht; Wien. Ak. Sitz.-Ber. 44, p. 306, t. 1, figg. 6—9 (in *Nod. raphanum transiens*).

f) tenuissime striata:

- Nodosaria acicula** Rss., 1873, Geinitz' Elbthalgeb. Sachs. 2, p. 82, t. 11. 20, fig. 10.

Nodosarina legumen LIN.

Tab. II, figg. 20—31.

Through such intermediate forms as *Marginulina bullata* Rss., etc., *Nod. legumen* becomes closely connected with *Nod. radricula*. Its great affinity to *Nod. communis* has been mentioned.

The compression of its shell is often very slight. Sometimes it is quite conspicuous during a less adult stage but gives place to a cylindrical form by age. The inclination of the septa to the shells axis is also very variable. But it will still be necessary to retain this Linnean species, as it must be used as are presentative type of those broader forms, on which D'ORBIGNY and others have founded their genera *Marginulina* and *Vaginulina*.

Frondicularia lingua BOLL. is a connecting link between *Nod. legumen* and *Nod. complanata* DEFR.

When in the young state the shell is more or less coiled up to a spiral, intermediate forms to *Nod. crepidula* FICHT. and MOLL are originated.

The pigmy forms of *Nod. legumen* (0,50—1 mm. in length) are not uncommon in the chalk-ooze; the stouter forms (about 12 mm.) occur in the coralline-gravel.

Figg. 20—21 b is *Vagin. lævigata* RÖM. or *Vagin. badenensis* D'ORB.; it is a dwarfish form from the chalk-bottom.

Figg. 22—25: highly developed forms; some with the older chambers compressed and those of later growth cylindrical; some with quite cylindrical chambers through all stages of growth. The shell is thin, nearly transparent and of a silky lustre.

Figg. 26—26 b: peculiar form, approaching *Nod. crepidula*.

Figg. 27—27 b: the same as *Margin. ensis* REUSS and *Margin. lituus* D'ORB. etc. pygmies from the chalk-ooze.

Figg. 28—31: stouter forms from the coralline-gravel.

a) *Nod. Bertheloti* D'ORB. sive *bullata* Rss.

- | | |
|---|---|
| Syn. Margin. bullata | Rss., 1845, Böhm. Kreide 1, p. 29, t. 13, figg. 34—38; 1859, Westphal. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 205, t. 6, figg. 4—6. |
| Margin. pediformis | BORNEMAN, 1855, Sept. Thon Hermsdorff; Ztschr. deutsch. geol. Gesellsch. 7, p. 326, t. 13, fig. 13. |
| » » , subbullata | HKEN., 1875, For. Clavul. Száb. Sch., p. 45, t. 4, figg. 12—13; t. 5, figg. 8—9. |
| » comma | RÖM., 1841, Verstein. Nordd. Kreide, p. 96, t. 15, fig. 15. |
| » Bertheloti | D'ORB., 1844, Iles Canaries, p. 125, t. 1, figg. 12—13. |
| » aculeata, hispida, pustulosa, affinis, agglutinans, echinata | NEUGEB., 1851, For. Felsö Lapugy; Siebenb. Verein. Mittheil. 1851, p. 142, t. 4, figg. 21—25. |
| Crist. (Marg.) spinulosa | KARR., 1877, Hochquell-Wasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 382, t. 16, fig. 34. |
| Marg. variabilis, Ackneriana, erecta, intermedia | NEUGEB., 1851, For. Felsö Lapugy; Siebenbürg. Verein. Mittheil. 1851, p. 133, t. 5, figg. 10—16; 18—19 (in var. <i>lituum</i> vergens). |
| » pauciloculata | HKEN., 1875, For. Clav. Száb. Sch., p. 47, t. 14, fig. 10. |

- Syn. **Margin. infarcta** Rss., 1863, Septarienthon. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 48, t. 3, fig. 36—37.
- » **elongata** Rss., 1845, Böhm. Kreide 2, p. 107; t. 24, figg. 31—36.
- » **deformis, abbreviata, Hauerina, Haidingerina, Czizekiana, inflata** NEUGEBO., 1851, For. Felsö Lapug.; Siebenbürg. Vereiu. Mittheil. 1851, p. 127, t. 5, figg. 3—7, 9.
- » **abbreviata** KARRER, 1861, Marin. Teg. Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 44, p. 445, t. 1, fig. 7.
- Gland. deformis** COSTA, 1854, Pal. Nap. 2, p. 129, t. 11, figg. 16—18; 26.
- Rimulina ventricosa** COSTA, 1854, ibid., p. 177, t. 13, fig. 11.
- Margin. pachygaster** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 633, t. 1, fig. 60.
- » **angistoma** STACHE, 1865, tert. Mergel Whaingar. Hafen, Novara Reise, geol. Theil 1. 2, p. 213, t. 22, fig. 46.
- » **opaca** STACHE, 1865, ibid. p. 214, t. 22, fig. 47.
- » **mucronatula** STACHE, 1865, ibid. p. 215, t. 22, fig. 48.
- Crist. spec. indet.; pisiformis, exigua** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Mitth. Jhrshft. 21, t. 5, fig. 17; t. 6, fig. 9.
- Cristell. incerta** EGG., 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 296, t. 14, figg. 31—33.
- Margin. subcrassa** SCHWAG., 1866, Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 240, t. 6, fig. 82.
- Pseudium ellipticum, simplex** NEUGEBO., 1856, For. Stich. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 99, t. 5, figg. 13—14.
- » » Rss., Friés Modellen N:o 55.
- Gland. elongata, adunca** COSTA, 1854, Pal. Nap. 2, p. 128, t. 11, figg. 23—24.
- Pseudium subovatum** KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 705, t. 1, fig. 7.
- » **Nussdorfense, Crist. (Margin.) humilis, mirabilis, ampla** KARR., 1877, Hochquell. Wasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 379, 382, t. 16, figg. 23, 33, 35; 36.
- b) *Nod. lituus* D'ORB.
- Crist. cephalotes, lituiformis** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 67, t. 7, figg. 5—6; 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 51, t. 4, fig. 50.
- » **Hauerina** D'ORB., 1846, For. tert. Vienne, p. 84, t. 3, figg. 24—25.
- Margin. spinulosa** STACHE, 1865, Tert. Merg. Whaingar. Hafen, Novara Reise, geol. Th. 1. 2, p. 216, t. 22, fig. 50.
- » **crstellarioides** CZJZ., 1847, For. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 140, t. 12, figg. 14—16.
- Crist. gracillima, foeda** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 64, t. 6, figg. 9—10; 11—13.
- Margin. lituus** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 259.
- » **rhomboidea** CZJZ., 1847, For. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 141, t. 12, figg. 21—23.
- » **sublituus** PARK. and JONES, 1860, For. Chellaston; Qu. Journ. geol. Soc. 16, t. 20, fig. 37.
- » **glabra** PARK. and JONES, 1866, Crag. For.: Pal. Soc. 19, p. 69, t. 1, fig. 26.
- Crist. Kressenbergensis** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 638, t. 1, fig. 66 (limbata).
- Margin. lituus** PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 343, t. 13, fig. 14.
- Crist. calcar** var. PARK. and JONES, 1857, For. Coast. of Norway; An. Mag. Nat. Hist. 19, p. 269, t. 10, fig. 1.
- Margin. neglecta** KARR., 1865, Grünsand, Orakey Bay, N. Zeel.; Novara Reise, geol. Th. 1. 2, p. 76, t. 16, fig. 4.

- Syn. **Margin. irregularis, Beierana** GÜMB., 1862, Streitenb. Schwammlag.; Würtemb. Nat. Verein. Jhrft. 1862, p. 220, t. 3, figg. 15—18; 20.
 » **bacillum** Rss., 1845, Böhm. Kreide 8, p. 29, t. 1, fig. 11; 1859, Westphal. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 208, t. 6, fig. 8.
 » **ensis** Rss., 1845, Böhm. Kreide 1, p. 29, t. 12, fig. 13, 26, 27.
 » " Rss., 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 27, t. 1, fig. 16.
 » **gradata** D'ORB., 1839, For. Craie bl. Par.; Mem. Soc. geol. Fr. (2) 4, p. 18, t. 1, figg. 23—24 (limbata).

e) *Nod. glabra* D'ORB. (a præcedente vix discernenda):

- Margin. pedum** D'ORB., 1846, For. tert. Vienne, p. 68, t. 3, figg. 13—14.
Cristell. simplex D'ORB., *ibid.* p. 85, t. 3, figg. 26—29.
 » **glabra** D'ORB., 1826, Tabl. meth.; An. Sc. Nat. 7, p. 259, N:o 6, Mod. N:o 55.
 » **similis, triangularis** D'ORB., 1846, For. tert. Vienne, p. 69, 71; t. 3, figg. 15—16; 22—23.
 » " COSTA, 1854, Pal. Nap. 2, p. 185, t. 16, fig. 18.
 » **regularis** D'ORB., 1846, For. tert. Vienne, p. 68, t. 3, figg. 9—12.
 » **tumida** Rss., 1851, **Böttcheri** Rss., 1863, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 64, t. 3, fig. 14; Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 48, t. 3, figg. 32—35; *ibid.* p. 49, t. 3, fig. 38—42.
 » **recta** HKEN., 1875, For. Clav. Száb. Sch. p. 47, t. 4, fig. 15.
 » **splendens, indifferens, irregularis, budensis** HKEN., *ibid.* t. 4, figg. 11, 14; t. 14, figg. 2—3; 5.
 » **Bachei** BAILEY, 1850, Micr. Examin. of Soundings; Smithson. contrib. knowl. 2, Art. 3, p. 10, figg. 2—6.
 » **tumida** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 632, t. 1, fig. 59.
 » **soluta, inæqualis** Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 1, 40, p. 206, t. 7, fig. 4; t. 7, fig. 3; 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 59, t. 5, fig. 13; t. 6, fig. 8.
 » **subtrigona** SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 240, t. 6, fig. 83.
Cristell. mucronata KARR., 1878, Foramf. Luzon.; Bolet. Comis. Mapa del España, 7. 2, p. 19, t. F, fig. 2.
 » **flaccida, resupinata, megaloccephala, deformis, parallela, rasa** SCHWAG., 1863, Jurass. Sch.; Württemberg. Nat. Verein. Jhrft. 21, pp. 116, 117, 121, 128, t. 4, figg. 27, 28, 29, 30, 34; t. 5, fig. 5; t. 6, fig. 6.
 » **contracta** COSTA, 1854, Pal. Nap. 2, p. 186, t. 13, fig. 10.
Crist. Dewalquei Rss., 1863, For. Crag. d'Anvers; Bull. Ac. Belg. (2) 15, p. 149, t. 2, figg. 22—23.
Margin. dubia (et 15 aliæ) NEUGEB., 1851, For. Felsö Lapug.; Siebenbürg. Ver. Mittheil. 1851, p. 120, tt. 4—5; figg. 1—19; figg. 1, 8.
 » **trilobata** D'ORB., 1839, For. Craie blanc. Par.; Mem. Soc. geol. Fr. (2) 4, p. 16, t. 1, figg. 16—17.
 » **Parkeri, Crist. Schlönbachi, exilis, parallela,** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 59, 64, 66, 67; t. 5, fig. 14; t. 6, figg. 14—15; t. 6, fig. 19; t. 7, figg. 1—2.
 » **calliopsis** Rss., *ibid.* p. 60, t. 5, fig. 16; **Crist. humilis** Rss., *ibid.* t. 6, figg. 16, 17 (limbata).
Crist. Gosæ Rss., 1854, Kreide. Ostalpen; Wien. Ak. Dkschr. 7, p. 67, t. 7, fig. 25 (limbata).
Margin. compressa D'ORB., 1839, Craie bl. Paris; Mem. Soc. geol. Fr. (2) 4, p. 17, t. 1, figg. 18—19.
 » **gladius** PHIL., 1843, Tert. Verstein. n. w. Deutschl., t. 1, fig. 37; Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 232, tt. 2, 3, figg. 31—33; Rss., 1864, Oberoligocän., Wien. Ak. Sitz.-Ber. 1. 50, p. 462, t. 2, figg. 14—17; HKEN., 1875, Clav. Száb. Schicht., p. 51, t. 5, fig. 12 (limbata).

- Syn. **Margin. simplex** KARR., 1861, Marin. Tegel Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 44, p. 445, t. 1, fig. 6.
 » **modesta** Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 207, t. 7, fig. 5.
 » **crassa, mutabilis, lata** CORN., 1848, Nouv. foss. cret.; Mem. Soc. geol. Fr. (2) 3, p. 251, 252, t. 1, figg. 22—25, 26—31; 34—37.
 » **lata** Rss., 1859, Westphäl. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 206, t. 5, fig. 7.
Cristell. lata KARR., 1879, Hochquell. Wasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 383, t. 16, fig. 37.
 » **subarcuata** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 637, t. 1, fig. 64.
Margin. jurassica GÜMB., 1862, Streitenberg. Schwammlager; Würtemb. Nat. Wiss. Ver. Jhrhft. 1862, p. 222, t. 3, figg. 21—22.
Cristell. compressa COSTA, 1854, Pal. Nap. 2, t. 27, fig. 23.
Vagin. denudata. incompta, plana, protosphæra Rss., 1862, Nordd. Hils u. Gault; Wien. Akad. Sitz.-Ber. 1. 46, p. 45, 68, 72; t. 3, fig. 4; t. 3, fig. 5; t. 8, fig. 3; t. 7, fig. 8 (in Vaginulinam s. Planulariam propriam transiens).

d) Vaginulina D'ORB.

- Vaginulina Kochi** var. **lævis** RÖM., 1842, Neue Kreidefor.; Leonh. u. Bronn. Jhrb. 1842, p. 273, t. 7 B, fig. 1.
Planularia longa CORN., 1848, Nouv. foss. microsc. cret.; Mem. Soc. geol. Fr. (2) 3, p. 253, t. 1, figg. 38—39.
 » **costata** CORN., ibid. p. 253, t. 2, figg. 5—8.
Vaginulina elegans D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 257, Mod. 54.
 » **marginulinoides, truncata, arguta, recta, corynota, protosphæra** (alia) Rss., 1862, Nordd. Hils. u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 44, 47, 48, 90, t. 3, figg. 2, 9, 13—15; t. 12, figg. 9—10.
 » **arguta** Rss., 1859, Westphäl. Kreidef.; Wien. Ak. Sitz.-Ber. 1. 40, p. 202, t. 8, fig. 4.
 » **transversalis, bicostulata** Rss., 1859, ibid. t. 8, figg. 3, 5.
 » **ligata** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 457, t. 1, fig. 11.
Vaginulina Geinitzi REUSS, 1873, Geinitz, Elbthalgeb. Sachs. 2, p. 91, t. II. 20, fig. 1.
 » **costulata** Rss., ibid. t. II. 20, fig. 24.
Margin. costulata REUSS., 1845, Böhm. Kreide 1, p. 28, t. 13, fig. 25.
Vaginulina costulata RÖM., 1842, Neue Kreidefor.; Leonh. u. Bronn., Jhrb. 1842, p. 273, t. 7 B, fig. 3, a. b. c. (in N. legumen typicam transgrediens.)
 » **italica** COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 143, t. 2, fig. 15 (semistriata).
 » **Bruckenthali** NEUGEGB., 1856, For. Stichosteg. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 98, t. 5, fig. 10.

e) Nod. legumen propria s. Nod. lævigata RÖM.; elongata D'ORB.

- Nautilus legumen** MONTAGU, 1808, Test. Britan. Supplem. p. 82, t. 19, fig. 6.
Dentalina legumen WILLIAMS., 1858, Rec. For. p. 22, fig. 45.
Vaginulina caudata D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 258, N:o 8.
 » **badenensis** D'ORB., 1846, For. tert. Vienne, p. 65, t. 3, figg. 6—8.
 » **»** NEUGEGB., 1856, For. Stichosteg. Ob. Lapugy; Wien. Ak. Dkschr. 1. 12. 2, p. 98, t. 5, figg. 7, 9.
 » **subulata** EHRENB., 1854, Microgeol., t. 24, fig. 10.
 » **lævigata** RÖM., 1838, Leonh. u. Bronn. Jhrb. 1838, p. 383, t. 3, fig. 11.
 » **»** Rss., 1855, Tert. Schicht. nordl. u. mittl. Deutschl., p. 226, t. 1, fig. 9.
Margin. gracilis CORN., 1848, Nouv. foss. microsc.; Mem. Soc. geol. Fr. (2) 3, p. 252, t. 1, figg. 32—33.
 » **elongata** D'ORB., 1839, Craie bl. Paris; Mem. Soc. geol. Fr. 4, p. 17, t. 1, figg. 20—21.

- Syn. **Marginulina elongata** Rss., 1845, Böhm. Kreide, 1, p. 29, t. 13, fig. 28—32; 2, p. 107, t. 24, fig. 36.
- Cristell. luna** KARR., 1868, Mioc. For. Faun. Kostež; Wien. Ak. Sitz.-Ber. 1. 58, p. 171, t. 4, fig. 6.
- Marginulina Römeri** Rss., 1845, Böhm. Kreide. 1, p. 28, t. 8, fig. 10.
- » **Beyrichi** Rss., 1855, Tert. Schicht. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 226, t. 1, fig. 10.
- Vaginulina cretæ** EHRENB., 1854, Microgeol., t. 24, fig. 8.
- » **bullosa** EHRENB., ibid. t. 24, fig. 9.
- Cristellaria perprocera** SCHWAG., 1866, For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 241, t. 6, fig. 84.
- Marginulina linearis, Cristell. linearis** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 60, t. 5, fig. 15; t. 12, fig. 1.
- Vaginulina recta** KARR., 1865, Tert. Grünsand, Orakey Bay; Novara Reise, geol. Theil 1. 2, p. 74, t. 16, fig. 2 (limbata).
- Marginulina obliqua** Rss., 1853, Kreidef. Ostalp.; Wien. Ak. Dkschr. 7, p. 65, t. 25, fig. 9 (limbata).
- Vaginulina legumen** PARKER and JONES, 1860, For. Chellaston; Qu. Journ. geol. Soc. 16, p. 453, t. 19, fig. 26—28.
- Nodosaria legumen** Rss., 1845, Böhm. Kreide 1, p. 28, t. 13, fig. 24.
- » » Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 187, t. 3, fig. 5.
- Vagin. legumen** subvar. **lævigata** PARK. and JONES, 1866, Crag. Foranf.; Palæont. Soc. 19, p. 66, t. 4, fig. 9.
- Dentalina marginulinoides** Rss., 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 25, t. 1, fig. 12.
- » **æquivoca** COSTA 1854, Pal. Nap. 2, p. 170, t. 13, fig. 8.

f) in *Nod. crepidulam transiens*:

- Cristellaria cœlata** SCHWAG., 1866, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 244, t. 7, fig. 88.
- » **Kochi** Rss., 1865, Sept. Thon Deutschl.; Wien. Ak. Dkschr. 1. 25. 1, p. 139, t. 2, fig. 35.
- » » HKEN., 1875, For. Clav. Szab. Sch., p. 53, t. 5, fig. 7.
- » **propinqua** HKEN., ibid. p. 52, t. 5, fig. 4.
- Hemicristellaria infrapapillata, verrucosa** STACHE, Mergel d. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 224, 226, t. 22, fig. 4; t. 23, fig. 5.
- Marginulina Hochstetteri** STACHE, ibid. p. 221, t. 22, fig. 55.

g) in *Nod. complanatam* DEFR. *transiens*:

- Frondicul. ensiformis** RÖM., 1838, Nordd. tert. Meeressand; Leonh. u. Bronn. Jhrb. 1838, p. 382, t. 3, fig. 8.
- » **lingua** BOLL, BRÜCKNER, 1846, Ostseeländern, p. 177, t. 2, fig. 12.

Nodosarina legumen LIN. var. **linearis** MONTAGU.

Tab. II, fig. 32—35.

This variety is not generally provided with broad and prominent ribs, but it will be impossible to define it from such forms, represented, as they are, by *Marginulina raphanus* D'ORB. with very few and strong ribs.

It is often quite cylindrical and hardly to be distinguished from *Nod. communis* var. *obliqua*. It has also its *forma obliquistriata*, which has been considered as a feature of specific importance. It has also its *forma seminuda* and *intermittens* with many names, as *Frondioul. seminuda* Rss., *Marg. granitocalcareo* GÜMB., *Marg. vaginella* Rss. etc.

Fig. 32 represents a stout, quite cylindrical nicely striated form with a strong affinity to *Nod. communis* var. *obliqua*; from the coralline-gravel.

Fig. 33 is near to *Marg. raphanus* D'ORB. but is finer costate than this. Sometimes in our form the costæ are interrupted, becoming like chains of raised dashes. It is somewhat obliquely costulated, which is not uncommonly the case with all striated forms of *Nodosarina*-genus.

Figg. 34—35 is near to or perhaps identical with *Robulina ariminensis* D'ORB.; which also may be considered as the »raphanus»-form of *Nodosaria calcar* LIN.

a) *Nod. Raphano propinqua*:

- Syn. **Margin. Raphanus, subtiluus** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 258, N:o 1, Mod. N:o 6; t. 10, figg. 7—8, p. 259, N:o 9.
- Nautilus costatus** BATSCH., 1791, Sechs Kupfertaf. t. 1, fig. 1a—1g. (sec. PARK. and JONES.)
- Marg. rugoso-costata** D'ORB., 1846, For. tert. Vienne, p. 70, t. 3, figg. 19—21.
- Vaginul. linearis** (MONTAGU) PARK. and JONES, 1865, For. N. Atl. and Arct. Oceans; Phil. Transact. 155. 1, p. 343, t. 13, fig. 12—13; t. 16, fig. 1.
- Nodosarina raphanus marginuloidea** PARK. and JONES, 1866, Crag. For.; Pal. Soc. 19, p. 71, t. 1, fig. 21.
- Crist. subarcuatula** var. **costata** (partim) WILLIAMS., 1858, Brit. rec. For. p. 31, fig. 63.
- Margin. tenuissima, Jonesi, Mülleri, striatocostata, dispar, robusta, turgida** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 61—63, t. 5, figg. 18—19; t. 6, figg. 1—2, 4, 7.
- Nodosaria lævipipes** MARSS., 1878, Rüg. Schreibebr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 130, t. 1, fig. 6.
- Margin. corticulata, spec. indet., Crist. sculptilis** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrhft. 21, p. 118, 129, t. 4, fig. 32; t. 7, fig. 23; t. 6, fig. 10.
- Dentalina gibbosa, Margin. interamniæ** COSTA, 1854, Pal. Nap. 2, p. 167, 184, t. 12, fig. 7; t. 13, fig. 9.
- Vagin. sulcata** COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 145, t. 2, fig. 17.
- Margin. interrupta, apiculata, pellucida, tricuspis, asprocostulata, elatissima** STACHE, 1865, tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 212, 216—219, t. 22, figg. 45, 49; 51—54.
- ” **costata, rugosa** NEUGEUB., 1856, For. Stichosteg.; Wien. Ak. Dkschr. 1. 12. 2, p. 98, t. 5, fig. 11; 1851: Siebenb. Verein. Mittheil. t. 4, fig. 20.
- ” **raricosta** D'ORB., 1839, For. Craie blanche Paris; Mem. Soc. geol. Fr. 4, p. 51, t. 1, fig. 25.
- ” **tunicata** HKEN., 1875, Clav. Száb. Sch., p. 48, t. 14, fig. 8.
- ” **serratocostata** GÜMB., 1862, Streitenberg. Schwammlager; Würtemb. Verein. Jhrhft. 17, p. 222, t. 3, fig. 23.
- Cristell. crassicosta** KARR., 1870, Kreidef. Leitzendorf; Österr. geol. Reichsanst. Jhrb. 20, p. 177, t. 11, fig. 8.

β) obliquestriata:

Syn. **Margin. obliquestriata** KARR., 1861, Mar. Tegel Wien. Beck.; Wien. Ak. Sitz.-Ber. 1, 44, p. 446, t. 1, fig. 8.

γ) crenulato-costata, vel papillato-limbata:

- Nautilus semilituus** MONTAGU, 1808, Testac. Brit. Suppl., p. 80, t. 19, fig. 3.
Cristell. Behmi Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25, p. 138, t. 2, fig. 37. (Margin. hirsutæ D'ORB., 1846, For. tert. Vienne, t. 3, figg. 17—18, valde propinqua).
Margin. Behmi, arcuata, fragaria HKEN., 1875, Clav. Száb. Sch., p. 48, 51, 53, t. 5, figg. 1—2; t. 14, fig. 6; t. 5, fig. 10; t. 6, figg. 1—3.
 » **rugoso-striata, fragaria, coronata, asperula, cumulicostata** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 633—638, t. 1, figg. 57—58; 61; 65; 67.

δ) seminuda:

- Nautilus linearis** MONTAGU, 1808, Test. Brit. Suppl. p. 87, t. 30, fig. 9.
Dentalina legumen var. **linearis** WILLIAMS., 1858, Brit. rec. For. p. 23, figg. 46—48.
Vaginulina lens COSTA, 1855, Marna terz. Mess.; Mem. Nap. 2, p. 144, t. 2, fig. 16.
Nodosarina Vaginulina legumen, subv. **linearis** PARK. and JONES, 1866, Crag. forf.; Pal. Soc. 19, p. 67, t. 1, figg. 10—12.
Margin. tenuissima var. Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 92, t. 12, fig. 12.
 » **seminotata** Rss., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 1. 40, p. 208, t. 5, fig. 6.
 » **semicostata** Rss., 1851, Tert. Sch. Ob. Schles.; Ztschr. deutsch. geol. Gesellsch. 3, p. 152, t. 8, fig. 3.
 » **vaginella** Rss., 1851, Tert. Sch. Oberschles.; Ztschr. deutsch. geol. Gesellsch. 3, p. 152, t. 8, fig. 2.
 » **tonsillaris, granitocalcareia** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 634, t. 1, figg. 56; 62.
Fronde. seminuda Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 65, t. 3, fig. 15—16.

b) magis complanata (= Vaginulina, Planularia D'ORB.).

- Vagin. striata** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 257, N:o 3.
 » » COSTA, 1854, Pal. Nap. 2, p. 182, t. 16, fig. 17.
 » **angustissima** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 45, t. 3, fig. 3.
Fronde. tricostulata Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 368, t. 46, fig. 12.
Flabell. striata HKEN., 1875, Clav. Száb. Sch., p. 43, t. 13, fig. 13.
 » **ensiformis** Rss., 1863, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 460, t. 5, fig. 2.
Crist. subarcuatula var. **costata** WILLIAMS, Brit. rec. Forf.; p. 31, figg. 64—67.
Marg. flabellata GÜMB., 1862, Streitenb. Schwammag.; Würtemb. Nat. Verein. Jhrhft. 17, p. 223, t. 3, fig. 24.

- Syn. **Vagin. eocæna, dilute-striata** GÜMB., 1868, For. Nordalp. Eocæn.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 632, 639, t. 1, fig. 49; fig. 69.
- » **harpa** RÖM., 1842, Verstein. Nordd. Kreidegeb. p. 96, t. 15, fig. 12.
- » **Dunkeri** KOCH, Palæontogr. 1. 4, p. 172, t. 24, fig. 3.
- Planulina reticulata** CORN., 1848, Nouv. foss. micr. Mem. geol. France (2) 3, p. 253, t. 2, fig. 1—4.
- Vagin. striatula** RÖM., 1842, Neue Kreideforamf.; Leonh. u. Bronn. Jhrb. 1842, p. 273, t. 7 B, fig. 2.
- Citharina strigillata** Rss., 1845, Böhm. Kreidef. 2, p. 106, t. 24, fig. 29.
- Vagin.** » PARK. and JONES, 1860, For. Chellast., Qu. Journ. geol. Soc. 16, p. 453, t. 19, fig. 29; t. 20, figg. 31—36.
- » **acuminata, orthonota, cristellaroides** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 48, 49, t. 4, figg. 1, 3; t. 3, fig. 17.
- » **discors, intumescens** Rss., ibid. t. 3, figg. 10—12; t. 4, fig. 2.
- » **sparsicostata, harpa, paucicostata, incrassata** Rss., ibid., p. 50—52, t. 4, figg. 4—9.
- » **notata** Rss., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 1. 40, p. 203, t. 9, fig. 3.

b. β) interlineata:

- Vagin. Zeuschneri** Rss., 1850, Kreidemergel Lemberg; Haid. Nat. Abh. 4. 1, p. 28, t. 1, fig. 19.
- » **Schlönbachi, striolata, Strombecki, paucistriata** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 46—48, t. 3, figg. 6—8; 16.

b. γ) seminuda.

- Planularia Cymba, Auris, rostrata** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 260, N:ris 4, 5, 7, t. 10, fig. 9; Mod. 27 (in *N. crepidulam vergens*).
- Fronde pulchra** D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France 4, p. 25, t. 2, figg. 12—14.
- Crist. compressa, lanceolata, semiluna** D'ORB., 1846, For. tert. Vienne, p. 86, 89, 90, t. 3, figg. 32—33; 41—44 (in *N. crepidulam vergens*).
- » **auricula** Rss., 1855, tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 235, t. 3, fig. 38.
- Fronde interrupta, longiuscula, typica, lanceolata, angustata, similis, ovata, subangulata, subfalcata, silicula** COSTA, 1855, Marna terz. Messina, Mem. Nap. 2, p. 372, 373; t. 2, figg. 25—26; t. 3, figg. 5, 7, 9, 11, 12, 14, 16, 17, 19, 20.
- Cristell. vaginata** KARRER, 1878, Foramf. Luzon; Bolet. Comis. Mapa geolog. del España 7 2, p. 18, t. F, fig. 1.

c) frondicularioidea:

- Flabellina ensiformis** Rss., 1855, Tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 229, t. 2, figg. 23—24.
- » **obliqua** Rss., (partim) ibid., t. 2, figg. 20—22; 1864, Oberoligocæn.; Wien. Akad. Sitz.-Ber. 1. 50, p. 460, t. 2, figg. 5—7.

Appendix.

Nodosarina (Fronicularia) striata D'ORB.

- Syn. **Frond. angusta, angustissima, lanceola** Rss., 1859, Westph. Kreide; Wien. Ak. Sitz.-Ber. 1. 40, p. 196—198, t. 4, figg. 5—6; t. 5, fig. 1.
- Flabellina cuneata** Rss. 1855, Tert. Sch. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 231, t. 2, fig. 29.
- ” ” Rss., 1864, Oberoligoc.; Wien. Ak. Sitz.-Ber. 1. 50, p. 460, t. 2, fig. 8.
- ” ” BRADY, 1881, Notes on retic. Rhizop.; Qu. Journ. micr. Sc. (n. s.) p. 271, t. 8, fig. 7.
- Frond. Antonina** KARR., 1878, Foramf. Luzon.; Bolet. Comis. Mapa geol. del España 7. 2, p. 17, t. E, fig. 14.
- ” **striata** D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 256, N:o 3.
- ” **angusta** Rss., 1845, Böhm. Kreide 1, p. 29, t. 8, figg. 13 (non fig. 14).
- ” **trisolca, striatula, apiculata** Rss., 1845, Böhm. Kreide 1, p. 30, t. 8, figg. 22—24; t. 43, fig. 11.
- ” d:o Rss., 1873, GEIN., Elbthalgeb. Sachsen, 2, p. 94, t. II. 20, fig. 2.
- ” **striatula** PARK. and JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16, t. 19, figg. 16—18.
- ” **capillaris** Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 29, t. 1, fig. 20.
- ” **pala** KARR., 1870, Kreid. Leitend. Jahrb. k. k. österr. geol. Reichsanst. 20, p. 172, t. 10, fig. 11.
- ” **multilineata** Rss., 1853, Kreide Ostalp.; Wien. Ak. Dkschr. 7, p. 66, t. 25, fig. 5.
- ” **Reussi, sculpta, badenensis, paupera** KARR., 1861, Marin. Tegel Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 44, p. 441, 443, t. 1, fig. 1—4.
- ” **tricuspis** Rss., 1849, Neue for. österr. tert. Becken; Wien. Ak. Dkschr. 1. 1, p. 368, t. 46, fig. 13.
- ” **Hörnesi, Lapugyensis, speciosa** NEUGEB., 1856, For. Stichost. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2. p. 93, t. 5, fig. 1—4.
- ” **inversa** Rss., 1873, GEIN., Elbthalgeb. Sachs. 2, p. 94, t. II. 21, figg. 5—7.
- ” **concinna** KOCH, Palæontogr. 1. 4, p. 172, t. 24, fig. 5.
- ” ” Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 54, t. 4, fig. 13.
- ” **foliola** KARR., 1868, Mioc. Forfauna Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 167, t. 4, fig. 4.
- ” **interrupta, superba, sculpta** KARR., 1877, Hochqu. Wasserl.; österr. geol. Reichsanst. Abh. 9, p. 380, 381, t. 16, fig. 27, 29, 30.
- ” **solea** v. HAG., 1842, Rügen. Kreideverst.; Leonh. u. Bronn. Jhrb. 1842, p. 569, t. 9, fig. 20.
- ” **solea, multistriata, linguæformis, affinis** MARS., 1877, Rügen. Schreibekr.; Greifswald. Nat. Verein. Mittheil. 1877—78, p. 133—136, t. 2, figg. 12—15.

β) seminuda et interlineata:

- Frond. intermittens** Rss., 1865, Feuersteinkreide Kanara See; Wien. Ak. Sitz.-Ber. 52, p. 460, fig. 11.
- ” **guestphalica, Becksi, strigillata** Rss., 1859, Westphal. Kreid.; Wien. Ak. Sitz.-Ber. 40, p. 192, 195, t. 6, figg. 2—4.
- ” **semicosta, raricosta** KARR. 1877, Hochqu. Wasserleit.; k. k. österr. geol. Reichsanst. Abh. 9, t. 16, figg. 26, 28.
- ” **Dumontana** Rss., 1860, Crag. Antwerp; Wien. Ak. Sitz.-Ber. 42, p. 359, t. 1, fig. 7.
- ” **cuneata** RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 383, t. 3, fig. 10.
- ” **elongata, spatulata** COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 371, t. 3, fig. 1, t. 2, fig. 19.
- ” **lævigata** KARR., 1868, Mioc. Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 167, t. 4, fig. 3.
- ” **sulcata** BORNEM., 1854, Liasform. Göttingen p. 37, t. 3, fig. 22.

Syn. Fron. striata	RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 382, t. 3, fig. 9.
Flabell. »	Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 230, t. 2, figg. 25—28.
Fron. microsphaera	Rss., 1873, Gein. Elbthalgeb. Sachs. 2, p. 94, t. II. 21, fig. 4.
Planularia elliptica	NILSS., 1827, Petref. Svec., p. 11, t. 9, fig. 21.
? Fron. Cordai	Rss., 1845, Böhm. Kreide. 1, t. 8, figg. 26—28; 2, t. 24, fig. 38.
Fron. Cordai	Rss., ibid. t. 13, fig. 41.
»	Rss., 1859, Kreideg. Ostalp.; Wien. Akad. Sitz.-Ber. 7, t. 25, fig. 3, p. 66.
» speciosa	KARR., 1870, Kreidef. Leitzendorf; Jhrb. k. k. österr. geol. Reichsanst. 20, p. 175, t. 11, fig. 6.
» radiata	D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France 4, p. 19, t. 1, figg. 26—28.
» Hosiusi	Rss., 1860, For. Dingden. Westphal.; Wien. Ak. Sitz.-Ber. 42, p. 365. t. 1, figg. 8—9.
» annularis	D'ORB., 1846, For. tert. Vienne, t. 2, figg. 44—47.

Nodosarina Crepidula FICHT. and MOLL.

Tab. II, III, figg. 36—44.

This species constitutes a link between *Nod. legumen* and *Nod. calcar*. Our long list of synonyms shows how steadily and gradually this transformation goes on. It does not attain any high development either on the coralline-gravel or on the chalk-bottom, and remains a dwarf in comparison with the allied *Nod. calcar* from the same localities.

Fig. 36—37 comes near to *Crist. cymboides* D'ORB., *Crist. nummulitica* GÜMB. and others with a very slight helicoid arrangement of the first chambers. It is not possible to distinguish such pigmy forms from some forms of *Nod. complanata* DEFR. in their earliest stage of growth.

Fig. 38, more inflated and irregular in growth, is called *Crist. subarcuatula* (WALK.) by WILLIAMSON loc. cit.

Fig. 39, stouter with some remaining features of *Nod. legumen*.

Fig. 40 »*aulostoma*»-form.

Figg. 41—42, pygmies from the chalk-bottom.

Fig. 43, the same with a peculiar arrangement of the first chambers.

Fig. 44, (tab. II) broad carinated form with a strong affinity to *Nod. calcar*., from the coralline-gravel.

a) *Nod. legumini proxima*, vix distincta:

Syn. Margin. vagina	NEUGEB., 1856, For. Stich. Ob. Lapug.; Wien. Ak. Dkschr. 1. 12. 2, p. 103, t. 5, fig. 12.
Cristell. recta, limbata	Rss., 1845, Böhm. Kreidef. 1, t. 13, fig. 55, 56.
» Hagenowi, tripleura, harpa, inepta	Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 210, 211, t. 9, figg. 5—6; t. 10, figg. 1—2, 4.
Cristell. Köneni	Rss., 1865, deut. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 139, t. 3, fig. 1.
» vaginalis	Rss., 1863, Sept. Thon. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 50, t. 4, fig. 49.
» major, deformis	BORNEM., 1854, Liasform. Göttingen p. 40, 41, t. 4, figg. 31, 35.

- Syn. **Cristell. intermedia** Rss., 1845, Böhm. Kreidef. 1, p. 33. t. 13, figg. 57—58; 2, p. 108, t. 24, figg. 50—51.
- » **dilecta** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 71, t. 7, fig. 12 (limbata).
- Hemicrist. procera, excavata, Hemirob. compressa** STACHE 1865, Tert. Mergel d. Whaingar. Haf.; Nov. Reise, geol. 1, 2. p. 222, 224, 229, t. 23, fig. 1, 3, 8.
- Cristell. æquilata** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50. p. 462, t. 2, fig. 13.
- » **manubrium** SCHWAG. 1863, Jurass. Sch.; Würtemb. Nat. Verein Jhrsheft. 21, p. 121, t. 5, fig. 6.
- Cristell. porvaensis, minuta, elegans** HTKEN., 1875, For. Clav. Száb. Schicht., p. 50, 88, t. 14, figg. 1, 7, 4.
- » **conferta** Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 50, t. 4, fig. 46.
- » **inclinata, increscens** Rss., 1863, ibid. p. 50 t. 4, figg. 45; 47—48.
- » **incurvata, perobliqua** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 66, 67, t. 6, fig. 18; t. 7, fig. 3.
- » **hastata** KARR., 1878, Foramf. Luzon.; Bolet. Comis. Mapa geol. del España 7. 2, p. 20, t. F, fig. 4.

b) magis typica:

- Nautilus crepidula** FICHT. and MOLL., 1803, Test. micr. p. 107, t. 19, figg. g—i.
- Cristell. cymboides** D'ORB., 1846, Bass. tert. Vienne, p. 86, t. 3, figg. 30—31.
- » » HTKEN., 1875, Clav. Száb. Sch. p. 49, t. 5, fig. 3.
- » **nummulitica** GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2. p. 636, t. 1, fig. 63.
- » » HTKEN., 1875, Clav. Száb. Sch. p. 51, t. 6, fig. 4.
- » **dentata** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 348, t. 1, fig. 1.
- » **insolita** SCHWAG., 1866, For. Kar-Nikobar; Nov. Reise, geol. Th. 2, 2, p. 242, t. 6, fig. 85.
- Vagin. laminæformis** GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. 1, 10. 2, p. 632, t. 1, fig. 48.
- Cristell. angusta** Rss., 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 32, t. 2, fig. 7.
- Margin. triangularis** COSTA, 1855, For. Marna blu d. Vaticano; Mem. Nap. 2, p. 119, t. 1, fig. 9.
- Cristell. spongiphila** GÜMB., 1862, Streitenb. Schwammag.; Würtemb. Nat. Verein. Jhrhft. 17, p. 224, t. 3, fig. 26.
- Margin. Webbiana** D'ORB., 1844, Iles Canaries, p. 124, t. 1, figg. 7—11.
- Cristell. denticulata** Rss., 1845, Böhm. Kreidef. 1, p. 33, t. 8, fig. 12.
- » **recta** D'ORB., 1839, Craie bl. Paris; Mem. Soc. geol. Fr. 4, p. 28, t. 2, figg. 23—24.
- » **cornucopiæ, ?complanata** SCHWAG., 1863, Jurass. Sch., Würtemb. Nat. Ver. Jhrhft. 21, t. 1, figg. 5—7; t. 5, fig. 8.
- Margin. compressa, Cristell. complanata** Rss., 1845, Böhm. Kreidef. 1, p. 29, 33, t. 13, figg. 33, 54.
- Cristell. complanata** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 92, t. 12, fig. 13 (limbata).
- » **compressiuscula** MARSS., 1877, Rüg. Schreibeckr.; Greifsw. Nat. Verein. Mittheil. 1877—78, p. 142.
- » **crepidulæformis** GÜMB., 1871, Ulmer Cem. Mergel; Münch. Ak. Sitz.-Ber. 1, p. 66, t. 1, fig. 11.
- » **Fraasi** SCHWAG., 1863, Jurass. Schicht.; Würtemb. Nat. Verein. Jhrhft. 21, p. 123, t. 5, fig. 10.
- » **tensa, subcompressa, spicula, irretita, amygdaloidea, laminosa, inclusa, serrigibbosa, subscalprata, insecta, impleta, multangulosa, implicata, turgida, subangulata, suprajurassica, lanceolata, Gumbeli, cristata, comptula, Alberti, collarifera** SCHWAG., 1863, ibid. t. 5, figg. 4, 9, 11, 12, 13, 14, 15, 16; t. 6, figg. 1, 2, 3, 5, 7, 11, 12, 13, 14, 18, 19, 20; t. 7, fig. 24.
- Planularia crepidularis** RÖM., 1842, Neue Kreidef.; Leonh. u. Bronn. Jhrb. 1842, p. 273, t. 7 B, fig. 4 (in N. legumen vergens.)
- Cristell. varians** BORNEM., 1854, Liasform. Göttingen p. 41, t. 4, figg. 32—34.

- Syn. **Cristell. Fraasi** GÜMB., 1871, Ulm. Cem. Mergel; Münch. Ak. Sitz.-Ber. 1, p. 67, t. 1, fig. 12.
 » **reniformis** D'ORB., 1846, For. tert. Vienne p. 88, t. 3, figg. 39—40.
Nautilus subarcuatulus MONTAGU, 1808, Test. Brit. Suppl. p. 80, t. 19, fig. 1 (limbata).
Margin. s. potius Planularia spirata, arcuata, compressiuscula, intermedia, semicircularis
 PHIL., 1843, Tert. Verstein. n. w. Deutschl. t. 1, figg. 27—29, figg. 38—39.
Cristell. arcuata, arguta, Nauckana Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 233, 235, t. 3, figg. 34, 37—40 (limbata).
 » **arcuata** Rss., 1864, deutsche Oberoligoc.; Wien. Ak. Sitz.-Ber. 1. 50, p. 463, t. 2, figg. 9—11.
 » **voluta** CORN., 1848, nouv. foss. microsc. cret.; Mém. Soc. geol. France (2) 3, p. 255, t. 2, figg. 14—16.
 » **Schwageri** HKEN., 1875, Clav. Száb. Sch. p. 49, t. 5, fig. 11.
 » **Bertheloti** D'ORB., 1844, Iles Canaries p. 127, t. 1, figg. 14—15 (in *Nod. legumen vergens*).
 » **laevigata** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 92, t. 12, fig. 14 (in *N. legumen vergens*).
 » **crepidula** D'ORB., 1839, Cuba p. 41, t. 8, figg. 17—19.
 » **crepidularis** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 69, t. 7, fig. 10 (limbata).
 » **tricarinnella** Rss., 1862, *ibid.* p. 68, t. 7, fig. 9; t. 12, figg. 2—4 (limbata).
Planularia orbiculata RÖM., 1842, Neue Kreidefor.; Leonh. u. Bronn. Jhrb. 1842, p. 273, t. 7 B, fig. 6.
Cristell. truncana GÜMB., 1868, For. nordalp. Eocän.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 639, t. 1, fig. 68.
 » **subarcuatula** WILLIAMS., 1859, Brit. rec. Foramf., p. 30, figg. 56—62.
 » **calcar** var. **oblonga** WILLIAMS., 1859, *ibid.* p. 28, fig. 55.
 » **Strombecki, grata** Rss. 1862, Nordd. Hils u. Gault, Wien. Ak. Sitz.-Ber. 1, 46, p. 68, 70, t. 7, figg. 7, 14.
 » **intermedia** ALTH., 1849, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 267, t. 13, fig. 23.
 » **multiseptata** Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4, 1, p. 33, t. 2, fig. 9.
 » **Jugleri** Rss., 1851, Ztschr. deutsch. geol. Ges. 3, p. 89, t. 4, fig. 19.
 » **crepidula** PARK. and JONES, 1865, N. atl. and Arct. Oc., Phil. Trans. 155. 1, p. 344, t. 13, figg. 15—16; t. 16, fig. 4.
 » **decorata** Rss., 1855, Kreidegeb. Meklenburg; Zeitschr. deutsch. geol. Ges. 7, p. 269, t. 8, fig. 16; t. 9, figg. 1—2 (limbata).
Planularia crepidula D'ORB., **Cristell. elongata, bilobata** D'ORB., 1826, Tabl. meth. Ann. Sc. Nat. 7, p. 260, N:o 6; p. 292, N:ris 11, 12.
 » **Auris** D'ORB. 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 260, N:o 5.
Cristell. Soldani D'ORB., 1826, *ibid.* p. 291, N:o 4.
 » **plana** Rss., 1862, Nordd. Hils u. Gault 1. 16, p. 72, t. 8, fig. 3.
 » **cassis** D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 290, N:o 3, Mod. 83; 1846, For. tert. Vienne, p. 91, t. 4, figg. 4—7.
Planularia auricula v. MÜNST.; RÖMER, 1838, Nordd. tert. Meeressande; Leonh. u. Bronn. Jhrb. 1838, p. 383. t. 3, fig. 12.
 » **Bronni** PARK. and JONES, 1860, For. Chellaston; Qu. Journ. geol. Soc. 16, t. 20, fig. 40.
Cristell. foliacea MARSS., 1877, Rüg. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 143, t. 2, fig. 18.
 » **Jurassica, alata** GÜMB., 1862, Streitberg. Schwammlag.; Württemb. Nat. Verein. Jhrhft. 1862, p. 224, t. 3, fig. 25; p. 226, t. 4, fig. 1.
 » **pauperata?** GÜMB., 1869, Cassian u. Raibl. Schicht.; Österr. geol. Reichsanst. Jhrb. 19, p. 182, t. 6, figg. 29—30.
Rob. lata Rss., 1863, Sept. Thon Offenbach, Wien. Ak. Sitz.-Ber. 1. 48, p. 52, t. 5, fig. 57.
Cristell. spinulosa Rss., 1851, Zeitschr. deutsch. geol. Gesellsch. (2) 4, 1852, p. 17 c. fig. xylograph.

- Syn. **Planularia pauperata** PARK. and JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16, t. 20, fig. 39.
Cristell. pauperata SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrft. 21, p. 131, t. 6, fig. 15.
Planularia nodosa v. HAGEN., 1842, Rügen. Kreide; Leonh. u. Bronn. Jhrb. 1842, p. 569, t. 9, fig. 21.

c) frondicularioidea:

- Cristell. Gaudryana** D'ORB., 1839, **Flab. rugosa**, **Baudouiniana** Craie bl. Paris; Mem. Soc. geol. Fr. 4, t. 2, 26—27, figg. 4, 5, 7, 8—11.
Flab. rugosa, **Baudouiniana**, **ornata** Rss., 1845, Böhm. Kreide 1, p. 32, 33, t. 8, figg. 31—36, t. 13, figg. 48—52; t. 24, fig. 43; 1873, Geinitz' Elbthalgeb. Sachs. 2, p. 99, t. II. 21, fig. 1.
Flab. macrospira Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 1. 40, p. 217, t. 9, fig. 2.
 » **crstellaroides**, **Jonesi** KARR., 1877, Hochqu. Wasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 381—382, t. 16, figg. 31—32.
 » **incrassata** Rss., 1867, Steinsalzablager. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 85, t. 3, fig. 5.
 » **rugosa** JONES & PARK. 1860, For. fr. Chellaston; Quart. Journ. geol. Soc. 16, t. 19, figg. 20—21.
 » **simplex** Rss., 1850, Kreidem. Lemberg; Haid. nat. Abh. 4. 1, p. 31, t. 2, fig. 2.
 » **budensis** HKE., 1875, For. Clav. Száb. Sch., p. 44, t. 4, fig. 17.
 » **lingula** Rss., 1861, Kreidef. Rügen; Wien. Ak. Sitz.-Ber. 1. 44, p. 326, t. 5, figg. 6—7.
 ? » **cordata** Rss. (partim), 1845, Böhm. Kreide 1. p. 32, t. 8, figg. 39—46; 1854, Kreide Ostalp.; Wien. Ak. Dkschr., p. 67, t. 25, figg. 6—8.
 ? » **interpunctata** Rss., 1859, Westph. Kreide, Wien. Ak. Sitz.-Ber. 40, p. 216, t. 9, fig. 1.
 ? » **oblonga** Rss., 1855, Tert. Schicht. n. u. m. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 226, t. 1, figg. 11—16; t. 2, figg. 17—19 (in Frond. complanata DEFR. transiens).

d) in *Nod. calcar transgrediens*:

- Cristell. obliqua** v. HAG., Kreideverstein. Rügen; Leonh. u. Bronn. Jhrb. 1842, p. 573, t. 9, fig. 25.
 » **planiuscula** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 71, t. 7, fig. 15.
 » **pulchella**, **sulcifera**, **nuda** var. Rss., 1842, *ibid.* p. 71, 74, 72, t. 8, figg. 1, 8, 2.
 » **Wetzleri** GÜMB., 1871, Ulmer Cem. Merg; Münch. Ak. Sitz.-Ber. 1, p. 67, t. 1, fig. 14.
 » **franconica** GÜMB., 1862, Streitberg. Schwammlag.; Würtemb. Nat. Verein. Jhrb. 1862, p. 225, t. 3, fig. 27.
 » **minima**, **ornata**, **galeata**, **Robulina porvaensis** HKEN., 1875, For. Clav. Száb. Sch., p. 54, 58, t. 13, fig. 21; t. 13, 14, figg. 20, 12; t. 18, fig. 19, t. 14, fig. 11 (*N. calcari proxima*).
 » **recurrens**, **spectabilis** Rss., 1865, Deutsch. Septarienthon; Wien. Ak. Dkschr. 1. 25. 1, p. 140, t. 2, fig. 36; t. 3, figg. 9—10.
 » **Gerlachi**, **simplicissima**, **concinna** Rss., 1862, Sept. Thon. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 51, t. 4, fig. 54; t. 5, figg. 55—59; t. 4, figg. 51—53; t. 5, fig. 58.
Rob. deformis Rss., 1862, *ibid.* p. 53, t. 5, figg. 60—61.
Cristell. nuda, **Williamsoni** Rss., 1861, Kreide v. Rügen; Wien. Ak. Sitz.-Ber. 1. 44, p. 327, 328, t. 6, figg. 1, 4.
 » **auriformis** Rss., 1851, Tert. Schicht. Oberschlesien; Ztschr. deutsch. geol. Ges. 3, p. 153, t. 8, fig. 4.
Rob. lepida Rss., 1845, Böhm. Kreide 2, p. 109, t. 24, fig. 46.
Cristell. granulata, **minuta**, **convoluta** BORNEM., 1854, Liasform. Gött. p. 41, 42, t. 4, fig. 36—38.

- Syn. **Cristell. convergens, elliptica, excisa, Rob. compressa** BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, t. 13, figg. 17, 18, 19—20; t. 15, fig. 17.
- » **pulchella** COSTA, 1855, For. Marna blu Vaticano; Mem. Nap. 2, p. 121, t. 1, fig. 8.
- » **gibba** D'ORB., 1839, Cuba Forf. p. 40, t. 7, figg. 20—21.
- » **Landgrebeana, Rob. torosa** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 461, 465, t. 3, figg. 1—2.
- » » , **polita** Rss., 1855, Tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 237, t. 3, figg. 42, 41.
- » **truncata** Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 32, t. 2, fig. 8.
- » **intermedia** var. Rss., 1861, Grünsand, New Jersey; Wien. Ak. Sitz.-Ber. 1. 44, p. 336, t. 8, fig. 2.
- » **rostrata, Russeggeri** Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 86, t. 3, figg. 6, 7.
- » **variabilis** Rss. 1849, neue For. Österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 369, t. 46, figg. 15—16.
- » **galeata** Rss., 1851, Sept. Thon. v. Berlin; Ztschr. deutsch. geol. Ges. 3, p. 66, t. 4, fig. 20.
- » » HREN., 1875, For. Clav. Száb. Sch. p. 54, tt. 13, 14, figg. 20, 12.
- » **nuda** var. Rss., 1861, Palæont. Beiträge; Wien. Ak. Sitz.-Ber. 1. 44, p. 328, t. 6, figg. 1—3.
- Anomalina auricula** RÖMER, 1842, Verstein. Nordd. Kreide p. 98, t. 15, fig. 26.
- Cristell. Osnabrugensis** Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 238, t. 4, figg. 44—45.
- Nautilina puteolana** COSTA, 1854, Pal. Nap. t. 27, fig. 28.
- Cristell. Josephina** D'ORB., 1846, For. tert. Vienne p. 88, t. 3, figg. 37—38.
- » **acuta** Rss., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 213, t. 10, fig. 3.
- » **Larva** STACHE, 1865, tert. Mergel. Whaingar. Haf.; Novara Reise, geol. 1. 2, p. 232, t. 23, fig. 11.
- Robul. Kressenbergensis** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 641, t. 1, fig. 71.

e) costata, vel striata:

- Robul. elegantissima** COSTA, 1855, Pal. Nap. p. 198, t. 19, fig. 4.

Nodosarina crepidula var. **italica** DEFER.

Tab. III, figg. 45—49.

Is a highly inflated Nod. crepidula, which not seldom becomes trigonal and, nearly like an *Orthocerina*, particularly when the first chambers are very slightly or not at all arranged in a helicoid manner. The inclination of the septa to the axis is liable to great variation. Sometimes the shell has the shape of a duplex trigonal pyramid with sharp angles and somewhat excavated sides, the aperture being seemingly central.

Its beautiful pearly shell is met with both on the coralline-gravel and on the chalk-ooze. It attains 3 mm. in height and 2 mm. in breadth.

Fig. 47: The outlines of the septal plan.

- Syn. *Saracenaria italica* DEFR., 1825, Blainv. DEFR. Dict. Sc. Nat.; planches Conchyl. 71, t. 13, fig. 6.
- Cristell. italica** D'ORB., 1826, Tabl. Meth.; An. Sc. Nat. 7, p. 293, N:o 26; Mod. 19 et 85.
- » *italica* var. *cincta, aureola* KARR., 1877, Hochquellenwasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 383, t. 16, figg. 38—39.
- » *Volpicella, contracta* COSTA, 1855, For. Marn. blu' Vatic.; Mem. Nap. 2, p. 120, t. 1, figg. 4—5.
- Margin. lobata** D'ORB., 1826, Tabl. meth.; An. Sc. Nat. 7, p. 259, N:o 12.
- Cristell. obesa** COSTA, 1855, For. Marn. blu' Vatic.; Mem. Nap. 2, p. 121, t. 1, fig. 7.
- » *triquetra* GÜMB., 1862, Streitb. Schwamml.; Würtemb. Nat. Ver. Jhrft. 17, p. 225, t. 3, fig. 28.
- » *navicula, triangularis* D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France 4, p. 27, t. 2, figg. 19—22.
- » *arcuata* D'ORB., 1846, For. tert. Vienne p. 87, t. 3, figg. 34—36.
- » " HKEN., 1875, For. Clav. Száb. Sch. p. 53, t. 5, fig. 5.
- » *triangularis* Rss., 1845, Böhm. Kreide. 1, p. 34, t. 4, fig. 48.
- » *pyramidata* Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 70 (sine icone).
- Hemicristellaria corculum, Hemirobul. galeola** STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 223, 228, t. 23, figg. 2, 7.
- Cristell. gibbosa** COSTA, 1854, Pal. Nap. 2, p. 191, t. 14, fig. 1; t. 16, fig. 24.
- » *subarcuatula* var. *Scapha* WILLIAMS., 1859, Rec. brit. Forf. p. 30, figg. 56—62.
- Naut. acutauricularis** FICHT. and MOLL., 1803, Test. micr. p. 102, t. 18, figg. g, h, i.
- Hemirobul. arcuatula** STACHE, 1865, tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 227, t. 23, fig. 6.
- Cristell. trigonalis** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 461, t. 2, fig. 12.
- » *Bronni* Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 70, t. 7, fig. 13.
- » *tetraëdra* BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 327, t. 13, fig. 15.
- » *Eseri* GÜMB., 1871, Ulmer Cementmerg.; Münch. Ak. Sitz.-Ber. 1, p. 66, t. 1, fig. 10.
- » *paucisepta* Rss., 1851, Zeitschr. deutsch. geol. Ges. (2) 4, p. 17 (xylograph.)
- » *brachyspira, pygmæa* Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 49, t. 3, 4, figg. 43, 44.
- » *Nysti* Rss., 1863, For. Crag. d'Anwers; Bull. Ac. Belg. (2). 15, p. 150, t. 2, fig. 24.
- » *minima* KARR., 1864, Leythakalk; Wien. Ak. Sitz.-Ber. 1. 50, p. 707, t. 1, fig. 8.
- » *mirabilis* Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 236, t. 3, fig. 39.
- » *obvelata* Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 33, t. 2, fig. 11.
- » *ovalis* Rss., 1845, Böhm. Kreidef. 1, p. 34, t. 8, fig. 49; t. 13, figg. 60—63; t. 12, fig. 19; 1873, Geinitz' Elbthal. Geb. Sachsen. 2, p. 103, t. II. 22, figg. 6—11.

Nodosarina crepidula var. **cassis** F. & MOLL.

Tab. III, figg. 50—51.

Sometimes this variety differs a great deal from the typical *N. crepidula*. It bears the same relation to this as the knobbed and spine-margined variety of *Nod. calcar* to its typical form. It is of course in vain to attempt to make a clear distinction between this variety and even *Nod. calcar*, as is best understood by d'ORBIGNY's representation of it in his *For. bass. tert. de Vienne t. 4, fig. 5*, which shows more affinity to *Nod. calcar* than to our form.

The individuals represented by FICHT. & MOLL. are more »cultrated» than our form, which is narrowkeeled.

It is a fine, highly developed form from the coralline-gravel. A more oblong and smaller form occurs in the chalkooze.

Fig. 51 edge-view of the aperture.

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|--|--|
| Syn. <i>Nautilus cassis</i> | FICHT. and MOLL., 1803, Test. microscop. p. 95, t. 17, figg. a—l; t. 18, figg. a—c. |
| <i>Cristell. consecta, navicularis, nitida, Rob. marginata</i> | D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 290, 291, 288 N:ris 1, 2, 5, 6. |
| (Naut.) <i>Cristell. Galea</i> | FICHT. and MOLL., l. cit. p. 100, t. 18, figg. d—f; D'ORB., l. cit. p. 291, N:o 6. |
| <i>Cristell. erinacea</i> | KARRER, 1878, Foram. Luzon; Bolet. Comis. Mapa geol. del España, 7. 2 p. 19, t. F, fig. 3. |

Nodosarina calcar LIN.

Tab. III, figg. 52—61.

This species rivals *Nod. legumen* in the abundance of names, which might be shared suitably by *three* or *four* varieties at the most.

The differences consist generally:

- 1) in the presence or absence of knobs and striæ (*verrucosa* et *lineata*),
- 2) in somewhat marked and raised septal bands (*limbata*),
- 3) in strongly curved septa (*vorticalis*).

The varieties called »cultrata» and »aculeata» are more or less accidental forms; those appendages or outgrowths of the shell are of too fickle a character to justify a particular nomination. The number of the chambers in the last whorl varies from 6—15.

Thanks to D'ORBIGNY's efforts to split up *Nod. calcar* into two genera, the list of synonyms has been wantonly encumbered.

Nod. calcar becomes highly developed both on the chalkbottom and on the coralline-gravel, and it yields not in size to specimens from the chalk and tertiary formation.

Fig. 52 is a mixed form from *Nod. calcar* and *Nod. legumen*. It has been favoured with many names, as *Cristellaria Hildesiensis* RÖM.; *Crist. Sauleyi* D'ORB., *Crist. Marcki* Rss., *Crist. inflata* Rss. etc.

Fig. 53 represents a peculiar monstrosity; a full-formed *Nod. calcar* turning back into *Nod. legumen*.

Figs. 54—56 are D'ORBIGNY'S *Robulina aculeata* of 1826 and his *Rob. calcar* of 1846. The larger one is from the chalk-bottom, the smaller from the coralline-gravel.

Figs. 57—59 has been named *Crist. inornata, austriaca* D'ORB., *Crist. tangentialis* Rss. etc. It is provided with a very thin and broad wing or keel and could also be referred to *Crist. cultrata* MONTF.; but this appendage is met with throughout all the varieties and is not peculiar to any of them. From the chalk-bottom.

Figs. 60—61 are monstrosities with luxuriant alar- and umbilical processes. From coralline-gravel.

The regular, typical form, *rotulata* LMK., is the most abundant and the stoutest of all our forms (3—5 mm.).

a) lævis:

Nautilus lævigatulus	MONTAGU, 1803, Test. Brit. p. 188; 1808: Suppl. p. 75, t. 18, figg. 7—8.
Lenticulites Comptoni	NILSSON, 1825, Mångrummiga snäckor i kritformat. i Sverige; K. Vet. Ak. Handl. 1825, p. 337; 1827, Petref. svecana p. 7, t. 2, fig. 3.
Cristell. rotulata	D'ORB., 1839, For. craie bl.; Mém. Soc. geol. Fr. 4, p. 26, t. 2, figg. 15—18.
» »	REUSS, 1845, Böhm. Kreide 1, p. 34, t. 8, fig. 50; t. 12, fig. 25; t. 24, figg. 48—49.
» »	PARK. and JONES, 1865, N. Atl. and Arct. Oc.; Phil. Trans. 1. 55. 1, p. 345, t. 13, fig. 19.
» simplex	D'ORB., 1846, For. tert. Vienne, p. 103, t. 4, figg. 27—28.
» calcar	PARK. and JONES, 1857, For. Coast. of Norway; Ann. Mag. Nat. Hist. (2), 19, p. 289.
Rob. canariensis	D'ORB., 1844, Iles Canaries, p. 127, t. 3, figg. 3—4.
Cristell. polita	SCHWAG., 1866, For. Kar-Nikobar; Novara Reise, geol. Th. 2. 2, p. 242, t. 6, fig. 86.
Rob. plicata	D'ORB., 1826, Tab. meth.; An. Sc. N. p. 290, N:o 23.
Cristell. multiseptata	Rss., 1865, For. deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 147, t. 3, figg. 14—15.
Rob. neglecta	Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 69, t. 4, fig. 27.
» stellifera	CZJZ., 1847, For. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 142, t. 12, figg. 26—27.
» dimorpha, incompta	Rss., 1851, Sept. Thon v. Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 67, 70, figg. 23, 28.
Cristell. macrodisca	Rss., 1862, Nordd. Hils u. Gault, Wien. Ak. Sitz.-Ber. 1. 46, p. 78, t. 9, fig. 5.
Cristell. paupercula	Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 141, t. 3, figg. 6—7.
Rob. Gottingensis, nautiloides	BORNEM., 1854, Liasform. Göttingen p. 43, t. 4, figg. 40—42.
Rob. trigonostoma, declivis	BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 333—336, t. 15, figg. 8—11.

- Syn. **Rob. trigonostoma** Rss., 1851, Sept. Thon v. Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 69, t. 4, fig. 26.
- » **subnodosa, propinqua**, MÜNST., RÖM., 1838, Nordd. tert. Meeressand, Leonh. u. Bronn. Jhrb. 1838, p. 391, t. 3, figg. 61, 63.
- Cristell. eximia** Rss., 1865, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 52, t. 5, fig. 56.
- » **Oppeli, semiexpleta** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrft. 21, p. 134, 135, t. 7, figg. 1, 3.
- » **lenticula** Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 369, t. 46, fig. 17.
- Rob. arcuata** KARR., 1861, Marin. Tegel Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 44, p. 446, t. 2, fig. 1.
- Cristell. umbilicata** Rss., 1861, Kreide Rügen; Wien. Ak. Sitz.-Ber. 1. 44, p. 327, t. 6, fig. 6.
- Rob. discrepans, impressa, turgidula, Dunkeri** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 78, 77, 73, t. 9, figg. 7, 2; t. 8, figg. 4, 6.
- Cristell. deformis** KARR., 1867, For. Fauna Österreich.; Wien. Ak. Sitz.-Ber. 1. 55, p. 349, t. 1, fig. 3.
- » **Spachholzi** Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 33, t. 2, fig. 10.
- » **convergens, integra**, BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 327, t. 13, fig. 16; p. 334, t. 15, figg. 12—16.
- » **lobata** Rss., 1845, Böhm. Kreidef. 1. p. 34, t. 13, fig. 59; 1873, Gein. Elbthalgeb. Sachsen 2, p. 104, t. II. 22, fig. 12; t. II. 23, fig. 1.
- » **inops** Rss., 1851, Tert. Schicht. Oberschlesien; Zeitschr. deutsch. geol. Ges. 3, p. 153, t. 8, fig. 5.
- » **oligostegia** REUSS, 1859, Wespähl. Kreide; Wien. Ak. Sitz.-Ber. 1. 40, p. 213, t. 8, fig. 8; 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 93, t. 13, fig. 2.
- » **tumida** KARR., 1870, Kreidef. Leitzendorf; Österr. geol. Reichsanst. Jhrb. 20, p. 180, t. 11, fig. 10.
- » **crassa** D'ORB., 1846, For. tert. Vienne, p. 90, t. 4, figg. 1—3.
- » **coarctata, bicornis** COSTA, 1854, Pal. Nap. 2, p. 192, t. 17, figg. 1, 3.
- Rob. articulata** Rss., 1862, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 53, t. 5, fig. 62, t. 6 fig. 63.
- Cristell. obesa** KARR., 1877, Hochqu. Wasserl.; k. k. österr. geol. Reichsanst. Abh. 9, p. 383, t. 16, fig. 40.
- » **depauperata, deformis** Rss., 1851, Sept. Thon v. Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 70, t. 4, figg. 29, 30; 1863, Sept. Thon Offenb.; Wien. Ak. Sitz.-Ber. 1. 48 p. 54, t. 6, figg. 67—68, t. 8, fig. 90.
- Rob. deformis, depauperata, incompta** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 337, t. 14, figg. 1—3, 11—12.
- » **bullata** HKE., 1875, Clav. Száb. Sch. p. 58, t. 14, fig. 13.
- » **ambigua** COSTA, 1854, Pal. Nap. 2, t. 20, fig. 17.
- » **angulata** Rss., 1851, Tert. Sch. Oberschles.; Zeitschr. deutsch. geol. Ges. 3, p. 154, t. 8, fig. 6.
- Cristell. Cassiana** GÜMB. 1869, For. Cassian-Raibler Sch.; Österr. geol. Reichsanst. Jhb. 19, p. 177, t. 5, figg. 2—3.
- » **lactea** STACHE, 1865, tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 235, t. 23, fig. 14.
- » **subangulata** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 74, t. 8, fig. 7; 1863, Sept. Thon v. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 53, t. 6, fig. 64.
- Rob. inornata, austriaca** D'ORB., 1846, For. tert. Vienne p. 102, t. 4, figg. 25—26, t. 5, figg. 1—2.
- » » BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 334, t. 15, figg. 2—3.
- » **intermedia** D'ORB., 1846, For. tert. Vienne, p. 104, t. 5, figg. 3—4.

- Syn. **Rob. nitida** Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 54, t. 6, fig. 66.
- Cristell. tangentialis, semiimpressa** Rss., 1866, deutsch. Septarienthon; Wien. Ak. Dkschr. 1. 25. 1, p. 143, t. 3, fig. 13.
- Rob. umbonata** Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 68, t. 4, fig. 24.
- » **cultrata** D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 287, N:o 1; Mod. 82.
- Soldania carinata** D'ORB., ibid. p. 281, N:o 1.
- Nautilus calcar** var. λ FIGHT. and MOLL., 1803, Test. microsc. p. 78, t. 13, figg. e—g.
- Rob. halophora** STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise geol. Th. 1. 2, p. 248, t. 23, fig. 28.
- Cristell. Grundensis** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 355, t. 1, fig. 8.
- Rob. d'Orbignii** BAILEY, 1850, Examin. of Soundings; Smithson. Contrib. of knowledge 2, Art. 3, figg. 9—10.
- Cristell. cultrata** PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155, 1, p. 344, t. 13, figg. 17—18; t. 16, fig. 5.
- Rob. cultrata β antipodum** STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 251, t. 23, fig. 30.
- » **nitidissima, galeata** Rss., 1851, Sept. Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 68, t. 4, fig. 25; fig. 21.
- Cristell. Gemellarii** SEG., 1862, Rhizopod. d. Catania, Acad. Gioenia Atti (2), 18, p. 13, t. 1, fig. 2.
- Rob. limbosa** Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 55, t. 6, fig. 69.
- » **depauperata β callifera** Rss., 1863, Sept. Thon Kreuznach; Wien. Ak. Sitz.-Ber. 1. 48, p. 66, t. 8, fig. 91.
- Cristell. Josephina β tuberculata** KARR., 1868, Mioc. faun. Kostež; Wien. Ak. Sitz.-Ber. 1. 58, p. 170, t. 4, fig. 7.
- » **nikobarensis, peregrina** SCHWAG., 1866, For. Kar-Nikobar; Novara Reise, geol. Th. 2. 2, p. 243, 245; t. 6, fig. 87; t. 7, fig. 89.
- » **hebetata** 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jahresh. 21, p. 134, t. 7, fig. 2.
- » **moravica, Ruditziana** KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 707, 708, t. 2, figg. 9—10.
- Rob. Beyrichi** BORNEM., 1855, Sept. Thon. Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 332, t. 14, fig. 8.
- » **Kubinyii** HKEN., 1875, For. Clav. Száb. Sch. p. 56, t. 6, fig. 7.
- » **depauperata, princeps, limbosa, budensis** HKEN., ibid. p. 55—58; t. 6, figg. 5—6, 8, 11; t. 7, fig. 1; t. 14, fig. 16.
- Cristell. Haasti, rotula, Clio, Rob. oculus** STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 247, t. 23, figg. 10, 12, 13, 27.
- Crist. Leubeana, ulmensis** GÜMB., 1871, Ulmer Cement. Mergel, Münch. Ak. Sitz.-Ber. 1, p. 67, t. 1, figg. 13, 15.
- Rob. radiata, limbata, spec. indet.** BORNEM., 1855, Septarienthon. Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 335, 336, t. 15, figg. 1—7.
- Rob. radiata** Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 54, t. 6, fig. 65.
- Cristell. grata** Rss., 1866, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25, p. 145.
- Rob. rosetta** GÜMB., 1868, Nordalp. Eocän; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 642, t. 1, fig. 73.
- Rob. radiata, pulchella, lævigata, aculeata** D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 288, 289, N:ris 7, 8, 9, 14.

Syn, <i>Nautilus calcar</i>	}	FICHT. and MOLL., 1803, Test. microsc. p. 71, 76, 79, t. 11, figg. a. b. c.; t. 12, figg. i. k; t. 13, figg. c. d. h. i.
var. α		
» β		
» μ		
Rob. calcar		D'ORB., 1846, For. tert. Vienne, p. 99, t. 2, figg. 18—20.

b) vortex:

Nautilus vortex	FICHT. and MOLL., 1803, Test. microsc. p. 33, t. 2, figg. d—i.
Rob. orbicularis, vortex	D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 288, N:ris 2, 4; t. 15, figg. 8—9.
» Soldanii	D'ORB., ibid. p. 288, N:o 5.
Cristell. falcata	KARR., 1878, For. Luzon; Bolet. Comis. Mapa geol. d. España 7. 2, p. 20, t. F, fig. 5.
Rob. imperatoria	D'ORB., 1846, For. tert. Vienne, p. 104, t. 5, figg. 5—6.
» obtusa	Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 369, t. 46, fig. 18.
Cristell. Baylei	Rss., 1861, Grünsand N. Jersey; Wien. Ak. Sitz.-Ber. 1. 44, p. 336, t. 7, fig. 7.
Rob. subangulosa, inornata, festonata	COSTA, 1854, Pal. Nap. 2, p. 229, t. 14, fig. 2; t. 19, fig. 6, t. 19, fig. 1.
» arcuato-striata	HKEN., 1875, For. Clav. Száb. Sch. p. 56, t. 7, fig. 2.
» regina	KARR., 1865, For. Grünsandstein N. Zealand; Novara Reise, geol. Th. 1. 2, p. 76, t. 16, fig. 6.
Cristell. callifera, duracina, bucculenta, glaucina, intermedia, gyrosalprum, Rob. foliata, corona lunæ, pseudocalcarata, incrustata	STACHE, Tert. Mergel Whaingar. Haf.; Novara Reise, geol. Th. 1. 2, p. 236—254, t. 23, figg. 15—17, 20—22, 24, 29, 31, 33.
Rob. alato-limbata	GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wissensch. Abh. 1. 10. 2, p. 641, t. 1, fig. 70.
» Cumingii (Michelotti)	BORNEM., 1860, For. Magdeb.; Zeitschr. deutsch. geol. Ges. 12, p. 156, t. 6, fig. 1.
Cristell. microptera	Rss., 1859, Westphäl. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 215, t. 8, fig. 7.

c) limbata:

Nautilus calcar	FICHT. and MOLL., 1803, Test. Micron. p. 72, 76, t. 11, figg. d—f, t. 12, figg. d—h.
» depressulus	MONTAGU 1803, Test. Britann. p. 190; 1808, Suppl. p. 78, t. 18, fig. 9.
Rob. rotunda	D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 290, N:o 24.
Lenticulites cristella	NILSS., 1827, Petrificata Svecana p. 7, t. 2, fig. 4.
Nautilus calcar	MONTAGU, 1803, Test. Brit. p. 189, t. 15, fig. 4; 1808, Suppl. p. 76.
Rob. cultrata	D'ORB., 1846, For. tert. Vienne, p. 96, t. 4, figg. 10—13.
» similis, clypeiformis	D'ORB., ibid. p. 98, 101, t. 4, figg. 14—15, 23—24.
Rob. Osnabrügensis, Cristell. subcostata	v. MÜNST., Röm., 1838, Cephalop. tert. Meeress. Nordd.; Leonh. u. Bronn. Jhrb. 1838, p. 391, t. 3, figg. 62, 64.
Cristell. subcostata	Rss., 1855, Tert. Sch. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 237, t. 3, fig. 43.
» planicosta	v. HAGENOW, 1842, Rügens Kreideverst.; Leonh. u. Bronns, Jhrb. 1842, p. 572, t. 9, fig. 24.
» exarata	Rss., 1861, Palæont. Beiträg. Rügen; Wien. Ak. Sitz.-Ber. 1. 44, p. 327, t. 6, fig.
» orbicula, subalata	Rss., 1854, Kreide Ostalp.; Wien. Ak. Dkschr. 7, p. 68, t. 25, figg. 12—13.

- Syn. **Cristell. rotulata** Rss., 1845, (partim), Böhm. Kreide t. 8, fig. 70.
Rob. angustimargo Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 67, t. 4, fig. 22.
 » **dimorpha** Rss., ibid. p. 67, t. 4, fig. 23.
 » **polyphragma, princeps, insignis** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 465, 466, t. 4, fig. 5; t. 5, figg. 3—4.
 » **angustimargo** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 332, t. 14, figg. 6—7.
Cristell. falcifer, Rob. lenticula STACHE, 1865, Tert. Merg. Whaingar. Haf.; Novara Reise, geol. Th. 1. 2, p. 240, 246, t. 23, figg. 19, 25.
 » **magna** COSTA, 1854, Palæont. Nap. 2, p. 193, t. 19, fig. 2.
 » **austriaca** COSTA, 1855, For. Marna blu' d. Vatieano; Mem. Nap. 2, p. 122, t. 1, fig. 10.
Rob. pterodiscoidea, declivis, radiifera, acutimargo GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 642, 640; t. 1, fig. 72; t. 2, figg. 76, 76 aa, 76 bb.
Cristell. Quenstedti GÜMB., 1862, Streitb. Schwammlag.; Würtemb. Nat. Verein. Jhrhft. 1862, p. 226, t. 4, fig. 2.
 » **pachynota, Römeri, subalata, Münsteri** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 69, 75, 76, 77, t. 7, fig. 11; t. 8, fig. 9; t. 9, figg. 1, 3, 4.
 » **prominula, megalopolitana** Rss., 1855, Kreideg. Meklenburg; Ztschr. deutsch. geol. Ges. 7, p. 271, t. 9, figg. 3, 5.
 » **secans** Rss., 1859, Westph. Kreide; Wien. Ak. Dkschr. 40, p. 215, t. 9, fig. 7.
Rob. magdeburgica BORNEMANN, 1860, For. Magdeb.; Zeitschr. deutsch. geol. Ges. 12, p. 157, t. 6, fig. 2.
 » **spec. indet.** BORNEMANN, 1855, Sept. Thon. Hermsdorf; Ztschr. d. geol. Ges. 7, p. 333, t. 14, figg. 9—10.
Cristell. lapugyensis KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 708, t. 2, fig. 11.
Rob. colorata, loculosa, pusilla STACHE, 1865, Tert. Merg. Whaingar. Haf.; Novara Reise, geol. Th. 1. 2, p. 229, 244, 247, t. 23, fig. 9; t. 23, figg. 23, 26.
Cristell. fenestrata, subplana Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 142, 143, t. 3, figg. 11—12.
Rob. virgata D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 290; N:o 17; Mod. N:o 14.
 » **nodosa** Rss., 1862, Nordd. Hils. u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 78, t. 9, fig. 6.
 » **lobata** COSTA, 1854, Pal. Nap. 2, t. 20, fig. 14.

d) papillosa:

- Nautilus papillosus** FICHT. & MOLL., 1803, Test. micr. p. 82, t. 14, figg. a. b. c.
Rob. calcar D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 289, N:o 12.
Crist. marginata, tuberculata }
 » **aculeata, elegans, papillosa** } D'ORB., ibid. p. 291—293, N:o 7, 13, 14, 24, 25.
Rob. echinata D'ORB., 1846, For. tert. Vienne, p. 100, t. 4, figg. 21—22 (striata).
Nautilus calcar var. γ , δ , ϵ FICHT. and MOLL., 1803, Test. micr. t. 11, figg. g, h, i, k; t. 12, figg. a, b, c; t. 13, figg. a, b.
Rob. rosacea D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 289, N:o 11.
Rob. trachyomphala Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 34, t. 2, fig. 12.
Rob. gutticostata, florigemma GÜMB., 1868, Nordalp. Eocän.; K. Bayer. Ak. Wiss. 1. 10. 2, p. 643, 644, t. 1, figg. 74—75.
 » **jurassofranconica** GÜMB., 1862, Streitenb. Schwammlag.; Würtemb. Nat. Verein. Jhrhft. 1862, p. 227, t. 4, fig. 3.

- Syn. **Cristell. mamilligera** KARR., 1865, For. Grünsandst. N. Zeeland; Novara Reise, geol. Th. 1. 2, p. 76, t. 16, fig. 5.
- Rob. gutticostata, baconica, granulata** HKE., 1875, Clav. Száb. Sch. p. 57, 58; t. 6, fig. 10; t. 14, figg. 9, 15.
- Cristell. Bufo** STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 239, t. 23, fig. 18.
- » **Helensæ** KARR., 1877, Hochquellenwasserl.; Österr. geol. Reichsanst. Abh. 9, p. 384, t. 16, fig. 42.
- » **undulata** KARR., 1867, For. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 348, t. 1, fig. 2.
- » **inflata** KARR., ibid. p. 355, t. 1, fig. 9.

e) striolata-costata:

- Rob. echinata, striolata** CZJZ., 1847, Foramf. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 141, 142, t. 12, figg. 24—25, 28—29.
- » **inæqualis, cancellata, semistriata** COSTA, 1854, Pal. Nap. 2, p. 328, 230, t. 19, figg. 3, 5, 7.
- » **signata** Rss., 1855, Kreideg. Meklenb.; Ztschr. deutsch. geol. Ges. 7, p. 272, t. 9, fig. 4.
- » **tettowatta** STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 252, t. 23, fig. 32.
- » **Vaticana** COSTA, 1855, For. Marna blu' d' Vaticano; Mem. Nap. 2, p. 122, t. 1, fig. 17.
- » **costata** D'ORB., 1826, An. Sc. Nat. 7, p. 289, N:o 13, Mod. 84.
- Nautilus costatus** FICHT. and MOLL., 1803, Tert. micr. p. 47, t. 4, figg. g, h, i.
- Rob. ornata** D'ORB., 1846, For. tert. Vienne p. 98, t. 4, figg. 16—17.
- » **ariminensis** D'ORB., ibid. p. p. 95, t. 4, figg. 8—9.
- » **Paulæ** KARR., 1877, Hochquell. Wasserl.; geol. Reichsanst. Abh. 9, p. 384, t. 16, fig. 41 (aculeata).

f) forma »Rhabdogonium»:

- Rhabdogon. globiferum** Rss., 1859, Westph. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 201, t. 7, fig. 6.
- » **pygmæum** Rss., 1865, Deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, t. 1, fig. 32.

g) in Nod. legumen rediens:

- Cristell. Hildesiensis** RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 391, t. 3, fig. 65.
- ? » **lævigata** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 292, N:o 19, Mod. N:o 47.
- » **Saulcyi** D'ORB., 1844, Iles Canaries p. 126, t. 3, figg. 7—9.
- » **inflata, Marcki** Rss., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 212, t. 8, fig. 6; t. 9, fig. 4.
- » **biclivosa, inflata, informis** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrshft. 21, p. 133, t. 6, fig. 21; p. 132, t. 6, fig. 16; p. 128, t. 6, fig. 8.
- ? » **lituola, excentrica** CORN., 1848, Nouv. foss. microsc.; Mem. Soc. geol. France (2) 3, p. 254, t. 2, figg. 9—13 (Nod. crepidulæ propinqua).
- Spiralina ?Streitbergensis** GÜMB., 1861, Streitberg. Schwammlag.; Würtemb. Nat. Verein. Jhrshft. 17, p. 232, t. 4, fig. 7.
- Cristell. lituola** Rss., 1845, Böhm. Kreide 2, p. 109, t. 24, fig. 47.

Nodosarina complanata DEFR.

Tab. III, figg. 62--64.

It is not without some hesitation that this form should be distinguished as a »species»; for a closer study leads to the conclusion, that it possibly may originate from different species of *Nodosarina*, thus being descendants, each bearing small marks of variation pointing back to their origin, but all still maintaining in common a feature of essential unity.

1. From *Nod. radricula* some simple forms of »*Fronidularia*» have seemingly their direct origin.

2. Other varieties keep close to *Nod. (Glandulina) lævigata* D'ORB., as *Fronidularia spathulata* WILLIAMS., *Fronid. simplex* Rss., *Fronid. folium* ALTH.

3. *Fronidularia ensiformis* RÖM., *Fronid. lingua* BOLL. bear the same relation to *Nod. legumen*.

4. All smooth varieties with their earliest chambers arranged in the same way as in *Nod. crepidula* are, it would seem, immediate offsets of this species. *Cristellaria Gaudryana* D'ORB., *Flabellina macrospira* Rss. etc. are instances of this transition.

In systematising the costate forms of *Nod. complanata* the same difficulty is met with as in the other *Nodosarina*. Sometimes the primordial chamber only is ribbed, the other parts being quite smooth; at another time the striation of the shell is quite faint and scarce.

When both forms of *Nod. complanata* (*Fronidularia* and *Flabellina*) with their numerous modifications of form are collected from the same localitiy, they certainly create the impression that they all belong to a single species.

This set of *Nodosarina* gives us a noteworthy hint of, how unsatisfactory must be the result of the attempts of our days to make out the genealogy of a species, for it can scarcely be denied, that sometimes one form may possibly have originated from several different species.

Fig. 62 is next to *Fronid. alata* D'ORB., it is taken from a small specimen, but on the chalkbottom it often attains the size of 10 mm. in hight and 8 mm. in breadth.

Fig. 63 the same with the younger state of *crepidula* growth.

Fig. 64 is still nearer *Nod. crepidula*. Sometimes the primordial chamber is provided with a couple of secondary chambers set at right angles to the ordinary ones. If this plan of growth had continued a four-winged form would have originated.

A stout lanceolate-elliptical form is also met with among the coralline-gravel.

Syn. Fronid. obliqua	v. MÜNST., RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 382, t. 3, fig. 7.
» oblonga, ovata	RÖM., ibid. t. 3, fig. 4—6.
» obliqua	ALTH., 1849, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 268, t. 13, fig. 26.
» lancea	PHIL., 1843; Tert. Versteiner. nordw. Deutschl. t. 1, fig. 31.
» Meyeri	BOLL., 1846, Ostseeländern. p. 177, t. 2, fig. 18.

- Syn. **Fronde Bradyana** KARR., 1877, Hochquellenwasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 380, t. 16, fig. 24.
- » **Medelingensis** KARR., ibid. p. 380, t. 16, fig. 25.
- » **fragilis** KARR., 1870, Kreidef. Leitzendorf; Jhrb. k. k. österr. geol. Reichsanst. 20, p. 175, t. 11, fig. 3.
- ? » **felis** KARR., ibid. p. 172, t. 10, fig. 9.
- » **tenuissima** HKEN., 1875, For. Clav. Száb. Sch. p. 43, t. 13, fig. 11.
- » **spathulata** WILL., 1858, Brit. rec. foramf. p. 23, fig. 50.
- » **tribus** KARR., Kreidef. in Leitzendorf; Jhrb. k. k. österr. geol. Reichsanst. 20, p. 175, t. 11, fig. 5.
- » **foliacea** SCHWAG., 1866, For. Kar-Nikob.; Novara Reise, geol. Th. 2. 2, p. 236, t. 6, fig. 76.
- » **folium** ALTH., 1849, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 268, t. 13, fig. 25.
- » **inæqualis, compressa** COSTA, 1855, Marna terz. Messina, Mem. Nap. 2, t. 3, figg. 2—3.
- » **Whaingaroica** STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 210, t. 22, fig. 43.

- Fronde Mandelsloheana** GÜMB., 1871, Ulmer Cem. Merg.; Münch. Ak. Sitz-Ber. 1, p. 66, t. 1, fig. 9.
- » **biformis** MARSS., 1879, Rügen. Schreibekr.; Greifsw. Nat. Ver. Mittheil. 1877—78, p. 137, t. 2, fig. 17.
- » **compta** BRADY, 1879, Notes on Retic. Rhizop.; Qu. Journ. microsc. Sc. (n. ser.) 75, p. 271, t. 8, fig. 6.
- » **amoena** KARR., 1870, Kreidef. Leitzendorf; Jhrb. k. k. österr. geol. Reichsanst. 20, p. 172, t. 10, fig. 10.
- » **Leitzendorfensis, pulchella, sarissa, plana** KARR., ibid. p. 171—174; t. 10, figg. 7—8, 13—14.
- » **lingulæformis** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrhft. 19, p. 113, t. 4, fig. 11.
- » **complanata** var. JONES & PARK. 1860, For. fr. Chellaston; Quart. Journ. geol. Soc. 16, t. 19, fig. 19.
- » **monocantha** Rss., 1839, Neue Forf. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 368, t. 44, fig. 14.
- » **mucronata** Rss., 1845, Böhm. Kreide 1, p. 31, t. 13, fig. 43; Geinitz' Elbthalgeb. Sachs. 2, p. 96, t. II. 2, figg. 14—16.
- » **bicornis** Rss., 1845, Böhm. Kreide 1, p. 32, t. 13, fig. 45; 2, p. 108, t. 24, fig. 37.
- » **Parkeri** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz-Ber. 1. 46, p. 91, t. 12, fig. 7.
- » **filocincta** Rss., ibid. p. 54, t. 4, fig. 12.
- » **rhomboidalis, alata, complanata** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 256, N:ris 1, 2, 5, Mod. 3.
- » **spec. indet., parabolica, acuminata, rhombea** COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 371, t. 2, figg. 21, 24; t. 3, figg. 10, 13, 15.
- » **superba** HKEN., 1875, Clav. Száb. Sch., p. 42, t. 4, fig. 16.
- » **hastata** RÖM., 1842, Neue Kreideforamf.; Leonh. u. Bronn. Jhrb. 1842, p. 272, t. 7 B, fig. 5.
- » » Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz-Ber. 1. 46, p. 53, t. 4, fig. 10.
- » **inversa** Rss., 1845, Böhm. Kreide 1, p. 31, t. 8, figg. 15—19; t. 13, fig. 42.
- » **crassa, simplex** Rss., ibid. t. 8, figg. 29—30.

- Syn. **Flabell. reticulata** Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 7. 1, p. 30, t. 1, fig. 22.
 » **foliacea** BRADY, 1879, Notes on Ret. Rhizop.; Qu. Journ. Sc. (u. ser.) 75, p. 271, t. 8, figg. 8—10 (in sequentem (b) transiens).

b) *Nod. crepidulæ* propinqua vide: *Nod. crepidula* (p. 46. c).

Nodosarina carinata D'ORB.

Tab. I, fig. 65—67.

Attains a high development particularly in the coralline-gravel. It is liable to great variation, sometimes being very ventricous and broadly wedge-shaped, and sometimes compressed and more linear. Sometimes it is provided with fine costæ on the flanks; being the first step to the strongly and entirely costate »raphanus» form. Some forms, described as *Frondicularia* and *Lingulinopsis* are more properly referred to this species.

Genus *Fissurina* Rss. who has been ranked with *Lagena*, seems to be the embryonal or the pigmy-form to *Nod. carinata*.

Fig. 65—66 is the typical *Lingulina carinata* D'ORB. of large growth.

Fig. 67 has the same shape as *Lingulina costata* D'ORB., and is identical with *Lingulina seminuda* HKEN.

- Syn. **Lingulina carinata, alata** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 257, N:o 1, 2; Mod. 26.
 » » D'ORB., 1839, Cuba p. 20, t. 1, figg. 13—14.
 » » D'ORB., 1844, Iles Canaries p. 124, t. 1, figg. 5—6.
 » » COSTA, 1854, Pal. Nap. 2, t. 16, fig. 25.
 » » PARKER and JONES, 1860, For. Chellast. Qu. Journ. geol. Soc. 16, t. 19, figg. 13—14.
 » **glabra** HKEN., 1875, Clav. Száb. Sch. p. 42, t. 13, fig. 14.
 » **bursæformis** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Abh. 1. 10. 2, p. 628, t. 1, fig. 51.
 ?**Frond. granulata, lucida** SCHWAG., 1863, Jurass. Schicht.; Würtemb. Nat. Ver. Jhrft. 21, p. 113, t. 4, figg. 25—26 (apertura rotundata; ad (d) p. 14 potius pertinet.).
Lingulina pygmæa Rss., 1873, GEINITZ' Elbthalgeb. Sachsen 2, p. 90, t. II. 20, fig. 23.
Frond. Nysti Rss., 1863, Crag. d'Anvers; Bull. Ac. Belg. (2) 15, p. 148, t. 2, fig. 20.
 » **linearis** PHIL., 1843, Tert. Versteiner. n. w. Deutschl. t. 1, fig. 32.

b) *costata* l. *semicostata*:

- Lingulina costata** D'ORB., 1846, For. tert. Vienne, p. 62, t. 3, figg. 1—5.
 » **multicostata** COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 146, t. 2, fig. 6.
 » **costata** var. **seminuda** HKEN., 1875, Clav. Száb. Sch. p. 41, t. 4, fig. 8.
 » **carinata** var. **striata** PARKER and JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16, t. 19, fig. 15.

Uvigerina pygmæa D'ORB.

Tab. IV, figg. 68—70.

This handsome species becomes pretty well developed on both the coralline-gravel and the chalk-ooze.

The neck of our form is nearly always provided with a lamina, like a screw-thread twisted a half or whole turn round it, also a mark of its intimate relation to certain *Nodosarina*. It is not common.

Uvigerina Raphanus PARK. and JONES is probably its »*Sagrina*»-development.

Figg. 68—69: the typical form.

Fig. 70: a very young, 3-chambered specimen.

a) *costata*:

- Syn. *Uvigerina pygmæa* D'ORB., 1826, Tab. meth.; Acad. Sc. Nat. 7, p. 269, t. 12, figg. 8—9; Mod. 67.
- » *nodosa* D'ORB., *ibid.* p. 269, N:o 3.
- » *pygmæa* D'ORB., 1846, Bass. tert. Vienne, p. 190, t. 11, figg. 25—26.
- » *bifurcata* D'ORB., 1839, Voy. Amer. 5, t. 7, fig. 17.
- » *striata* COSTA, 1854, Pal. Nap. 2, p. 266, t. 15, fig. 3.
- » *pygmæa* WILLIAMS., 1858, Brit. rec. forf. p. 66, figg. 138—139.
- » " PARKER and JONES, 1857, For. Coast. of Norway; A. M. N. H. (2) 19, p. 297, t. 11, figg. 41—43 (forma emaciata).
- » " HKE., 1875, For. Clav. Száb. Schichten p. 62, t. 7, fig. 4.
- » *globosa* KARRER 1878, Foram. Luzon; Bolet. Comis. Mapa geol. Esp. 7. 2, p. 21, t. F, fig. 6.
- Syn. *Uvigerina paucicosta* COSTA, 1854, Pal. Nap. 2, p. 268, t. 22, fig. 7.
- » *eocæna* GÜMB., 1868, Nordalp. Eocæn.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 645, t. 2, fig. 78.
- » *gemmæformis, nitidula, crassicostata* SCHWAG., 1866, Foss. For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 247—249, t. 7, figg. 92—94.
- » *striatella* Rss., 1851, Tert. Sch. Oberschles.; Zeitschr. deutsch. geol. Ges. p. 159, t. 8, fig. 7.
- » *rugulosa* Rss., 1863, Crag. d'Anvers; Bull. Ac. Belg. (2) 15, p. 153, t. 3, fig. 43.

a. β) forma »*Sagrina*»:

- Uvigerina nodosa* PARKER & JONES 1865, Northatl. and Arct. Oceans; Phil. Transact. 155, 1, t. 18, fig. 15.
- Uvigerina (Sagrina) Raphanus* PARK. and JONES, *ibid.* t. 18, fig. 16—17.
- ? *Dimorphina striata* SCHWAG., 1866, Foss. For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 251, t. 7, fig. 99.
- ? " *elegans* HKEN., 1875, Clav. Száb. Sch. p. 63, t. 7, fig. 9.

b) *semiornata*:

- Uvigerina semiornata, urnula* D'ORB., 1846, For. Bass. tert. p. 95, t. 4, figg. 21—24.
- » " Egg., 1857, Miocæn. Ortenburg; Leonh. u. Bronns Jhrb. 1857, p. 285, t. 11, figg. 17—18.

- Uvigerina cochlearis, Brunnensis, Parkeri** KARR., 1877, Hochqu. Wasserl.; Österr. geol. Reichsanst. Abh. 9, p. 385, t. 16, figg. 48—50.
 » **pygmæa** var. PARK. and JONES, 1865, Northatl. and Arct. Oceans; Phil. Trans. 155. 1, p. 363, t. 13, figg. 53—57.

b. β) Sagrinæformis:

- Sagr. pulchella** D'ORB., 1839, Cuba p. 150, t. 1, figg. 23—24; 1846, For. Bass. tert. Vienne p. 252, t. 21, figg. 48—49 (textulariæformis).

c) angulosa:

- Uvigerina angulosa** WILLIAMS., 1858, Brit. rec. forf. p. 67, fig. 140.
 » **pygmæa** var. **angulosa** PARK. and JONES, 1865, North. Atl. and arct. Oc.; Phil. Transact. 155. 1, p. 364, t. 13, fig. 58.
 » **trigona** SEG., 1862, Rhizop. foss. Catania p. 26, t. 2, fig. 1; Acad. Gioenia Att. (2) 18.
 » **cristata** MARSS., 1876, Rüg. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 150, t. 3, fig. 20.

Uvigerina Auberiana D'ORB.

Tab. IV, figg. 71—75.

Our form is often more smooth and more slender than D'ORBIGNY'S — also from the West Indies. *Uvigerina gracilis* Rss. from the »Septaria»-clay at Berlin is prickly, but seems nevertheless to belong to this species, as also does *Uvig. proboscidea* SCWHAG. and *Uvig. farinosa* HKEN.; probably also *Uvig. canariensis* D'ORB.

One would be inclined to consider this form as a starved variety of *Uvig. pygmæa*, but there is a remarkable difference between them in the fineness and arrangement of their pore-canals, for whilst *Uvig. pygmæa* has them nearly as fine and closely set as *Nodosarina*, this form has a somewhat coarser poration, resembling in this respect some of the *Bulimina*.

Loxostomum aculeatum EHRENBG. is a biserial *Uvigerina* with a strong tendency to become uniserial (= *Heterostomella* Rss.). If a form with its sides somewhat produced in angles and coarse spines — not uncommon on the chalkbottom, and represented by fig. 75 — is identic with EHRENBURG'S form, it will be impossible to establish any specific distinction between our *Uvig. Auberiana* and this *Loxostomum* of EHRENBURG.

Fig. 71—73 the smooth *Uvig. Auberiana* from the chalkooze; fig. 74 more magnified.

Fig. 75—75 b the *Loxostomum* form (= *Heterostomella aculeata* PARK. and JONES).

a) spinosa aut rugosa:

- Syn. **Uvigerina Auberiana** D'ORB., 1839, Cuba p. 106, t. 2, figg. 23—24.
 » **asperula, Orbignyana** CZJZ., 1847, Foss. for. Wien. Beck.; Haid. nat. Abh. 2. 1, p. 146, t. 13, figg. 14—17 (an forma præcedentis).
 » » Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 93, t. 4, figg. 6—9.

- Syn. *Uvigerina aculeata* D'ORB., 1846, For. tert. Vienne p. 191, t. 11, figg. 27—28.
 » *hispidata* SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 249, t. 7, fig. 95 (an forma præcedentis).
 » *gracilis* Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 77, t. 5, fig. 39.

a. β) forma »Sagrina»:

- Sagrina rugosa* D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France (2) 4, p. 47, t. 4, figg. 31—32.
Heterostomella rugosa Rss., Wien. Ak. Sitz.-Ber. 52, p. 448.
Uvigerina proboscidea SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 250 t. 7, fig. 96.

b) *lævis*:

- Uvigerina nodosa* var. β D'ORB., 1826, An. Sc. Nat. 7, p. 269.
 » *farinosa* HTKEN., 1875, Clav. Száb. Sch. p. 62, t. 7, fig. 6.
 » *canariensis* D'ORB., 1844, Iles Canaries p. 138, t. 1, figg. 25—27.

c) »*Loxostomum*» EHRENB.:

- Loxostomum tumens* EHRENB., 1854, Microgeol. t. 28, figg. 25—26.
 » *aculeatum* EHRENB., ibid. t. 27, figg. 21—22; t. 30, fig. 16.
Heterostomella aculeata PARK. and JONES, 1872, Nomenclat.; An. Nat. H. (4), 9, 10.
Sagrina aspera MARSS., 1878, Rügen. Schreibekreide; Greifsw. Nat. Verein. Mitth. 1877—78, p. 157, t. 3, fig. 26.

Appendix.

- Uvigerina porrecta* BRADY, 1879, Qu. Journ. micr. Sc. (n. ser.) 75, p. 274, t. 8, figg. 15—16.
 » *interrupta* BRADY, ibid. p. 274, t. 8; figg. 17—18.

Uvigerina (Heterostomella) lævis PARK. and JONES.

Tab. IV, fig. 76.

It may be that this form after all — according to the authority of Messrs. PARKER and JONES — ought to be considered as a variety of *Heterostomella aculeata* EHRENB.; but as there is a great difference in the structure of the test it seems reasonable to distinguish it as species. In transmitted light our species is amber-coloured, very delicate and without pores, so that one would be disposed to refer it to the Miliolina-group.

A single specimen only has been met with on the chalk-bottom, in a pigmy state.

Fig. 76 seen in transmitted light.

Fig. 76 b the same more enlarged.

Syn. *Loxostomum longirostre* EHRENB., 1854, Microgeol. t. 32, fig. 22.

Heterostomella aculeata β *lævis* PARK. and JONES, 1872, Nomenclature foramf.; A. M. N. H. (4) 9 and 10.

Uvigerina dimorpha PARK. and JONES.

Tab IV, figg.77—81.

Though the designation of »dimorpha» applied to a *Sagrina*, which genus has been founded on such a character, does not imply any specific distinction, we still retain Messrs. PARKERS and JONES' name for this form, being by no means inclined to enrich our nomenclature.

Its early *uvigerina*-stage is often reduced to a couple of chambers, and it would sometimes be hard to recognise the small egg-shaped bodies without any traces of septal marks as *Uvigerina*, if the somewhat prolonged mouth-necks did not betray its affinity to this genus.

Our form is highly agglutinant, constructing its shell of the finest chalkdebris and detritus. Its original form is mostly narrow cylindrical, but it seems to accumulate with age a thick deposit of loosely cemented detritus, so that it becomes egg-shaped with a somewhat rough and chalky surface.

It seems likely, that this species has been confounded by some authors with »*Clavulina*» forms. *Clavulina cylindrica* HKEN. and KARRER is probably identical with it, perhaps also *Glandulina rudis* of COSTA.

It is not uncommon on the chalkbottom and attains 3—4 mm. in length.

Figg. 77—78: the slender form.

Figg. 79—80: the eggshaped one.

Fig. 81 apertural side.

- Syn. **Uvigerina dimorpha** (*Sagrina*) PARK. and JONES, 1865, Phil. trans. 155. 1, t. 18, fig. 18.
Glandulina rudis COSTA, 1855, Marna terz. Messina; Mem. Nap. 2, p. 142, t. 1, fig. 12.
Clavulina cylindrica HKE., 1875, For. Clav. Száb. Sch. p. 18, t. 1, fig. 8.
 » » KARR., 1877, k. k. österr. geol. Reichsanst. Abh. 9, p. 373, t. 16, fig. 4.
 ?**Haplophragmium verruculosum** GÜMB., 1871, Ulmer Cem. Mergel; Münch. Ak. Sitz.-Ber. 1, p. 63, t. 1, fig. 1.
 ?**Globulina fragaria** GÜMB., ibid. p. 68, t. 1, fig. 16.

Appendix.

- Sagrina virgula** BRAD., 1879, Notes on Ret. Rhizop. »Challeng.» Exp.; Qu. Journ. Micr. Sc. (n. Ser.) 75, p. 275, t. 8, figg. 19—21.
-
- » **divaricata** BRAD., ibid. p. 276, t. 8, figg. 22—24.

Bulimina pupoides D'ORB.

Tab. IV, figg. 82—94.

A very variable species, the small differences consisting in the chambers being more or less inflated and in the different degrees of overlapping, the chamber-wall being often very much lengthened out backwards so as to enclose a smaller or greater part of the preceding chambers. It is not compatible with a philosophical arrangement to attach to all these individual modifications varietal and even specific designations, as has been done by some authors.

Our form is remarkable for its extremely thin, glassy test. Owing to its extreme tenuity one or two of the last chambers often become detached from the rest, whence mature specimens in perfect condition are scarce. Sometimes the first chambers are provided with a few delicate folds in transmitted light looking as straight, bright streaks radiating from the primordial chamber.

Our specimens agree mostly with *Bul. pyrula*, *ovula* and *ovata* D'ORB.

The spinous form figg. 82—83 may more properly be referred to another species on account of its different poration, but being very young and scarce, there has been little chance of comparing and identifying it with other forms. It is nearly identical with *Polymorphina aculeata* EHRENBERG.

Bul. pupoides is not very common in the chalkooze.

Figg. 82—83 the aculeate form.

Fig. 82 b the same as 82 more enlarged.

Figg. 84—85: nearly the typical *Bul. pupoides* D'ORB.

Fig. 86, more blunt form approaching *Bul. pyrula* D'ORB.

Fig. 87: very small specimen, enlarged.

Fig. 88: with the chambers spirally set in a more regular row, approaching *Bul. arctica* D'ORB.; 88 b the same more magnified.

Fig. 89: small specimen.

Fig. 90: pigmy form with extenuated chambers, approaching the habitus of »*Virgulina*», and with radiating folds.

Figg. 91—93: very young specimens seen from above with radiating folds.

Fig. 94: slender form, between *Bul. pupoides* and *Bul. (Virgulina) squamosa* D'ORB.

Syn. <i>Bulimina brevis</i>	D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France (2) 4. p. 41. t. 4, figg. 13—14.
» <i>auriculata, turgida</i>	BAILEY, 1850, Micr. Exam. of Soundings; Smiths. Contrib. 2, Art. 3, p. 12, fig. 25—30.
» <i>pyrula</i>	D'ORB., 1846, For. Bass. tert. Vienne p. 184, t. 11, figg. 9—10.
? » <i>intermedia</i>	Rss., 1845, Böhm. Kreide 1, p. 37, t. 13, fig. 71.
? » »	Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 39, t. 3, fig. 11.
» <i>pustulosa</i>	COSTA. 1854, Pal. Nap. 2, p. 264, t. 15, fig. 8.
» <i>ovulum</i>	Rss., 1845, Böhm. Kreidef. 1, p. 37, t. 8, fig. 57; t. 13, fig. 73.

- Syn. *Bulimina ovulum* Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 38, t. 3, fig. 9.
 » » ALTH., 1849, Umgeb. Lemb.; Haid. Nat. Abh. 3. 2, p. 264, t. 13, fig. 18.
 » **Murchisoniana** D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. France (2) 4, p. 41, t. 4, figg. 15, 15'.
 » » Rss., 1845, Böhm. Kreide 1. p. 37, t. 8, figg. 69, 72, t. 13, fig. 70.
 » **subsphaerica** Rss., ibid. 2. p. 109, t. 24, fig. 52.
 » **imperatrix, incrassata** KARR., 1868, Mioc. For. Koste; Wien. Ak. Sitz.Ber. 1. 58, p. 176, 177, t. 4, figg. 11—12.
 » **socialis** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 342, t. 16, fig. 10.
 » **pitecusana** COSTA, 1854, Pal. Nap. 2, t. 15, fig. 5.
 » **elipsoides** COSTA, ibid. p. 265, t. 15, fig. 9.
 » **Presli** var. **pyrula** PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 372, t. 15, figg. 8—9.
 » **caudigera** D'ORB., 1826, An. Sc. Nat. 7, p. 270, N:o 16. Mod. 68.
 » **marginata** PARK. and JONES, 1857, (partim) For. Norway; A. N. H. 19, t. 11, figg. 36—38.
 » **buccinoides** EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 282, t. 10, figg. 9—11.
 » **inconstans** EGGER, ibid. p. 283, t. 12, figg. 1—3.
 » **truncata, d'Orbignyi** Rss., 1845, Böhm. Kreide 1, p. 37, 38, t. 8, fig. 73, t. 13, fig. 74.
 ? *Pleurostomella brevis* SCHWAG., 1866, Foss. Foramf. Kar-Nikobar; Nov. Reise, geol. Th. 2. 2, p. 239, t. 6, fig. 81.
Bulimina declivis Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 55, t. 6, fig. 70; t. 7, fig. 71.
Robertina austriaca Rss., 1849, Neue Foramf.; Wien. Ak. Dkschr. 1. 1, p. 375, t. 47, fig. 15.
Bulimina ovulum D'ORB., 1839, Voy. Am. merid. 5, p. 50, t. 1, figg. 10—11.
 » **ovata** D'ORB., 1846, For. Bass. tert. Vienne; p. 185, t. 11, figg. 13—14.
 » » PARKER and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 374, t. 17, fig. 67.
 » » STACHE, 1865, tert. Merg. Whaingar. Haf.; Nov. Reise, geol. 1. 2, p. 266, t. 24, fig. 14.
 » **pupula, aperta, propinqua** STACHE, ibid. p. 265, 266, 267, t. 24, figg. 13, 15, 16.
 » **pupoides** D'ORB., 1846, For. tert. Vienne, p. 185, t. 11, figg. 11, 12.
 » » WILLIAMS., 1858, Brit. rec. Foramf. p. 62, figg. 124—125.
 » **pedunculata, mamillata** COSTA, 1854, Pal. Nap. 2, p. 334, 335, t. 18, figg. 13, 16.
 » **elongata** HKEN., 1875, For. Clav. Száb. Sch., p. 61, t. 10, fig. 7.
 » **elegans** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 270, Mod. 9.
 » **obtusa** D'ORB., 1839, For. Craie blanche Paris; Mem. Soc. geol. Fr. 4, p. 39, t. 4, figg. 5—6.
 » **affinis** D'ORB., 1839, Cuba. foramf. p. 105, t. 2, figg. 25—26.
 ? » **spec.** SCHWAG., 1863, Jurass. Sch. loc. cit. p. 136, t. 7, fig. 4.
 ? » **tortilis** Rss., 1861, Grünsand N. Jersey; Wien. Ak. Sitz.-Ber. 1. 44, p. 338, t. 8, fig. 3.
 » **pupoides** var. **fusiformis** WILLIAMS., 1858, Rec. For. p. 63, figg. 129—130.
 » **acuta, acicula** COSTA 1854, Pal. Nap. 2, p. 336, t. 13, fig. 25, t. 22, figg. 6, 8.
 » **tenera** Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 94, t. 4, figg. 11—12.
 » **acuta** Rss., 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 38, t. 3, fig. 8.
 » **uva** RÖM., 1838, Nordd. tert. Meeressand; Leonh. u. Bronn. Jhrb. 1838, p. 387, t. 3, fig. 43.
 » **cylindrica** RÖM., ibid, p. 387, t. 3, fig. 44. (an *Bul. elongata* D'ORB. vide Append. b).

- Syn. **Bulimina Puschii** Rss., 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 37, t. 3, fig. 6.
 » **imbricata** Rss., ibid. p. 38, t. 3, fig. 7.
 » **scabriuscula** Rss. 1860, For. Crag. v. Antwerp.; Wien. Ak. Sitz.-Ber. 42, p. 360, t. 2, fig. 13.
 » **squamigera** D'ORB., 1844, Iles Canaries, p. 137, t. 1, figg. 22—24 (in »Virg.» squamosam transiens).

b) spinulosa:

- Bulimina patagonica** D'ORB., 1839, Voy. Am. merid. 5, p. 50, t. 1, figg. 8—9.
 » **pupoides** var. **spinulosa** WILLIAMS., 1858, Brit. rec. Forf. p. 62, fig. 128.
 » **aculeata** (Czjz.) Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 374, t. 47, fig. 13.

Polymorphina? aculeata EHRENB., 1854, Microgeol., t. 19, fig. 85.

c) marginata et spinose-marginata (an species distincta):

- Bulimina marginata** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 269, t. 12, figg. 10—12.
 » **pupoides** var. **marginata** WILLIAMS., 1858, Brit. rec. Forf. p. 62, figg. 126—127.
 » **marginata** (part.) PARK. and JONES, 1857, For. Coast. of Norway; An. Mag. Nat. Hist. 19, t. 11, figg. 39—40.
 » **Presli** var. **marginata**, var. **aculeata** PARK. and JONES, 1865, For. N. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 372, 373, t. 15, figg. 10—11; t. 17, figg. 68—70.
 » **spinosa** SEG., 1862, Rhizopod. foss. d. Catania p. 23, t. 1, fig. 8 (sep. de Accad. Gioenia Atti (2) 18).
 » **etnea** SEG. ibid. p. 24, t. 1, fig. 9.
 » **acanthia** COSTA, 1854, Pal. Nap. 2, p. 335, t. 13, figg. 35—36.
 ? » **serrata** BAILEY, 1850, Micr. Examin. of Soundings; Smithson. contrib. knowl. 2, Art. 3, p. 12, figg. 32—34.

c) carinata vel spinose alata:

- Textul. echinata** D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 263. N:o 24.
Bulimina trilobata D'ORB., ibid. p. 269. N:o 6.
 » **aculeata** D'ORB., ibid. p. 269. N:o 7.

f) costata vel seminuda:

- Bulimina inflata** SEG., 1862, Rhizopod. foss. Catan. p. 25, fig. 10 (Sep. Atti Accad. Gioenia (2) 18).
 » » SCHWAG., 1866, Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 246, t. 7, fig. 91.
 » **Buchiana** Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 95, t. 4, fig. 10.
 » **Buchiana** D'ORB., 1846, For. tert. Vienne, p. 186, t. 11, figg. 15—18.
 » **Presli** var. **Buchiana** PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 374, t. 17, fig. 71.
 » **truncana** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 644, t. 1, fig. 77.
 » » HKEN., 1875, For. Clav. Száb. Sch., p. 61, t. 7, fig. 5.

Appendix.

Plerumque agglutinans.

a) gibbosa:

- Valvulina gibbosa** D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. geol. Fr. (2) 4, p. 38, t. 4, figg. 1—2.
- » **quadribullata** v. HAGEN, 1842, Rügen. Kreideverst., Leonh. u. Bronn. Jhrb. 1842, p. 570.
- Globigerina confluens** v. HAGEN, ibid. p. 571.
- Bulimina obesa** Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 40, t. 3, fig. 12, t. 4, fig. 1.
- Ataxophragmium globulare** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 449, t. 1, fig. 2 (an *B. variabilis* D'ORB.).
- » **arenaceum** KARR., 1865, Wien. Sandstein; Wien. Ak. Sitz.-Ber. 52, p. 495, fig. 9.
- » **Presli** Rss., 1845, Böhm. Kreide 1, p. 38, t. 13, fig. 72.
- » » Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 39, t. 3, fig. 10.
- » » Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 31.
- ?**Bulimina rimosa** MARSS., 1878, Rüg. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 153, t. 3, fig. 21 (forsan Lituola).

b) elongata:

- Bulimina elongata** D'ORB., 1846, For. tert. Vienne, p. 187, t. 11, figg. 19—20.
- Ataxophragmium oblongum** Rss., 1865, Feuerstein-Kreide Kanara See; Wien. Ak. Sitz.-Ber. 52, p. 458, fig. 2.
- » **magdaliidiforme, subovale, laceratum** SCHWAG., 1866, For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 193, 194, t. 4, figg. 1—3.

c) variabilis:

- Bulimina variabilis** D'ORB., 1839, For. Craie bl. Par.; Mem. Soc. geol. Fr. (2) 4, p. 40, t. 4, figg. 9—12.
- » » Rss., 1845, Böhm. Kreide 1, p. 37, t. 8, figg. 56, 76, 77.
- Ataxophragm. simile** KARR., 1868, Mioc. For. Faun. Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 126, t. 1, fig. 1.
- » **humile** KARR., 1878, Foramf. Luzon.; Bolet. Comis. Mapa del España, 7. 2, p. 11, t. E, fig. 3.

Bulimina elegantissima D'ORB.

Tab. IV, figg. 95—98.

I am unable to find any nearer type for our form than *Bul. elegantissima*, particularly its variety *Rob. arctica* D'ORB., though it does not quite agree with any of them. But it is either too young or too pygmean to be more accurately defined. The principal feature by which it is distinguished from *Bul. pupoides* is the extreme fineness and close arrangement of the pore-canals, in which respect it is scarcely surpassed by *Nodosarinæ*. The septal bands are generally very thick, somewhat amber-coloured in transmitted light.

Some of EHRENBERGS *Strophoconi* seem to be identical with our form.

It is not common in the chalk-ooze, seldom attaining more than 0,20 mm. in length.

Fig. 95: small specimen.

Fig. 96: the same seen in transmitted light.

Figg. 97—98: two other very small specimens.

Syn. <i>Bulimina elegantissima</i>	D'ORB., 1839, Voy. Am. merid. 5, p. 51, t. 7, figg. 13—14.
»	» WILLIAMS., 1858, Brit. rec. For. p. 64, figg. 134—135.
» <i>Presli</i> var. <i>elegantissima</i>	PARK. and JONES, 1865, N. Atl. and arct. Oc.; Phil. Transact. 155. 1, p. 375, t. 15, figg. 12—17.
» <i>elegantissima</i>	var. BRADY, 1878, An. Mag. Nat. Hist. (5) 1, p. 436, t. 21, fig. 12.
» <i>subteres</i>	BRADY, 1881, Qu. Journ. micr. Sc. (n. s.) 21, p. 55.
<i>Rotalina bulimoides</i>	Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 77, t. 5, fig. 38 (ad hanc pertinens sec. PARKER and JONES 1872).
<i>Robertina arctica</i>	D'ORB., 1846, For. Bass. tert. Vienne, p. 203, t. 21, figg. 37—38 (sec. PARKER and JONES).
? » <i>obliqua</i>	D'ORB., 1839, For. Craie blanc. Par.; Mem. Soc. geol. Fr. 4, p. 40, t. 4, figg. 7—8.

Bulimina (Virgulina) squamosa D'ORB.

Tab. IV, figg. 99—108.

I am not able to trace any sort of *essential* distinction between *Bul. (Virgulina) squamosa* D'ORB. and *Bul. (Virgulina) Schreibersiana* CZJZ. To judge by the representations of the latter given by different authors all agree in the shape and setting of the chambers, being not quite so regular as in *Bul. squamosa typica*, which seems to be more biserial in its growth, whilst the CZJZEKS form shews some tendency to a multi-serial arrangement.

The boundary between this species and *Bul. (Bolivina) punctata* D'ORB. is far from being distinct. And yet Mr. D'ORBIGNY found himself compelled to distinguish these two species as two *genera*.

Bul. squamigera D'ORB. from Canary Islands comes very near to this species and may be more allied to this than to *Bul. pupoides* D'ORB.

The variation of *Bul. squamosa* consists chiefly in the greater or less flatness and breadth of the chambers and their greater or less elongation backwards. There is also a slight difference in the size and arrangement of the pores and in the transparency of the shell.

All our forms are from the chalk-bottom, where they are not unfrequent.

Figg. 99—103: comes next to *Virgulina Schreibersiana* CZJZ.; it is generally of a dusky hue, so that the pores are scarcely visible in transmitted light. It is not uncommon and attains a pretty good size.

Fig. 104: more textularia-formed, of the same dull hue in transmitted light as the preceding.

Fig. 105: approaching *Bul. (Boliv.) punctata* D'ORB.

Figg. 106—107: next to the typical *Virgulina squamosa* D'ORB. Our form is quite hyaline and very scantely provided with moderate sized pores. It is probably a pigmyform.

Fig. 108: broader, with the chambers less produced.

a) minus compressa, interdum fusiformis:

- Syn. *Virgulina squamosa* D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 267, N:o 1, Mod. 64.
 » *punctata* D'ORB., 1839, Cuba p. 139, t. 1, figg. 35—36.
 » *squamosa* RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 386, t. 3, fig. 39.
- Bulimina Presli* var. *Virg. squamosa* PARK. and JONES, 1865, N. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 375, t. 15, figg. 19—20.
- Virgulina pertusa* Rss., 1860, Crag. Antwerp.; Wien. Ak. Sitz.-Ber. 42, p. 362, t. 2, fig. 16.
 » » FRIČS Mod. 65.
 » *tegulata* Rss., 1845, Böhm. Kreide 1, p. 40, t. 13, fig. 81.
 » *Schreibersiana* CZJZ., 1847, For. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 147, t. 13, figg. 18—21.
- Bulimina marginata* var. *attenuata* PARK. and JONES, 1857, For. Coast of Norw.; An. Nat. H. 19, t. 2, fig. 35.
 » *Presli* var. *Schreibersii* PARK. and JONES, 1865, N. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 375, t. 15, fig. 18; t. 17, figg. 72—73.
 » *compressa* BAIL., 1850, Microsc. Exam. of Soundings; Smithson. Contrib. 2, figg. 35—37.
 » *cylindracea* COSTA, 1854, Pal. Nap. 2, t. 15, fig. 10.
 » *pupoides* var. *compressa* WILLIAMS., 1858, Brit. rec. forf. p. 63, fig. 131 (forma valde elongata).
- Strophoconus* nominib. variis EHRENB., 1854, Mikrogeol. t. 20, figg. 2—4; t. 26, fig. 25; t. 28, fig. 27; t. 31, figg. 21, 23, 24, 25, 32—34.
- Virgulina Schreibersi* HKEN., 1875, Clav. Száb. Sch., p. 63, t. 7, fig. 15.

b) magis dilatata, cameris valde productis:

- Strophoconus Hemprichii* EHRENB., 1854, Mikrogeol. t. 24, fig. 32.

c) magis compressa, Bolivinaeformis h. e. textularioides (*Buliminae punctatae* valde propinqua):

- Syn. *Virgulina Reussii* GEIN., Rss., 1845, Böhm. Kreide. 1, p. 40, t. 8, fig. 61.
 » » Rss., 1865, Kreide am Kanara See; Wien. Ak. Sitz.-Ber. 52, t. 45, fig. 7.
- Bolivina textularioides* Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 81, t. 10, fig. 1.
 » *antiqua* D'ORB., 1846, For. tert. Vienne, p. 240, t. 14, figg. 11—13.
 » *elongata* KARR., 1878, For. Luzon; Bolet. Comis. Mapa geol. del España, 7. 2, p. 23, t. F, fig. 8.
 » » HKEN., 1875, For. Clav. Száb. Sch. p. 65, t. 7, fig. 14.
- Polymorph. asparagus*, *Grammost. macilentum* EHRENB., 1854, Mikrogeol. t. 27, figg. 14—16; t. 29, figg. 30—31.
- ?*Bolivina tenuis* MARSSON, 1877, Rügen. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 156, t. 3, fig. 23 (an *B. punctata*).

Syn. *Bolivina tegulata* Rss., 1850, Kreidemergel Lemberg; Heid. Nat. Abh. 4. 1, p. 45, t. 4, fig. 12.

d) striata:

Bolivina nobilis HKEN., 1875, For. Clav. Száb. Sch. p. 65, t. 15, fig. 4.

» *semistriata* HKEN., ibid. p. 65, t. 7, fig. 13.

Bulimina squamosa var. *subsquamosa* EGGER.

Tab. IV, figg. 109—113.

This form, which is not to be identified with *Virg. subsquamosa* EGGER without some hesitation, seems to occupy a position intermediate between D'ORBIGNY'S genus *Bulimina* and his *Virgulina*; but it is more nearly allied to the latter than appears at first sight.

The generally slender and elongated *Virg. squamosa* becomes sometimes short and broad (see fig. 103) and then is hardly distinguishable from the variety in question.

Its shell-substance like the preceding has in transmitted light the same dusky hue, being, as it were, incorporated with fine dust, which almost hides the pores and presents a strong contrast to the clear, transparent shells of most of its nearest congeners. The pores are more wide apart than in *Bul. pupoides*.

The tendency of the early chambers to coil up is of no specific importance and is often wanting. Such broad forms resemble somewhat *Cassidulina oblonga* Rss. WILLIAMSON has described a *Bul. pupoides* var. *convoluta*, which may possibly belong to this variety (Brit. recent foranf. p. 63, figg. 132—133).

It is always of small size and not uncommon on the chalk-bottom.

Fig. 109: a. Textulariaformed; b. the same more enlarged.

Figg. 110—113: two somewhat coiled specimens.

Syn. *Virgulina subsquamosa* EGGER, 1857, Miocän. v. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 295, t. 12, figg. 19—21.

» *tenuis* SEG., 1862, Rhizopod. foss. Catania p. 28, t. 2, fig. 2 (Accad. Gioenia Atti (2) 18).

Strophoconus? teretiuscula EGGER, l. cit. p. 292, t. 12, figg. 30—32.

» *Hemprichii* EHRENB. (partim) t. 28, figg. 28—30; t. 29, fig. 38; t. 32, figg. 18—20?

Grammostomum EHRENB., ibid. t. 24, figg. 28—23.

Bulimina (Bolivina) punctata D'ORB.

Tab. IV, figg. 114—126.

This is the most Textularialike of the *Buliminae*. Its principal difference from *Bul. squamosa* should consist in the smaller degree of obliquity in its septa; of course a very vague mark of distinction among members of such a class as Rhizopodes.

Bolivina textularioides Rss., *Bol. elongata* KARR., *Bol. antiqua* D'ORB., *Virgul. Reussii* GEIN. are all intermediate between *Bul. punctata* and *squamosa*.

The shape of the shell is liable to great variations according to the greater or less degree of convexity of the septa and marginal walls, the breadth of the chambers and its gradual or more rapid increase in size. Sometimes the surface is provided with faint hexagonal impressions like those found on *Globigerina*. Generally it has coarser pore-canals than its congeners, the pores equalling in size those of some *Planorbulina*.

The very faint longitudinal folds which some times adorn our form can scarcely be of any, even varietal, importance, being often wanting.

Figg. 114—115: the narrow form of *Bul. punctata*, sometimes provided with a few narrow folds. It is the same as *Grammostomum elegans* EHRENB., *Brizalina ænariensis* COSTA, *Boliv. plicata* D'ORB. & MÖB. Generally this has finer pores than the var. *dilatata*. 115 *b*: the same more magnified.

Figg. 116—123: the commonest form of *Bul. punctata*.

Figg. 124—126: the broad form, called *dilatata* Rss.

It is very common on the chalk-bottom but it is of very small size.

a) minus dilatata:

Syn. <i>Bolivina punctata</i>	D'ORB., 1843, Voy. Am. mer. for. p. 63, t. 8, figg. 10—12.
» <i>incrassata</i>	Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. 4. 1, p. 45, t. 4, fig. 13.
» <i>catanensis</i>	SEG., Rhizopod. Catania p. 29, t. 2, fig. 3; Accad. Gioenia Atti (2) 18.
» <i>punctata</i>	BRADY, 1864, Rhizopod. Shetl.; Trans. Lin. Soc. 24, p. 468, t. 48, fig. 9.
» <i>antiqua</i>	EGGER, 1857, Miocæn. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 294, t. 12, figg. 22—26.
» <i>Presli</i> var. <i>punctata</i>	PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 376, t. 17, fig. 74.
» <i>punctata</i>	PARK. and JONES, 1866, Crag. For.; Pal. Soc. 19, t. 3, figg. 3—4.
» <i>ligularia</i>	SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 255, t. 7, fig. 102.
<i>Textil. jurassica</i>	GÜMB., 1862, Streitenb. Schwammlag.; Würtemb. Nat. Verein. Jhrft. 21, p. 228, t. 4, fig. 17.
<i>Grammostomum laterale</i> , <i>polystigma</i> , <i>elegans</i> , <i>plica</i> , <i>aciculatum</i>	EHRENB., 1854, Microgeol. t. 19, figg. 83—84; t. 20, fig. 7; t. 21, figg. 84, 85; t. 20, fig. 10.
<i>Proroporus argus</i>	EHRENB., ibid. t. 20, fig. 8.
<i>Textul. linearis</i>	EHRENB., 1854, Microgeol. t. 24, figg. 16—17.
<i>Nominib. variis</i>	EHRENB., ibid. t. 25, figg. 16—20; t. 29, figg. 26—27.
<i>Grammost. cribrosum</i>	EHRENB., ibid. t. 24, fig. 19.
<i>Brizalina ænariensis</i>	COSTA, 1854, Pal. Nap. 2, p. 297, t. 15, figg. 1—2.
<i>Bolivina punctata</i>	MÖB., 1880, Maur. u. Seychell. p. 94, t. 9, figg. 9—10.

b) magis dilatata:

<i>Bolivina dilatata</i>	Rss., 1849, Neue For. Österr.; Wien. Ak. Dkschr. 1. 1, p. 381, t. 48, fig. 15.
» <i>reticulata</i>	HKEN., 1875, For. Clav. Száb. Sch. p. 65, t. 15, fig. 6.
» <i>linearis</i>	MARSS., 1877, Rügen. Schreibungkreide; Greifsw. Nat. Verein. Mitth. 1877—78, p. 155, t. 3, fig. 22.
<i>Grammost. nom.</i> var.	EHRENB., 1854, Microgeol. t. 21, figg. 82, 86, 87; t. 24, figg. 20—24; t. 27, figg. 13, 20; t. 29, fig. 23; t. 32, figg. 15—19.
<i>Bolivina thebaica</i>	MÖB., 1880, Meeresfaun. Maurit. u. Seych. p. 95, t. 9, fig. 11.

c) striata vel costulata:

Syn. <i>Bolivina plicata</i>	D'ORB., 1843, Voy. Am. mer. 5, p. 62, t. 8, figg. 4—7.
» »	MÖB., 1880, Beiträge z. Meeresfaun. Mauritius u. Seychell. p. 95, t. 9, figg. 12—13.
» <i>pusilla</i>	SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 254, t. 7, fig. 101.
? » <i>plicata</i>	BRADY, 1870, Brack. water foram.; A. M. N. H. (4) 6, p. 302, t. 12, fig. 7 (an <i>B. costata</i> D'ORB.).
<i>Grammost. sulcatum</i>	EHRENB., 1854, Microgeol. t. 20, fig. 9.

***Bulimina punctata* var. *decurrens* EHRENB.**

Tab. IV, fig. 127.

A handsome form not uncommon on the chalk-bottom and of pretty good size. It may be more allied to *Bul. squamosa* than to *punctata*.

Fig. 127: *Bul. punctata* var. *decurrens*; 127 b.: the same more magnified.

Syn. <i>Grammost. decurrens</i>	EHRENB., 1854, Microgeol. t. 30, fig. 17.
<i>Bolivina decurrens</i>	MARSS., 1877, Rügen. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—1878, p. 156, t. 3, fig. 24.
» <i>Beyrichi</i>	RSS., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 83, t. 6, fig. 51.
? » <i>Beyrichi</i>	HKEN., 1875, For. Clav. Szab. Sch. p. 64, t. 7, figg. 11—12.

***Bulimina costata* D'ORB.**

Tab. IV, figg. 129—132.

Although our form exhibits some differences from *Bolivina costata* D'ORB. in being more closely ribbed and having the costæ often produced to short spines, particularly on the edges — as in »*Bulim. inflata*» SCHWAG. —, it cannot be entitled to rank of distinct species. It is more or less compressed; the pores are of the same size and scattered disposition as is often found in *Bul. punctata* D'ORB. In its outlines it often has some resemblance to *Sagrina pulchella* D'ORB. The aperture is very narrow and difficult to bring into view.

It is very common in the chalk-ooze, always of a pigmy size.

Fig. 129: very small specimen, highly magnified.

Fig. 130: more developed.

Fig. 131: edge view of the same; 132: apertural side.

Syn. <i>Bolivina costata</i>	D'ORB., 1839, Voy. Amer. mer. p. 62, t. 8, figg. 8—9; 1846, For. Bass. tert. Vienne p. 239, t. 21, figg. 44—45.
<i>Bulimina Presli</i> var. <i>Boliv. costata</i>	PARK. and JONES, 1865, N. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 376, t. 17, fig. 75.
? <i>Bolivina subangularis</i>	BRADY, 1881, Notes on retic. Rhizopod.; Qu. Journ. Micr. Sc. (N. Ser.) 81. p. 59.

Textularia sagittula DEFR.

Tab. IV, figg. 133—158.

The species of *Textulariæ* are not less difficult to define within proper boundaries than are *Nodosarinæ*. It is obvious that many gradations in the flatness or in the distention of the chambers will make the whole liable to numberless variations, from a compressed lanceolate to a quite conical shape with either straight or sinuous margins and contours.

The shells substance is also variable in character being sometimes more translucent and glossy, but it is usually agglutinated of calcareous or siliceous debris. In the whole range of known *Textulariæ* forms it is therefore not easy to distinguish besides the *Gaudryina*- and *Verneuilina*-forms more than 3 or 4 species; that is to say:

1. *Textularia sagittula* DEFR. or *agglutinans* D'ORB., including such forms as: *Textul. pygmæa*, *Mariæ*, *carinata*, *cuneiformis*, *Baudouiana*, *conica*, *caribæa*, *aciculata*, *agglutinans*, *Candeiana* etc. D'ORB. and a long list of names from REUSS and others.
2. *Textularia gibbosa* D'ORB. should be another but, it is a very ill defined species; its chambers being more inflated.
3. A third species is *Textularia trochus* D'ORB.; this has some tendency to become »*Cuneoline*».
4. The fourth species is *Textularia pennatula* BATSCH., apparently representing an intermediate form between the *textularioid* *Buliminæ* and the real *Textulariæ*.

All these species have their respective *Bigenerinæ* forms.

Whether »*Gaudryina*» and »*Verneuilina*» are to be considered as »varieties», or »species», is a question that we are not yet prepared to settle, as our collections are wanting in intermediate forms.

The transverse section of our form varies from narrow oval or pointed elliptical to nearly orbicular. The more »*sagittular*» form exhibits often raised bands along the sutures. In older specimens the surface is more chalky and uneven. All forms that we have met with are agglutinant; the shell being compactly built up of very fine chalk-debris and dust. Very young ones are semitransparent, presenting a deep brown tint in transmitted light; the fine granular texture of the shell concealing the pores. It appears from many instances in our collection, that whenever the *Textularia*-stadium becomes more developed, the *Nodosarina* growth is reduced to only one or two chambers; and on the other hand, whenever the *Nodosarina*-stadium has a high development the *textularia*-part is found to be stunted and often reduced to a few chambers. These fluctuations of development give rise to a number of varietal *Bigenerina*-forms. All our forms are composed solely of calcareous matter.

Figg. 133—136: intermediate form between D'ORBIGNY'S *Textul. agglutinans* and *Textul. sagittula*, and provided with one »*Nodosarina*»-chamber, the first step towards forma »*Bigenerina*».

Figg. 137—139: the same more flattened and *sagittula*-like.

Figg. 140—143: is the typical *Textul. agglutinans* D'ORB.; it cannot properly be distinguished from *Textul. sagittula* DEFR.

Figg. 144—146: a very compressed and often serrated form; it has received many names: *Textul. carinata*, *Maria*, *cuneiformis* D'ORB., *Plecanium serratum*, *spinulosum*, *pectinatum* etc. Rss. It is sometimes very much flattened out and has then again been loaded with a number of new names. The gradations between this and the conical form are many and altogether too insignificant to be distinguished from each another even by varietal-names.

Figg. 147—149: its first step towards the conical form.

Figg. 150—158: different gradations of *Textul. sagittula* into the conical form (= *Textul. cuneiformis* var. *conica* WILLIAMS.); sometimes with convex, another time with flat basis.

Figg. 150—151: small specimen.

Figg. 152—154: very developed with a chalky texture.

Figg. 155—156: smaller specimen with distended base, and nearly circular in transverse section.

Figg. 157—158: nearly of the same shape as the preceding.

a) *pygmæa*:

- Syn. ***Textularia pygmæa, aciculata*** D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 263, t. 11, figg. 1—4, Mod. 7.
- ” ***agglutinans*** var. ***pygmæa*** PARK. and JONES, 1865, Arct. and Northatl. Ocean; Phil. Trans. 155. 1, p. 370, t. 15, fig. 22; t. 17, fig. 78.
- ” ***pygmæa*** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 80, t. 9, fig. 11.
- ” ***Caribæa*** D'ORB., 1839, Cuba, p. 145, t. 1, figg. 28—29.
- ” ***franconica*** GÜMB., 1862, Streitenberg. Schwammlager; Würtemb. Nat. Wiss. Ver. Jhrhft. 17 (1862), p. 229, t. 4, fig. 18.
- ” ***ulmensis*** GÜMB., 1871, Ulmer Cementmergel; Münch. Ak. Sitz.-Ber. 1, p. 68, t. 1, fig. 17.
- ” ***cognata*** Rss., 1863, Sept. Thon Kreuznach; Wien. Ak. Sitz.-Ber. 1. 48, p. 68, t. 8, fig. 96.
- ” ***bolivinoïdes*** Rss., 1859, Westphäl. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 335, t. 12, fig. 6.
- ” ***tetraëdra, laminaris, mutata*** COSTA, 1854, Pal. Nap. 2, p. 288, t. 23, fig. 10, 15—17.
- ” ***quadrilatera*** SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 253, t. 7, fig. 103.
- ” ***triticum*** JONES, 1850, Kings Monogr. Perm. foss. p. 18, t. 6, fig. 5 (sec. BRADY).
- ” ” RICHT., 1855, Thüringer Zechstein; Zeitschr. deutsch. geol. Ges. 7, p. 532, t. 26, figg. 24—25; 1861, Geinitz Dyas p. 122, t. 20, figg. 36—37.
- ” ” BRADY, 1877, Carbonif. and Perm. foranf.; Pal. Soc. 30, p. 134, t. 10, figg. 24—25 (an spec. distincta).
- ” ***pusilla, pugiunculus*** SCHWAG., 1863, Jurass. Sch.; Württemberg. Nat. Verein. Jhrhft. 21, p. 140, t. 7, figg. 14, 16.
- ” ***attenuata*** Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 59, t. 7, fig. 87.
- ” ***variabilis, γ. lævigata*** WILLIAMS., 1858, Brit. rec. For. p. 76, figg. 162—163; 168.

- Syn. *Textularia ovata, elliptica* RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 384, t. 3, figg. 17—18.
- » *prælonga* SCHWAG., 1866, For. Kar-Nikobar; Novara Reise, geol. Th. 2. 2, p. 252, t. 7, fig. 104.
- » *articulata* Rss., 1850, Kreidemerg. Lemberg; Haid. nat. Abh. 4. 1, p. 45, t. 4, fig. 14.
- » *multilocularis* Rss., 1861, Geinitz Dyas 1, p. 122, t. 20, fig. 38.
- » » BRADY, 1877, Carbon. and Perm. foranf.; Pal. Soc. 30, p. 135, t. 10, fig. 23.
- Proroporus complanatus* Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 231, t. 12, fig. 5.
- » *Schultzei* Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 80, t. 9, fig. 10.
- » *sp.* SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrhft. 21, t. 7, fig. 19.
- Textularia lævigata, nussdorfensis* D'ORB., 1846, For. tert. Vienne, p. 243, t. 14, figg. 14—19.
- Plecanium lanceolatum* KARR., 1868, Mioc. Fauna Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 129, t. 1, fig. 2.

b) margine obtuso s. rotundato:

- Textularia agglutinans* D'ORB., 1839, Cuba, p. 144, t. 1, figg. 17—18; 32—34.
- » » PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 165, p. 369, t. 15, fig. 21.
- » » PARK. and JONES, 1866, Crag. Foranf.; Palæont. Soc. 19, t. 3, figg. 14—16 (cameris divisis).
- » » SEG., 1862, Rhizopod. foss. Catania p. 30, t. 2, fig. 4. Sep. Accad. Gioenia Atti (2) 18.
- Plecanium agglutinans* Rss., 1869, Oligocän. v. Gaas; Wien. Ak. Sitz.-Ber. 59, p. 452, t. 1, figg. 1—2.
- Textularia Candeiana* D'ORB., 1839 Cuba p. 143, t. 1, figg. 25—27.
- » *eximia* (D'EICHWALD) BRADY, 1877, Carbonif. and Perm. forf.; Pal. Soc. 30, p. 132, t. 10, figg. 27—29.
- » *agglutinans* var. *abbreviata* PARK. and JONES, 1876, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, t. 17, fig. 76.
- » *conulus* Rss., 1845, Böhm. Kreide 1, p. 38, t. 8, fig. 59, t. 13, fig. 75.
- » » Rss., 1854, Kreidef. Ostalp.; Wien. Ak. Dkschr. 7, p. 72, t. 26, fig. 7.
- » » Rss., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 231, t. 13, fig. 3.
- Plecanium concavum* KARR., 1868, Mioc. For. faun. Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 129, t. 1, fig. 3.
- Textularia obtusangula* RÖM., 1841, Verstein. Nordd. Kreide, p. 97, t. 15, fig. 18.
- » » Rss., 1845, Böhm. Kreide 1, p. 38, t. 8, fig. 58.
- Plecanium Speieri* Rss., 1864, Oligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 447, t. 1, fig. 3.
- Textularia concinna* Rss., 1845, Böhm. Kreide 2, p. 109, t. 24, fig. 34.
- » » Rss., 1854, Kreide. Ostalpen; Wien. Ak. Dkschr. 7, p. 71, t. 26, fig. 6.
- » » Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 233, t. 13, fig. 1.
- » *budensis, elongata* HKEN., 1875, Clav. Száb. Sch., p. 67, t. 15, figg. 1, 3.
- » *globosa* HKEN., ibid. p. 67, t. 15, fig. 5.
- » *sagittula* COSTA, 1854, Pal. Nap. 2, p. 291, t. 23, fig. 11.
- » *foeda* Rss., 1845, Böhm. Kreide 2, p. 109, t. 13, figg. 12—13.
- ? » *minima* KARR., 1865, Grünsandst. N. Zeel.; Novara Reise, geol. Th. 1. 2, p. 79, t. 16, fig. 9.
- » *convexa* KARR., ibid. p. 78, t. 16, fig. 8.
- » *rotundata, granulata* COSTA, 1854, Pal. Nap. 2, t. 15, figg. 4, 6.
- » *rugosa* COSTA, ibid. t. 15, fig. 7.

- Syn. **Textularia proxima, elata, conuloides** COSTA, Pal. Nap. 2, t. 23, figg. 8, 9, 12.
 » **Faujasi** Rss., 1861, Kreidetuff Maastricht; Wien. Ak. Sitz.-Ber. 1. 44, p. 320, t. 3, fig. 9.
 » **Partschii** Rss., 1845, Böhm. Kreide 1, p. 39, t. 13, fig. 80; 1859, Westphäl. Kreidef.; Wien. Ak. Sitz.-Ber. 1. 40, p. 233 t. 13, fig. 6.
 » **parallela** Rss., 1859, Westphäl. Kreidef.; ibid. p. 233, t. 12, fig. 7.
Plecanium parallelum Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 46. 1, p. 33.
 » **eocænum** GÜMB., 1868, Nordalp. Eocæn.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 603, t. 1, fig. 3 bis.
 » **Sturi** KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 703, t. 1, fig. 1.
 » **depravatum** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jahresh. 21, p. 93, t. 2, fig. 3.
 » **roscidum, foedum** KARR., 1870, Kreidef. Leitzendorf; Jhrb. k. k. österr. geol. Reichsanst. 20, p. 165, t. 10, figg. 2—3.
Textularia Hayi KARR., 1865, Grünsand. N. Zeeland; Novara Reise, geol. Th. 1. 2, p. 78, t. 16, fig. 7.

c) sagittula: magis anceps, interdum carinata et serrata:

- Textularia sagittula** (DEFR.) D'ORB., 1826, Tab. Meth.; An. Sc. Nat. 7, p. 263, N:o 20.
 » " PARK. and JONES, 1857, For. Coast. of Norway; Ann. Mag. Nat. Hist. 19, p. 297, t. 11, figg. 44—45.
 » " PARK. and JONES, 1866, Crag. For.: Pal. Soc. 19, t. 3, figg. 7—9; 77.
 » **agglutinans** var. **sagittula** PARKER and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 369, t. 17, fig. 77.
 » **obsoleta** Rss., 1845, Böhm. Kreide 1. p. 39, t. 13, fig. 79; 1865, Kreide an Kanara See; Wien. Ak. Sitz.-Ber. 52, p. 455, fig. 8.
 ? » **lævis** RÖM., 1841, Nordd. Kreidegeb. p. 97, t. 15, fig. 17.
 » **delloidea** Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 381, t. 49, fig. 4.
 » **subrhombica** STACHE, 1865, Tert. Merg. Whaingar. Hafen, Novara Reise, geol. Th. 1. 2, p. 271, t. 24, fig. 20.
 » **fiabelliformis** GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 649, t. 2, fig. 83.
 » **subfiabelliformis** HKEN., 1875, For. Clavul. Száb. Sch., p. 66, t. 15, fig. 2.
Plecanium laxatum SCHWAG., 1866, Foss. Foramf. Kar.-Nikobar; Nov. Reise, geol. Th. 2. 2, p. 195, t. 4, fig. 5.
Textularia subangulata, gramen, abbreviata, Hauerii D'ORB., 1846, For. tert. Vienne, p. 247, 249, 250; t. 15, figg. 1—15.
 » **Bronniana, deperdita, Mayeriana, carinata, articulata** D'ORB., ibid. p. 244—250, t. 14, figg. 20—28, 32—34; t. 15, figg. 16—18.
 » **compressa, gracilis, lanceolata, subangularis** RÖM., 1838, Nordd. tert. Meeressand; Leonh. u. Bronn. Jhrb. 1838, p. 384, t. 3, figg. 13—16.
 » **cuneiformis** D'ORB., 1839, Cuba, p. 147, t. 1, figg. 37—39.
 » " WILLIAMS., 1859, Brit. rec. Foramf. p. 75, figg. 158—159.
 » **prælonga** CZJZ., 1847, For. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 149, t. 13, figg. 28—30.
 » **sagittula** D'ORB., 1844, Iles Canaries p. 138, t. 1, figg. 19—21.
 » **Baudouiana** D'ORB., 1839, Craie bl. Paris; Mém. Soc. géol. Fr. 4, p. 46, t. 4, figg. 29—30.
 » **sagittula** COSTA, 1855, For. foss. Marna blu' Vaticano; Mem. Nap. 2, p. 125, t. 1, fig. 16.

- Syn. **Plecanium rugosum** Rss., 1869, Oligocän. von Gaas; Wien. Ak. Sitz.-Ber. 59, p. 453, t. 1, fig. 3.
- Textularia anceps** Rss., 1845, Böhm. Kreide 1, p. 39, t. 8, fig. 79; t. 13, fig. 78; 1859, Westphäl. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 234, t. 13, fig. 2.
- » **Saulcyana** D'ORB., 1839, Cuba p. 146, t. 1, figg. 21—22.
- » **prælonga** Rss., 1845, Böhm. Kreide, 1, p. 39, t. 12, fig. 14; 1854, Ostalpen. Kreidef. Wien. Ak. Sitz.-Ber. 7, p. 72, t. 26, fig. 8.
- » **agglutinans** var. **carinata** PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 370, t. 17, fig. 79.
- » **attenuata, lacera** Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 84, t. 6, figg. 52, 54.
- » **carinata** HKEN., 1875, For. Clav. Száb. Sch. p. 66, t. 7, fig. 8.
- » **acuta** Rss., 1849, Neue Foramf.; Wien. Ak. Dkschr. 1. 1, p. 381, t. 49, fig. 1.
- » **capitata, carinata** var. **antipodium**, var. **robusta** STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 270—272, t. 24, figg. 19, 21—22.
- » **corrugata** COSTA, 1855, For. Marna blu' d' Vaticano; Mem. Nap. 2, p. 125, t. 1, fig. 15.
- Plecanium Lythostrotum, solitum** SCHWAG., 1866, For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 194—195, t. 4, figg. 4, 6.
- Textularia folium** PARKER and JONES, 1865, Phil. Transact. 155. 1, t. 18, fig. 19 (an spec. distincta).
- » " Möb., 1881, Maurit. and Seyhell. p. 92, t. 8, figg. 16—17.
- » **cuneiformis** JONES, 1880, Kings Monogr. Perm. fossils p. 18, t. 6, fig. 6 (sec. RICHTER).
- » " RICHT., 1855, Zeitschr. deutsch. geol. Ges. 7, p. 532, t. 26, fig. 23.
- » " RICHT., 1861, Gein. Dyas p. 122, t. 20, fig. 34—35 (sec. BRADY).
- » **Jonesi** BRADY, 1876, Carb. and Perm. foramin.; Pal. Soc. 30, p. 133, t. 10, figg. 20—22.
- » **pala** CZJZ., 1847, Foss. for. Wien. Beck.; Haid. nat. Abh. 2. 1, p. 148, t. 13, fig. 25.
- » **dentata** ALTH, 1849, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 262, t. 13, fig. 13.
- » **Marieæ** D'ORB., 1846, For. tert. Vienne, p. 246, t. 14, figg. 29—31.
- Plecanium** " var. Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 64, t. 1, figg. 5—7.
- » **spinulosum, serratum** Rss., ibid. p. 66, t. 1, figg. 3—4.
- » **Marieæ** var. **inermæ** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. 10. 2, p. 603, t. 1, fig. 3 ter.
- Textularia pectinata** Rss., ibid. p. 98, t. 3, fig. 11.
- » " Rss., 1849, Neue For. Wien. Beck.; Wien. Ak. Dkschr. 1. 1, p. 381, t. 49, figg. 2—3.
- Textularia variabilis** var. **spathulata, difformis** WILL., 1858, Brit. rec. foramf. p. 76, 77, figg. 164—167.

d) conica:

- Textularia conica** D'ORB., 1839, Cuba p. 143, t. 1, figg. 19—20.
- » **cuneiformis** var. **conica** WILLIAMS., 1858, Brit. rec. forf. p. 75, figg. 160—161.
- » **turris** D'ORB., 1839, For. Craie blanche Paris; Mem. Soc. geol. Fr. 4, p. 46, t. 4, figg. 27—28.
- » " Rss., 1845, Böhm. Kreide 1, p. 39, t. 13, fig. 76.

e) *biformis* (an species distincta):

- Syn. *Spiroplecta rosula* EHRENB., 1854, Microgeol. t. 32, fig. 26.
Textularia biformis BRADY, 1881, Österr. Ung. Nordpols-Exp.; Wien. Ak. Dkschr. 43. 2, p. 101.
 » *adnectens* PARK. and JONES, 1863, Nomenclature; A. M. N. H. (3), 11, p. 91.
 » *agglutinans* var. *biformis* PARKER and JONES, 1865, North. Atl. and Arct. Oceans; Phil. Trans. 155. 1, p. 370, t. 15, figg. 23—24.
 » *complexa* BRADY, 1865, Trans. Northumb. 1, p. 101, t. 12, fig. 6 (sec. PARKER and JONES).

Textularia sagittula forma *bigenerina* D'ORB.

- Syn. *Bigenerina nodosaria* D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 261, t. 11, figg. 9—12, Mod. 57.
 » » FRICS' Mod. 12.
 ? » *subtilis* KARR., 1878, For. Luzon; Bolet. Comis. Mapa geol. d. España 7. 2, p. 13, t. E, fig. 6.
Textularia agglutinans var. *Bigenerina nodosaria* PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 371, t. 15, fig. 25; t. 17, fig. 80.
Bigenerina pusilla RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 384, t. 3, fig. 20.
 » *agglutinans* D'ORB., 1846, For. Bass. tert. Vienne; p. 238, t. 14, figg. 8—10.
 » *torulosa* COSTA, 1854, Palæont. Nap. 2, p. 285, t. 15, fig. 12.
 » *annulata* COSTA, ibid. p. 284, t. 15, fig. 13.
Gemmulina digitata D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 262; Mod. 58.
Textularia agglutinans var. *Bigen. digitata* PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155, 1, p. 371, t. 17, fig. 81.
Bigenerina digitata BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 468, t. 48, fig. 8.
 » *bifida* COSTA, 1854, Pal. Nap. 2, p. 287, t. 23, fig. 1.

Appendix.

- Textularia spica, elongata* CORN., 1848, Nouv. foss. microsc.; Mem. Soc. geol. Fr. (2) 3, p. 258, t. 2, figg. 23—25.

Textularia gibbosa D'ORB.

- Syn. *Textularia gibbosa, obtusa, lævigata* D'ORB., 1826, An. Sc. Nat. 7, p. 262; Mod. 28.
 » *punctulata, tuberosa* D'ORB., ibid. p. 262—263.
 » *gibbosa* PARK. and JONES, 1865, Crag. foramf.; Pal. Soc. 19, t. 3, figg. 10—13.
 » » BRADY, 1876, Carbon. and Perm. Forf.; Pal. Soc. 30, p. 131, t. 10, fig. 26,
 » *Ehrenbergii* RÖM., 1841, Nordd. Kreidegeb. p. 97, t. 15, fig. 16.
 » *globulosa* Rss., 1845, Böhm. Kreide 1, p. 39, t. 12, fig. 23.
 » *cordiformis* SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrshft. 21, p. 139, t. 7, fig. 15.
 » *globigera* SCHWAG., 1866, For. Kar-Nikobar; Novara Reise, geol. Th. 2. 2, p. 252, t. 7, fig. 100.
 » *globifera* Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 232, t. 13, figg. 7—8

- Syn. **Textularia Partschii** CZJZ., 1847, Foramf. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 148, t. 13, figg. 22—24.
 » **pupa** Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz-Ber. 40, p. 232, t. 13, figg. 4—5.
 » **strombus, peocetia, clypeata, crassa** COSTA 1854, Pal. Nap. 2, p. 293—296, t. 13, fig. 34, t. 23, figg. 4, 6, 7.
Plecanium Karreri, granosissimum, eurystoma STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 179, t. 21, figg. 17—19.
Grammostomum depressum etc. EHRENB., 1854, Mikrogeol., t. 19, fig. 82; t. 25, figg. 8—12; t. 28, fig. 31; t. 32, figg. 5, 9, 10.
Spiroplecta americana EHRENB., ibid. t. 32, fig. 25.

b) striata:

- Textularia striato-punctata** EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 294, t. 12, figg. 27—29.
 (Nominibus variis) EHRENB., 1854, Mikrogeol. t. 27, figg. 3—5.
Spiroplecta americana EHRENB., ibid. t. 32, figg. 13—14.

c) aculeata:

- Textularia aculeata** etc. EHRENB., 1854, t. 29, figg. 20. a. b.

Forma bigenerina D'ORB.

- Bigenerina lævigata** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 261.
 » **ampla** KARR., 1877, Hochquellenwasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 374, t. 16, fig. 374.
 » **patula** BRADY, 1876, Carb. and Perm. forf.; Pal. Soc. 30, p. 136, t. 8, figg. 10—11, t. 10, figg. 30—31.

Textularia sagittula DEFR. forma **Bigenerina**.

Tab. V, figg. 159—161.

Is liable to great variation in size, form and condition of its surface, depending on the greater or less development of the textularia-stage and on the coarseness or fineness of the constituents of the sea-bottom which have been agglutinated. It happens often that the textularia-stage is very atrophic and the chambers are difficult to trace. Our form from the chalk-bottom contains not seldom great many spongia spicula agglutinated with shell- and chalk-debris, so that the surface is quite bristly. The aperture is generally orbicular and central; but sometimes it is semilunar in shape. Among several representations given by different authors of »Bigenerina» we have not been able to find any, that fully agrees with our form. *Bigenerina torulosa* COSTA is the nearest to our coarser specimens, but his is thicker.

It is very common in both coralline-gravel and chalk-ooze, and attains a length of 5—6 mm.

For the synonymy see under *Textul. sagittula*.

Fig. 159: a coarse form, which not unfrequently becomes still rougher and more shapeless, like a small piece of mortar.

Fig. 160: the bristly and more regularly made form; its Textularia-stage is often very attenuated with the chambers nearly obliterated; the different shape of the aperture is also represented.

Fig. 161: a pigmy-form with a nicely developed Textularia-stage. 161*b*: the same more magnified. (The penultima-chamber of the Textularia-stage is wrongly represented with an aperture leading to the Nodosaria-stage.)

Textularia gibbosa D'ORB. forma **Bigenerina**.

Tab. V. figg. 162—164.

This form differs from the preceding by its Textularia-stage being more round or distended. Its whole appearance reminds one more of a »Clavulina» than a Bigenerina, but its early stage is plainly biserial and generally extremely short, without any external septal impressions or markings, its surface usually being polished and of yellowish tint. The Nodosaria-stage is generally more rough (not so smooth as is represented in the pictures).

The aperture is often replaced by a number of pores; sometimes triangular and provided with a tongue, nearly as in a Valvulina.

It is not uncommon in the coralline-gravel, of slender growth, generally of small size, but sometimes attaining a length of 7 mm.

Figg. 162—163: 2 specimens cut open, with a transvers section, fig. 164, of the Textularia-stage, shewing the biserial arrangement; the different forms of aperture are also represented

Textularia Pennatula BATSCH. var. **aculeata** EHRENB. forma **Bigenerina**.

Tab. V, figg. 165—166.

It is a pigmy with a thin, glassy shell, which soon becomes nodosarine in growth. This form may also be considered as a pigmyform of the preceding, *Textul. sagittula* forma *Bigenerina*, but not having met with transitory forms between the two we place it as a variety of *Textul. Pennatula*. REUSS has referred this form to his genus *Schizophora* and GÜMBEL to *Venilina*. It shews some affinity to »Bolivina» in the poration and the shell-substance.

It is sometimes provided with a few crescent-shaped folds on each segment.

It is not common in the chalk-ooze.

Fig. 165: the textularia-stage.

Fig. 166: its bigenerinaform. 0,42 mm. in length.

Textularia Trochus D'ORB.

Tab. V, figg. 167—170; Tab. VI, figg. 171—172.

In his wellknown treatise: *Mémoire sur les foraminifères de la craie blanche du Bassin de Paris*, Mem. Soc. géol. France 4, p. 45, t. 4, figg. 25—26, D'ORBIGNY has designated a young *Textularia*, that very much resembles, and is without doubt identical with our form.

Textularia cuneiformis var. *conica* WILLIAMS. has been referred by CARPENTER also to *Textul. Trochus*, but that form is rather a *Textul. sagittula*, to which also should be referred *Textul. conica* D'ORB. from Cuba.

In their admirable work upon the Crag-Foraminifera (Palæont. Soc. 19, tab. 3, figg. 14—16) Messrs PARKER, JONES and BRADY have represented a *Textul. agglutinans*, with the chambers divided nearly in the same manner as in the West Indian form, with which it also agrees in the shape of aperture and base, but its general shape and features are those of a common *Textul. agglutinans*.

The same Authors' *Textul. trochus* (Pal. Soc. 19, tab. 3, figg. 17—18) may be identical with our form, but may also prove to be a *Textul. sagittula*.

The Caribbean form is remarkable for its compressed and more or less spread out or fanlike shape, when of a more advanced age. The plane of this compression is quite contrary to that of the commonly known *Textularia* in as much as the zigzag boundary-lines, marking the septa are found on the edges. It agrees in this respect perfectly with D'ORBIGNY'S *Cuneolina* from lower Cretaceous formation (For. Bass. tert. Vienne p. 253, t. 21, figg. 50—52) and is an intermediate form between that represented species and the common *Textularia*. It has sometimes the margins of its long fissure-like aperture here and there quite closely approached one to another and grown together, shewing thus a tendency to the same arrangement of a row of small apertures, as we find in *Cuneolina*.

Our form is very compact and thickwalled, tightly agglutinated of the finest debris of chalk; the surface is quite smooth and covered with fine pores. When laid open along the flat central space between the two rows of chambers, which space is formed by their apertures, the long chambers are exposed to view. They consist of, first a shallow vestibule occupying the whole breadth of the inner part of the shell: then at the back of the vestibule a row of a few deep impressions or shallow chambers, each of which has about four short channels leading out of it. These channels branch off into about the same number of short tubes and these again terminate in from 3 to 5 very fine porecanals. In this way a system of 4 different sets or orders of branching cavities and channels are produced. Each set of ramification is ordinarily arranged in pairs, one pair being placed above another. Such a regular arrangement as the mentioned is however far from invariable, for it happens sometimes, that the first ramification is only di- or trichotomous and the second and third may be variable in like manner. Occasionally too a part of a chamber or even a whole chamber is found to be destitute of one or other of the sets of channels.

The septa are thicker and more compact on the inner edge, their outer part being so taken up with channels, that they are absorbed, so to speak, in channelwalls.

The subdivisions of the chambers in the younger stages are more irregular and spongelike.

It is very common, both on the chalkbottom and in the coralline-gravel, and attains a length of 6 and a breadth of 4,5 mm.

Fig. 167: View of its flat side.

Fig. 168: » » » edge.

Fig. 169: » » » aperture-side.

Fig. 170: Vertical section in the flat median plane; in the background of the broad vestibules the first set of channels (or shallow chambers) shew their four ramifications, the upper couples being half hidden by the slanting septa.

Fig. 171, tab. VI: Vertical section through the median transverse plane; the interstices between the septa, the vestibules and the channels of sets N:ris 2 and 3 and the pore-canals are represented.

Fig. 172: A chamber, horizontally opened shewing the walls and subdivisions of the channels of the different sets.

***Textularia pupoides* D'ORB.**

Tab. VI, figg. 173—180.

The close affinity between the genus *Gaudryina* D'ORB. and *Textularia* has long ago been proved by Messrs. PARKER, JONES and CARPENTER, and in fact there is no reason at all for their generic distinction. Indeed evidence may by and by be adduced to shew, that each *Textularia*-species has its *Gaudryina*-development, just as it has its *Bigenenerina* form. But ad interim we must consider it as a distinct species, although there is no want of intermediate links, for sometimes the young tri- or multiserial stage is reduced nearly to nothing, and the biserial arrangement occupies almost the whole shell; as for instance in *Gaudr. chilostoma* Rss.

Our form comes next to *Gaudr. insecta* STACHE, *Gaudr. rugosa* D'ORB. and *Gaudr. prælonga* STACHE. It is often very irregular with small protuberances and wrinkles being nearly square in transverse section. Its early stage is often 3—5-serial. At other times it is quite regular, smooth and cylindrical with the multiserial stage reduced to 1—2 rows of chambers. Sometimes it is very slender and produced.

It is always agglutinated of the finest chalkdust, without siliceous sand. It occurs not very commonly both on the chalkbottom and in the coralline-gravel.

Figg. 173—174: the wrinkled form.

Figg. 175—176: transverse section of its 4—5 serial stage.

Fig. 177: smooth regular form.

Fig. 178: transverse section of the same.

Fig. 179: slender produced form.

Fig. 180: transverse section of its first stage.

a) *Gaudryina rugosa*, pupoides:

- Gaudryina rugosa*, pupoides** D'ORB., 1839, For. craie bl. Paris; Mém. Soc. géol. Fr. 4, p. 44, t. 4, figg. 20—24.
- » ***rugosa*** D'ORB., 1846, Bass. tert. Vienne, p. 197, t. 21, figg. 34—36
- » » Rss., 1845, Böhm. Kreide 1, t. 12, figg. 15, 24; 1855, Tert. Sch. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 244, t. 6, fig. 61.
- » » HKEN., 1875, For. Clav. Száb. Sch. t. 1, fig. 4.
- » ***pupa, subglabra*** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 602, t. 1, fig. 3—4.
- » ***pupoides*** FRIČS Mod. 11.
- » ***subrotundata*** SCHWAG., 1866, Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 198, t. 4, fig. 9.
- » ***praelonga*** KARR., 1877, Hochquellenwasserleit.; k. k. österr. geol. Reichsanst. Abh. 9, p. 374, t. 16, fig. 6.
- Textularia chilostoma*** Rss., 1851, Tert. Sch. Oberschles.; Zeitschr. deutsch. geol. Ges. (2) 4, p. 18 (xylogr.).
- Textularia labiata*** Rss., 1866, Crag. Antwerp.; Wien. Ak. Sitz.-Ber. 42, p. 362, t. 2, fig. 17.
- Gaudryina chilostoma*** Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 120, t. 1, figg. 5—7 (*Textularia gibbosæ* D'ORB. proxima, interdum vix distinguenda).
- » ***oxycona*** Rss., 1859, Westph. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 229, t. 12, fig. 3.
- » ***textilaroides*** HKE., 1875, For. Clav. Száb. Schichten p. 15, t. 1, fig. 6.
- » ***Reussi*** HKE., ibid. p. 14, t. 1, fig. 5.
- » ***gyrophora*** GÜMB., 1871, Ulmer Cem. Mergel; Münch. Ak. Sitz.-Ber. 1, p. 64, t. 1, fig. 4.
- » ***Draschei*** KARR., 1878, For. Luzon; Bolet. Comis. Mapa geol. del España, 7. 2, p. 12, t. E, fig. 5.
- » ***badenensis*** Rss., 1849, Neue For. österr. Beck.; Wien. Ak. Sitz.-Ber. 1. 1, p. 374, t. 47, fig. 14.
- » ***Reussi, obliquata, megastoma, novo Zelandica, capitata, insecta*** STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 177, t. 21, figg. 11—16.
- » ***crassa*** MARSSON, 1877, Rügen. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 158, t. 3, fig. 17.

b) magis bulloides:

- Gaudryina globulifera*** Rss., 1851, Tert. Sch. Oberschl.; Ztschr. deutsch. geol. Ges. (2) 4, p. 18.
- » ***baccata, uva*** SCHWAG., 1866, For. Kar.-Nikob.; Novara Reise, geol. Th. 2. 2, p. 200, 201, t. 4, figg. 12—13.
- ? » ***solida*** SCHWAG., ibid. p. 199, t. 4, fig. 11 (an Verneuilina?).
- » ***irregularis*** HKEN., 1875, Clav. Száb. Sch. p. 15, t. 1, fig. 7.
- » ***crassa*** KARR., 1870, Kreidef. Leitzendorf; Jhrb. k. k. österr. geol. Reichsanst. 20, p. 166, t. 10, fig. 4.
- » ***ulmensis*** GÜMB., 1871, Ulmer Cem. Mergel; Münch. Ak. Sitz.-Ber. 1, p. 64, t. 1, fig. 3.

c) forma bigenerina:

- Gaudryina ruthenica*** Rss., 1850, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 41, t. 4, fig. 4.
- Plectina irregularis*** MARSS., 1872, Rügen. Schreibekr.; Greifsw. Nat. Ver. Mittheil. 1877—78, p. 160, t. 3, fig. 28.

Syn. <i>Gaudryina pavicula</i>	SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 198, t. 4, fig. 10.
<i>Plectina clava</i>	MARSS., 1877, Rügen. Schreibekreide; Greifsw. Nat. Verein. Mitth. 1877—78, p. 160, t. 3, fig. 29.
? <i>Clavulina robusta</i>	STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 169, t. 21, figg. 9—10.
? <i>Gaudryina siphonella</i>	Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 78, t. 5, figg. 40—42.
? " "	HKEN., 1875, Clav. Száb. Sch. p. 14, t. 1, fig. 3.

Textularia pupoides var. conica n.

Tab. VI, figg. 181—182.

This variety, which resembles somewhat *Gaudryina oxycona* Rss. differs from the type-species in being very pointed with a square or trigonal early stage and conical-round textularia-stage. It is very tightly built with scarcely any external visible traces of septal impressions or lines. Sometimes it is still more slender and produced than is represented by fig. 181.

It has been found only in the coralline-gravel.

Fig. 182: apertural side.

Textularia triquetra v. MÜNST.

Tab, VI, figg. 183—184.

This species, known as *Verneuilina tricarinata* D'ORB., has been even generically distinguished from *Text. pupoides* by D'ORBIGNY; and yet it is nearly impossible to draw a clear line of specific distinction between the two. Both have their young stage constructed after the same plan, both are dimorphous; the more developed form of *T. triquetra* is commonly referred to »*Clavulina*».

It is besides somewhat remarkable, that *Text. triquetra* and *T. pupoides* sometimes, when from the same bottom, get exactly the same accidental feature of the shell surface; as for instance *Verneuilina cretacea* KARR. from the chalk at Letzterdorf which is provided with the same sort of tubercles all over its surface, as *Gaudryina crassa* KARR. from the same place. Whether this external likeness is the result of an extremely close relation between the two or an adaptation to local circumstances is in this case difficult to decide about.

Our form is in its young stage nearly transparent, with an amber tinge in transmitted light; the pores are fine and pretty close. The sides are sometimes scooped out a little, so that the edges become quite sharp; the month reminds one somewhat of the aperture in *Valvulina* or *Miliolina*.

It is identical with *Verneuilina spinulosa* Rss. from the tertiary formation of Austria.

It is scarce in the coralline-gravel. »*Tritaxia*» Rss. is nothing but an incipient »*Bigenerina*» of *Text. triquetra*. This developed form occurs also in the coralline-gravel. It is generally twice as large as the »*Verneuilina*» stage of the fully developed *Bigenerina* form.

Fig. 183: represents the flat side of *Text. triquetra*.

Fig. 184: the apertural side.

Syn. <i>Textularia triquetra</i>	(v. MÜNST.). RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 384, t. 3, fig. 19.
»	Rss., 1845, Böhm. Kreide 1, p. 39, t. 13, fig. 77.
<i>Verneuilina Münsteri</i>	Rss., 1854, Kreide Ostalp.; Wien. Ak. Dkschr. 7, p. 71, t. 26, fig. 5.
» <i>Bronni</i>	Rss., 1845, Böhm. Kreide 1, p. 38, t. 12, fig. 5; 1855, Kreidem. Lemberg; Haid. Nat. Abh. 4. 1, p. 40, t. 4, fig. 2.
» <i>tricarinata</i>	D'ORB., 1839, For. Craie bl. Paris; Mem. Soc. géol. France 4. p. 39, t. 4, figg. 3—4.
»	D'ORB., 1846, For. Bass. tert. Vienne p. 182, t. 21, figg. 26—27.
» <i>oberburgensis</i>	Rss., 1863, Oberb. in Steiermark; Wien. Ak. Dkschr. 1. 23. 1, p. 6, t. 1, fig. 2.
» <i>cognata</i>	Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 448, t. 1, fig. 1.
» <i>spinulosa</i>	Rss., 1849, Neue For. Wien. Beck.; Wien. Ak. Dkschr. 1. 1, p. 374, t. 47, fig. 12.
»	EGGER, 1857, Miocän. v. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 292, t. 9, figg. 17—18.
» <i>cretacea</i>	KARR., 1870, Kreidef. in Leitzerdorf; Jhrb. k. k. österr. geol. Reichsanst. 20, p. 164, t. 10, fig. 1.
? <i>Textularia atlantica</i>	BAILEY, 1850, Examin. of Soundings; Smithson. Contrib. of knowledge 2, Art. 3, p. 12, figg. 38—43.
<i>Grammost. aculeatum</i>	EHRENB., 1854, Microgeol. t. 28, fig. 17.

b) forma *Tritaxiæ* (*Bigenerinæ* incipienti æqualis):

<i>Textularia tricarinata</i>	Rss., 1845, Böhm. Kreide 1, p. 39, t. 8, fig. 60.
<i>Uvigerina tricarinata</i>	D'ORB., 1839, For. Craie bl. Par.; Mem. Soc. géol. Fr. (2) 4, p. 42, t. 4, figg. 16—17.
<i>Tritaxia pyramidata</i>	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 32, t. 1, fig. 9.
<i>Verneuilina dubia</i>	Rss., 1854, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 41, t. 4, fig. 3.
<i>Tritaxia tricarinata</i>	Rss., 1859, Westphäl. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 228, t. 12, figg. 1—2.
» <i>foveolata, minuta</i>	MARSS., 1877, Rügen. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 161, t. 3, figg. 30—31.
? » <i>ulmensis</i>	GÜMB., 1871, Ulmer Cement. Mergel; Münch. Ak. Sitz.-Ber. 1, p. 63, t. 1, fig. 2.

c) forma *Bigenerina* completa:

<i>Verneuilina communis</i>	PARK. and JONES, 1866, Crag. For.; Pal. Soc. 19, t. 3, fig. 19.
<i>Clavulina irregularis</i>	(MÜNST.) RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 387. t. 3, fig. 40.
» <i>elegans</i>	KARR., 1865, For. Grünsandst. N. Zeeland; Novara Reise, geol. Th. 1. 2, p. 80, t. 16, fig. 11.

- Syn. *Clavulina antipodum* STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 167, t. 21, figg. 3—8.
 ? » *variabilis* SCHWAG., 1866, Foss. For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 197, t. 4, fig. 8.

Appendix.

- Verneuilina polystropha* PARK. and JONES, 1865. N. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 371, t. 15, fig. 26.
 » » BRADY, Arct. Exped. 1875—76; A. M. N. H. (5) 1, p. 436, t. 20, fig. 9.

Huc a PARKER et JONES relatæ sunt:

- Bulimina polystropha* Rss., 1845, Böhm. Kreide. 2, p. 109, t. 24, fig. 53.
 ? » *scabra* ALTH, 1850, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 265, t. 13, fig. 19.
 » » WILLIAMS., 1858, Brit. rec. For. p. 65, figg. 136—137.
 ? » *tuberculata* EGG., 1857, Miocän. Ortenburg; Leonh. u. Bronns Jhrb. 1857, p. 284, t. 12, figg. 4—7.
 » *pygmæa* EGG., ibid. p. 284, t. 12, figg. 10—11.
Guttulina aculeata, turrita EHRENB., 1854, Microgeol. t. 27, figg. 35—36.

- Verneuilina rotundata* KARRER 1878, Foram. Luzon; Bolet. Comis. Mapa geol. del Esp. 7. 2, p. 10, t. F, fig. 2 (an Gaudryina).

Textularia triquetra Bigenerina (alias *Clavulina*).

Tab. VI, figg. 185—186.

It is not an easy task to decide from the representations of »*Clavulinae*» by the different authors which properly should be referred to *Text. triquetra* and which to *Valvulinae* genus. Our list of synonyms will therefore be less satisfactory.

Our form resembles somewhat the *Bigenerina* form of *Text. sagittula* and is easily overlooked, when found mixed with the latter from the same locality. The shell is rough and bristly with spongeneedles, which are copiously incorporated with the chalkdebris, of which the shell is agglutinated. The aperture is often pouting, round or somewhat crescentshaped.

The »*Verneuilina*»-stage is very short and with scarcely any traces of outer septal-furrows or marks, obtuse trigonal.

It is not common either on the chalkbottom or in the coralline-gravel.

Fig. 185: *Text. triquetra* adulta.

Fig. 186: transverse section of the »*Verneuilina*» stage.

For the synonymy see under the preceding c).

Valvulina triangularis D'ORB., forma **Clavulina angularis** D'ORB.

Tab. XI, fig. 387—389.

Our form seems to be identical with *Clavulina tricarinata* D'ORB. from the West-Indies; but it is much larger, sometimes attaining 3 mm. in length. The trigonal circumference is not at all a constant feature in this form, for *Clavulina nodosaria* D'ORB. from the same locality is unquestionably a *Valvulina* but of cylindrical shape and not distinct from the tricarinate form.

I am far from being able with any satisfactory degree of certainty to identify all of D'ORBIGNY'S *Clavulina* species, but most of them display an arrangement of their 3 or 4 serial stage more in accordance with the plan of growth of *Valvulina* than of the more regular type of *Text. triquetra*. In our form the septal impressions are ordinarily very strongly marked, particularly on the flat sides, where they become changed into broad semilunar transverse furrows. The angles of the chambers are often somewhat produced. The shell-substance is finely agglutinated of chalk-matter. It is not common in the coralline-gravel.

Fig. 387: the edge side; 389: the flat side; 389: the aperture.

a) rotaliaëformis, plus minusve conica:

Syn. Valvulina triangularis	D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 270. Mod. N:o 25.
»	» FRIË'S Mod. N:o 5.
»	» PARK. and JONES, 1857, For. Coast. of Norway; An. Mag. Nat. Hist. (2) 19, p. 209, t. 11, figg. 15—16.
»	» CARPENTER, 1860, Introd. t. 11, figg. 15—16.
Rotalina fusca	WILLIAMS., 1858, Brit. rec. forf. p. 55, figg. 114—115 (sec. CARPENTER).
Valvulina austriaca	D'ORB., 1846, For. Bass. tert. p. 181, t. 11, figg. 7—8.
» triangularis var. conica	PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 406, t. 15, fig. 27.
? » allomorphinoides	RSS., 1859, Westph. Kreidef.; Wien. Ak. Sitz.-Ber. 40, p. 223, t. 11, fig. 6.
? » bulloides	BRADY, 1876, Carbonif. and Perm. foranf.; Pal. Soc. 30, p. 89, t. 4, figg. 12—15.
? » plicata	BRADY, ibid. p. 88, t. 4, fig. 10.
? » rudis	BRADY, ibid. p. 90, t. 3, figg. 19—20.

b) buliminæformis:

	CARPENT., Introd. t. 11, figg. 19, 25.
Valvulina gibbosa	D'ORB., 1839, For. Craie blanc. Par.; Mem. Soc. géol. Fr. 4, p. 38, t. 4, figg. 1—2.
» parvula v. MÜNST., globularis v. MÜNST.	1838, RÖM., Tert. Meeress. N. Deutschl.; Leonh. u. Bronn. Jhrb. 1838, p. 387, t. 3, figg. 41—42.
» Oviedoana	D'ORB., 1839, Cuba p. 103, t. 2, figg. 21—22.
» spicula	RSS., 1845, Böhm. Kreide 1, p. 37, t. 13, fig. 69.

c) *Clavulina communis*:

- ?*Nautilus radicula* MONTAGU, 1803, Test. Brit. p. 197, t. 14, fig. 6.
Clavulina communis D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 268. FRIÉ'S Mod. No 10.
 » » D'ORB., 1846, For. Bass. tert. Vienne, p. 196, t. 12, figg. 1—2.
 » *irregularis, communis* COSTA, 1854, Pal. Nap. 2, p. 270, t. 22—23, figg. 1—3; fig. 2.

d) *Clav. angularis*:

- » *triquetra* Rss., 1869, Oberburg; Wien. Ak. Dkschr. 1. 23. 1, p. 6, t. 1, fig. 1.
 » *tripleura* Rss., 1865, Feuerstein-Kreide an. Kanara See; Wien. Ak. Sitz.-Ber. 52, p. 448, t. 1, fig. 1.
 » *Száboi* HKEN., 1875, For. Clav. Száb. Sch. p. 15, t. 1, fig. 9.
 » *Philippinica* KARR., 1878, Foramf. Luzon.; Bolet. Comis. Mapa geol. del España, 7. 2, p. 11, t. E, fig. 4.
Clavulina parisiensis D'ORB., 1826, Tab. meth.; Acad. Sc. Nat. 7, p. 268, Mod. 66.
 » *nodosaria* D'ORB., 1839, Cuba p. 110, t. 2, figg. 19—20.
Orthocerina clavulus D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 255, Mod. 2 (sec. PARK. and JONES).
Clavulina angularis D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 268, t. 12, fig. 7.
 » *tricarinata* D'ORB., 1839, Cuba p. 111, t. 2, figg. 16—18.
 CARP., Introduct. t. 11, figg. 17, 18.

***Valvulina triangularis* D'ORB. var. *polyphragma* n.**

Tab. XI, figg. 390—400.

It is somewhat surprising, that this »*Clavulina*», which is one of the most frequent rhizopodes on our chalk-bottom, has escaped the notice of our many and industrious scrutinizers of the different tertiary strata, amongst the constituents of which this species also may be anticipated. The loosely agglutinated structure of its shell may have prevented its more extensive preservation during the ages.

Its *Valvulina*-stage proper, is ordinarily very short and owing to its strongly agglutinant power the limits and arrangement of its chambers are nearly perfectly masked. This early stage seems sometimes to belong to the rotaline form of *Valvulina*. Sometimes, but not so frequently, it has a more produced (buliminoid) shape. The most remarkable feature by our form is the high development of its uniserial stage with its regular, handsome lituolina-like, radial subdivisions of the chambers. These subdivisions vary in number from 5 to 10 or rather from 10 to 20, each being subdivided into two branches. The aperture is usually closed by a thin cribriform lamina. The surface of the shell, even in the young, is often studded with knobs and coarse spines of accumulated chalkdebris.

The shape of the whole varies from cylindric and clavate to ovoid, and globular. The older ones assume ordinarily the ovoidform, resulting from the thick deposit of debris, which render the outer layers soft, like white-chalk. It is devoid of siliceous sand; but from the Atlantic Prof. SMITT and Dr LJUNGMAN have brought home large specimens somewhat admixed with real and coarse sandy particles.

As far as I know, there is not on record any *Valvulina* with subdivided chambers but *Valv. Youngi* BRAD. from the lower carboniferous limestone in Scotland and England (Palæogr. Soc. 30, p. 86, t. 4, figg. 6—9).

Fig. 390: clavate, smooth and hard specimen, with produced valvuline stage.

Fig. 391: stout form with thick deposit of chalk.

Fig. 392: median section of the same.

Fig. 393: longitudinal section of a better defined specimen displaying the ovoid or uterus-shaped central space of the chambers, their radiating, bifid divisions, and the very short triserial stage.

Fig. 394: transverse section through the earlier stage, exhibiting the triserial arrangement.

Fig. 395: section at the commencement of the uniserial stage.

Fig. 396: section through the more advanced stage.

Fig. 397: young clavate form cut longitudinally.

Fig. 398: young ovoidal form.

Fig. 399: still younger form, nearly globular.

Fig. 400: longitudinal cut of a very young specimen, only 1.1 mm.

Valvulina triangularis var. *eocæna* GÜMB.

Tab. XI, figg. 401—403.

The multiserial stage is so very little developed as often to be wanting, and the specimen may be taken for a *Lituolina*; or at the best the early stage is reduced to a few chambers, rendered extremely indistinct or masked by the agglutinated coarse sandgrains. Unquestionably our form ought to be placed quite near to »*Clavulina communis*» D'ORB.

The shell of our form is tightly built of coarse sandgrains mixed with a great many sponge-needles. Its shape varies from a more slender, to a stout pupoid form, which latter is prevalent. The aperture is generally very narrow, not unfrequently poreformed, sometimes obsoletely triangular. The chambers are ordinarily undivided, but occasionally there are at nearly regular intervals a few sandgrains projecting from the walls, representing rudimentary partitions.

From the northalpine Eocæn Mr. GÜMBEL has designated a variety of *Clavulina*, that seems nearly identical with our form (*Clavulina eocæna* GÜMB. 1868, K. Bay. Ak. Wiss. Abh. 1. 10. 2, p. 601, t. 1, fig. 2). It is not unfrequently met with in the coral-line-gravel and chalk-ooze, attaining a length of 3 mm.

Figg. 401—402: thicker and narrower specimens, the first one with scarcely a valvulina-stage.

Fig. 403: the aperture

Candeina nitida D'ORB.

Tab. VI, figg. 187—189.

This distinguished form was considered by D'ORBIGNY as being in near affinity to *Globigerina* merely on account of its globular chambers. The same relationship is also attributed to it by Mr. BRADY (Notes on retic. Rhizop. Challeng. exped.; Quart. Journ. microsc. Sc. 75, p. 292). Professors PARKER and JONES again place it in the closest relation to the threeserial *Textulariæ*. The poration, which is extremely fine and exactly resembles that of the vitreous *Textularia triquetra*, as well as its plan of growth would seem to afford some support to this latter suggestion.

It is very scarce in the chalk-ooze, always of a pigmy size. According to BRADY its habits seem to be pelagic.

Fig. 187: the spiral side.

Fig. 188: sideview.

Fig. 189: basal-side.

Syn. **Candeina nitida** D'ORB., 1839, Cuba p. 108, t. 2, figg. 27—28; 1846, For. Bass. tert. Vienne, p. 192, t. 21, fig. 28.

Sphæroidina bulloides D'ORB.

Tab. VI, figg. 190—193.

Our form differs sometimes from the typical one in having its aperture more regular and symmetrically placed in the midst of the septal suture of the last chamber. The apertural tongue is not seldom wanting and the mouth becomes of the same shape as in *Globigerina*. The poration is just as fine and delicate as in *Candeina*.

It occurs not frequently in the chalk-ooze, and is of small size.

Syn. **Sphæroidina bulloides** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 267.
 " " PARK. and JONES, 1854, Phil. Trans. 155. 1, p. 369, t. 16, figg. 52.
 " **austriaca** D'ORB., 1846, Bass. tert. Vienne, p. 284, t. 20, figg. 19—21.
 " " Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1, p. 387, t. 51, fig. 3—19.
 " " EGGER, 1857, Miocän. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 273, t. 6, figg. 19—20.
 " " HKEN., 1875, For. Clav. Száb. Sch. p. 62, t. 10, fig. 4.
 " " SCHWAG., 1866, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 250, t. 7, fig. 98.
 " **variabilis** Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 88, t. 7, figg. 61—64.
 ? " **variabilis** var. **conica** Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 58, t. 7, fig. 86.

Globigerina universa D'ORB.

Tab. VI, fig. 194.

This species has received a smaller number of names than most of the other species of this class, owing to its simple and nearly uniform structure in all seas and in those geological strata, where it has appeared.

Orbulina Neojurensis KARR. from the secondary strata of Austria is distinguished by a strongly reticulated surface, but this feature is common within the whole genus, and is not a mark of essential importance.

A twinform is sometimes met with, which has been identified with *Glob. bilobata* D'ORB. from the tertiary strata at Vienna. But D'ORBIGNY'S form is provided with a lateral aperture like that in the ordinary *Glob. bulloides*. Our twinform is destitute of such an orifice, in place of which it is provided with the usual large pores, scattered between the finer ones.

Globigerina bipartita Rss., from the Antwerpen.-Crag may belong to this form.

Globigerina universa of different sizes and thinness of shell is very common on both sorts of bottom at our localities.

The twinform, fig. 194, is very rare in the coralline-gravel.

Syn. <i>Orbulina universa</i>	D'ORB., 1839, Cuba p. 3, t. 1, fig. 1; 1844, Hes. Canaries p. 122, t. 1, fig. 1; For. tert. Vienne p. 22, t. 1, fig. 1.
" "	BAILL., 1850, Microsc. Exam. of Soundings; Smithson. Contrib. 2. 3, p. 9, fig. 1.
" "	COSTA, 1854, Pal. Nap. 2, t. 11, fig. 5.
" <i>tuberculata</i> , <i>granulata</i>	COSTA, <i>ibid.</i> fig. 1—2; t. 15, fig. 14.
" <i>granulata</i> β <i>impressa</i> , γ <i>areolata</i>	<i>ibid.</i> t. 11, figg. 3—4.
" <i>universa</i>	WILLIAMS., 1858, Brit. rec. Forf. p. 2, fig. 4 («arenacea»).
" <i>Neojurensis</i>	KARR., 1867, For. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 368, t. 3, fig. 10.
" <i>universa</i>	WALLICH, 1876, Deepsea Researches fig. 13.
<i>Globigerina universa</i>	BRAD., 1879, Notes on Ret. Rhizop. »Challeng.» Exp.; Qu. Journ. Micr. Sc. (n. Ser.) 75, p. 289.

Globigerina bulloides D'ORB.

Tab. VI, figg. 195—207.

As with most other species of this class *Glob. bulloides* also has its tiny pigmy-form, that in some respect deviates from the type. It is usually of more regular growth; the first chambers are extremely small (about 0.02 mm.) and with 5 or 6 in each convolution; the pores are generally finer than in the larger and coarser form. It was distinguished by D'ORBIGNY as *Glob. cretacea* and *Glob. Dutertrei*; *Glob. dubia* EGGER.

The stoutly developed form of *Glob. bulloides* commences its life with much larger and fewer chambers in each convolution. It is often very irregular, the chambers

being more or less loosely connected, whence arises the difference in the number of visible apertures; not unfrequently the shell appears as if broken through by the immense apertures, which look like large defects in the chamber-walls. The shape of the chambers varies from globiform and oval to compressed thumb-like and even beak-formed.

The surface of the shell and the size of the pores are also liable to some variation, but even such features seem in this species to be only of an accidental character.

The most distinct character is found in the variety called *Glob. hirsuta* D'ORBIGNY, which has its chambers regularly coiled up in a nautiloid way, with the last ones generally unattached to the preceding coil. The aperture in this variety is situated on the inner (or lower) side of the last chamber. It is a mediate form between the pigmy and the typical forms. Notwithstanding all such peculiar features, we do not consider it in accordance with the usual conception of *varietal* distinction to mark this form with a separate designation.

The thick-walled, sometimes very coarse form with several outer apertures, by D'ORB. distinguished as *Glob. rubra*, is one of the commonest on our bottoms and has usually a reddish tint.

Mr. H. BRADY in his valuable paper »Notes on some of the Reticularian Rhizopoda of the »Challenger» Expedition» in Quart. Journ. Microscop. Science (new ser.) 75, p. 284. distinguishes the following varieties of Globigerina bulloides:

- Globigerina dubia* EGGER.
 » *cretacea* D'ORB.
 » *aequilateralis* D'ORB.
 » *digitata* BRAD.
 » *inflata* D'ORB.
 » *Dutertrei* D'ORB.
 » *rubra* D'ORB.
 » *conglobata* BRAD.
 » *sacculifera* BRAD.
 » *helicina* D'ORB.

Fig. 195: a form near to REUSS' and others' *Glob. trilobata*, with the chambers highly developed from the first and with 1 or 2 apertures; seldom met with on the coralline-gravel.

Fig. 196: a coarse, thickshelled form with large chambers and several apertures; it comes near to *Glob. rubra* D'ORB. and may be identical with *Glob. conglobata* BRAD.; from the coralline-gravel.

Figg. 197—199: with large and loosely connected chambers, large apertures, and with the last chamber approaching to the thumbform. The pores are of middle size sunk in the bottom of the usual hexagonal impressions (fig. 199); from the coralline-gravel.

Fig. 200: the same form with still wider apertures; the latest chamber has a compressed beakform and is quite open underneath; from the chalk-ooze.

Fig. 201—202 the nautiloid form; from the chalk-ooze.

Fig. 203: the pigmyform: *Glob. cretacea* D'ORB., 203 b: the same more magnified from the chalk-ooze.

Figg. 204—207: the same form highly magnified with pores variable in size; viewed in transmitted light; from the chalk-ooze.

a) *cameris conglomeratis*:

- Syn. **Globigerina inflata** D'ORB., 1844, Iles Canaries, p. 134, t. 1, figg. 7—9.
- " **bulloides** var. **inflata** PARK. and JONES, 1865, N. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 367, t. 16, figg. 16—17.
- " **bulloides** D'ORB., 1826, Tabl. meth.; An. Sc. Nat. 7, p. 277, N:o 1, Mod. 17 et 76.
- " " D'ORB., 1844, Iles Canaries p. 132, t. 2, figg. 1—3; 28.
- " " RÖM., 1838, Nordd. tert. Meeressand, Leonh. u. Bronn. Jhrb. 1838, t. 3, fig. 42 a.
- " " D'ORB., 1846, For. tert. Vienne, p. 163, t. 9, figg. 4—6.
- " " WILLIAMS., 1858, Brit. rec. Forf. p. 56, figg. 116—118.
- " " PARK. and JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 365, t. 16, fig. 15.
- " " GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 661, t. 2, fig. 106.
- " " HKEN., 1875, For. Clav. Száb. Sch. p. 69, t. 8, fig. 2.
- " **β borealis** BRADY, 1881, Österr. Ung. Nordpols-Exp.; Wien. Ak. Dkschr. 43. 2, p. 103; An. Mag. Nat. Hist. (5) 1, t. 21, fig. 10.
- " **regularis** D'ORB., 1846, For. tert. Vienne p. 162, t. 9, figg. 1—3.
- " **helicina** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 277, N:o 5.
- " **globularis** D'ORB., *ibid.* p. 277, N:o 3.
- " " RÖM., 1838, Nordd. tert. Meeressand, Leonh. u. Bronn. Jhrb. 1838, t. 3, fig. 57.
- " **trilocularis** D'ORB., 1826, An. Sc. Nat. 7, p. 277, N:o 2.
- " " RÖM., 1838, Nordd. tert. Meeressand; Leonh. u. Bronn. Jhrb. 1838, t. 3, fig. 41 a.
- " **bilobata** D'ORB., 1846, For. tert. Vienne, p. 164, t. 9, figg. 11—14.
- " **quadrilobata** D'ORB., *ibid.* p. 164, t. 9, figg. 7—10.
- " " COSTA, 1854, Pal. Nap. 2, t. 21, fig. 5—6; p. 240.
- " **alpigena, asperula** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, t. 2, fig. 107—108.
- " **regularis** COSTA, 1854, Pal. Nap. 2, p. 240, t. 21, fig. 3.
- " **triloba** Rss., 1849, Neue For. österr. Beck.; Wien. Ak. Dkschr. 1. 1, p. 374, t. 47, fig. 11.
- " " HKEN., 1875, For. Clav. Száb. Sch., p. 69, t. 8, fig. 1.
- " **siphonifera** D'ORB., 1839, Cuba, p. 83, t. 4, figg. 15—18.
- " **rubra** D'ORB., *ibid.* p. 82, t. 4, figg. 12—14.
- " " BAILEY, 1850, Micr. Exam. of Soundings; Smiths. Contrib. 2, Art. 3, p. 11, fig. 20—24.
- " **elevata** D'ORB., 1839, For. Craie bl. Paris; Mém. Soc. geol. Fr. 4, p. 34, t. 3, figg. 15—16.
- " **reticulata** STACHE, 1865, Tert. Merg. Whaingar. Haf.; Novara Reise, geol. Th. 1. 2, p. 287, t. 24, fig. 37.

- Syn. **Globigerina angipora** STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 287, t. 24, fig. 36.
 " **seminulina** SCHWAG., 1866, Kar. Nikobar; Novara Reise, geol. Th. 2. 2, t. 7, fig. 112.
 " **conglomerata** SCHWAG., ibid. p. 255, t. 7, fig. 113.
 ? " **bipartita** Rss., 1863, Crag. d'Anvers; Bull. Ac. Belg. (2) 15, p. 156, t. 3, fig. 46.
 " (**Rhynchospira**) **glomerata** KARR., 1877, Hochquell. Wasserl.; geol. Reichsanst. Abh. 9, p. 387, t. 16, fig. 53.
 ? **Cassidulina globulosa** EGG., 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 296, t. 10, figg. 4—6.

b) magis regularis helicoidea vel subhelicoidea; var. cretacea D'ORB.

- Globigerina hirsuta** D'ORB., 1844, Iles Canaries p. 133, t. 2, figg. 4—6.
 " **concinna** Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 373, t. 47, fig. 8.
 " **diplostoma** Rss., ibid. p. 373, t. 47, figg. 9—10; t. 48, fig. 1.
 " **regularis** Rss., ibid. p. 373, t. 47, fig. 7.
 " **eocæna** GÜMB., 1868, Nordalp. Eocæn.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 662, t. 2, fig. 109.
 " **cretacea** D'ORB., 1839, For. Craie bl. Paris; Mém. Soc. geol. France 4, p. 341, t. 3, figg. 12—14.
 " " Rss., 1845, Böhm. Kreide 1, p. 36, t. 8, fig. 55.
 " **Dutertrei** D'ORB., 1839, Cuba, p. 84, t. 4, figg. 19—21.
 " **dubia** EGG., 1857, Miocæn. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 281, t. 9, figg. 7—9.
 " **Carteri** KARR., 1878, Foranf. Luzon; Bolet. Comis. Mapa geol. del España 7. 2, p. 23, t. F, fig. 9.
 " **spirata** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 342, t. 16, fig. 9.

c) magis planata; rotaliformis; marginata Rss.:

- Rotalina hirsuta** D'ORB., 1844, Iles Canaries p. 131, t. 1, figg. 37—39.
Rosalina marginata Rss., 1845, Böhm. Kreide 1, p. 36, t. 8, figg. 54, 74, t. 13, fig. 68.
 " " Rss., 1854, Kreide Ostalp.; Wien. Ak. Dkschr. 7, p. 69, t. 26, fig. 1.
 " **canaliculata** Rss., ibid. t. 26, fig. 4.
 " **Linneiana** D'ORB., 1839, Cuba, p. 101, t. 5, figg. 10—12 (sec PARK. et JONES).

d) trochoides sive Rhynchospira EHRENB.:

- Globigerina canariensis** D'ORB., 1844, Iles Canaries, p. 133, t. 2, figg. 10—12.
 " **trochoides** Rss., 1845, Böhm. Kreidef. 1, p. 36, t. 12, fig. 22.
 " " Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 37, t. 3, fig. 5.
 ? **Rhynchospira abnormis** HKEN., 1875, For. Clav. Száb. Sch. p. 69, t. 7, figg. 17—19 (Verneulinæformis).

Carpenteria balaniformis GRAY var. **proteiformis** n.

Tab. VI, figg. 208—214; Tab. VII, figg. 215—219.

In general our form agrees in structure with *Carpenteria balaniformis* from the Pacific (Carpenter Introduction t. 21); but it appears to be of a higher development than the latter. It is a Proteus without its equal in this class. Its original structure is regularly rotaline, but owing to its strong propensity to propagate additional chambers, particularly from its upper, i. e. apertural side and from the chamber-walls also issuing strong tubes, out of which new chambers are developed, the greatest variety of forms and alienation from the parent-type is the result. At one time the shell has its balaniform shape carrying on its top a cluster of ovoid or globular chambers. At another time this cluster appears detached from its parent shell, of which nothing is traceable. Sometimes the whole assumes the shape of a somewhat irregular *Nodosarina*.

When this becomes ramified, the whole resembles some forms of *Polytrema*, to which genus Mr. CARTER not improperly has referred this species (CARTER, »On the *Polytremata*», A. M. N. H. (4) 17. 1876. p. 185). This variety is often of a rosecoloured tinge; its chambers are generally of smaller size and more closely fitted and irregularly triserially arranged, the whole structure somewhat resembling a *Cerriopora cribrosa* GOLDF., but not so regularly built as that. Its surface is often provided with coarse scattered impressions beside the channelpores.

Again it is developed in a free and unattached state into the shape of a large *Globigerina* or *Bulimina*. The chambers are sometimes of an extraordinary size — 3 or 4 mm. The pore-canals are large, pretty regularly and closely arranged in the thick walls.

Carpenteria Rhapsidodendron MOEB., 1880, *Maurit. u. Seychell.* p. 81, t. 5, figg. 6—10, t. 6, figg. 1—6 seems not essentially to differ from the Philippine form.

Rupertia stabilis WALLICH, A. M. N. H. (4) 19 (1877) p. 501, t. 20 seems to belong to this genus, and may be a pigmy form of this species notwithstanding its fissure-like and differently placed aperture. Its near affinity to *Carpenteria* is also indicated by Mr. WALLICH.

Sphaeroidina dehiscens PARK. and JONES, from India (*Philos. Trans.* 155. 1. t. 19, fig. 5, seems also to come nearer to *Carpenteria* than to any other genus.

It is not rare in the coralline-gravel and also in the chalk-ooze; it grows not seldom to a height of 10 mm. with long varicous branches.

Fig. 208 is the regular balaniform-rotaline, attached form; a new chamber shooting forth from the apertural part.

Fig. 209: a thin section of the walls, showing a network of pores very densely arranged.

Fig. 210: a tranverse section at the base, showing an entirely rotaline structure.

Fig. 211: another form with aulostoma-tubes on the latest segment.

Fig. 212; *Nodosarina*- or *Virgulina*formed.

Fig. 213: rotaliform with a cluster of extra chambers.

Fig. 214: a single detached chamber with 3 eferent and 1 afferent tubes.

Fig. 215—216: free, globigerine form, with fissure like aperture.

Fig. 217: mediane section of the same.

Fig. 218: Polytremaformed, uniserial.

Fig. 219: Buliminaformed.

Syn. *Carpenteria balaniformis* GRAY, 1858, On Carpenteria etc.; Proceed. Zool. Soc. 1858. 26, p. 266.

CARP., 1862, Introd. p. 186, t. 21.

" *monticularis* CART., 1877. A. M. N. H. (4) 19, p. 209; t. 13, ff. 9—15; ibidem 20. p. 68.

Polytrema balaniforme CART., 1876, A. M. N. H. (4) 17, p. 198, t. 13; figg. 7—10.

Planorbulina fareta FICHT. and MOLL.

Tab. VII, figg. 220—225.

Our form has sometimes a subnautiloid shape with both sides nearly alike indicating an independent life, but in general it is »truncatuline.» This nautiloid form is hardly to be distinguished from *Plan. tuberosa* FICHT. and MOLL. The early stage of growth is not distinguishable from the young of *Plan. vulgaris* D'ORB.

It is scarcely within our power to identify the many »species» referred to the genera *Truncatulina*, *Anomalina*, *Rosalina* etc.; which have been somewhat uncritically instituted by the different authors. Our list of synonyms, to a great deal founded on the able suggestions and unparalleled experience of Messrs. PARKER and JONES, may still be liable to some errors in the disposition of the »species».

This cosmopolite is not uncommon, particularly in the chalk-ooze, but it seldom attains fully 1 mm. in diameter.

Figg. 220—222; 223—225: two specimens viewed from different sides; the one more »Anomalina» formed than the other.

Syn. *Nautilus farctus* FICHT. and MOLL., 1803, Test. microsc. p. 64, t. 9, figg. g, h, i.

a) *irregularis*: *vulgaris* D'ORB.

Webbina lævis, tuberculata SOLLAS, 1877, Geol. Mag. Dec. 2; 4, N:o 1, p. 103, t. 6, figg. 1—3.

Truncatulina variabilis D'ORB., 1844, Iles Canaries p. 135, t. 1, fig. 29.

" " Rss., 1864, Oberburg; Wien. Ak. Dkschr. 1. 23. 1, p. 10, t. 1, fig. 15.

" *innormalis* COSTA, 1854, Pal Nap. 2, t. 21, fig. 11.

Planorb. truncata EGG., 1857, Mioc. Ortenb.; Leonh. u. Bronn. Jhrb. 1857, p. 280, t. 10, figg. 15—17.

Acervulina cretæ MARSS., 1877, Rügen. Schreibeckreide; Greifsw. Nat. Verein. Mitth. 1877—78, p. 169, t. 5, fig. 39.

Anomalina anomala EGG., 1857, Mioc. Ortenb.; Leonh. u. Bronn. Jhrb. 1857, p. 280, t. 9, figg. 10—13.

Truncatulina tumescens EGG., ibid. p. 279, t. 9, figg. 14—16 (in *Pl. tuberosam transgrediens*).

- Syn. **Truncatulina variabilis** D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 279 (= Pl. tuberosa sec. PARKER et JONES).
- Planorb. mediterraneus** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 280. Mod. 79; 1846, Bas. tert. Vienne, p. 166, t. 9, figg. 15—17.
- » **vulgaris** D'ORB., 1839, Cuba p. 85, t. 6, fig. 11—15; 1844, Iles Canaries p. 34, t. 2, fig. 30.
- » » WILLIAMS., 1858, Brit. rec. Foramf., p. 57, figg. 119—120.
- » **difformis** v. MÜNST.; RÖMER, 1838, Nordd. tert. Meeresande; Leonh. u. Bronn. Jhrb. 1838, p. 390. t. 3, fig. 59.
- » **farcta** var. **mediterraneus** PARK. et JONES, 1865, N. atl. and Arct. Oc., Phil. Trans. 155. 1, p. 383, t. 16, fig. 21.
- » **retinaculata** PARK. et JONES, 1862, Carp. Introd. p. 209; Phil. transact. 155, p. 421, t. 19, fig. 2.
- » **larvata** PARK. et JONES, 1865. ibid. t. 19, fig. 3; A. M. N. H. (3) 5, p. 68.
- » » CARTER, 1877, On for. found in and about Tubipora musica; A. M. N. H. (4) 19, p. 214.
- Nominib. variis** EHRENB., 1854, Microgeol. t. 25, fig. 42—43.

b) magis regularis: **farcta** FICHT. and MOLL.:

- Nautilus lobatulus** WALK. and JAC., 1784, Test. min. rar. fig. 69. } sec. PARK.
Serpula lobata MONTAGU, 1803, Test. Brit. Suppl. p. 515, fig. H. a. } et JONES.
- Planorb. nitida** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 280, Mod. 78.
- Truncatulina tuberculata**, **Planulina incerta** D'ORB., ibid. p. 279, 280, Mod. 37.
- » **laevigata** RÖM., REUSS' Böhm. Kreide 1, p. 37, t. 13, fig. 47.
- » **lobatula** WILLIAMS., 1858, Brit. rec. For. p. 59, figg. 121—123.
- » » , **alternans** COSTA, 1854, Pal. Nap. 2, p. 249, t. 14, fig. 7; t. 20, fig. 12.
- Rosalina inæqualis** COSTA, ibid. t. 14, fig. 8.
- Truncatulina carbonifera** BRADY, 1876, Carbonif. and Perm. foramf.; Pal. Soc. 30, p. 138, t. 6, fig. 10.
- Nominibus variis** EHRENB., 1854, Microgeol. t. 19, fig. 87, t. 25, figg. 27—28, 35—38; t. 26, figg. 32—36.
- Truncatulina Beaumontiana** D'ORB., 1839, For. Craie bl. Paris; Mém. Soc. geol. France 4, t. 3, figg. 17—19.
- » **lobata** D'ORB., 1844, Iles Canaries, p. 134, t. 2, figg. 22—24.
- » **lobatula** D'ORB., 1846, For. tert. Vienne p. 168, t. 9, figg. 18—23.
- ? » **Boueana**, **Anomalina variolata** D'ORB., ibid. p. 169, 170, t. 9, figg. 24—26, 27—29.
- » **Boueana** BRADY, 1876, Carb. and Perm. foramf.; Pal. Soc. p. 138, t. 6, fig. 10.
- » **lobatula** PARK. et JONES, 1857, For. Coast. of Norway; An. Mag. Nat. Hist. 19, p. 293, t. 10, figg. 17—21.
- Planorb. farcta** var. **lobatula** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans 155. 1, p. 381, t. 14, figg. 3—6; t. 16, figg. 18—20.
- Truncatulina lobatula** PARK. et JONES, 1866, Crag. For.; Pal. Soc. 19, t. 2, figg. 4—10; 19.
- » **convexa** Rss., 1854, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 36, t. 3, fig. 4.
- Rotalina sulcata** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 85, t. 11, fig. 2 (Obs. Rot. sulcata Röm. incerta est).
- Rosalina rudis** Rss., ibid. p. 87, t. 11, fig. 7.
- » **nitens** Rss., ibid. p. 86, t. 11, fig. 4.

- Syn. *Truncatulina sublobatula*, **Rot. ammophila, macrocephala** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 659, 652, t. 2, fig. 103; figg. 90—91 (in Pl. Ungerianam transiens).
- Anomalina explanata** COSTA, 1854, Pal. Nap. 2, p. 252, t. 14, fig. 4.
- ?**Soldania hexagona** COSTA, ibid. p. 248, t. 20, fig. 6.
- Truncatulina magnifica** COSTA, ibid. t. 14, fig. 3.
- Rotalia deplanata** Rss., 1855, Kreidegeb. Meklenburg; Zeitschr. deutsch. geol. Ges. 7, t. 11, fig. 3.
- Truncatulina concinna** Rss., ibid. p. 285, t. 11, fig. 4.
- » **Dekayi** Rss., 1861, Grünsand, New Jersey; Wien. Ak. Sitz.-Ber. 1. 44, p. 338, t. 7, fig. 6.
- » **horrida** KARR., 1870, Kreidef. Leitzendorf; Österr. geol. Reichsanst. Jhrb. 20, p. 183, t. 11, fig. 14.
- Rotalina pusilla** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrft. 21, p. 141, t. 7, fig. 20.
- Rosalina galiciana** ALTH, 1850, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 265, t. 13, fig. 20.
- Truncatulina lobatula** MARSS., 1877, Rüg. Schreibkr.; Greifsw. Nat. Verein. Mittheil. 1877—78, p. 167, t. 5, fig. 38.
- » **advena** D'ORB., 1839, Cuba p. 87, t. 6, figg. 3—5.
- ? » **communis** Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 242, t. 5, fig. 56.
- » **oblongata** Rss., 1863, For. Crag. d'Anvers; Bull. Ac. Belg. (2). 15, p. 155, t. 3, fig. 45.
- » **Candei** D'ORB., 1839, Cuba p. 88, t. 3, figg. 6—8.
- Rosalina Bosqueti** Rss., 1861, Kreidetuff. Maastr.; Wien. Ak. Sitz.-Ber. 1. 44, p. 316, t. 3, fig. 1.
- Rosalina Edwardsiana** D'ORB., 1839, Cuba, p. 101, t. 1, figg. 8—10.

Planorbulina farcta var. **vulgaris** D'ORB.

Tab. VII, figg. 226—227.

If one should venture to dispose the *Planorbulina* forms into species, instead of using the more philosophical way of arrangement initiated by Messrs. PARKER and JONES, 3 or at the most 4 forms might be distinguished by somewhat specific characters. This genus is next to *Nodosarina* the clearest example of the advantage of the nomenclatural system adopted by those eminent naturalists.

Some or perhaps all of these species have a free and an attached form, whence it will be obvious, that a number of varieties may result from the different modes of life. The attached forms have a great propensity towards irregular growth, and forms like *Truncatulina variabilis* D'ORB., *Webbina laevis* and *tuberculata* SOLLAS, *Plan. vulgaris* D'ORB., *Acer vulina* W. SCHULTZE are originated. In other instances the same attached species adopts a more regular growth, such as *Truncatulina lobatula* WALK. or the typical *Plan. farcta* FICHT. and MOLL., and when it passes its life in a free condition, its shape may be more or less nautiloid.

It may for this reason be proper to arrange *Planorb. vulgaris* as a variety under *Plan. farcta* and take *Plan. lobatula* as quite synonymous with the typical *farcta*, maintaining the latter name for the species, notwithstanding the priority of *lobatula*.

A second species, but rather too closely allied to *farcta* to claim the rank of species, would be *Plan. tuberosa* FICHT. and MOLL., seemingly identical with *Rosalina ammonoides* Rss., *Plan. angulata* v. HAGEN, *Plan. coronata* PARK. and JONES. Many forms belonging to this group (*Anomalina* D'ORB.) may after a closer examination be recognised as the detached form of *Plan. farcta*, as is also suggested by Mr. CARPENTER (Intro. p. 208). *Planorbulina Ariminensis* D'ORB. is too closely allied both to *Plan. tuberosa* and *farcta* to be distinguished as a species.

Plan. Ungheriana D'ORB. which cannot be distinguished from *Plan. Haidingeri*, and oth., would be a third species. It has a more finished structure and is provided with finer pore-canals.

A fourth species is *Plan. reticulata* Czjz.

Plan. farcta β *vulgaris* does not attain any larger size either on the coralline- or chalk-bottom; its pigmy form is not unfrequent. The early chambers have generally a reddish or orange tint.

Fig. 226: the developed form of *Plan. farcta vulgaris*; nearly of the same habitus as *Planorb. larvata* PARK. and JONES, with a narrow mouth on each of the outer chambers.

Fig. 227: pigmy form.

For the synonymy see under the preceding.

***Planorbulina tuberosa* FICHT. and MOLL. var. *Ariminensis* D'ORB.**

Tab. VII, figg. 228—233.

It may be more consistent with natural affinity to rank this variety with *Plan. farcta*. But if *Plan. tuberosa* is to comprise the principal forms of the nautiloid and subnautiloid *Planorbulina*, this variety would be the first to take a place under this species on account of its decided and completely nautiloid plan of growth. Our form is often rough or wrinkled, with somewhat raised and sinuous septal lines and a truncated or even grooved margin, the edges of which are often crenulate or spinous (figg. 228—230).

Another form is smoother and has not a squared margin but is single-edged (figg. 231—233). It comes near to *Anomal. rotula* D'ORB.

The variety *Ariminensis* has generally a greater number of chambers in each convolution (7—10) than *Plan. farcta*. Its close affinity to this is shown by its coarse pores and the yellowish or reddish tint of its early chambers.

It is very common in the chalk-ooze, but its diameter is seldom greater than 0,5 mm.

a) tuberosa sive ammonoides:

- Syn. *Rotalina cryptomphala* Rss., 1849, Neue For. Wien. Beck.; Wien. Ak. Dkschr. 1. 1, p. 371, t. 47, fig. 2.
- » » EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 277, t. 9, figg. 4—6.
- Rosalina inflata* Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz-Ber. 1. 46, p. 87, t. 11, fig. 6.
- » *simplex* D'ORB., 1846, For. tert. Vienne p. 178, t. 10, figg. 25—27.
- » » EGGER, 1857, Miocän. v. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 278, t. 10, figg. 4—6.
- Truncatulina granosa*, *Pulv. similis* HREN., 1875, For. Clav. Száb. Sch., p. 74, 78, t. 10, figg. 2, 5.
- Rotalina depressa* ALTH, 1849, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 266, t. 13, fig. 21.
- Anomalina rotula* D'ORB., 1846, Bass. tert. Vienne, p. 172, t. 10, figg. 10—12 (ab »Anom.» austriaca vix diversa).
- » *subæqualis* Rss., 1865, Tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz-Ber. 1. 18, p. 244, t. 5, fig. 59.
- » *complanata* COSTA, 1854, Paleont. Nap. 2, t. 20, fig. 16.
- » » Rss., 1850, Kreidemerg. Lemberg; Haid. Nat. Abh. 4. 1, p. 36, t. 3, fig. 3.
- Rosalina complanata* Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz-Ber. 1. 46, p. 86, t. 11, fig. 3.
- Anomalina tenuissima* Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz-Ber. 1. 18, p. 244, t. 5, fig. 60.
- Truncatulina tenuissima* Rss., 1861, Kreidetuff. Maastr.; Wien. Ak. Sitz-Ber. 1. 44, p. 317, t. 3, fig. 2.
- Truncatulina costata* HREN., 1875, Clav. Száb. Sch. p. 73, t. 9, fig. 2 (in Planorb. ariminensem vergens).
- Nautilus tuberosus* FICHT. et MOLL., 1803, Test. micr. p. 111, t. 20, figg. g—k.
- Rosalina ammonoides* Rss., 1845, Böhm. Kreide 1, p. 36, t. 8, fig. 53; t. 13, fig. 66.
- » » Rss., 1850, Kreidem. Lemberg; Haid. nat. Abh. 4. 1, p. 36, t. 3, fig. 2.
- Truncatulina stella*, *inæqualis* KARR., 1868, Mioc. Kostej.; Wien. Ak. Sitz-Ber. 1. 58, p. 182, t. 4, fig. 13—14.
- Planorbulina angulata* v. HAGEN., 1842, Rügen. Kreide; Leonh. u. Bronn. Jhrb. 1842, p. 571, t. 9, fig. 23.
- Rotalina constricta* v. HAGEN, ibid.: Rss., 1861, Kreide v. Rügen; Wien. Ak. Sitz-Ber. 1. 44, p. 329, t. 6, fig. 7, t. 7, fig. 1.
- Rosalina moniliformis* Rss., 1845, Böhm. Kreide. 2, p. 36, t. 12, fig. 30, t. 13, fig. 67.
- Anomalina Svesi* KARR., 1861, Marin. Teg. Wien. Beck.; Wien. Ak. Sitz-Ber. 1. 44, p. 447, t. 2, fig. 2.
- Rosalina Kochi* Rss., 1855, Kreidegeb. Meklenburg; Zeitschr. deutsch. geol. Ges. 7, p. 274, t. 9, fig. 3.
- » *Weinkauffi* Rss., 1863, Sept. Thon Kreuznach; Wien. Ak. Sitz-Ber. 1. 48, p. 68, t. 8, fig. 97.
- Truncat.* » Rss., 1866, deut. Sept. Thon; Wien. Ak. Dkschr. 25, p. 160.
- Rotalia capitata*, *Rosalina rudis* GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 653, 657, t. 2, figg. 92, 99.

b) in Planorb. farctam vergens (a qua vix distinguenda):

- Anomalina punctulata* D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 282, t. 15, figg. 1—3 bis.
- Rosalina Lorneiana* D'ORB., 1839, For. Craie bl. Paris.; Mem. Soc. geol. Fr. 4, p. 36, t. 3, figg. 20—22.

- Truncatulina grosserugosa** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 660, t. 2, fig. 104.
 » » HKEN., 1875, Clav. Száb. Sch. p. 74, t. 9, fig. 6.
Anomalina polymorpha COSTA, 1854, Pal. Nap. 2, p. 252, t. 22, figg. 7—9.
 » **badenensis, austriaca** D'ORB., 1846, Bas. tert. Vienne, p. 171, 172, t. 10, figg. 1—9.

c) »coronata»: nautiloidea, tumida:

- Anomalina coronata** PARKER et JONES, 1858, For. Coast. of Norway; A. M. N. H. (2) 19, p. 294, t. 10, figg. 15—16.
 » » PARKER et JONES, 1865, North. Atl. and Arct. Oceans; Phil. Trans. 155. 1, p. 383, t. 14, figg. 7—11.
 » » BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 469, t. 48, fig. 13.
Rotalia cochleata GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. 1, 10. 2, p. 654, t. 2, fig. 94.
Truncatulina cristata GÜMB., ibid. p. 660, t. 2, fig. 105.
Rosalina Calymene GÜMB., ibid. p. 658, t. 2, fig. 100.
 » **fasciata, maorica, latifrons** STACHE, 1865, tert. Mergel. Whaingar. Haf.; Novara Reise, geol. Th. 1. 2, p. 282, 284, t. 24, figg. 31—33.
Rotalia speciosa KARR., 1864, Leythakalk; Wien. Ak. Sitz.-Ber. 1. 50, p. 709, t. 2, fig. 12.
 » **nonionina** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 81, t. 10, fig. 2.

d) »Ariminensis»: nautiloidea, compressa:

- Planulina Ariminensis** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 280, t. 14, figg. 1—3 bis. Mod. 49.
 » **Soldanii** D'ORB., ibid. p. 280.
 ? » **Osnabrügensis** RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 390, t. 3, fig. 58.
Rosalina Osnabrugensis Rss. 1855, Tert. Sch. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 243, t. 5, fig. 58.
Truncatulina compressa HKEN., 1875, For. Clav. Száb. Sch. p. 72, t. 8, fig. 8.
 » **osnabr.** HKEN., ibid. p. 73, t. 9, fig. 4.

Planorbulina Ungeriana D'ORB.

Tab. VII, figg. 234—236.

Our form has the more distended shape of *Plan. Haidingeri* D'ORB. but in all other respects it falls in with *Plan. Ungeriana* of the same author. Sometimes it approaches the subnautiloid form, but its most common shape is that of a bi- or plano-convex, somewhat thick, lens with a blunt edge and rotaline arranged chambers.

It plainly exhibits the very vague and faint distinction between the »*Anomaline*» and *Planorbuline* types. Sometimes the shell is quite conical the aboral face being flat, the other raised conically. The central bosses are often granulated, not seldom spreading over a great portion of the shell around the centre and hiding the convolutions and septal lines, which often are somewhat raised (limbate). At another times the bosses are reduced to small specks of clear shell-substance.

The pores of the adult are finer and closer set than in *Plan. farcta*; in young specimens the pores are of variable size, often coars and scattered. The surface is of high finish without being quite polished.

It is one of the most common rhizopodes in deep water, both in the cretaceous ooze and on the coralline-gravel, attaining a horizontal diameter of 1,5 mm.

Fig. 234: the aboral side of *Plan. Ungeriana* with large and somewhat granulated central boss.

Fig. 235: side view.

Fig. 236: the apertural side with defectively grown umbilical boss.

a) magis convexa:

- Syn. **Rotalina Haidingeri** D'ORB., 1846, For. tert. Vienne, p. 154, t. 8, figg. 7—9.
 " **rosea** D'ORB., 1826, Tabl. meth.; Ann. Sc. Nat. 7, p. 272; Mod. 35.
 " " D'ORB., 1839, Cuba p. 72, t. 3, figg. 9—11.
 ? " **Ehrenbergii** BAILEY, 1850, Examin. of Soundings; Smithson. Contrib. of knowledge 2, Art. 3, p. 10, figg. 11—13.
Planorb. Haidingeri BRADY, 1864, Rhizopod. Shetl.; Trans. Lin. Soc. 24, p. 469, t. 48, fig. 11.
 " **farcta** var. **Haidingeri** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 382, t. 16, fig. 22.
 " **Haidingeri** PARK. et JONES, 1866, Crag. Foramf.; Palæont. Soc. 19, t. 4, fig. 18.
Rotalina lenticula Rss., 1845, Böhm. Kreide 1, p. 35, t. 12, fig. 17.
 " **grata** Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 163, t. 4, fig. 17.
 " **Dutemplei** EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 274, t. 7, fig. 8—10.
 " **orthorapha** EGG., ibid. p. 275, t. 10, figg. 1—3.
 " **discigera, anomphala** EGG., ibid. p. 275, t. 8, figg. 5—10.
 " **propinqua** EGG., ibid. p. 275, t. 7, figg. 14—17.
 " **Kaltembergensis** EGG., ibid. p. 273, t. 9, figg. 21—23.
Truncat. kallomphalia GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 659, t. 2, fig. 102.
Rotalia eocæna GÜMB., ibid. p. 650, t. 2, fig. 87.
 " **pteromphala, megomphala** GÜMB., ibid. p. 651, 655; t. 2, fig. 88, t. 2, fig. 94 bis.
 " **truncana** GÜMB., ibid. p. 653, , t. 2, fig. 93 (in b) transiens).
Rosalina subumbonata GÜMB., ibid. p. 657, t. 2, fig. 98.
Rotalina Akneriana var. BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 340, t. 16, fig. 7.
 " **Ungeriana** var. BORNEM., ibid. p. 341, t. 16, fig. 5.
 ? **Truncat. propinqua** Rss., 1855, Tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 241, t. 4, fig. 53.
 ? " " HKEN., 1875, Clav. Száb. Sch. p. 71, t. 8, fig. 9.
Pulvinulina Haidingeri HKEN., 1875, For. Clav. Száb. Sch., p. 77, t. 15, fig. 10.
 " **umbilicata** HKEN., ibid. t. 15, fig. 9.
Rotalia peraffinis COSTA, 1855, Pal. Nap. 2. t. 22, fig. 17.
 " **Brückneri** Rss., 1855, Kreidegeb. Meklenburg; Zeitschr. deutsch. geol. Ges. 7, p. 273, t. 9, fig. 7.
 " **hemisphærica** Rss., 1861, Kreidetuff Maastricht; Wien. Ak. Sitz.-Ber. 1. 44, p. 314, t. 2, fig. 5.

Syn. ?	Rotalia præincta	KARR., 1868, Mioc. For. fauna Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 189, t. 5, fig. 7 (Pulv. eleganti similis).
	» tenuimargo	Rss., 1866, Crag. Antwerp.; Wien. Ak. Sitz.-Ber. 42, p. 359, t. 1, fig. 11.
	» franconica	GÜMB., 1862, Streitb. Schwamml.; Würtemb. Nat. Ver. Jhrft. 1862, p. 229, t. 4, fig. 9 (in b) transiens).
	» semipunctata	BAILL., 1850, Researches on the Virg. forf.; Smithson. Contrib. 1850. 2, Art. 3, p. 11, figg. 17—19 (in b) transiens).
?	» Siemensis	D'ORB., 1826, Tabl. meth.; Ann. Se. Nat. 7, p. 275.
?	Rosalina Clementiana	D'ORB., 1839, For. Craie bl. Paris; Mém. Soc. geol. France 4, p. 37, t. 3, figg. 23—25 (= Planorb. tuberosa sec. PARK. et JONES).
	Rotalina scutellaris	KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 709, t. 2, fig. 13.
	» Voltziana	D'ORB., 1839, For. Craie bl. Paris; Mém. Soc. geol. France 4. p. 31, t. 2, figg. 32—34.

b) magis compressa, interdum carinata (ab a non distincta):

	Rotalina Ungeriana	D'ORB., 1846, For. Bas. tert. Vienne, p. 157, t. 8, figg. 16—18.
	Planorb. farcta var. Ungeriana	PARK. et JONES, 1865, North. Atl. and Arct. Ocean; Phil. Trans. 155. 1, p. 382, t. 16, figg. 23—25; Pl. Culter t. 19, fig. 1.
	» Ungeriana	PARK. et JONES, 1866, Crag. For.; Pal. Soc. 19, t. 2, figg. 11—12.
	Truncat. Ungeriana	HKEN., 1875, Clav. Száb. Sch. p. 72, t. 8, fig. 7.
	Planorb. Ungeriana	BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 469, t. 48, fig. 12.
	Rotalia Mortoni	Rss., 1861, Grünsand N. Jersey; Wien. Ak. Sit.-Ber. 1. 44, p. 337, t. 8, fig. 1 (ab a) non distincta).
	» tuberculifera	Rss., 1861, Kreidetuff Maastricht.; Wien. Ak. Sitz.-Ber. 1. 44, p. 313, t. 2, fig. 2.
	» granosa	Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 75, t. 5, fig. 36.
	» umbonella	Rss., 1859, Westph. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 221, t. 11, fig. 5.
	» Römeri	Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 240, t. 4, figg. 52.
	» involuta var.	Rss., 1861, Kreidetuff Maastricht.; Wien. Ak. Sitz.-Ber. 1. 44, p. 313, t. 2, fig. 4.
	Rosalina crenata	Rss., 1855, Tert. Schicht. n. u. m. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 243, t. 5, fig. 57.

c) convexo-plana (forsan adnata) in Planorb. tuberosam et farctam FICHT & MOLL. transiens:

	Anomalina Wüllerstorfi	SCHWAG., 1866, For. Kar-Nikobar; Nov. Reise, geol. Th. 2, 2, p. 258, t. 7, figg. 105—107.
	Rosalina Schlönbachi	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 84, t. 10, fig. 5, t. 11, fig. 5.
	» Kalebergensis	D'ORB., 1846, For. Bass. tert. Vienne, p. 151, t. 7, figg. 19—21.
	» Akneriana, Dutemplei	D'ORB., 1826, ibid. p. 156, 157, t. 8, figg. 13—15, 19—21.
	» lenticula	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 82, t. 10, fig. 3.
	» affinis	CZJZ., 1847, Foss. for. Wien. Beck.; Haid. nat. Abh. 2. 1, p. 144, t. 12, figg. 36—38.
	Rotalina involuta, polyrraphes	Rss., 1845, Böhm. Kreidef. 1, p. 35, t. 12, figg. 18; 1850, Kreidemergel Lemberg; Haid. Nat. Abh. 4. 1, p. 35, t. 2, fig. 14; t. 3, fig. 1.
	Truncat. cryptomphala	HKEN., 1875, Clav. Száb. Sch. p. 73, t. 9, fig. 1.
?	» insignis	Rss., 1869, Oligocän. v. Gaas; Wien. Ak. Sitz.-Ber. 1. 59, p. 461, t. 2, fig. 2.

Syn. Truncat. varians	Rss. 1860, For. Crag. v. Antwerp.; Wien. Ak. Sitz.-Ber. 42, p. 359, t. 2, fig. 12.
» lucida	Rss., 1865, Deutsch. Septarienthon; Wien. Ak. Dkschr. 1. 25. 1, p. 160, t. 4, fig. 15.
» Dutemplei	Rss., ibid. p. 160, t. 4, fig. 16.
» »	HKE., 1875, For. Clav. Száb. Schichten p. 157, t. 8, figg. 19—21..
» tenella	Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 477, t. 5, fig. 6.
Rosalina patella	EGGER, 1857, Mioc. Ortenb.; Leonh. u. Bronn. Jhrb. 1857, p. 278, t. 10, figg. 12—14.

Planorbulina Ungeriana var. **affixa** n.

Tab. VII, figg. 237—241.

Notwithstanding its finer pores and its other deviation from the type, the texture, surface of the shell and the arrangement of the chambers, this form bear too close an affinity to *Plan. Ungeriana* not to be ranged under this species. Its upper side is often scooped out in an irregular manner, and the much flattened shell is somewhat undulated with irregular sinuous edges, indicating an attached life. The central boss on this side is sometimes wanting, but never on the opposite (apertural) side.

It is not very common in the coralline-gravel.

Fig. 237: represents a transverse section near the attached side.

Fig. 238: edge view of the same specimen.

Fig. 239: another specimen; its upper hollowed out side.

Fig. 240: the edge view, showing the shell as if bent in its diameter, the upper side being concave, the apertural side convex.

Fig. 241: the apertural side.

Planorbulina reticulata CZJZ.

Tab. VII, figg. 242—244.

This remarkable species was first described in 1847 as occurring in the tertiary strata of Austria by CZJZEK. Its close affinity to the genus *Planorbulina* has been asserted by Messrs PARKER and JONES. One side is generally smooth the other wrinkled or coarsely striated. The pores are coarse and often stand closer together at the central part of the shell. Its broad marginal keel is transversely costated and seems to be a constant appendage. Some pigmy forms have their chambers arranged in a very imperfect coil; the primordial chamber not being placed in the centre.

It occurs not uncommonly both in the chalk-ooze and in the coralline-gravel.

Fig. 242: the striated side.

Fig. 243: a younger specimen seen in transmitted light.

Fig. 244: pigmy form in transmitted light, magnified.

Syn. Rotalina reticulata	CZJZ., 1847, For. foss. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 145, t. 13, figg. 7—9.
Siphonina fimbriata	Rss., 1849, Neue for. österr. tert. Becken; Wien. Ak. Dkschr. 1. 1, p. 372, t. 47, fig. 6.
» puteoiana	COSTA, 1854, Pal. Nap., t. 27, fig. 22.

Tinoporus vesicularis PARK. and JONES.

Tab. VII, figg. 245—247.

Our form with its much flattened shape, and the form and arrangement of its chambers suggests at once its affinity to *Planorbulina*; an affinity almost too close to afford sufficient reason for a generic distinction. The surface is somewhat foveolate-reticulated with faintly marked septal lines, and of a light-brown colour. A remarkable feature is the slight differentiation of the chambers in the median plane, which are somewhat larger than those of the other layers, this arrangement in some degree approaching the structure of Orbitoides.

It is not common on the coralline-gravel.

Fig. 245: *Tinoporus vesicularis* with its areolated surface.

Fig. 246: a vertical section in the median plane.

Fig. 247: Section through or near the horizontal middle-plane.

Syn. *Orbitulina vesicularis, congesta, lævis* PARK. et JONES, 1863, Nomenclature — LAMARCK — ; A. M. N. H. (3) 5, p. 285, et sequ.

Tinoporus lævis

CARPENTER, 1862, Introd., p. 224, t. 15, figg. 1—4.

” ”

BRADY, 1864, Rhizop. Shetland; Trans. Lin. Soc. 24, p. 470, t. 48, fig. 17.

Pullenia sphæroides D'ORB.

Tab. VIII, figg. 248—250.

This little thickwalled, highly polished, milkwhite rhizopode attains seldom a greater diameter than 0,50 mm. Its shape is often subglobose, but somewhat compressed forms also occur. It is frequently somewhat unsymmetrical; the aperture being placed somewhat to one side. The form called *Pullenia obliqueloculata* PARK. and JONES is such a variety with a more conspicuous lack of symmetry.

It is not uncommon in the coralline-gravel.

Fig. 248—249: the compressed form of *Pullenia sphæroides*.

Fig. 250: nearly globose, with slightly unsymmetrical whorls.

Syn. Nonion. sphæroides	D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 293, N:o 1, Mod. 33.
” bulloides	D'ORB., 1846, For. foss. tert. Vienne, p. 107, t. 5, figg. 9—10.
” ” var.	COSTA, 1854, Pal. Nap. 2, t. 17, fig. 13.
” ”	BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 339, t. 16, figg. 1—3.
” ”	PARK. et JONES, 1859, For. Coast. of Norway; Ann. Mag. Nat. Hist. (2) 19, p. 287, t. 11, figg. 9—10.
Pullenia sphæroides	PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 15. 1, p. 368, t. 14, fig. 43, t. 17, fig. 53.
” ”	PARK. et JONES, 1866, Crag. For.; Pal. Soc. 19, t. 2, figg. 31—32.
” ”	CARPENTER, 1862, Introd. p. 184, t. 12, fig. 12.

- Syn. **Pullenia bulloides** HKEN., 1875, Clav. Száb. Sch., p. 59, t. 10, fig. 9.
 » **obliqueloculata** PARK. and JONES, 1865, Arct. and Northatl. Ocean; Phil. Trans. 155. 1, t. 19, fig. 4.

b) magis compressa:

- Nonion. quaternaria** Rss., 1850, Kreidemerg. Lemberg; Haid. nat. Abh. 4. 1, p. 34, t. 2, fig. 13.
 » **quinqueloba** Rss., 1851, Sept. Thon v. Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 72, t. 5, fig. 31.
Pullenia compressiuscula ♂ **quadriloba** Rss., 1867, Steinsalzablager. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 87, t. 3, fig. 8.

Discorbina rosacea D'ORB.

Tab. VIII, figg. 251—257.

Our form is generally of pigmy size; it comes near to *Asterigerina planorbis* D'ORB. and EGGER (from the tertiary strata) and is also nearly identical in shape with *Ros. Auberii* D'ORB. from the West Indies. Its most striking feature is its semilunar, long chambers, and their restricted number in each convolution. It has a yellowish hue in transmitted light.

The scantiness of our supply of *Discorbinae* and the uncritical method of specific distinction and representation of the forms adopted by the different authors make us unable to make a satisfactory disposition of the forms in their natural places, notwithstanding the very sagacious hints in regard to this matter given by Messrs. PARKER and JONES.

The difference between *Discorb. rosacea* and *valvulata* is very slight.

It is not uncommon, but always in a pigmy-state, (0,25 mm.) in the chalk-ooze.

Figg. 251—253; *Discorbina rosacea*; 251 b: the same more enlarged, in transmitted light.

Figg. 254—255: another specimen, spiral and apertural sides.

Figg. 256—257: young small specimens; it has sometimes a clouded appearance in transmitted light.

- Syn. **Rotalia rosacea** D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 273, N:o 15, Mod. 39.
Discorbina turbo var. **rosacea** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 385, t. 16, fig. 28.
 » **rosacea** PARK. et JONES, 1866, Crag. For.; Pal. Soc. 19, t. 4, fig. 17.
Rotalia Mamilla, ochracea WILLIAMS., 1858, Brit. rec. forf. p. 54, 55, figg. 109—113.
Asterigerina planorbis D'ORB., 1846, For. tert. Vienne p. 205, t. 11, figg. 1—3.
 » " EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 281, t. 11, figg. 8—10.
Rosalina Auberii D'ORB., 1839, Cuba, p. 94, t. 4, figg. 5—8.
Truncat. flos KARR., 1868, Mioc. For. faun. Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 182, t. 4, fig. 15.

- Syn. ?*Discorbina baconica*, *elegans* HKEN., 1875, Clav. Száb. Sch. p. 76, t. 10, fig. 3, t. 9, fig. 3, t. 15, fig. 7.
 » *eximia* HKEN., *ibid.* p. 76, t. 15, fig. 8.

Discorbina turbo D'ORB. et multæ aliæ trochiformes auctorum a *rosacea* forsau non sunt distinctæ.

Discorbina valvulata D'ORB.

Tab. VIII, figg. 258—261.

Although this form has been placed as a variety under *Discorb. vesicularis* LMCK, by Messrs PARKER and JONES, it may be proper to distinguish it as a species in virtue of its peculiarly formed shell. It is identical with *Rosalina Binkhorsti* Rss. from the Maestrich-chalk, and is remarkable for the fewness and the large size of its chambers, its hollowed apertural side, which is of simpler structure than usually, not being complicated with additional »asterigerine» flaps, having no more than a narrow valvular strip on the upper margin of the aperture.

It attains a pretty good size, occurring only in the coralline-gravel.

Figg. 258—259: the spiral side.

Fig. 260: apertural side.

Fig. 261: edge-view.

- Syn. *Rosalina valvulata* D'ORB., 1826, Tabl. meth. Ann. Sc. Nat. 7, p. 271.
 » » D'ORB., 1839 Cuba p. 96, t. 3, figg. 21—23.
 » *Binkhorsti* Rss., 1861, Kreidetuff Maastricht; Wien. Ak. Sitz.-Ber. 1. 44, p. 317, t. 2, fig. 3.
 ?*Rotalina patella* Rss., 1849, Neue For. Wien. Beck.; Wien. Ak. Dkschr. 1. 1, p. 371, t. 46, fig. 3 (an *D. Berthelotiana*).
Discorb. stellata, squamula Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 101, t. 5, figg. 1—2 (an *D. rosacea*).

Discorbina bulloides D'ORB.

Tab. VIII, fig. 262—263.

I am not able to find any satisfactory reason for a generic nay even for specific distinction between *Discorbina rosacea* and this form, which has been referred to the genus *Cymbalopora* (Hagenow) by Messrs PARKER, JONES and CARPENTER.

This however seems to have very small affinity to our form — if any at all. (See also SCHWAGER in Bütschli's Klassen und Ordnungen des Thierreichs 1881, p. 256.)

Prof. MOEBIUS has carried the separation from its natural relations still further by assigning it a place in a new genus, *Tretomphalus*; (Meeresfauna Mauritius und Seychellen; foramf. p. 98, t. 10, figg. 6—9). The pores of various sizes on the last segment should not be regarded as a mark of generic nor of specific distinction. If this globular chamber is detached, the rest will hardly be distinguished from *D. rosacea*.

From *Discorbina globigerinoides* PARK. and JONES it may be difficult to keep our form distinct. (Phil. trans. 155. 1, t. 19, fig. 7).

Fig. 262: *Discorbina* (*Rosalina*) *bulloides* D'ORB.

Fig. 263b: The same more magnified.

Fig. 263: side-view.

Syn. *Rosalina bulloides* D'ORB., 1839, Cuba p. 98, t. 3, figg. 2—5.

Cymbalopora bulloides CARPENT., Introd. 1862, p. 216.

Tretomphalus bulloides MÖB., 1880, Meeresfaun. Maurit. u. Seych. p. 98, t. 10, figg. 6—9.

***Discorbina Poeyi* D'ORB.**

Tab. VIII, figg. 264—265.

This remarkable form seems just as little entitled to generic distinction from *Discorbina* as the preceding. It is densely covered with ribs or knobs on its spire-side, the apertural face being more scarce provided but with somewhat larger tubercles.

It is more seldom met with on the chalk-bottom. According to Mr. D'ORBIGNY who found his specimens in great abundance among sea-weed, its true home seems to be in the littoral zone.

Fig. 264: apertural side.

Fig. 265: side-view.

Syn. *Rosalina Poeyi* D'ORB., 1839, Cuba p. 92, t. 3, figg. 18—20.

» *squamosa* D'ORB., ibid. p. 91, t. 3, figg. 12—14.

Cymbalopora Poeyi CARPENT., Introd. p. 215; MÖB., Maurit. et Seych. p. 97, t. 10, figg. 1—5.

Rosalina granulosa KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 710, t. 2, fig. 14.

***Discorbina Berthelotiana* D'ORB.**

Tab. VIII, figg. 266—268.

This tiny species may be a pigmy only to a more developed form. It is extremely thin, quite hyaline with very small and closely set pores. It is devoid of that yellowish tint, so common with this genus. The shape is sometimes flat and scale-like but often convex on the upper side: the hollowed apertural side with its prominent riblike septal sutures are its most conspicuous characteristic. Sometimes those ribs are sunken in septal furrows between the somewhat bulged chamberwalls.

It is the fineness of the pores only which seems to distinguish this form from some *Planorbulina*; f. instance. *Planorb. Bosqueti* Rss. (from Maestrich-chalk) being nearly isomorphous with this species.

In »Microgeology» by EHRENBURG t. 35, B, fig. 7 there is represented a young form called *Spiropleurites nebulosus*, which probably belongs to this species. From *Discorb. valvulata* it differs only in closer and finer poration, not yellowish shell and its pigmy size.

Fig. 266: spire-side.

Fig. 267: side-view; 268: apertural side.

- Syn. *Rosalina Berthelotiana* D'ORB., 1844, Hist. îles Canaries for., p. 135, t. 1, figg. 28—30.
Discorbina Bertheloti BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 469, t. 48, fig. 10.
 » *Parisiensis* var. *Berthelotiana* PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 387, t. 16, figg. 26—27.
 ?*Rosalina concava* Rss., 1854, Kreide. Ostalpen; Wien. Ak. Dkschr. 7, p. 70, t. 26, fig. 3.

Discorbina vesicularis LMK. var. *elegans* D'ORB.

Tab. VIII, figg. 269—271.

On the authority of Messrs PARKER and JONES we consider this form as identical with *Rosalina complanata* D'ORB. (For. Bass. tert. Vienne p. 176, t. 10, figg. 13—15) notwithstanding this, as also *Ros. complanata* Rss. (Neue For. österreich. tert. Beck.; Wien. Akad. Dkschr. 1. 1, p. 373, t. 47, fig. 5) has its spire less invested by the last convolution. Our form is remarkable for the great symmetry of both its sides, which are hardly distinguishable from each another; both being provided with a deep and narrow umbilicus. The aperturale fissure is very inconspicuous. The »valve» or »astral lobes» are represented by 2 or 3 small scalelike outgrowths partly covering the opening of the umbilicus; the shell surface is somewhat polished.

Where is not for the yellowish tint of the shell-substance in transmitted light and for the characteristic size and disposition of the pore-canals one would hardly be able to recognize this form as a *Discorbina*, but would rather refer it to *Planorbulina*.

It is not common in the chalk-ooze, and is always found in a pigmy state.

Fig. 269: spire-side.

Fig. 270: side-view.

Fig. 271: apertural-side.

- Syn. *Anomalina elegans* D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 282; Mod. N:o 42.

Spirillina vivipara EHRENB.

Tab. VII, fig. 272.

The pores of this very simple rhizopode are variable in closeness of arrangement. Fullgrown specimens have them pretty close and of the same size as *Planorbulina Ungeriana*. Very small ones are not easily distinguishable from young *Trochamminæ incertæ*.

It is very common; particularly in the chalk-ooze, seldom attaining in diameter more than 0,20 mm.

Syn. <i>Spirillina vivipara</i>	EHRENB., 1841, Verbreit. u. Einfluss des mikroskopischen Lebens in Süd- u. Nord-Amerika; Berl. Kön. Wiss. Akad. Abhandl. 1841, t. 3, fig. 41; ibid. 1847, t. 2, fig. 82.
<i>Cornuspira perforata</i>	M. SCHULTZE, 1854, Organ. Polythalam. p. 41, t. 2, fig. 22.
<i>Spirillina vivipara</i>	WILLIAMS., 1858, Brit. rec. For. p. 92, fig. 202.
<i>Spirillina</i> »	PARK. et JONES, 1851; An. Mag. Nat. Hist. 19, p. 12, t. 11, fig. 46.
» »	PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 397, t. 15, fig. 28.
» »	PARK. et JONES, 1866, Crag. foramf.; Pal. Soc. 19, t. 3, figg. 20—22.
? <i>Cyclolina impressa</i>	EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 304, t. 8, figg. 7—8.
? <i>Spirillina polygyrata</i> , ? <i>tenuissima</i>	GÜMB., 1862, Streitenb. Schwammlog.; Würtemb. Nat. Verein. Jhrft. 1862, p. 214, t. 4, figg. 11—12.
» <i>margaritifera</i>	WILLIAMS., 1858, Brit. rec. Foramf. p. 93, fig. 204.

Appendix.

<i>Spirillina inæqualis</i>	BRADY, 1879, Notes on retic. Rhiz.; Quart. Journ. micr. Sc. p. 278, t. 8, figg. 25, a, b.
» <i>limbata</i>	BRADY, ibid. p. 278, t. 8, figg. 26, a, b.
» <i>obconica</i>	BRADY, ibid. p. 279, t. 8, figg. 27, a, b.
» <i>tuberculata</i>	BRADY, ibid. p. 279, t. 8, figg. 28, a, b.

Pulvinulina auricula FICHT. and MOLL.

Tab. VIII, figg. 273—275.

This handsome, generally hyaline, species resembles very much *Nodosarina crepidula*. Although it seems to be one of the best defined species in the whole class, still intermediate forms are found with a nearly round, rotaline shape (as for instance *Rot. Hauerii* D'ORB. from the tertiary strata at Vienna).

It is not uncommon both in the coralline-gravel and in the chalk-ooze, but attains a higher development in the former.

For clearing up the intricate synonymy of this genus we are indebted to Messrs PARKERS' and JONES' elaborate and careful inquiries, recorded in their lucid and admirable treatises »*On foramf. from North Atlantic and Arctic Oceans 1865*, and »*On the foramf. of the Family Rotalinæ (CARPENTER) found in the cretaceous formations etc.* in Qu. Journ. geol. Soc. 1872. 28, p. 103.

Eig. 273: frontal view;

Fig. 274: spire-side.

Fig. 275: pigmy, broad form.

Syn. <i>Nautilus Auricula</i>	FICHT. et MOLL., 1803, Test. micr. p. 108, t. 20, figg. a—f.
<i>Valvulina oblonga</i>	D'ORB., 1844, Iles Canaries p. 136, t. 1, figg. 40—42.
» <i>excavata</i>	D'ORB., ibid. p. 137, t. 1, figg. 43—45.
<i>Rotalina oblonga</i>	WILLIAMS., 1858, Brit. rec. forf. p. 51, figg. 98—100.

- Syn. *Valvulina auris, inæqualis* D'ORB., 1845, Voy. Amer. merid. 5. 5, t. 2, figg. 15—17; t. 7, figg. 10—12.
- Rotalina scaphoidea* Rss., 1849, Neue For. österr. Beck.; Wien. Ak. Dkschr. 1. 1, p. 372, t. 47, fig. 3.
- » *deformis, Sagra* D'ORB., 1839, Cuba, p. 77, t. 5, figg. 13—15.
- Pulv. auricula* PARK. et JONES, 1866, Crag. For.; Pal. Soc. 19, t. 2, figg. 33—35.
- Valvulina cordiformis* COSTA, 1854, Pal. Nap. 2, p. 262, t. 21, fig. 10.
- Pulv. cordiformis* Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 103, t. 5, fig. 3.
- Rotalia cristellarioides* Rss., 1863, For. Crag. d'Anvers; Bull. Ac. Belg. (2), 15, p. 154, t. 3, figg. 44.
- » *contraria* Rss., 1851, Sept. Thon. v. Berlin; Ztschr. deutsch. geol. Ges. 3, p. 76, t. 5, fig. 37.
- » *Brongniartii* D'ORB., 1826, Tabl. Meth.; Ann. Sc. Nat. 7, p. 273.
- » » D'ORB., 1846, For. tert. Vienne p. 158, t. 8, figg. 22—24 (valde porosa quasi Planorbulina fere).
- » » EGGER, 1857, Mioc. Ortenb.; Leonh. u. Bronn. Jhrb. 1857, p. 274, t. 7, figg. 5—7.
- » *Hauerii* D'ORB., 1846, For. tert. Vienne, p. 151, t. 7, figg. 22—24 (minus oblonga).
- Discorb. inæqualis* MÖB., 1880, Beitr. z. Meeresfaun. Mauritius u. Seychell. p. 97, t. 9, fig. 19.

Pulvinulina repanda FICHT. and MOLL.

Tab. VIII, figg. 276—282.

Our form comes next to *Rotalina caribæa* D'ORB. or *Rot. pulchella* D'ORB. Its shape is generally inflated biconvex, but the younger specimens are often planoconvex or subconical with the spiral side quite flat. It is sometimes slightly marginated.

It has been found in the coralline-gravel only, attaining a diameter of 1,5 mm.

Figg. 276—277: the apertural-side and the edge-side of *Pulv. repanda* FICHT. and MOLL.

Fig. 278: spiral-side, nearly flat, of a younger individual.

Fig. 279: a transverse section near the horizontal, median plane.

Fig. 280: section near the spiral side of a very young specimen.

Fig. 281: the side-view of the same.

Fig. 282: side-view of another young specimen, nearly biconvex.

- Syn. *Nautilus repandus* FICHT. et MOLL., 1803, Test. micr. p. 35, t. 3, figg. a—d.
- » *sinuatus* FICHT. et MOLL., ibid. p. 65, t. 10, figg. a—d.
- Pulvin. repanda* PARK. et JONES, 1866, Crag. For.; Pal. Soc. 19, t. 2, figg. 22—24.
- ? *Rosalina Mediterranensis* D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 271, N:o 2.
- Rotalia communis* D'ORB., ibid. p. 273, N:o 29 (an *P. auricula*).
- » *pulchella* D'ORB., ibid. p. 274, N:o 32; Mod. N:o 71.
- » *Caribæa* D'ORB., 1839, Cuba p. 74, t. 5, figg. 1—3.
- Pulvin. pulchella* PARK. et JONES, 1866, Crag. For.; Pal. Soc. 19, t. 2, figg. 25—27.
- Rotalina Bouéana* D'ORB., 1846, For. tert. Vienne, p. 152, t. 7, figg. 25—27.
- Pulvin. Bouéana* Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 161, t. 4, fig. 14.

Syn. (Nomina varia)	EHRENB., 1854, Mikrogeol. t. 29, fig. 15; t. 30, fig. 28.
Rotalia punctulata	D'ORB., 1826, Tab. Meth.; An. Sc. Nat. 7, p. 273, N:o 25; Mod. No 12 (Pulvin. Schreibersi propinqua).
? » antillarum	D'ORB., 1839, Cuba, p. 75, t. 5, figg. 4—6 (Pulvin. Schreibersi valde propinqua).
Pulvin. repanda var. punctulata	PARK. et JONES, 1865, North. Atl. and Aret. Oc.; Phil. Trans. 155. 1, p. 394, t. 14, figg. 12—13.
» pygmæa	HKEN., 1875, For. Clav. Száb. Sch. p. 78, t. 10, fig. 8.
» affinis	HKEN., ibid. p. 78, t. 10, fig. 6.
Planorb. vermiculata	D'ORB., 1826, Tabl. meth., Ann. Sc. Nat. 7, p. 280, N:o 3.
Pulvin. »	CARPENT., 1860, Introduct. p. 211, t. 13, figg. 4—6.

Pulvinulina elegans D'ORB.

Tab. VIII, figg. 283—285.

Comes very near to *Pulv. repanda*, its chief characteristic being its somewhat raised or thickened septal band on the apertural side.

Our form is nearly identical with *Rotalina Carpenteri* Rss., *Gyroidina caracolla* RÖM., *Rot. Partschiana* D'ORB.

It has often a nearly hyaline, biconvex, and very symmetrical shell; often its both sides are umbonated and then it resembles *Nodosarina calcar*, so that it is easily overlooked, when associated with this.

It is not frequent in the coralline-gravel.

Fig. 283: the apertural side.

Fig. 284: cut open to show the spiral-side from underneath.

Fig. 285: edge-view.

Syn. Rotalia elegans	D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 276, N:o 54.
» »	PARK. et JONES, 1860, For. Chellast.; Qu. Journ. geol. Soc. 16. p. 455, t. 20, fig. 46.
» Partschiana	D'ORB., 1846, For. tert. Vienne, p. 153, t. 7, figg. 28—30; t. 8, figg. 1—3.
» »	BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, t. 16, fig. 3.
» reticulata	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 83, t. 10, fig. 4.
Gyroidina caracolla	RÖM., 1841, Verstein. Nordd. Kreideg., p. 97, t. 15, fig. 22.
Rotalia »	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 84, t. 10, fig. 6.
» spinulifera	Rss., ibid. p. 93, t. 13, figg. 3—5.
» Carpenteri	Rss., ibid. p. 94, t. 13, fig. 6.
Anomal. Bengalensis	SCHWAG., 1866, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 259, t. 7, figg. 111.
Lenticulina pachyderma et nominibus aliis	EHRENB., 1854, Mikrogeol., t. 29, fig. 14—14; t. 31, fig. 54.
Rotalina stelligera	Rss., 1859, Kreideg. Ostalp.; Wien. Akad. Sitz.-Ber. 7, p. 69, t. 25, fig. 15.
» Berthelotiana	D'ORB., 1844, Iles Canaries p. 130, t. 1, figg. 31—33.
Pulvin. concentrica	BRADY, 1865, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 470, t. 48, fig. 14.

Pulvin. sacculata	PARK. et JONES, 1876, For. English Channel; A. N. H. (4) 17, p. 284, figg. 1—3.
Rotalina concamerata	WILL., 1858, (partim) Brit. rec. foranf. p. 62, figg. 101—103.
» infundibulum	COSTA, 1854, Pal. Nap. 2, p. 237, t. 14, fig. 9.
» repanda var. elegans	PARK. et JONES, 1865, North. Atl. and Arct. Oceans.; Phil. Trans. 155, 1, p. 397, t. 16, figg. 44—46.
» badensis	CZJZ., 1847, Foranf. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 144, t. 13, figg. 1—3 (a Pulvin. Schreibersi D'ORB. vix diversa).
» Cordieriana	D'ORB., 1839, Craie bl. Paris; Mém. Soc. geol. Fr. 4, p. 33, t. 3, figg. 9—11.
» semiglobosa	Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46., p. 85, t. 10 fig. 7, t. 11, fig. 1 (Pulvin. Michelianæ D'ORB. propinqua).
» fiosculiformis	SCHWAG., 1866, For. Kar.-Nikobar; Novara Reise, geol. Th. 2. 2, p. 262, t. 7, fig. 109.
Pulvin. prominens	Rss., 1869, Oligocän. von Gaas; Wien. Ak. Sitz.-Ber. 59, p. 463, t. 3, fig. 2.
» Broeckiana	BRADY, 1876, Carb. and Perm. forf.; Pal. Soc. 30, p. 140, t. 6, fig. 12.

Pulvinulina elegans var. **trochus** RÖM.

Tab. VIII, figg. 286—288.

This form is remarkable for its strongly developed umbo, which as a solid, highly polished, porcellaneous cupola so covers nearly the entire spiral-side, that the marginal part only of the 2 or 3 latest segments are visible. On the opposite side the umbilical boss is very small or is absorbed in the raised septal lines or in starlike exogenous shellsubstance. It is slightly marginated.

It is very common on the chalk-bottom, but much developed specimens are scarce.

Fig. 286: apertural side with its starlike rays of thickened septal marks.

Fig. 287: the spire-side with its cupola.

Fig. 288: edge-view.

Syn. Rotalia trochus	(MÜNST.) RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 388, t. 3, fig. 47.
? » mammillata	RÖM., ibid. p. 388, t. 3, fig. 48.
» trochus	Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 242, t. 5, fig. 55.

Pulvinulina Menardii D'ORB.

Tab. VIII, figg. 289—295.

The more conspicuous features of this elegant rhizopode are its flatness, its broad keel, its large and few chambers and its crenulated or jagged apertural lip, which is often produced into a sort of valve. The margin of the young individuals is often lacinated. As is the case with the whole class, its vertical diameter is liable to some

variation in its proportion to the horizontal one and thus distended forms sometimes present themselves somewhat diverging from the flat type. Intermediate forms between *P. Menardii* and *repanla* and also *P. Micheliniana* D'ORB. are occasionally met with.

This species is next to *Globigerina bulloides* and *universa* the most common rhizopode in deep water and attains a diameter of 1,50 mm. and more.

The most beautiful and exact delineation of this species ever given is to be found in Prof. WYWILLE TOMSONS great work The »Challengers» Exped., *the Atlantic*, 1, p. 218, fig. 48.

Figg. 289—291: the flat form of *Pulv. Menardii* D'ORB.

Figg. 292—294: more distended form.

Fig. 295: very young.

Syn. <i>Rotalia Menardii</i>	D'ORB., 1826, Tab. meth.; An. Sc. Nat. 7, p. 273, N:o 26; Mod. 10.
<i>Pulvin. repanda</i> var.	PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 394, t. 16, figg. 35—37.
» » var. <i>Menardii</i> , subvar. <i>pauperata</i>	PARK. et JONES, ibidem p. 395, t. 16, figg. 50—51.
? <i>Rotalina spinimargo</i>	Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 371, t. 47, fig. 1.
» <i>cultrata</i>	D'ORB., 1839, Cuba, p. 76, t. 5, figg. 7—9.
» »	BAILEY, 1850, Micr. Exam. of Soundings; Smiths. Contr. Knowl. 2, Art. 3, p. 11, figg. 14—16.
<i>Rosalina asterites</i>	GÜMB., 1868, For. nordalp. Eocän.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 658, t. 2, fig. 101.
<i>Discorb. saccharata</i>	SCHWAG., 1866, Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 257, t. 7, fig. 106.
<i>Rotalia paupercula</i>	STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 277, t. 24, fig. 27.
» <i>canariensis</i>	D'ORB., 1844, Iles Canaries p. 130, t. 1, figg. 34—36.
? <i>Truncat. budensis</i>	HKEN., 1875, For. Clav. Száb. Sch. p. 75, t. 8, fig. 6.
<i>Pulvin. erinacea</i>	KARR., 1868, Mioc. Fauna Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 187, t. 5, fig. 6.

b) in *Pulvin. Michelinianam* D'ORB. transgrediens:

<i>Pulvin. repanda</i> var. <i>Menardii</i> subvar. <i>canariensis</i>	PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 395, t. 16, figg. 47—49.
<i>Rotalina dubia</i>	D'ORB., 1839, Cuba, p. 78, t. 2, figg. 29—30.
» <i>crassa</i>	D'ORB., 1839, For. Craie bl. Paris; Mém. Soc. geol. France 4, p. 32, t. 3, figg. 7—8.
» <i>bimammata, campanella</i>	GÜMB., 1868, Nordalp. Eoc.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 649—650, t. 2, figg. 85—86 (an <i>Pulv. Schreibersi</i> var.).

c) in *Pulvin. repandam* FICHT. et MOLL. transgrediens:

<i>Rotalina umbonata</i>	Rss., 1851, Sept. Thon Berlin.; Zeitschr. deutsch. geol. Ges. 3, p. 75, t. 5, fig. 35.
<i>Pulvin.</i> »	HKEN., 1875, Clav. Száb. Sch., p. 77, t. 9, fig. 8.
» <i>formosa</i>	Rss., 1864, Oberburg; Wien. Ak. Dkschr. 1. 23, t. 1, fig. 14; 1869, Oligoc. v. Gaas; Wien. Ak. Sitz.-Ber. 1. 59, p. 464, t. 3, fig. 1.

Pulvinulina Micheliniana D'ORB.

Tab. VIII, figg. 296—298.

Our ordinary form comes close to *Rotalia truncatulinoides* D'ORB. from the Canary Islands. Its prominent characteristics are its conical form, restricted number of chambers, deep umbilicus and deep incisions between the umbilical prolongations of the chambers. The chamberwalls are often nearly plain or so very little bent, that the flat spiral side becomes obtusely angulous. The pores are not quite as fine as in its congeners in general.

It has been met with principally in the coralline-gravel, where it is common.

Fig. 296: the spiral side seen in transmitted light.

Fig. 297: sideview.

Fig. 298: apertural side.

- Syn. **Rotalia Micheliniana** D'ORB., 1839, For. Craie bl. Paris; Mém. Soc. geol. Fr. 4, p. 31, t. 3, figg. 1—3.
- » **nitida** Rss., 1845, Böhm. Kreide. 1, p. 35, t. 12, figg. 8, 20, 31, t. 8, fig. 52.
- » **truncatulinoides** D'ORB., 1844, Iles Canaries p. 132, t. 2, figg. 25—27.
- (Nom. varia) EHRENB., 1854, Microgeol. t. 27, figg. 48, 51, 52; t. 28, fig. 53.
- Pulv. repanda** var. **Menardii**, subvar. **Micheliniana** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155, p. 396, t. 14, fig. 16; t. 16, figg. 41—43.
- » **Normanni** KARRER 1878, For. Luzon; Bolet. Comis. Mapa geol. d. España 7. 2, p. 24, t. F. fig. 10.

Polystomella crassula WALK. var. **Scapha** FICHT. & MOLL.

Tab. VIII, figg. 299—300.

Our form is usually very much compressed and starved. The aperture is narrow and not easily discoverable.

It is unfrequently met with in the chalk-ooze.

- Syn. **Nautilus Scapha** FICHT. et MOLL., 1803, Test. microscop. p. 105, t. 19, figg. d—f.
- Nonionina Grateloupi** D'ORB., 1839, Cuba, p. 46, t. 6, figg. 6—7.
- » **Sloanii** D'ORB., ibid. p. 46, t. 6, figg. 18—18bis.
- » **Brownii** D'ORB., ibid. p. 45, t. 7, figg. 22—23.
- » **communis** D'ORB., 1846, Bass. tert. Vienne, p. 106, t. 5, figg. 7—8.
- » " PARK. et JONES, 1857, For. Coast. of Norway; An. Mag. Nat. Hist. (2) 19, p. 287, t. 11, figg. 7—8.
- Pullenia communis** HKEN., 1875, For. Clav. Szab. Sch. p. 59, t. 10, fig. 10.
- Nonionina Fraasana** GÜMB., 1862, Streitenberg. Schwammlager; Würtemb. Nat. Wiss. Ver. Jhrft. 1862, p. 233, t. 4, fig. 5.
- » **communis** (partim) EGG., 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 298, t. 14, figg. 11—13.
- » **Labradorica** DAWS., 1860, Canad. Geol. et Nat. 5, p. 192, fig. 4.

- Syb. **Nonion. Scapha** var. **labradorica** DAWES., 1870, For. Gulf and Riv. St. Laur.; A. M. N. Hist. (4) 7, p. 86, fig. 5.
- Polystomella crispa** var. **Scapha** PARK. et JONES, 1865, North. Atl. and Arct. Ocean.; Phil. Trans 155. 1, p. 404, t. 14, figg. 37—38; t. 17, figg. 55—56.
- Nonionina Labradorica** PARK. et JONES, 1866, Crag. For.; Pal. Soc. 19, t. 2, figg. 44—45.
- » **Scapha** PARK. et JONES, ibid. t. 2, figg. 36—37.
- Rotalina turgida** WILLIAMS., 1858, Brit. rec. Foranf., p. 50, figg. 95—97.
- Polystom. crispa** var. **Non. turgida** PARK. et JONES, 1865, N. atl. and Arct. Oc., Phil. Trans. 155. 1, p. 405, t. 17, fig. 57.

Appendix.

- Nautilus crassulus** WALK. Test. min. rar. 1784, figg. 68, 70 (sec. PARK. et JONES).
- Syb. **Nonion. crassula** WILLIAMS., 1858, Brit. rec. For. p. 33, figg. 70—71.
- Nonion. Boueana** D'ORB., 1846, Bas. tert. Vienne p. 108, t. 5, figg. 11—12.
- » » Rss., 1863, Crag. d'Anvers; Bull. Ac. Belg. (2) 15, p. 156, t. 3, figg. 47, 48 (in Scapham transiens).
- Polystom. crispa** var. **umbilicatula** PARK. et JONES, 1865, N. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 405, t. 14, fig. 42, t. 17, figg. 58—59.
- Nonion. punctata** D'ORB., 1846, For. tert. Vienne, p. 111, t. 5, figg. 21—22.
- » **affinis** Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 72, t. 5, fig. 32.
- ? » **perforata** D'ORB., 1846, Bass. tert. Vienne p. 110, t. 5, figg. 17—18.
- » **bathyomphala** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 95, t. 13, fig. 1.
- ? » **rudis** COSTA, 1854, Pal. Nap. 2, p. 205, t. 20, fig. 2.
- » **communis** (partim) EGG., 1857, Miocän. Ortenburg; Leonh. u. Bronns Jhrb. 1857, p. 298, t. 14, figg. 14—15.
- Dendr. lævis** COSTA, 1854, Pal. Nap. 2, t. 20, fig. 4.
- Nonion. dense-punctata** EGG., 1857, Mioc. Ortenb.; Leonh. u. Bronn. Jhrb. 1857, p. 299, t. 14, figg. 22—23.
- » **pauper** EGG., ibid. p. 300, t. 14, figg. 26—27.
- » **simplex** KARR., 1865, Grünsandst. N. Zeel.; Novara Reise, geol. Th. 1. 2, p. 83, t. 16, fig. 17.
- » **Soldanii** D'ORB., 1846, Bass. tert. Vienne p. 109, t. 5, figg. 15—16.
- » » COSTA. 1854, Pal. Nap. 2, p. 201, t. 17, fig. 11.
- » **Melo** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 293, N:o 4.
- » **umbilicata** D'ORB., Mod. 86.

b) umbonata aut granulata:

- Nautilus crassulus** MONTAGU, 1803, Test. Brit. p. 191; 1808: Suppl. p. 79, t. 18, fig. 2.
- » **umbilicatus** MONTAGU, ibid. t. 18, fig. 1.
- » **pompilioides** FICHT. et MOLL., 1803, Test. microscop. p. 31, t. 2, figg. a—c.
- Nonion. umbilicata** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 293, N:o 5; t. 15, figg. 10—12.
- » **falx** CZJZ., 1847, For. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 142, t. 12, figg. 30—31
- » **attenuata** COSTA, 1854, Pal. Nap. 2, p. 202, t. 17, fig. 10.
- » **Barleana** WILLIAMS., 1858, Brit. rec. Forf. p. 32, fig. 68—69.

- Syn. **Nonion. crassula** PARK. et JONES, 1857, For. Norway; A. M. N. Hist. (2) 19, p. 286, t. 11, figg. 5—6.
- » **glabra** RÖM., 1838, Nordd. tert. Meeressand; Leonh. u. Bronn. Jhrb. 1838, p. 392, t. 3, fig. 66.
- » **compressa** Rss., 1845, Böhm. Kreide 1, p. 35, t. 8, fig. 51.
- » **lævis** D'ORB., 1826, An. Sc. Nat. 7, p. 294, N:o 11; Mod. 46.
- » **subcarinata** SEG., 1862, Rhizopod. Catania; Accad. Gioena Atti (2) 18, p. 15, t. 1, fig. 3, (sep.)
- ? **Robulina Planciana** D'ORB., 1826, Tabl. méth.; Ann. Sc. Nat. 7, p. 290, N:o 20.
- Nonion. helicina** COSTA, 1855, For. foss. Marna blu' Vaticano; Mem. Nap. 2, p. 123, t. 1, fig. 18; t. 14, fig. 13.
- » **ornata** COSTA, 1854, Pal. Nap. 2, p. 203, t. 17, fig. 17.
- Nautilus incrassatus** FICHT. et MOLL., 1803, Test. microscop. p. 38, t. 4, figg. a—c.
- Nonion. punctulata** COSTA, 1854, Pal. Nap. 2, t. 19, fig. 9.
- » **tuberculata** D'ORB., 1846, Bass. tert. Vienne, p. 108, t. 5, figg. 13—14.
- » **granosa** D'ORB., ibid. p. 110, t. 5, figg. 19—20.
- » **subgranosa** EGGER, 1857, Miocän. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 299, t. 14, figg. 16—18.
- ? » **macromphalus** GÜMB., 1862, Streitberg. Schwammilag.; Würtemb. Nat. Verein. Jhrb. 1862, p. 232, t. 4, fig. 4 (an *Nodosarina*).
- c) *striata*:
- Nonion. striolata, ornata** COSTA, 1854, Pal. Nap. 2, p. 203, t. 17, fig. 12, t. 19, fig. 8 (in *Pol. striato-punctatam transiens*).
- d) *asterisans*:
- Nautilus asterizans** FICHT. et MOLL., 1803, Test. microsc. p. 37, t. 3, figg. e—h.
- ? **Nonion. costata** RÖMER, 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 392, t. 3, fig. 67.
- » **limba** D'ORB., 1826, Tab. méth.; A. Sc. N. 7, p. 294, N:o 14, Mod. N:o 11.
- » **stelligera** D'ORB., 1844, Iles Canaries, p. 128, t. 3, figg. 1—2.
- » **asterisans** PARK. et JONES, 1857, For. Norway; A. M. N. H. (2) 19, p. 287, t. 11, figg. 20—21.
- Polystom. crispa** var. **depressula** PARK. et JONES, 1865, North. Atl. and Arct. Ocean.; Phil. Trans 155. 1, p. 403, t. 14, fig. 39.
- Polystomella crispa** var. **stelligera** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 404, t. 14, fig. 40.
- » » var. **asterisans** PARK. et JONES, 1865, ibid. p. 403, t. 14, fig. 35, t. 17, fig. 54.
- Nonion. stelligera** BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 471, t. 48, fig. 19.
- » **leo** KARR., 1868, Mioc. Kostež; Wien. Ak. Sitz.-Ber. 1. 58, p. 190, t. 5, fig. 8.

Polystomella crispa LIN. var. **Poëyana** D'ORB.

Tab. VIII, figg. 301—302.

It may be unnecessary to keep this form distinct from *Polyst. umbilicata* (WALK.) WILLIAMS., their chief differens consisting in the arrangement of the apertural pores.

Our form seems also identical with *Polyst. articulata* D'ORB., and *Polyst. rugosa obtusa*, *Fichteliana* etc. D'ORB., *Polyst. Ortenburgensis*, *angulata*, *subcarinata* EGGER.

Owing to the scarcity of our supply of specimens we are not able to make an even approximately correct and critical survey of the several (about 40) described »species» of *Polyst. crispa* but refer the student to the able and interesting arrangement of this genus devised by Messrs PARKER and JONES in their admirable treatise on Foramf. of North Atlantic and Arctic Oceans; Phil. Trans. 155. 1, p. 400.

It has been met with in the chalkooze only.

Heterostegina depressa D'ORB. var. **simplex** D'ORB.

Tab. VIII, figg. 303.

This form comes next to *Heterostegina curva* MÖB. (from Mauritius), which is a weak form of *Heterost. depressa* with few and large chamberlets. Our form is very thin and gives at first sight the impression of a starved and miscarried *Amphistegina*, with which as to shell-substance and pores it has much in common.

It is very seldom met with, but reaches a pretty good size on both the coralline-gravel and the chalk-bottom.

Fig. 303: viewed in transmitted light.

a) Septis secundariis paucis:

Syn. Heterosteg. simplex	D'ORB., 1846, For. tert. Vienne, p. 211, t. 12, figg. 12—14.
» curva	MÖB., 1880, Maur. u. Seychell. p. 105, t. 13, figg. 1—5.

b) Septis secundariis nummerosis:

Heterosteg. depressa	D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 305, Mod. 99; t. 17, figg. 5—7.
» Antillarum	D'ORB., 1839, Cuba, p. 122, t. 7, figg. 24—25.
» costata	D'ORB., 1846, For. tert. Vienne, p. 212, t. 12, figg. 15—17.
» »	FRIĚS Mod. 100.
» reticulata	(RÜTIGM.) IKEN., 1875, For. Clav. Száb. Sch. p. 81, t. 12, fig. 3.
Gen. indef.	COSTA, 1854, Pal. Nap. 2, t. 20, fig. 15.
? Heterosteg. Grotriani	RSS., 1865, Deutsch. Septarienthon; Wien. Ak. Dkschr. 1. 25. p. 164, t. 4, fig. 18 (an <i>Operculina complanata</i> DEFR.).

Amphistegina vulgaris D'ORB.

Is very common in the coralline-gravel and attains a diameter of 3 mm. and more, with many gradations in the relation between the length of the vertical and horizontal diameters. It seems on our bottom to substitute genus *Nummulina*, of which no trace has appeared, even in the shape of *Operculina*.

- Syn. *Amphistegina vulgaris*, Lessonii D'ORB., 1826, Tabl. méth., Ann. Sc. Nat. 7, p. 304, 305; Mod. 40, 98; t. 17, figg. 1—4.
- » *gibbosa* D'ORB., 1839, Cuba, p. 120, t. 8, figg. 1—3.
- » *Hauerina, mamillata, rugosa* D'ORB., 1846, For. tert. Vienne, p. 186, t. 12, figg. 3—11.
- » *vulgaris* PARKER et JONES et BRADY, 1866, Crag. For.; Pal. Soc. 19, t. 2, figg. 46—48.
- » *minuta* BRADY, 1876, Carbonif. and Perm. foramf.; Pal. Soc. 30, p. 146, t. 11, fig. 7.
- » *Campbelli, Aucklandica* KARR., 1865, For. Grünsandst. N. Zeeland.; Novara Reise, geol. Th. 1. 2, p. 84—85, t. 16, figg. 19.
- ? » *ornatissima* KARR., 1865, Grünsandst. N. Zeel.; Novara Reise, geol. Th. 1. 2, p. 85, t. 16, fig. 20.

Orbiculina adunca FICHT. et MOLL.

Tab. IX, figg. 304—307.

This handsome and variable species presents itself in deep water promiscuously in both its *adunca*- and »*orbicula*»forms. The latter is for the most part flattened out to a singlefloored thin disc, that often shows a few broad radiating impressions on both its sides. Those impressed bands are occupied by somewhat wider subdivisions or »chamberlets.

A *Peneropli*-form variety is also met with in company with the common forms. It is impossible to distinguish it from some forms designated as *Peneroplis proteus* D'ORB. from the West Indies, *Peneropl. prisca* Rss. from the tertiary strata and *Peneropl. planatus* var. *levigatus* KARR., also from the tertiary formation.

Since no other true distinction between *Orbiculina* and *Peneroplis* has been stated than the striation or plication of the surface of the latter, it would be inconsistent with the notion of *genus* and even of *species* to distinguish forms, which cannot duly be entitled higher than as to rank of varieties.

D'ORBIGNY himself admits that »les Orbiculines, pour nous, ne sont que des *Peneroples* à loges divisées (Hist. d. l'Île de Cuba Foraminif. p. 64).» On this account it seems justifiable to range »*Peneroplis*» as a variety under *Orbiculina* or vice versa, as the latter may be regarded as a higher developed *Peneroplis*.

The striated form, in no way but in this feature differing from young *Orbiculina*, are also met with, but always scanty and in a pigmy state.

Orbiculina adunca is very common also in deep water, particularly its orbicula-form, which attains a diameter of 6 mm.

The *simple* and unstriated form is more rarely met with.

By examing several specimens whole and in horizontal section I have satisfied myself that the outer chamberwalls are *perforated* with veritable pores of a middle size, now pretty closely arranged and now more scattered.

Figg. 304—305: quite young specimens.

Figg. 306—307: peneropliform, unstriated *Orbiculina adunca*.

a) striata s. costulata, simplex, compressa (*Peneroplis* MONTF.), plus minusve nautiloidea:

Syn. <i>Nautilus planatus</i>	FICHT. et MOLL., 1803, Test. micr. p. 91, t. 16, figg. a—i.
<i>Spirol. depressa</i>	D'ORB., 1826, Tabl. méth.; An. Sc. Nat. 7, p. 287, N:o 3.
<i>Peneroplis planatus</i>	D'ORB., ibid. p. 285, N:o 1; Mod. 16.
»	WILLIAMS., 1858, Brit. rec. Forf. p. 45, figg. 83—85.
»	CARP., 1862, Introduct. t. 7, figg. 16, 18.

b) striata simplex rotulata, crassa, apertura ramosa (*Dendritina* D'ORB.) aut porosa:

<i>Dendritina arbuscula</i>	D'ORB., 1826, Tabl. méth.; Ann. Sc. Nat. 7, p. 285, N:o 1, Mod. 21, t. 15, fig. 6—7 bis.
» <i>Antillarum</i>	D'ORB., ibid. N:o 3; 1839, Cuba p. 58, t. 7, figg. 3—6.
» <i>Hauerii, Juleana, elegans</i>	D'ORB., 1846, For. tert. Vienne, p. 134—135, t. 7, figg. 1—6.
<i>Peneroplis elegans</i>	D'ORB., 1839, Cuba, p. 61, t. 7, figg. 1—2.
	CARP., 1862, t. 7, figg. 13—15, 17, 19.

c) striata, lituiformis (*Spirolinites* LMCK.):

<i>Nautilus arietinus</i>	BATSCH, 1791, t. 6, figg. 15 d—f. (sec. PARK. et JONES); D'ORB. Mod. 48.
<i>Spirolina cylindracea</i>	(LMCK.) D'ORB., 1826, Tabl. méth.; Ann. Sc. Nat. 7, p. 286, Mod. 24.
» <i>austriaca</i>	D'ORB., 1846, For. tert. Vienne, p. 137, t. 7, figg. 7—9.
»	FRIE'S Modell. 25.
» <i>longissima</i>	COSTA, 1854, Paleont. Nap. 2, p. 225, t. 20, fig. 11.
<i>Peneroplis Laubei</i>	KARR., 1868, Mioc. For. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 154, t. 3, fig. 8.

d) laevis simplex:

<i>Peneroplis proteus</i>	D'ORB., 1839, Cuba p. 60, t. 7, figg. 7—11.
» <i>dubius</i>	D'ORB., ibid. p. 62, t. 6, figg. 21—22.
» <i>prisca</i>	Rss., 1863, Oberburg. Steiermark; Wien. Ak. Dkschr. 1. 23. 1, p. 9, t. 1, fig. 7.
» <i>planatus</i> var. <i>laevigatus</i>	KARRER, Mioc. For. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 153, t. 3, fig. 7.
<i>Dendritina arbuscula</i>	PARK. et JONES, BRADY, 1866, Crag. For.; Pal. Soc. 19, t. 3, figg. 48—49.
<i>Peneroplis aspergilla</i>	KARR., 1868, Mioc. For. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 154, t. 3, fig. 9.

e) cameris divisis (*Orbiculina* LMCK.):

<i>Nautilus aduncus</i>	FICHT. et MOLL., 1803, Test. micr. p. 115, t. 23.
» <i>angulatus, orbiculus</i>	FICHT. et MOLL., ibid. p. 112—113, t. 21, 22.
<i>Orbic. Numismalis</i>	(LMCK.) D'ORB., 1826, Tabl. Méth.; Ann. Sc. Nat. 7, p. 305, Mod. 20, t. 17, figg. 8—10.
» <i>compressa, adunca</i>	D'ORB., 1839, Cuba p. 66, t. 8, figg. 4—16.
	CARPENTER, 1862, Introd., t. 8, figg. 1—12.
» <i>Rotella</i>	D'ORB., 1846, Bass. tert. Vienne p. 142, t. 7, figg. 13—14 (an »Dendritina«).

Cornuspira foliacea PHIL.

Tab. IX, figg. 308—310.

This widely diffused form attains a pretty high development on the chalk-bottom. Its shape is very variable, according to the more or less rapid increase of the breadth of its convolutions. Some of the more marked striae, which like septal-lines closely adorn the surface, look very much like septa when viewed in transmitted light.

It is not uncommon on the chalk-bottom. It seems to reach its highest development in the arctic seas, where it occurs in shallow water sometimes in good numbers.

Fig. 308: a halfgrown specimen with more numerous and narrow convolutions.

Fig. 309: large specimen with unusually sudden increase of the last convolution.

Fig. 310: the edge with the aperture.

- Syn. **Orbis foliaceus** PHIL., 1844, Enumer. Mollusc. Sicil. 2, p. 147, t. 24, fig. 26.
- Operculina striata, plicata** CZJZ., 1847, Foss. for. Wien. Beck.; Haid. nat. Abh. 2. 1, p. 146, t. 12, figg. 10—11; t. 13, figg. 12—13.
- Spirillina foliacea** WILLIAMS., 1858, Brit. rec. for. p. 91, figg. 199—201.
- Cornuspira rugulosa** Rss., 1855, Tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 222, t. 1, fig. 1.
- Operculina carinata, ammonitiformis** COSTA, 1854, Pal. Nap. 2, p. 209, t. 17, figg. 15—16.
- Cornuspira planorbis** SCHULTZE, 1854, Org. Polythal. p. 40, t. 2, fig. 21.
- » **Bornemanni** Rss., 1863, Sept. Thon Offenbach, Wien. Ak. Sitz.-Ber. 1. 48, p. 39, t. 1, fig. 3.
- » **Reussi** (BORNEM.) Rss., 1865, Deutsch. Septarienthon; Wien. Ak. Dkschr. 1. 25. 1, p. 121, t. 1, fig. 10.
- » **foliacea** PARKER et JONES, 1865, North. Atl. and Arct. Oceans; Phil. Trans. 155. 1, p. 408, t. 15, fig. 33.
- » » PARK. et JONES, BRADY, 1866, Crag. For.; Pal. Soc. 19, p. 3, t. 3, figg. 52—54.
- Operculina involvens** Rss., 1849, Neue For. Wien. Beck.; Wien. Ak. Dkschr. 1. 1, p. 370, t. 46, fig. 20.
- Cornuspira involvens** Rss., 1863, Sept. Thon. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 39, t. 1, fig. 2.
- » » HKEN., 1875, Clav. Szab. Sch. p. 19, t. 1, fig. 2.
- » **oligogyra** HKEN., ibid. p. 20, t. 1, fig. 10.
- » **tenuissima** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrhft. 21, p. 94, t. 2, fig. 5.
- ? » **pachygyra** GÜMB., 1869, Cassian u. Raibl. Schicht; Österr. geol. Reichsanst. Jhrb. 19, p. 178, t. 5, figg. 9—10.
- Operculina angigyra** Rss., 1849, Neue for. österr. tert. Becken; Wien. Ak. Dkschr. 1. 1, p. 370, t. 46, fig. 19.
- Cornuspira polygyra** Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 39, t. 1, fig. 1.
- » » HKEN., ibid. p. 19, t. 1, fig. 11; t. 2, fig. 1.
- » **nummulitica** GÜMB., 1868, Nordalp. Eocän.; K. Bayr. Ak. Wiss. Abh. 1. 10. 2, p. 604, t. 1, fig. 5.
- » **Archimedis, elliptica** STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 180—181, t. 22, figg. 1—2.

Vertebralina conicoarticulata BATSCH.

Tab. IX, figg. 311—318.

This species includes a great number of forms with such an inconstancy of characters that it would be wasted time and labour, and not only so, but inconsistent with a philosophical notion of designation, to range them even as distinct varieties. It has one stout, highly developed, and one pigmy form. Its most singular form is that in which the primordial chamber is flaskformed and the subsequent chamber develops itself from the top of its neck and so on, one chamber after the other in Nodosarina fashion; thus its usual *Miliolina* formed stage is passed over altogether.

The *peneropliform* variety, recorded by CARPENTER, we have not met with. This species is not unfrequent both in the chalk-ooze and in the coralline-gravel, and attains a higher development on the latter.

Figg. 311—313: broad, stout forms. designed by D'ORBIGNY as *Vertebr. cassis* and *striata*; *Articulina Sagra* D'ORB. etc.

Figg. 314—315: sections in the medial plane, exhibiting the young *Milioline* stage included in the succeeding flattened chamber of the *Nodosarina* growth.

Fig. 316: pigmy form from the chalk-ooze.

Fig. 317: rodformed »*Articulina nitida*» D'ORB., a primordial highly developed chamber taking the place of the early *Miliolina*-stage.

Fig. 317 b: the same more magnified.

Fig. 318: Very young *Vertebralina*, about 0,11 mm. in length.

a) *tenuis*, *articulata*, *striata*:

Syn. *Nautilus conico-articulatus* BATSCH, 1791, Sechs Kupfertafeln etc. t. 3, fig. 11 (sec. PARK. et JONES).

Articulina nitida D'ORB., Tab. méth.; An. Sc. nat. 7. p. 300; Mod. N:o 22.

» *Sagra* D'ORB., 1839, Cuba p. 183, t. 9, figg. 23—26.

» *gibbosula* D'ORB., 1846, For. tert. Vienne, p. 282, t. 20, figg. 16—18.

Vertebralina elongata KARR., 1868, Mioc. For. fauna Kostež; Wien. Ak. Sitz.-Ber. 1. 58, p. 155, t. 3, fig. 10.

» *striata* var. CARPENTER, 1862, Introd. t. 5, fig. 23.

β) *tenuis*, *articulata*, *lævis* v. *sublævis*:

Vertebralina striata var. CARPENTER, 1862, Introd. t. 5, figg. 19, 24.

» *sarmatica* KARR., 1877, Hochqu. Wasserleit.; Österr. geol. Reichsanst. Abh. 9, p. 376, t. 16, fig. 12.

b) *magis dilatata*, *striata*:

Vertebralina striata D'ORB., 1826, Tabl. méth.; Ann. Sc. Nat. 7, p. 283, N:o 1; Mod. N:o 81.

» *cassis, mucronata* D'ORB., 1839, Cuba p. 51, 52, t. 7, figg. 14—19.; 1846, Bass tert. Vienne p. 120, t. 21, figg. 18—19.

Articulina sulcata Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 383 t. 49, figg. 13—17.

<i>Vertebralina sulcata</i>	Rss., 1863, Oberburg in Steiermark; Wien. Ak. Dkschr. 1. 23. 1, p. 9, figg. 2—6.
<i>Articulina compressa</i>	Rss., 1863, Mainzer Becken; Leonh. u. Bronn. Jhrb. 1853, p. 673, t. 9, fig. 3.
<i>Vertebralina striata</i>	WILLIAMS., 1858, Rec. Brit. For. p. 90, figg. 197—198.
»	CARPENTER, 1862, Introd. t. 5, figg. 17—22, 25.
? <i>Spidostomella globulifera</i>	COSTA 1854, Pal. Nap. 2, t. 27, fig. 27 (an Miliolina).

Miliolina seminulum LIN.

Tab. IX, figg. 319—355; Tab. X, figg. 356—360.

As the type for this species, — the varied forms of which have been ranged in a bewildering assemblage of species, founded even on the most trifling and inconstant differences —, could properly be chosen the oblong, more or less compressed, usually smooth form. The relation of the length of the different diameters to each another is subject to an infinity of variations, whence a mass of varietal modifications originates (besides all those, resulting from different arrangement of the chambers) from produced oblong to the disciform *Triloc. orbicularis* RÖM. The shape of the mouth is also very variable: if the last chamber is provided with a long tubiform neck, the mouth is round with a very reduced tongue, while a flat and broad neck usually has a narrow, produced mouth with a flat, often raised tongue; the thick inflated forms have broad mouth and valvelike tongue somewhat resembling that of *Mil. ringens*. It is often finely agglutinant, and is one of the commonest rhizopodes in the chalk-ooze, particularly its pigmyforms, *Triloc. oblonga* MONTAG. and D'ORBIGNY.

1. Var. *scapha* D'ORB. This variety has a fine porcellaneous lustre and a nearly semilunar aperture. It seems in some way closely allied to *Mil. ringens*. It has a lenticular, somewhat marginated shape. When the edge of an older chamber occasionally becomes turned outside on the flat side of the shell, its shape approaches to »*triangularis*» D'ORB. Such a form has been designated as *Quinqueloculina Lamarckiana* D'ORBIGNY.

It is common both in the coralline-gravel and the chalk-ooze.

2. Var. *triangularis* D'ORB. is scarcely deserving to be ranked as a distinct variety, since its features seem to be quite accidental and inconstant. It is not seldom 3 to 6 keeled or even winged as in *Quinqueloculina Candeiana* D'ORB. When the edges or the keels and ridges become truncate, the form has been called *Ferusaci, quadrilatera* D'ORB. It is often finely agglutinated.

Occurs chiefly in the coralline-gravel.

3. Var. *trigonula* LMCK. seems to be a more distinct form; Prof. WILLIAMSON has also ranked it as a distinct species. Our form is quite trigonal, sometimes with sharp edges and flat sides. It has a porcellaneous lustre, but its intimate shellstructure is not homogeneous, either because of some slight admixture of agglutinated particles or because of a spongy texture.

It is infrequently met with on our terrain.

4. Var. *agglutinans* D'ORB. We retain this name, notwithstanding it is not properly applied in a group of forms through which this feature is so commonly distributed. It comes near to the typical form, but its *aperture being furnished with marginal teeth* — which feature seems to be of some constancy — there is a reason for ranking it as a distinct variety. The tongue of the mouth is generally forked. It is finely agglutinant (h. c. composed of finest chalkdebris) and attains on the chalk-bottom a larger size than any other of these varieties.

5. Var. *pulchella* D'ORB. On the experienced authority of Mr. BRADY we refer to this variety all longitudinally plicated forms of *Mil. seminulum*. It may be, that the designation of »*bicornis*» WALK., should have the preference as older. Our form is not a typical *pulchella*, but irregularly and scantely plicated, generally longnecked and a little agglutinant. It is found very rarely in coralline-gravel.

6. Var. *Brogniartii* D'ORB. A finestriated *Mil. seminulum*, usually of the same shape as *Mil. oblonga* MONT.

It would, no doubt, be more conformable to a natural arrangement of the varieties of this species to assign to the striated and ribbed forms a place under their respective corresponding smooth forms; for it seems as if those varieties had originated directly from each of the principal smooth ones. Nevertheless we have provisionally brought together in our synoptical list of synonyms all *striate* and *costate* forms under one head.

Figg. 319—320: the typical or nearly typical *Mil. seminulum* somewhat agglutinant; from the chalk-bottom.

Figg. 321—329: pigmyforms and young of *Mil. seminulum*; from 0,07 to 0,20 mm. in length.

Figg. 330—334: var. *scapha* D'ORB.; 330: endview; 331: edgeview; 332: sideview; the aperture resembling that of *Mil. ringens*; 333—334: transverse and longitudinal sections of the same.

Figg. 335—345: transitional forms to flat »*triangularis*» form (porcellaneous); from chalk-ooze.

Figg. 346—354: carinate forms of »*triangularis*» D'ORB.; slightly agglutinant, not quite porcellaneous; from the coralline-gravel.

Fig. 355: transverse section of »*trigonula*», highly magnified; of porcellaneous lustre; from the coralline-gravel.

Figg. 356—358, tab. X: »*pulchella*» with few and irregular folds, slightly agglutinant; from the coralline-gravel.

Figg. 359—360: the typical »*agglutinans*» D'ORB.; 360 shows the closely toothed mouthedge and the produced forked tongue.

a) *laevis, oblonga, interdum tumida*:

- Syn. **Vermiculum oblongum** MONTAGU, 1808, Testac. Brit. p. 522, t. 14, fig. 9.
- Trilocul. oblonga** D'ORB., 1826, Tabl. méth.; An. Sc. Nat. 7, p. 300, Mod. 95.
- » » RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 393, t. 3, fig. 70.
- » **oblonga, eburnea** D'ORB., 1839, Cuba, p. 175, 180 t. 10, figg. 3—5; 21—23.
- » » PARK. et JONES, 1866, Crag. Foranf.; Pal. Soc. 19, p. 7, t. 3, figg. 31—32.
- Miliola oblonga** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 411, t. 15, figg. 34, 41, t. 17, figg. 85, 86.
- Triloculina Chemnitziana** D'ORB., 1844, Iles Canaries p. 141, t. 3, figg. 19—21.
- » **nitida** D'ORB., ibid. p. 141, t. 3, figg. 22—24.
- Quinqueloc. laevigata** D'ORB., ibid. t. 3, figg. 31—33.
- Triloculina consobrina** D'ORB., 1846, For. tert. Vienne p. 277, t. 17, figg. 10—12.
- Miliolina seminulum** var. **oblonga** WILLIAMS., 1858, Brit. rec. Foranf. p. 86, figg. 186—187.
- Triloculina nitens, microdon** Rss., 1849, Neue For. österr. Beck.; Wien. Ak. Dkschr. 1. 1, p. 383, t. 49, figg. 9—11.
- » **carinata, angusta** PHIL., 1843, Tert. Verstein. nordw. Deutschl. t. 1, figg. 36, 40.
- Quinqueloc. angusta** Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 253, t. 9, fig. 90.
- Triloculina æmulans, acutangula** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 451, t. 1, figg. 5—6.
- » **Raibliana** GÜMB., 1869, St. Cassian-Raibl. Sch.; k. k. österr. geol. Reichsanst. Jhrb. 19, p. 182, t. 6, fig. 34.
- Miliolina consobrina** EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 271, t. 6, figg. 7—9.
- » **prælonga** EGG., ibid. p. 273, t. 6, figg. 16—18.
- ? **Quinquelocul. lyra, longirostra** D'ORB., 1826, Tabl. méth., Ann. Sc. Nat. 7, p. 303, N:o 45; Mod. 8.
- » **Bosciana** D'ORB., 1839, Cuba p. 191, t. 11, figg. 22—24.
- » **angustissima, concinna, pygmæa, tenuis**, Rss., 1849, Neue For. Wien. Becken; Wien. Ak. Dkschr. 1. 1, p. p. 384—385, t. 49, fig. 18, t. 50, figg. 2—3, 8.
- Quinquelocul. tenuis** CZJZ., 1847, For. foss. Wien. Beck.; Haid. Nat. Abh. 2. 1, p. 149, t. 13, figg. 31—34. (in Spiroloculinam vergens).
- » » Rss., 1851, Sept. Thon v. Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 87, t. 7, fig. 60.
- Miliolina tenuis** PARK. et JONES, 1865, Arct. and Northatl. Ocean; Phil. Trans. 155. 1, p. 411, t. 17, figg. 84.
- Quinquelocul. gracilis** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 361, t. 3, fig. 2.
- » **Philippi, oblonga** Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 252, t. 9, figg. 87, 89.
- » **Ludwigi** Rss., 1865, Sept. Thon Deutschland; Wien. Ak. Dkschr. 1. 25. 1, p. 126, t. 1, fig. 12.
- Triloc. lucida** KARRER 1868, Mioc. Kostej; Wien. Ak. S. Ber. 1. 58, p. 139, t. 2, f. 7.

b) *ovalis et dilatata*

- Triloculina inflata, ovalis, Quinquelocul. ovata**, RÖM., 1838, Nordd. tert. Meeressand, Leonh. u. Bronn. Jhrb. 1838, p. 393—394, t. 3, figg. 72, 73, 78.
- Quinquelocul. aspera** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 301. N:o 11.
- Miliolina agglutinans** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 410, t. 15, fig. 37.

- Syn. *Miliolina seminulum* WILLIAM. 1858, Brit. rec. Foramf. p. 86, figg. 183—185.
- Quinquelocul. foeda* Rss., 1849, Neue For. österr. Beck.; Wien. Ak. Dkschr. 1. 1, p. 384, t. 50 figg. 5—6.
- » *seminulum* PARKER et JONES, 1858, For. Coast. of Norway; A. M. N. H. (2) 19 p. 300, t. 10, figg. 34—36.
- Triloculina scapha, oculina, Quinqueloc. pauperata, Hauerina, Mayeriana, Bronniana, Akneriana* D'ORB., 1846, Bass. tert. Vienne, p. 276, 278 etc., t. 17, figg. 4—9, 22—27; t. 18, figg. 1—6, 16—21.
- Quinquelocul. rotundata* COSTA, 1854, Pal. Nap. 2, t. 26, fig. 10.
- Quinquelocul. transsilvanicæ* KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 704, t. 1, fig. 4.
- Triloculina moguntiaca* Rss., 1853, Mainzerbeck.; Leonh. u. Bronn. Jhrb. 1853, p. 672, t. 9, fig. 5.
- » *cuneata* KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 359, t. 2, fig. 8. (var. *secanti approximans*).
- » *orbicularis, rotundata* RÖM., 1838, Nordd. tert. Meeressand, Leonh. u. Bronn. Jhrb. 1838, p. 393, t. 3, figg. 74, 79 (var. *triangulari propinqua*).
- » » Rss., 1855, Tert. Sch. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 251, t. 8, fig. 85.
- » *vitrea* KARR., 1870, Kreidef. Leitzendorf; Jhrb. k. k. österr. geol. Reichsanst. 20, p. 167, t. 10, fig. 5.
- » *Selene* KARR., 1868, Mioc. For. faun. Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 138, t. 1, fig. 12.
- Quinquelocul. seccans* KARRER 1878, Foram. Luzon; Bolet. Comis. Mapa geol. del Esp. 7. 2, p. 14, t. E, fig. 7.
- Triloculina lævissima* COSTA, 1854, Pal. Nap. 2, t. 25, fig. 8.
- » *subinflata, exilis* Rss., 1869, Oligocæn. v. Gaas; Wien. Ak. Sitz.-Ber. 1. 59, p. 454, 455, t. 1, figg. 4—5.
- » *obotritica* BOLL., Ostseeländer p. 127, t. 2, fig. 14.
- Quinquelocul. Brauni, Klipsteini* Rss., 1853, Mainzer Beck.; Leonh. u. Bronn. Jhrb. 1853, p. 674, t. 9, figg. 4, 6.
- Triloc. anceps, Qu. lenticularis, suturalis* Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 383 385, t. 49, f. 11; t. 50, figg. 4, 9.
- Miliolina Haidingeri* EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 272, t. 6, figg. 10—12.
- Quinquelocul. confusa* Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 42, t. 2, fig. 8 (ad *triangularem adiens*).
- » *lamellidens* Rss., *ibid.* p. 41, t. 1, fig. 7.
- » *obliqua, suturalis* Rss., 1867, Steinsalzablager. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 75, 76, t. 2, figg. 6—7, t. 3, fig. 1.
- » *rugosa* KARR., 1866, Grünsandst. Orakay Bay N. Zeeland; Novara Reise, geol. Th. 2. 2, p. 203, t. 4, fig. 16.
- » *subrotunda* PARK. et JONES, 1865, North. Atl. and Arct. Ocean; Phil. Trans. 155. 1, p. 411, t. 15, fig. 38.
- » » PARK. et JONES, BRADY 1866, Crag. For.; Pal. Soc. 19, p. 11.
- » *dilatata* D'ORB., 1839, Cuba, p. 192, t. 11, figg. 28—30.
- » *labiosa* D'ORB., *ibid.* p. 178, t. 10, figg. 12—14.

β) magis inflata:

- » *seminulum* PARK. et JONES, BRADY, 1866, Crag. For.; Pal. Soc. 19, p. 9, t. 3, figg. 35—36.
- » *impressa* Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 87, t. 7, fig. 59.

- Syn. **Quinquelocul. sarmatica** KARR., 1877, Hochquell. Wasserleit.; k. k. österr. geol. Reichsanst. Abh. 9, p. 375, t. 16, fig. 11.
- » **ovula** KARR. 1868, Mioc. Koste; Wien, Ak. S. Ber. 1. 58, p. 147, t. 2, fig. 8.
- » **lævigata** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 350, t. 19, fig. 5.
- » **cognata, impressa, ovalis** BORNEM., ibid. p. 350, t. 19, figg. 7—9.
- » **impressa** Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 124.
- » **regularis** Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 384, t. 50, fig. 1.
- Triloculina Martiana** D'ORB., 1844, Iles Canaries p. 141, t. 3, figg. 16—18.
- » **Schreibersiana** D'ORB., 1839, Cuba p. 174, t. 9, figg. 20—22 (in *M. ringentem transiens*).
- » **inflata, inornata** D'ORB., 1846, Bass. tert. Vienne, p. 278, 279, t. 17, figg. 13—18.
- » **pyrula** KARR., 1862, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 359, t. 2, fig. 7.
- » **decipiens** Rss., 1849, Neue For. Wien Beck.; Wien. Ak. Dkschr. 1. 1, p. 382, t. 49, fig. 8.
- Adelosina lævigata** D'ORB., 1826, Tabl. Méth.; An. Sc. Nat. 7, p. 304; For. tert. Vienne p. 302, t. 20, figg. 22—24.
- » **cretacea** Rss., 1850, Kreidem. Lemberg; Haid. nat. Abh. 4. 1, p. 46, t. 4, fig. 15.
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- Miliola cribrosa** EGGER, 1857, Miocän. v. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 273, t. 6, figg. 13—15.
- Sexiloculina Haueri** CZJZ., 1847, Haid. Nat. Abh. 2, 1, p. 149, t. 13, figg. 35—38.
- ?**Triloculina cryptella, sphæra** D'ORB., 1845, Voy. Amer. mérid. 5. t. 9, figg. 4—5; t. 8, figg. 13—16.
- » » PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 410, t. 15, fig. 39. (an *M. ringens* var.).
- » **truncata** KARR., 1864, Leythakalk Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 50, p. 704, t. 1, fig. 2.
- » **valvularis** Rss., 1851, Sept. Thon Berlin; Ztschr. deutsch. geol. Ges. 3, p. 85, t. 7, fig. 56 (ad *Mil. ringentem* vergens).
- » **turgida** Rss., ibid. p. 86, t. 7, fig. 58.
- Triloculina austriaca** D'ORB., 1846, For. tert. Vienne p. 275, t. 16, figg. 25—27 (ad *Mil. ringentem* vergens).
- Miliola austriaca** EGGER, 1857, Mioc. Ortenb.; Leonh. u. Bronn. Jhrb. 1857, p. 271, t. 6, figg. 4—6.
- Triloculina trigonula** var. Rss., 1864, Oberburg, Steiermark; Wien. Ak. Dkschr. 1. 23. 1, p. 8, t. 1, fig. 12.
- c) *trigonula*:
- Miliolites trigonula** LMCK., 1801, 1816, Encycl. méth. t. 469, fig. 2.
- Triloculina trigonula** D'ORB., 1826, Tabl. Méth.; Ann. Sc. Nat. 7, p. 293, t. 16, figg. 5—9; Mod. 93.
- » » RÖMER, 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhb. 1838. p. 393, t. 3, fig. 71.
- Miliolina trigonula** WILLIAMS., 1858, Brit. rec. forf. p. 84, figg. 180—182.
- Triloculina tricarinata** D'ORB., 1826, Tabl. méth. Ann. Sc. Nat. 7, Mod. 94.
- » **gibba** D'ORB., ibid.; 1846, For. tert. Vienne, p. 274, t. 16, figg. 22—24.
- » » var. Rss., 1864, Oberoligoc.; Wien. Ak. Sitz.-Ber. 1. 50, p. 450, t. 1, fig. 4.
- » » EGGER, 1857, Mioc. Ortenburg; Leonh. u. Bronn. Jhrb. 1857, p. 271, t. 6, figg. 1—3.

- Syn. *Triloculina gibba* HKEN., 1875, For. Clav. Száb. Sch., p. 21, t. 12, fig. 10.
 » *trigonula, angulosa* COSTA, 1854, Pal. Nap. 2, p. 314, 315, t. 24, figg. 8, 14—15.
 » *tricarinata* BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 466, t. 48, fig. 3.
Miliolina tricarinata PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155, 1, p. 409, t. 15, fig. 40.
Mil.-Triloculina-tricarinata PARK. et JONES, BRADY, 1866, Crag. foramf.; Pal. Soc. 19, p. 7, t. 3, figg. 33—34.
Triloculina tricarinata Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 71, t. 2, fig. 4.
Cruciloculina triangularis D'ORB., 1846, For. tert. Vienne, p. 280, t. 21, fig. 57.
 » CARPENTER, 1862, Introd., t. 6, fig. 15.

d) *angularis*: ab a) vix diversa; lateribus interdum truncatis (Qu. Ferusaci D'ORB.):

- Quinquelocul. triangularis* D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 302. N:o 34.
 » D'ORB., 1846, For. tert. Vienne p. 288, t. 18, figg. 7—9.
 » PARK. et JONES, BRADY, 1866, Crag. For.; Pal. Soc. 19, t. 4, fig. 1.
 » *peregrina, Partschii* D'ORB., 1846, For. tert. Vienne p. 292—293, t. 19, figg. 1—6.
Miliolina seminulum PARK. et JONES, 1865, North. Atl. and Arct. Oceans.; Phil. Trans. 155, 1, p. 410, t. 15, fig. 35.
Quinquelocul. Ermani BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 351, t. 19, fig. 6.
Triloculina decipiens, exigua, Quinquelocul. lobata, Buchiana COSTA, 1854, Pal. Nap. 2, t. 24, figg. 13—17, t. 26, figg. 2, 7.
Quinquelocul. semiplana Rss., 1855, Kreidegeb. Meklenburg; Zeitschr. deutsch. geol. Ges. 7, p. 275, t. 10, fig. 1.
 » *ovata* Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 252, t. 9, fig. 88.
 » *Biondi, tubulosa* SEG., 1862, Rhizopod. Catan. p. 35, t. 2, fig. 7, 8. Accad. Gioenia Atti (2) 18.
Triloculina Kochi Rss. (partim) 1855, Kreideg. Meklenb.; Ztschr. deutsch. geol. Ges. 7, p. 289, t. 11, fig. 6.
Quinquelocul. inæqualis D'ORB., 1844, Iles Canaries, p. 142, t. 3, figg. 28—30.
 » *Lamarckiana, Cuvieriana, Auberiana* D'ORB., 1839, Cuba p. 189, 190, 193, t. 11, figg. 14—15, 19—21; t. 12, figg. 1—3.
 » *bicostata, Candeiana* D'ORB., ibid. p. 195, 199, t. 12, figg. 8—10, 24—26.
 » *planciana* D'ORB., ibid. p. 186, t. 11, figg. 4—6.
 » *Gualteriana* D'ORB., ibid. p. 186, t. 11, figg. 1—3. (transversim plicata).
 » *Buchiana, Ungeriana, longirostra* D'ORB., 1846, For. tert. Vienne p. 289, 291, t. 18, figg. 10—12, 22—27.
 » *punctata* Rss., 1853, Mainzer Becken; Leonh. u. Bronn. Jhrb. 1853, p. 675, t. 9, fig. 8.
 » *eborea* SCHWAG., 1866, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 204, t. 4, fig. 18.
 » *signata* Rss., 1849, Neue For.; Wien. Ak. Dkschr. 1. 1, p. 385, t. 50, fig. 11.
 » *venusta* KARR., 1868, Mioc. For. Faun. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 147, t. 2, fig. 6.
Triloculina intermedia, sulcata KARR., ibid. p. 139, t. 1, figg. 11, 13.
 » *angulata, nodosa* KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 55, p. 359, t. 2, f. 6.
Quinquelocul. bicarinella Rss., 1869, Oligoc. Gaas.; Wien. Ak. Sitz.-Ber. 1. 59, p. 451, t. 3, fig. 1.
 » *latidorsata, Grintzingensis, concava* Rss., 1849, Neue For. österr. tert. Beck. p. 385—386; t. 50, fig. 12, t. 51, figg. 1—2.

- Syn. ?? **Triloculina nodosaroides** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 360, t. 2, fig. 9,
Triloculina quadrilatera D'ORB., 1839, Cuba, p. 173, t. 9, figg. 14—16.
 » **bicarinata, Qu. polygona** D'ORB., ibid. p. 180, t. 10, figg. 18—20; t. 12, figg. 21—23.
Quinquelocul. Sagra, Antillarum D'ORB., ibid. p. 188, 194, t. 11, figg. 16—18; t. 12, figg. 4—6.
 (transversim plicata).
 » **Ferusacii** D'ORB., 1826, Tabl. méth., Ann. Sc. Nat. 7, p. 301, N:o 18, Mod. 32.
Adelosina pulchella D'ORB., 1846, For. tert. Vienne, p. 303, t. 20, figg. 25—30.
Miliolina bicornis var. **angulata** WILLIAMS., 1858, Brit. rec. For. p. 88, fig. 196.
 » **Ferusaci** PARK. et JONES, 1865, North. Atl. and Arct. Ocean; Phil. Trans. 155. 1, p. 411, t. 15, fig. 36.
 » » PARK. et JONES, BRADY, 1866, Crag. For.; Pal. Soc. 19, p. 12, t. 4, fig. 4.
Quinquelocul. Juleana, contorta, Rodolphina, Badenensis, Mariæ D'ORB., 1846, For. tert. Vienne, p. 298—300, t. 20, figg. 1—15.

β) agglutinans et rugosa:

- Quinquelocul. agglutinans** D'ORB., 1839, Cuba p. 195, t. 12, fig. 11—13.
 » **enoplostoma, bidentata** D'ORB., ibid. p. 196, t. 12, figg. 14—20.
 » **Berthelotiana** D'ORB., 1844, Iles Canaries p. 142, t. 3, figg. 25—27.
 » **opaca** Rss., 1862, Sept. Thon. Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 42, t. 2, fig. 9.
 » **Atropos, Kostejana, excavata** KARR., 1868, For. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 148, 152, t. 3, figg. 4, 6; t. 2, fig. 9.
 » **sclerotica** KARR., ibid. p. 152, t. 3, fig. 5.
 » **asperula** SEG., 1862, Rhizopod. foss. Catania p. 36, t. 2, fig. 6 (Accad. Gioenia Atti (2) 18).

Appendix.

e) transversim plicata:

- Quinquelocul. secans** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 303, N:o 43, Mod. 96.
 » » RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 393, t. 3, fig. 77.
Miliolina seminulum var. **disciformis** WILLIAMS., 1858, Brit. rec. Forf. figg. 188—189.
Quinquelocul. Haidingeri D'ORB., 1846, For. tert. Vienne, p. 289, t. 18, figg. 13—15.
 » **denticulata, corrugata, transversa** COSTA, 1854, Pal. Nap. 2, p. 324, 325, t. 25, figg. 6, 14, t. 26, fig. 9.
 » **notata** Rss., 1849, Neue For. österr. tert. Becken; Wien. Ak. Dkschr. 1. 1, p. 385, t. 5, fig. 7.
 » **ornatissima** KARR., 1868, Mioc. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 151, t. 3, fig. 2.
Triloculina dilatata KARR., ibid. p. 139, t. 2, fig. 1.
Quinquelocul. falcifera KARR., ibid. p. 151, t. 3, fig. 3.
 ? » **fabularoides** KARR., 1864, Leythakalk; Wien. Ak. Sitz.-Ber. 1. 50, p. 704, t. 1, fig. 3. (apertura cribriformis).
 » **scidula** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 361, t. 3, fig. 1.

β) angularis:

- » **Sandbergeri** Rss., 1853, Mainzer Beck.; Leonh. u. Bronn. Jhrb. 1853, p. 674, t. 9, fig. 7.

- Syn. **Quinquelocul. speciosa** Rss., 1855, Tert. Sch. nordl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18. p. 251, t. 8, fig. 86.
 » **plicatula** Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 74, t. 3, fig. 2.
 » **Clotho** KARR., 1868, Mioc. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 151, t. 2, fig. 5.
 » **Lachesis** KARR., ibid. p. 146, t. 2, fig. 4.
 » **Ungeriana** var. **stenostoma** KARR., ibid. p. 141, t. 2, fig. 3.
 » **undosa** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 361, t. 3, fig. 3.

f) longitud. plicata sive costata (Qu. pulchella D'ORB.):

- Adelosina Soldanii** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 304; N:o 4.
Triloculina tricosata, Quinquelocul. Soldanii D'ORB., ibid. p. 300, 303; N:ris 21, 48.
Quinquelocul. pulchella D'ORB., ibid. p. 303; N:o 42.
 » » BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 466, t. 48, fig. 1.
 » » PARK. et JONES, BRADY, 1866, Crag. For.; Pal. Soc. 19, p. 13, t. 4, fig. 3.
 » **trisulcata, sulcifera** RÖM., 1838, Nordd. tert. Meeress.; Leonh. u. Bronn. Jhrb. 1838, p. 393, t. 3, figg. 75—76.
 » **Verneuiliana, Schreibersii, Josephina** D'ORB., 1846, For. tert. Vienne, p. 296, 297, t. 19, figg. 19—27.
Uniloculina indica D'ORB., ibid. p. 261, t. 21, figg. 53—54.
Triloculina pulchella D'ORB., ibid. t. 17, figg. 19—21.
Quinquelocul. tricarinata D'ORB., 1839, Cuba p. 187, t. 11, figg. 7—9, 13.
 » **plicosa, Josephina** COSTA, 1855, Pal. Nap. 2, p. 321, 322, t. 25, figg. 2, 4.
 ? » **nobilis** KARR., 1868, Mioc. For. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 149, t. 2, fig. 11 (ad d) forsan pertinens).
Miliolina bicornis WILLIAMS., 1858, Brit. rec. For. p. 88, figg. 190—194.
Quinquelocul. Boueana, Dutemplei, nussdorfensis D'ORB., 1846, For. Bass. tert. Vienne p. 293 et sequ. t. 19, figg. 7—15.
Triloculina Linneiana D'ORB., 1839, Cuba p. 172, t. 9, figg. 11—13.
Quinquelocul. Poeyiana D'ORB., ibid. p. 191, t. 11, figg. 25—27.
Miliolina bicornis var. **elegans** WILLIAMS., 1858, Brit. rec. Forf. p. 98, fig. 195.
Triloculina dichotoma Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 383, t. 49, fig. 12.
 » **porvaensis** HKEN., 1875, Clav. Száb. Sch. p. 21, t. 13, fig. 3.
Miliola Schreibersii BLAKE, 4876, Yorkshire Lias p. 451, t. 18, fig. 2 (an Vertebralina).

g) striata, a præcedente vix distinguenda:

- Adelosina striata** D'ORB., 1826, Tabl. méth.; Ann. Sc. Nat. 7, p. 304, Mod. 18, 97.
Quinquelocul. seminulum D'ORB. partim, ibid. p. 303; N:o 44.
Triloculina Brongniartii D'ORB., 1826, Tabl. méth.; Ann. Sc. Nat. 7, p. 300; N:o 23.
 » **Brogniartiana** D'ORB., 1839, Cuba; For. p. 176, t. 10, figg. 6—8.
 » **Gualteriana, Fichteliana, suborbicularis** D'ORB., ibid. p. 170, 171, t. 9, figg. 5—10; t. 10, figg. 9—11.
 » **Planciana** D'ORB., ibid. p. 173, t. 9, figg. 17—19.
Quinquelocul. gracilis D'ORB., ibid. p. 181, t. 11, figg. 10—12.
Triloculina Webbiana, Quinqueloc. Guancha D'ORB., 1844, Iles Canaries, p. 140, 143, t. 3, figg. 13—15, 34—36.

- Syn. **Quinquelocul. Brongniartii** PARK. et JONES, BRADY, 1865, Crag. For.; Pal. Soc. 19, p. 14, t. 3, fig. 41, t. 4, fig. 2.
- Triloculina Brogniartiana** BAILEY, 1850, Examin. of Soundings; Smithson. Contrib. 2, Art. 3, p. 13, figg. 44—45.
- » **striatella** KARR., 1868, Mioc. Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 140, t. 2, fig. 2.
- Quinquelocul. seminuda** RSS., 1865, For. deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1. p. 125, t. 1, fig. 11 (d) angulari par).
- » **triedra, obsoleta, striatella, Boueana, affinis, nussdorfensis** COSTA, 1854, Pal. Nap. 2, p. 326—329, t. 25, figg. 11, 13, 15; t. 26, figg. 3, 4, 6 (var. angulari par).
- » **longicollis, gracilis** COSTA, ibid. t. 25, fig. 3, t. 26, fig. 1.
- Quinquelocul. hiantula** Rss., 1863, Oberburg. Steiermark; Wien. Ak. Dkschr. 1. 23. 1, t. 8, fig. 11.
- » **striolata** Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 385, t. 50, fig. 10.
- » **costata** KARR., 1867, For. faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 362, t. 3, fig. 4.
- » **paucisulcata** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 452, t. 1, fig. 7.
- » **Eos** Rss., 1869, Oligocän. von Gaas; Wien. Ak. Sitz.-Ber. 59, p. 457, t. 1, fig. 7.
- » **incrassata, Schroekingerii, vermicularis** KARR., 1868, Mioc. Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 148—150, t. 2, figg. 10, 12, t. 3, fig. 1.
- » **Carp.** Introd. t. 6, fig. 3.

h) serratim lineata:

- Quinquelocul. zigzag** D'ORB., 1846, For. tert. Vienne p. 295, t. 19, figg. 16—18.

i) ordine punctata:

- Quinquelocul. saxorum** (LMCK.) D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 301, t. 16, figg. 10—14 Mod. 33.
- Miliola saxorum** EGGER, 1857, Mioc. Ortenb.; Leonh. u. Bronn. Jhrb. 1857, p. 272, t. 10, figg. 18—20.
- Quinquelocul. striatopunctata** KARR., 1867, For. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 362, t. 3, fig. 5.
- » **lacunosa** KARR., ibid. p. 362, t. 3, fig. 6.
- Triloculina carinata** D'ORB., 1839, Cuba p. 179, t. 10, figg. 15—17.
- » **granulata** Rss., 1863, Oberburg, Steiermark; Wien. Ak. Dkschr. 1. 23. 1, p. 8, t. 1, fig. 13.

k) reticulata:

- Triloculina reticulata** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 299; N:o 9 (var. secanti affinis).
- Quinquelocul. reticulata** KARR., 1861, Marin. Teg. Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 44, p. 449, t. 2, fig. 5.
- » **Carp.** Introd. t. 6, fig. 13.

Miliolina ringens LMK.

Tab. X, figg. 361—386.

The form which usually occurs on our bottom is identical with *Biloculina bulboides* D'ORB. with its more or less broad, often carinated and inclined shelf, produced by the excess of the last chamber beyond the preceding. The modification with lobate limb — *Bil. caudata* BORNEM., *Bil. appendiculata* Rss. — are often met with, but such trifling features are too accidental to entitle to any separate designation whatever. *Biloc. sphaera* BRADY or *Bil. globulus* BORNEM. is ordinarily distinguished by higher lustre and absence of limb, the sutural mark being quite faint; the shell nearly globular and the last chamber much larger than and overlapping the preceding one. It is found associated with the typical form.

Triloculina enoplostoma Rss. from the »Septaria»-clay at Berlin, is a »triloculine» form, which also occurs on our bottom, but is very rare. Its glossy porcellaneous lustre and the shape of its aperture betray its close kindred to *Mil. ringens*. Some of D'ORBIGNY's *Triloculinae* may also be referred to this variety, as *Triloc. Schreibersiana*, *austriaca* D'ORB. etc. also *Triloc. circularis* BORNEM.; *Triloc. valvularis* Rss. From the Atlantic ocean off the Azores Prof. SMITT and LJUNGMAN brought home in 1868 an extensive series of highly developed *Miliolina ringens*, elucidating the indistinct demarcation between it and *Mil. seminulum*. Some delineations of a few examples from this valuable collection will illustrate this gradational transition.

The form with tubulated round aperture recorded by LAMARCK as *Miliolit. ringens* and by COSTA as *Biloc. tubulosa* has not been met with on our bottom. But in deep water in the Atlantic it seems to be common.

The form »*contraria*» D'ORB. has not occurred.

The typical form is sometimes finely striate — figg. 370—371. A handsome *costulate triloculine form* is sometimes met with on our bottom, figg. 384—385.

Figg. 361—362: the typical *Mil. ringens*, from chalk-bottom; the limb being thick and uneven with folds.

Figg. 363—365: oblong, cyclostome form (*Biloc. tubulosa* COSTA); from the Atlantic off the Azores, 790 fathoms, SMITT and LJUNGMAN.

Figg. 366—367: depressed form (*Bil. carinata*, *depressa* D'ORB.) with nearly tubular mouth; from the same locality as the preceding, 550 fathoms.

Figg. 368—369: the *spheroidal* variety; the last chamber being much larger than the preceding; from the chalk-bottom.

Figg. 370—371: finely striate form; from the Atlantic, 790 fathoms, SMITT and LJUNGMAN.

Figg. 372—373: *triloculine* variety, from the coralline-gravel off the Virgin Islands.

Figg. 374—375: irregular, *triloculine* form of high development, from the Atlantic, off the Azores, 600 fathoms, SMITT and LJUNGMAN.

Figg. 376—378: *quadriloculine*. tubulated form, from the same place, SMITT and LJUNGMAN.

Figg. 379—381: *quinqueloculine* form, associated with the preceding.

Figg. 382—383: *triloculine*, tubulated variety; with the preceding.

Figg. 384—385: *costulate*, *triloculine* form of *Mil. ringens*; from the chalk-bottom.

Fig. 386: young or pigmy, with very thin shell, viewed in transmitted light.

Syn. *Miliolites ringens* LMCK., 1804, Ann. du Mus. 5, p. 351, N:o 1; IX, t. 17, fig. 1.

a) sphaerica vel subsphaerica, interdum carinata:

- Biloculina bulloides, ringens** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 297, N:o 1, 2.
 " **subsphaerica** D'ORB., 1839, Cuba, p. 162, t. 8, figg. 25—27.
 " **sphaera** BRADY, 1864, Rhizop. Shetland; Trans. Lin. Soc. 24, p. 466, t. 48, fig. 1.
 " **simplex** D'ORB., 1846, For. tert. Vienne, p. 264, t. 15, figg. 25—27.
 " **bulloides, simplex, inornata, æquivoca, circumclausa** COSTA, 1854, Pal. Nap. 2, t. 24, figg. 1, 3—6.
 " **globulus** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 349, t. 19, fig. 3.
 " " Rss., 1863, Sept. Thon Offenbach, Wien. Ak. Sitz.-Ber. 1. 48, p. 40, t. 1, fig. 4.
 " **globiformis, antiqua** KARR., 1867, For. Fauna Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 357, 365, t. 2, fig. 1, t. 3, fig. 7.
 " **obesa** Rss., 1864, Oberoligocän.; Wien. Ak. Sitz.-Ber. 1. 50, p. 450, t. 5, fig. 7.
 " **ringens** PARK. et JONES, 1857, For. Coast. of Norway; An. Mag. Nat. Hist. (2) 19, p. 298, t. 10, figg. 28—33.
 " **lucernula** SCHWAG., 1866, Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 202, t. 4, fig. 17.
 " **amphiconica** var. Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 67, t. 1, fig. 8.
 " **bulloides** var. **calostoma, anodonta** KARR., 1868, Mioc. For. Kostej.; Wien. Ak. Sitz.-Ber. 1. 58, p. 133, t. 1, figg. 4, 6.
 " **turgida** Rss., 1851, Sept. Thon Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 85, t. 7, fig. 55.
 " **appendiculata** Rss., 1863, Crag. d'Anvers; Bull. Ac. Belg. (2) 15, p. 137, t. 1, fig. 1.
 " **Murrhina** SCHWAG., 1866, For. Kar.-Nikobar.; Novara Reise, geol. Th. 2. 2, p. 203, t. 4, fig. 15.

b) magis ovalis:

- Biloculina bulloides** D'ORB., 1826, An. Sc. Nat. 7, t. 16, figg. 1—4; Mod. 90.
Miliola (Biloculina) ringens PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 409, t. 15, figg. 42—43.
Biloculina canariensis D'ORB., 1844, Iles Canaries p. 139, t. 3, figg. 10—12.
 " **peruviana** D'ORB., 1845, Voy. Am. mér. 5, p. 65, t. 9, figg. 1—3.
 " **patagonica** D'ORB., ibid. p. 65, t. 3, figg. 15—17.
 " **clypeata, affinis, inornata** D'ORB., 1846, For. tert. Vienne, p. 263, 266, t. 15, figg. 19—21, t. 16, figg. 1—3, 7—9.
 " **cyclostoma** Rss., 1849, Neue For. Wien. Beck.; Wien. Ak. Dkschr. 1. 1, p. 382, t. 49, fig. 6.
 " **lobata** Rss., 1863, Sept. Thon Offenbach; Wien. Ak. Sitz.-Ber. 1. 48, p. 40, t. 1, figg. 5—6.
 " **oblonga** D'ORB., 1839, Cuba, p. 163, t. 8, figg. 21—23.

- Syn. *Biloculina ringens* WILLIAMS., 1858. Brit. rec. Forf. p. 79, figg. 169—171, 175—176.
 » *ventricosa, bulloides* var. *larvata* Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 68, 69, t. 1, fig. 9; t. 2, figg. 1—3.
 » *constricta* COSTA, 1854, Paleont. Nap. 2, p. 301, t. 24, fig. 2.
 » *Grinzingensis* KARR., 1877, Hochquellenwasserleit.; Jhrb. Österr. geol. Reichsanst. Abh. 9, p. 375, t. 16, fig. 8.
 » *caudata* BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 348, t. 19, fig. 2.
 » *elongata* D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 298; N:o 4.
 » » PARK. et JONES, 1865, North. Atl. and Arct. Ocean.; Phil. Trans. 155, p. 409, t. 17.
 » *tenuis* KARR., 1868, Mioc. For. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 133, t. 1, fig. 5.
 » *Carp. introduct.* tab. 6, fig. 7.

c) *angulata*:

- Biloculina aculeata* D'ORB., 1826, Tabl. méth.; Ann. Sc. Nat. 7, p. 296, Mod. 31.

d) *depressa*:

- Biloculina depressa* D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 298, N:o 7, Mod. 91.
 » » PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans. 155. 1, p. 409, t. 17, fig. 89; 1866, Crag. For.; Pal. Soc. 19, p. 6, t. 3, figg. 29—30.
 » *carinata* D'ORB., 1839, Cuba p. 164, t. 8, fig. 24, t. 9, figg. 1—2.
 » *lunula* D'ORB., 1846, For. tert. Vienne p. 264, t. 15, figg. 22—24.
 » *ringens* var. *carinata* WILLIAMS., 1858, Brit. rec. Foramf., p. 79, figg. 172—174.
 » *amphiconica* Rss., 1849, Neue for. österr. tert. Becken; Wien. Ak. Dkschr. 1. 1, p. 382, t. 49, fig. 5.
 » *scutella* KARR., 1868, Mioc. Kostej; Wien. Ak. Sitz.-Ber. 1. 58, p. 134, t. 1, fig. 7.
 » *plana* KARR., 1877, Hochquellen-Wasserleitung; Österr. geol. Reichsanst. Abh. 9, p. 375, t. 16, fig. 9.

e) *apertura subrotunda*:

- Biloculina applanata* GÜMB., 1862, Streitenberg. Schwammlager; Würtemb. Nat. Wiss. Ver. Jhrft. 1862, p. 233, t. 4, fig. 16.
 » *tubulosa* COSTA, 1854, Pal. Nap. 2, t. 24, fig. 7.

f) *compressa*:

- Biloculina contraria* D'ORB., 1846, For. tert. Vienne, p. 266, t. 16, figg. 4—6.
 » » BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 466, t. 48, fig. 2.
 » » Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 70, t. 1, fig. 10.
Nummoloculina STEINMANN, 1881, Leonh. u. Bronn. Jhrb. 1881, p. 31, t. 2.

g) in seminulam transiens:

- Syn. **Biloculina lucernula** var. SCHWAG., 1866, Kar. Nikobar; Novara Reise, geol. Th. 2. 2, p. 202, t. 4, fig. 14.
- Triloculina enoplostoma** Rss., 1851, Sept. Thon Berlin.; Zeitschr. deutsch. geol. Ges. 3, p. 86, t. 7, fig. 57; 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 72, t. 2, fig. 5.
- » **circularis** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 349, t. 19, fig. 4.
- ? » **bipartita** D'ORB., 1846, For. tert. Vienne, p. 275, t. 17, figg. 1—3.
(Cfr. p. 126).

Miliolina planulata LMCK.

The usual form on the chalk-bottom is *Spiroloculina canaliculata* D'ORB., which cannot claim particular designation. It is met with less frequently than either *Mil. seminulum* or *ringens*.

- Syn. **Miliolites planulata** LMK., 1804, Ann. Mus. 5, p. 352, N:o 4.
- Spiroloculina depressa, perforata** D'ORB., 1826, Tabl. méth.; Ann. Sc. Nat. 7, p. 298, N:o 12, Mod. 92.
- » **nitida** D'ORB., ibid. p. 298, N:o 4.
- » **badenensis** D'ORB., 1846, For. tert. Vienne, p. 270, t. 16, figg. 13—15.
- » **dilatata** D'ORB., ibid. p. 271, t. 16, figg. 16—18.
- » **excavata** D'ORB., ibid. p. 271, t. 16, figg. 19—21.
- » **depressa** var. **rotundata** WILLIAMS., 1858, Brit. rec. Forf. p. 82, fig. 178.
- Miliola-Spiroloculina-planulata** PARKER et JONES et BRADY, 1866, Crag. For.; Pal. Soc. 19, p. 15, t. 3, figg. 37—38.
- Miliola planulata** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 408, t. 17, fig. 82.
- Spiroloculina excavata** COSTA, 1854, Pal. Nap. 2, p. 311, t. 24, fig. 11.
- » **Sandbergeri** Rss., 1853, Mainzerbecken; Leonh. u. Bronn. Jhrb. 1853, p. 671, t. 9, fig. 2.
- » **Freyeri** Rss., 1863, Oberburg. Steiermark; Wien. Ak. Dksehr. 1. 23. 1, p. 7, t. 1, fig. 9.
- » **tenuissima** Rss., 1867, Steinsalzablag. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 71, t. 1, fig. 11.
- » **Lapugyensis** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 357, t. 2, fig. 2.
- » **compressiuscula** KARR., ibid. p. 358, t. 2, fig. 4.
- » **tenuirostra** KARR., ibid. p. 358, t. 2, fig. 5.
- » **panda** SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrhft. 17, p. 95, t. 2, fig. 6.
- » **Carp.** Introd. t. 6, fig. 1.

b) limbata:

- Spiroloculina limbata** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 299, N:o 12.
- Miliola limbata** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Trans 155. 1, p. 409, t. 17, fig. 83.

- Syn. **Spiroloculina dorsata** Rss., 1865, Deutsch. Septarienthon; Wien. Ak. Dkschr. 1. 25. 1, p. 123, t. , fig. 83.
- » **limbata** BORNEM., 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 348, t. 19, fig. 1.
- » » Rss., 1863, Sept. Thon Kreuznach; Wien. Ak. Sitz.-Ber. 1. 48, p. 64, t. 8, fig. 89.
- » » HKEN., 1875, For. Clav. Szab. Sch. p. 20, t. 13, fig. 2.
- » **depressa** WILLIAMS., 1858, Brit. rec. for. p. 82, figg. 177.
- » **canaliculata** D'ORB., 1846, For. tert. Vienne, p. 269, t. 16, figg. 10—12.
- » » COSTA, 1854, Pal. Nap. 2; t. 24, figg. 9—10.
- » » PARK. et JONES, BRADY, 1866, Crag. For.; Pal. Soc. 19, p. 16, t. 3, figg. 39—40.
- » **alata** Rss., 1853, Mainzer Becken; Leonh. u. Bronns. Jhrb. 1853, p. 671, t. 9, fig. 1.
- » **ovalis** RÖM., 1838, Nordd. tert. Meeresand; Leonh. u. Bronn. Jhrb. 1838, p. 392, t. 3, fig. 68.
- » **dubia** RÖM., ibid. p. 392, t. 3, fig. 69.
- » **ornata** D'ORB., 1839, Cuba, p. 167, t. 12, figg. 7, 7'.
- » **cymbium** D'ORB., 1844, Iles Canaries, p. 140, t. 3, figg. 5—6.
- » **cretacea** Rss., 1853, Kreide. Ostalpen; Wien. Ak. Dkschr. 7, p. 72, t. 26, fig. 9.
- » **rostrata** Rss., 1849, Neue For. österr. tert. Beck.; Wien. Ak. Dkschr. 1. 1, p. 382, t. 49, fig. 7.
- » **Morloti** Rss., 1863, Oberburg in Steiermark; Wien. Ak. Dkschr. 1. 23. 1, p. 7, t. 1, fig. 10.
- » **cavernosa** KARR., 1867, For. Faun. Österr.; Wien. Ak. Sitz.-Ber. 1. 55, p. 358, t. 2, fig. 3.
- » **Berchtoldsdorfensis** KARR., 1877, Hochquellen-Wasserleit.; Jhrb. Österr. geol. Reichsanstalt Abh. 9, p. 375, t. 16, fig. 10.
- » **depressa** var. **Cymbium** WILLIAMS., 1858, Brit. rec. For. p. 82, fig. 179.
- » **Carp.** Introd. t. 6, f. 2.

c) crenata:

- Spiroloculina plicata** D'ORB., 1826, Tab. méth.; A. Sc. N. 7, p. 299, N:o 15.
- » **speciosa** KARR., 1868, Mioc. Fauna Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 135, t. 1, fig. 8.
- » **crenata** KARR., ibid. p. 135, t. 1, fig. 9.

d) striata aut aspera:

- Spiroloculina Poeyiana** D'ORB., 1839, Cuba p. 168, t. 10, figg. 1—2.
- » **antillarum** D'ORB., ibid. p. 166, t. 9, figg. 3—4
- » **striatella** Rss., 1863, Oberburg in Steiermark; Wien. Ak. Dkschr. 1. 23. 1, p. 7, t. 1, fig. 8.
- » **asperula** KARR., 1868, Mioc. Koste; Wien. Ak. Sitz.-Ber. 1. 58, p. 137, t. 1, fig. 10,
- » **celata** COSTA, 1854, Pal. Nap. 2, t. 26, fig. 5.
- » » COSTA, 1855, For. foss. Marna blu' Vaticano; Mem. Nap. 2, p. 126, t. 1, fig. 14.

Trochammina incerta D'ORB.

Tab. XI, figg. 404—405.

This form is one of the smoothest amongst the arenaceous group of this class, being composed of the finest siliceous particles and probably a large quantity of secreted or precipitated cementing siliceous matter, the lime being quite absent; a rusty colouring matter renders the shell yellowish brown. It is very regularly formed, somewhat biconcave. The aperture is a very narrow crescent placed on the inner part of the last convolution. It is sparsedly met with on the chalk-bottom, attaining a diameter of 2 to 3 m. m.

Fig. 404: side-view of *Trochammina incerta*.

Fig. 405: edge-view.

Syn. Operculina incerta	D'ORB., 1839, Cuba, p. 49, t. 6, figg. 16—17.
» cretacea	Rss., 1845, Böhm. Kreide 1, p. 35, t. 13, figg. 64—65 (sec. PARK. et JONES).
? » punctata	Rss., 1849, Neue Foramf. österr. tert. Becken; Wien. Ak. Dkschr. 1. 1, p. 370, t. 46, fig. 21.
Orbis infimus	STRICKLAND, 1846, Microsc. Shells found in the Lias; Qu. Journ. geol. Soc. 2 p. 30, fig. a.
Spirillina arenacea	WILLIAMS., 1858, Brit. rec. for. p. 93, fig. 203.
Trochammina squamata var. <i>incerta</i>	CARP., 1860, Introduct. p. 141, 312, t. 11, fig. 2.
» <i>incerta</i>	PARK. et JONES, 1869, The perm. Troch. pusilla etc.; A. M. N. H. (4) 4, p. 388, t. 13, fig. 1.
» »	BRADY, 1876, Carbonif. and Perm. foramf.; Pal. Soc. 30, p. 71, t. 2, figg. 10—14.
Ammodiscus	Rss., 1861, Entwurf einer systematischen Zusammenstellung etc.; Wien. Ak. Sitz.-Ber. 44, p. 365.
Serpula Roesleri	SCHMID, 1867, Leonh. u. Bronn. Jhrb. 1867, p. 583, t. 6, figg. 46—47.
Ammodiscus infimus	BORNEM., 1874, Ueber Involutina; Zeitschr. deutsch. geol. Ges. 26, p. 725, t. 8, figg. 4—7; t. 9, fig. 8.
» <i>miocenicus</i>	KARR., 1877, Hochquellenwasserleitung; Österr. geol. Reichsanst. Abh. 9, p. 372, t. 16, fig. 2.
? Cornuspira Hörnesi	KARR., 1865, Wien. Sandstein.; Wien. Ak. Sitz.-Ber. 52, p. 495, figg. 10—11.
» <i>granulosa, infraoolithica, silicea, aspera</i>	TERQUEM. (sec. BRADY l. cit. p. 72).
» <i>oolithica</i>	SCHWAG., 1867 (sec. BRADY l. cit. p. 72).
» <i>infima</i>	BLAKE, 1876, Yorkshire Lias p. 451, t. 18, fig. 2. (Vide etiam BRADY, Carbonif. and Perm. foramf.; Pal. Soc. 30, p. 71—72)

Lituolina scorpiurus MTFERT.

Tab. XI, figg. 406—409.

A great deal of confusion has been brought into the designation and definition of the genus *Lituolina*; and of late the dissociation of its closely allied forms even into new genera, based upon very trifling and inconstant characters, has scarcely contributed to advance our knowledge as to the real relation between its different forms

It has been repeatedly noticed and stated, that the mode of life, in a free or attached state, amongst this class does not afford sufficient characteristics even for specific, much less for generic, distinction; and no greater importance seems to be attributable to the feature of the chambers being subdivided or not.

Our form commences its early growth with a thin, slender, somewhat angular, half transparent, horny nodosarina-stage of a few produced chambers, the apex of which always seems to be broken off. From this condition in connection with rare instances of very young — twochambered — specimens being attached endwise to shells of larger rhizopodes its ordinary mode of life — at least in its youth — may be inferred.

Its young state resembles very much *Reophax spiculifera* BRADY. The increase in size of the consecutive chambers are somewhat rapid; its agglutinating power is very strong, large pieces of broken shells and some sponge-needles, but no grains of sand, being used for the fabric. The aperture is usually reniform, a feature on which the genus *Hippocrepina* DAWSON. et PARK. has been founded. It is one of the most abundant rhizopodes chiefly on the chalk-bottom.

Fig. 406—407: Two specimens of *Lit. scorpiurus* with part of their slender early stage.

Fig. 408: the apertural end.

Fig. 409: Longitudinal section through the medial plane.

- Syn. *Reophax scorpiurus* MONTF., 1808, Conchyliol. syst. 1, Genre 83, p. 330.
Dentalina Scorpionus D'ORB., 1826, Tabl. méth., Ann. Sc. Nat. 7, p. 255, N:o 40.
 ?*Margin. hirsuta* D'ORB., ibid. p. 259, N:o 5.
Lituola scorpiurus BRADY, 1864, Rhizop. Shetl.; Trans. Lin. Soc. 24, p. 467, t. 48, fig. 5.
 » *nautiloidea* var. *scorpiurus* PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155. 1, p. 407, t. 15, fig. 48.
 » *scorpiurus* var. DAWSON., 1870, For. Gulf and Riv. St. Laur.; A. M. N. Hist. (4) 7, (1871) p. 86, fig. 4 (fr. Canadian Naturalist 1870).
 » *Soldanii* CARPENT., 1862, Introd. t. 6, fig. 43.
Protonina fusiformis, pseudospiralis WILLIAMS., 1858, Brit. rec. For. p. 1—2, figg. 1—3.
Rheophax fusiformis BRADY, 1882, Ret. Rhizopod., Österr. Ungar. Exped. Wien. Ak. Dkschr. 43. 2, p. 99.

Lituolina scorpiurus var. *ammophila* n.

Tab. XII, figg. 410—414.

The shell of *Lituolina scorpiurus* when solely depending on siliceous sand for its construction becomes sometimes very much enlarged, with immense, thick walls. Such is the case with our form, which is built of loosely coherent grains of sand and sponge-needles. This deficiency in the coherence of the structure, particularly in aged specimens, is seldom met with in this class and indicates a lack of cementing secretion

or precipitation by the animal. Young specimens have a firmer construction with a great many sponge-needles entering into the building-materials, rendering its surface quite bristly. The earliest stage seems to be of the same slender form as in the preceding. The septal impressions are very indistinct; the aperture does not exhibit that decided semilunar form as the preceding, being rounder or of undecided form, owing to the looseness and coarseness of the texture. The chambers are on their inside lined throughout with bright rust-coloured reddish sand.

It is not common either on the chalk or in the coralline-gravel, attaining 10 mm. in length and about 3 mm. in diameter.

Fig. 410: *Lit. scorpiurus* var. *ammophila*.

Fig. 411: Section through the median plane.

Fig. 412: apertural end.

Figg. 413—414: young individuals.

Lituolina foedissima REUSS.

Tab. XII, figg. 415—418.

Notwithstanding the more compact and homogeneous texture of this form than the foregoing and its striking difference I am not quite convinced of its specific distinctness from *Lit. scorpiurus*. It is no doubt identical with REUSS' species from the cretaceous formation, although his form is stated to be furnished with subdivided chambers, on which character he has based his new genus: *Haplostiche*.

The surface is very rough, but still the shell is agglutinated of fine chalk-particles and probably also a great deal of *precipitated* or *secreted* carbonate of lime. The chambers are somewhat roughly sketched out, often very irregular in size and shape, with impressed and quite distinct septal lines. The aperture is semilunar, often furnished with a small tongue.

It occurs chiefly in the coralline-gravel and grows to a length of 8 mm.

Fig. 415: Stout form, with sudden increase of the size of the chambers.

Fig. 416: A longitudinal section of the same.

Fig. 417: More pointed form.

Fig. 418: The aperture furnished with a tongue.

Syn. Dentalina foedissima	Rss., 1859, Kreidef. Westphal.; Wien. Ak. Sitz.-Ber. 40, p. 189, t. 3, figg. 2—3.
Haplostiche »	Rss., GEINITZ' Elbthalgeb. Sachs., 1873, 2, p. 121, t. II. 24, figg. 1—3.
» »	FRIÉ'S Modell. 2.
? Nodosaria constricta	Rss., 1845, Böhm. Kreide. 1, p. 26, t. 13, figg. 12—13.
? Haplostiche »	Rss., 1873, GEINITZ Elbthalgeb. Sachs. 2, p. 122, t. II. 24, figg. 9—12.
» dentalinoides, clavulina	Rss., ibid. p. 121, t. II. 24, figg. 4—8.
» horrida	SCHWAG., 1863, Jurass. Sch.; Würtemb. nat. Verein. Jhrhft. 21, t. 2, fig. 2. (an <i>Lit. scorpiurus</i> var.).

Lituolina irregularis RÖM.

Tab. XII, figg. 419—420.

As I am unable with any degree of certainty to identify *Lituolites deformis* (alias »*difformis*») LMCK. (Encycl. méth. Moll. Test. t. 466, fig. 1; Ann. Mus. 8, t. 62, f. 13) on account of it being less satisfactorily delineated, ROEMERS designation must be applied to this form, which is of the same shape as *Haplophragmium crassum* REUSS, an inflated form of *Lit. canariensis* D'ORB., which is to be regarded as a juvenile form of *Lit. irregularis*.

Since the difference between this species and its variety, *Lit. nautiloidea* LMCK. consists only in the chambers of the latter being subdivided, it is not always possible to refer their different designations by various authors to their proper places in a list of synonyms.

Our form has a tolerably compactly built shell composed of coarse polished grains of siliceous sand. The aperture is narrow and sometimes replaced by a number of pores; the chambers undivided.

It is sparsely met with in the coralline-gravel.

A) libera:

a) minus inflata:

- | | |
|-----------------------------------|--|
| Syn. <i>Spirolina irregularis</i> | RÖM., 1841, Verstein. nordd. Kreidegeb. p. 98, t. 15, fig. 29. |
| » <i>lagonalis</i> | RÖM., ibid. fig. 28. |
| » <i>æqualis</i> | RÖM., ibid. fig. 27. |
| ? <i>Haplophrag. irregulare</i> | FRICS Modell. N:o 4 (an <i>Lit. nautiloidea</i> LMCK.). |
| <i>Spirolina irregularis</i> | Rss., 1845, Böhm. Kreide 1, p. 35, t. 8, figg. 62—66, 75. |
| <i>Haplophragm. irregulare</i> | Rss., 1859, Westphäl. Kreidegeb.; Wien. Ak. Sitz.-Ber. 40, p. 219, t. 11, fig. 1. |
| » <i>æquale</i> | Rss., ibid. p. 218, t. 11, figg. 2—3; 1862, Nordd. Hills. u. Gault.; Wien. Ak. Sitz.-Ber. 1. 46, p. 29, t. 1, figg. 1—7. |
| <i>Spirolina agglutinans</i> | D'ORB., 1846, For. Bass. tert. Vienne, p. 137, t. 7, figg. 10—12. |
| <i>Lituola nautiloidea</i> var. | PARK. et JONES, 1860, For. Chellaston; Quart. Journ. geol. Soc. 16, p. 453, t. 20, fig. 47. |
| <i>Spirolina grandis</i> | Rss., 1854, Kreide Ostalp.; Wien. Ak. Dkschr. 7, p. 69, t. 25, fig. 14. |
| » <i>simplex</i> | Rss., 1855, Tert. Schicht. nördl. u. mittl. Deutschl.; Wien. Ak. Sitz.-Ber. 1. 18, p. 232, t. 2, fig. 30. |
| <i>Haplophragm. rectum</i> | BRADY, 1876, Carbonif. and Perm. Foranf.; Pal. Soc. 30, p. 66, t. 8, figg. 8—9. |
| » <i>suprajurassicum</i> | SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Verein. Jhrhft. 1865, p. 92, t. 2, fig. 1. |
| » <i>tuba</i> | GÜMB., 1868, For. nordalp. Eocän.; K. Bayr. Ak. Wiss. 1. 10. 2, p. 600, t. 1, fig. 1. |
| » <i>lituus</i> | KARR., 1861, Marin. Tegel Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 44, p. 450, t. 2, fig. 7. |
| <i>Spirolina Humboldti</i> | Rss., 1851, Sept. Thon v. Berlin; Zeitschr. deutsch. geol. Ges. 3, p. 65, t. 3, figg. 17—18. |
| <i>Haplophragm. Humboldti</i> | Rss., 1865, deutsch. Sept. Thon; Wien. Ak. Dkschr. 1. 25. 1, p. 119, t. 1, figg. 1—4. |

- Syn. **Haplophragm. Humboldti** HKEN., 1875, Clav. Száb. Sch. p. 11, t. 2, figg. 3—4.
- Spirolina Sacheri** Rss., 1850, Kreidemergel Lemberg; Haid. Nat. Abh. 4. 1, p. 31, t. 2, figg. 3—4.
- Nonionina canariensis** D'ORB., 1844, Iles Canaries p. 128, t. 2, figg. 33—34.
- Placopsilina canariensis** PARKER et JONES, 1858, For. Coast. of Norway; A. M. N. H. (2) 19, p. 301, t. 10, figg. 13—14.
- Nonionina Jeffreysii** WILLIAMS., 1858, Brit. rec. Foramf. p. 34, figg. 72—73.
- » **placenta** Rss., 1851, Sept. Thon Berl.; Ztschr. d. geol. Gesellsch. 3. p. 72, t. 5, f. 33.
- Lituola canariensis** CARPENT., 1862, Introduct. t. 6, figg. 39—40.
- » **nautiloidea** var. **canariensis** PARKER et JONES, 1865, North. Atl. and Arct. Oceans.; Phil. Trans. 155, 1, p. 406, t. 15, fig. 45; t. 17, figg. 92—95.
- Cristellaria aspera** ALTH, 1849, Umgeb. Lemberg; Haid. Nat. Abh. 3. 2, p. 268, t. 13, fig. 24.
- Haplophragm. grande** Rss., 1865, Kanara See; Wien. Ak. Sitz.-Ber. 52, p. 446, fig. 3.
- » **incisum, maoricum** STACHE, 1865, Tert. Merg. Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 166, t. 21, fig. 1—2.
- » **nonionoides** Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 30, t. 1, fig. 8.
- » **acutidorsatum, rotundidorsatum** HKEN., 1875, Clav. Száb. Sch., p. 12, t. 1, fig. 1—2.
- » **crassum** Rss., 1867, Steinsalzablager. Wieliczka; Wien. Ak. Sitz.-Ber. 1. 55, p. 62, t. 1, figg. 1—2.
- » **nanum** BRADY, 1881, Austro-Hung. Exped.; A. M. N. Hist. (5) 8, p. 406, t. 21, figg. 1; Wien. Ak. Dkschr. 1. 43. 2, p. 99, t. 2, fig. 1.
- Nonionina latidorsata** BORNEM., 1855, Sept. Thon Hermsdorf; Ztschr. deutsch. geol. Ges. 7, p. 339, t. 16, fig. 4.
- b) inflata:
- Orbignyina ovata** v. HAGEN. Rügen. Schreibekr.; Leonh. u. Bronn. Jhrb. 1842, p. 573, t. 9, fig. 26.
- Haplophragm. ovatum** Rss., 1861, Kreide v. Rügen; Wien. Ak. Sitz.-Ber. 1. 44, p. 329, t. 5, figg. 8—9.
- Nonionina inflata** ALTH, 1849, Umgeb. Lemberg; Haid. nat. Abh. 3. 2, p. 266, t. 13, f. 22.
- Lituola ovata** MARSS 1877, Rüg. Schreibekr.; Greifsw. Mitth. Nat. Ver. p. 171, t. 5, f. 40.
- Spirolina inflata** Rss., 1850, Kreidem. Lemberg; Haid. nat. Abh. 4. 1, p. 32, t. 2, fig. 5.
- Haplophragm. inflatum** KARR., 1861, Marin. Tegel Wien. Beck.; Wien. Ak. Sitz.-Ber. 1. 44, p. 449, t. 2, fig. 6.
- » » FRIČS Modell. N:o 3.
- ? » **subglobosum** (SARS) BRADY 1882, Österr. Ung. Exped.; Wien. Ak. Dkschr. 43. 2, p. 100.
- ? **Cyclammina cancellata** NORM., 1876, Proc. Roy. Soc. 25, p. 214.

B) adnata:

- Placopsilina irregularis, cenomana**, D'ORB., 1850, Prodröm. Palæontol. 2. p. 185.
- » » FRIČS, Modell. N:o 1.
- » » Rss., 1854, Kreide Ostalp.; Wien. Ak. Dkschr. 7, p. 71, t. 28, fig. 4—5.
- » » »Oeufs de mollusques» CORN., 1848, Nouv. foss. micr. cret.; Mém. Soc. géol. France (2) 3, t. 2, fig. 36.
- Lituola cenomana** forma **placopsilina** CARPENTER, 1862, Introd. t. 11, figg. 11—14.

Appendix.

Cameris compositis:

- Lituolites nautiloidea** LMECK., 1816, Tabl. Encyclop. méth.; Moll. test., tab. 465, fig. 6 et Ann. d. Mus. 8, t. 62, fig. 12.
- Spirolina nautiloides** D'ORB., 1826, Tab. méth.; An. Sc. Nat. 7, p. 287. N:o 6.

Syn. <i>Lituola nautiloides</i>	D'ORB., 1839, For. Craie bl. Paris; Mém. Soc. geol. France 4, p. 29, t. 2, figg. 28—31.
»	»
»	D'ORB., 1846, For. Bas. tert. Vienne p. 138, t. 21, figg. 20—21.
»	»
»	Rss., 1859, Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 220, t. 10, figg. 5—8.
»	<i>nautiloidea</i>
»	BRADY, 1876, Carbonif. and Perm. For.; Palæontogr. Soc. 30, p. 63, t. 8, fig. 7.
»	»
»	CARPENT., Introd. t. 6, fig. 44.

Lituolina irregularis var. *compressa* n.

Tab. XII, figg. 421—423.

This form seems nearly identical with *Haplophragmium acutidorsatum* HANTKEN from the Clavulina Száboi strata in Hungary.

Compressed forms of *Lituolinæ* have seldom come under notice, but this surpasses in flatness all such described forms being probably a star ved variety of the type. It is on both sides somewhat umbilicated; somewhat rough or scrobiculate, and appears as if felted together of siliceous needles and a smaller quantity of grains of sand, whence the surface presents a sericeo-tomentous aspect. The septal lines are very indistinct. The adult shows a tendency to become litiiform, the aperture being placed near the top of the last chamber, otherwise it has its ordinary Nonioninoid shape and place. Since the principal constituents of the shell are hyaline and colourless in themselves, it is evident that its rust-colour is not derived from any materials with colour of their own but from the partly precipitated and partly secreted, coloured cementing matter.

Raphidohelix elegans MÖB., Mauritius p. 76, t. 2, fig. 2 seems to belong to this variety; perhaps also *Haplophragmium foliaceum* BRADY, Qu. J. Micr. Sc. (N. S.) 81, p. 50.

It is scantily met with in the coralline-gravel.

Fig. 421: sideview.

Fig. 422: edgeview.

Fig. 423: Thin section showing the texture of the test and the faintly marked septa.

Lituolina irregularis var. *globigerinæformis* PARK. and JONES.

Tab. XII, figg. 424—425.

Notwithstanding the suggestive assumption advanced by some most able and experienced investigators as to the true *Globigerine* nature of this form, its arrangement of chambers and apertures being so characteristic »as to leave no room for doubt that these forms are true *Globigerinæ* and not *Lituolæ*» (G. C. WALLICH, M. D., Deep-sea-researches on the biology of *Globigerina*, Lond. 1876, p. 63), and although there is occasionally associated with it a *nautiloid* form with globular chambers exactly in con-

formity with that form of *Globigerina*, previously mentioned, I still provisionally and until further evidence has been adduced, place this form under *Lituolina*.

The shell is very thin, but firmly constructed of polished uniform grains of sand, rendering its surface in comparison with other sandstructures smooth and neat, and the septal lines nearly as distinct as in *Globigerina bulloides*.

It is not frequent, but occurs both in the coralline-gravel and chalk-ooze.

Fig. 424: outer form.

Fig. 425: Longitudinal section through the medial plane.

- Syn. *Lituola nautiloidea* var. **globigerinæformis** PARK. et JONES, 1865, North. Atl. and Arct. Oc.; Phil. Transact. 155, 1, p. 407, t. 15, figg. 46—47; t. 17, figg. 96—98.
 ” ” WALLICH, 1862, N. Atl. seabed. t. 6, figg. 22.
 ? ” **glomerata** BRADY, 1879, Retic. and Rad. of the Arctic Exp. 1875—76; A. N. H. (5) 1, p. 433, t. 20, figg. 1 a—c.
Haplophragmium globigerinæforme BRADY 1882. Österr. Ung. Exped.; Wien. Ak. Dkschr. 43. 2, p. 100.

Hyperammia elongata BRADY.

Tab. XII, figg. 426—429.

The generic separation of this form from the closely allied *Rhabdammina linearis* BRAD. and *Rh. abyssorum* SARS. seems uncalled for, and not quite appropriate from a systematical and biological point of view; for it is likely that *Hyperammia* should be regarded as a single-armed *Rhabdammina*. I still keep these forms asunder until further evidence of their unity may be produced.

Our form is usually a long, slender, seldom quite straight tube, constructed of siliceous sand and a large portion of sponge-needles, very brittle and with moderately thick walls. Sometimes it becomes so enlarged in the transverse direction as to approach a produced ovoid form.

It reaches a length of 15 mm. and is met with on the coralline-gravel and in the chalk-ooze.

Fig. 426: The common form of a halfgrown specimen.

Fig. 427: The same cut open.

Fig. 428: Aperture.

Fig. 429: Ovoidal form.

- Syn. **Hyperammia elongata** BRADY, 1879, Retic. and Radiol. of the Arctic Exp. 1875—76; A. M. N. H. (5) 1, p. 433, t. 20, figg. 2 a, b.; A. M. N. H. (5) 1. p. 425, t. 20, f. 2.

Appendix.

- Syn. **Hyperammia ramosa** BRADY, 1879, Retic. Rhizopod. Challenger-Exped.; Qu. Journ. micr. sc 73, p. 33, t. 3, figg. 14—15.

Rhabdammina abyssorum Sars. var. **robusta** n.

Tab. XII, figg. 430—431.

As far as I am aware of, the type form has not been described except in a short notice in the last Edit. of GRIFFITHS and HENFREY'S Micrograph. Dictionary, and in »Descript. Catalogue of objects from Deep-sea dredgings exhibited at the Soirée of the Roy. Microscop. Soc. Kings College 1870, by W. B. CARPENTER.»

Our form has a very brittle test, composed entirely of siliceous sandgrains. Its »body» displays at the roots of its 3 or 4 arms a tendency to swelling, corresponding to the swelling or bulb in the early stage of *Hyperammina*. The arms radiate in the same plane, tapering gradually at their ends, which are furnished with a central, narrow and round aperture.

It is scantily met with in the coralline-gravel attaining a length of 16 mm.

Fig. 430: Three-armed specimen.

Fig. 431: Four-armed.

Syn. **Rhabdammina abyssorum** Sars., 1868, Fortsatte Bemærkning. over det dyriske Livs Utbredning i Havets Dybder; Christiania Vid. Selsk. Forhandl. 1868, p. 248 (nec descripta nec delineata).

Appendix.

Syn. **Rhabdammina linearis** BRADY, 1879, Retic. Rhizop. Challenger-Exp.; Quart. Journ. microsc. sc. 73, p. 37, t. 3, figg. 10—11.

Jaculella acuta BRADY.

Tab. XII, fig. 432.

Provisionally I refer our form to this species although not convinced either as to the true nature of these organisms or of their identity. Ours is slender with a very narrow channel, which here and there exhibits very faintly traces of septa.

It is not common in the coralline-gravel.

Syn. **Jaculella acuta** BRADY, 1879, Reticul. Rhizopod. Challenger-Exped.; Quart. Journ. microsc. sc. 73, p. 35, t. 3, figg. 12—13.

APPENDIX.

To the lists of synonyms are to be added the following names adopted by Mrs. J. G. BORNEMANN and J. F. BLAKE in their valuable essays, resp. from 1854 and 1876, on the *Liasformation*, which have been partly omitted in this paper. There are also a few other omissions remarked.

Nodosarina radicula LIN. p. 12.

- Syn. **Glandulina rotundata, tenuis, major; Orthocerina pupoides** BORNEMANN, 1854, *Liasformat. Göttingen* p. 31, t. 2, figg. 1—4; p. 35, t. 3, fig. 16.
 » **humilis, cuneiformis** BLAKE, 1876, *Yorkshire Lias* p. 454, t. 18, figg. 11—12.
Dentalina tecta, nodosa BLAKE, l. c. p. 459, t. 18, figg. 25—26.
Fronicularia intumescens BLAKE, loc. cit. p. 468, t. 19, fig. 21 pertinet ad variet. in *Nodos. complanata* transientem: d) p. 14; aut forsan ad *Nodos. carinata* d'ORB.

Nodosarinæ radiculæ forma **Orthocerina** p. 14.

- Syn. **Orthocerina hæringsensis, rhomboidalis** BLAKE, 1876, *Yorkshire Lias* p. 469, 470, t. 17, figg. 29—30.

Nodosarina radicula var. **monile** SOLD. p. 14.

- Syn. **Nodosarina radicula** BLAKE, 1876, *Yorkshire Lias* p. 456, t. 18, fig. 17.
Glandulina laguncula BORNEMANN, 1854, *Liasformation Göttingen* p. 32, t. 2, fig. 5 (forsan ad b typicam, p. 18, pertinens).
Dentalina oligostegia BLAKE, loc. cit. p. 458, t. 18, fig. 21 (in *Nodos. communem*, d) p. 19, transiens).

Nodosarina radicula var. **raphanus** LIN. p. 21.

- Syn. **Glandulina quinquecostata, sexcostata, septangularis, melo, abbreviata, costata, Orthocerina multicostata** BORNEMANN, 1854, *Liasformation Göttingen* p. 32—35, 39, t. 2, figg. 6—12; t. 3, figg. 14—15, 26.
Nodosarina raphanus, raphanistrum BLAKE, 1876, *Yorkshire Lias* p. 456, 457, t. 18, figg. 14—18.

- Syn. **Glandulina paucicosta** BLAKE, loc. cit. p. 455, t. 18, fig. 13; t. 19, figg. 1—1a.
Dentalina burgundiae, nummulina BLAKE, loc. cit. p. 461, t. 18, figg. 29—30.
Lingulina tenera BORNEMANN, loc. cit. p. 38, t. 3, fig. (24 ad var. d) p. 23 pertinens).
 » **tenera, striata** BLAKE, loc. cit. p. 455, t. 18, figg. 15—16 (eandem ad var. pertinentes).
Fronicularia nodosaria BLAKE, loc. cit. p. 469, t. 17, fig. 44; t. 19, fig. 24: var. in *Lingulinam transiens* = *Lingul. semiornata* Rss., in p. 24 omitta.
Lingulina semiornata Rss., 1862, Nordd. Hils u. Gault; Wien. Ak. Sitz.-Ber. 1. 46, p. 91, t. 12, fig. 11 (ad varietatem inter f) et g) p. 24 pertinens; = *Nod. radiculara* var. *raphanus* in *Nod. carinatum transiens*).

Nodosarina communis D'ORB. p. 26.

- Syn. **Dentalina brevis** BLAKE, 1876, Yorkshire Lias p. 459, t. 18, fig. 24; ad var. *a* p. 26 pertinens.
 » **monilis, pauperata** BLAKE, loc. cit. p. 458, 459, t. 18, figg. 23, 27; ad *b* p. 28 pertinens.
 » **planata** BLAKE, loc. cit. p. 458, t. 18, fig. 22; ad *c* p. 30 pertinens.
 » **communis** BLAKE, loc. cit. p. 457, t. 18, fig. 19; ad var. *d* p. 30 pertinens.
 » **subarcuata** WILLIAMS., 1858, Brit. rec. For. p. 18, fig. 40; ad eandem pertinens.

Nodosarina communis var. **obliqua** LIN. p. 31.

- Syn. **Dentalina funiculosa** BLAKE, 1876, Yorkshire Lias p. 461, t. 18, fig. 28; ad *a* p. 31 pertinens.
 » **rapa** BLAKE, loc. cit. p. 460, t. 19, fig. 3; ad *b* p. 32 pertinens.
 » **obliquestriata** BLAKE, loc. cit. p. 460, t. 19, fig. 4; ad *c* p. 33 pertinens.

Nodosarina legumen LIN. p. 34.

- Syn. **Margin. reversa, depressa, Crist. pauperata** BLAKE, 1876, Yorkshire Lias p. 461—465, t. 18, fig. 31, t. 19, figg. 9, 12; ad *c* p. 36 pertinentes.
Cristellaria protracta, Listi BORNEMANN, 1854, Liasformation Göttingen p. 39, 40, t. 4, figg. 27—28, ad *c* p. 36 pertinentes.
Planularia arguta BLAKE, loc. cit. p. 2, 64, t. 19, fig. 10; ad *d* p. 37 pertinens.
Vaginulina Hausmanni BORNEMANN, loc. cit. p. 38, t. 3, fig. 25; ad *e* p. 37 pertinens.
Margin. Römeri, Vagin. legumen BLAKE, loc. cit. p. 463, 464, t. 19, figg. 8, 11; ad *e* p. 37 pertinentes.

Nodosarina legumen var. **linearis** MONTAG. p. 39.

- Syn. **Marginulina rugosa** BORNEMANN, 1854, Liasformation Göttingen p. 39, t. 3, fig. 26.
 » **raphanus, picta** BLAKE, 1876, Yorkshire Lias p. 462, t. 19, figg. 5—6; ad *a* p. 39 pertinens.
 » **inæquistriata** BLAKE, loc. cit. p. 462, t. 19, fig. 7; ad *b* p. 40 pertinens.

Nodosarina Crepidula FICHT. et MOLL. p. 43.

- Syn. **Cristellaria recta** BLAKE, 1876, Yorkshire Lias p. 465, t. 19, fig. 13; t. 17, fig. 24; ad var. *a* p. 43, aut ad *Nod. legumen* var. *c* p. 36 pertinens.
- » **Bronnii** BLAKE, loc. cit. p. 466, t. 17, fig. 26; ad var. *a* p. 43 pertinens.
- » **crepidula, major** BLAKE, loc. cit. p. 465, 466, t. 17, fig. 25; t. 19, figg. 14—15; forma typica p. 44.
- » **globifera** BLAKE, loc. cit. p. 467, t. 19, fig. 17; typicæ forma inflata.
- Flabellina rugosa** BLAKE, loc. cit. p. 467, t. 19, fig. 19; ad formam *c* p. 46 pertinens.
- Cristellaria varians** BLAKE, loc. cit. p. 466, t. 17, fig. 27; t. 19, fig. 16, ad *d* p. 46 pertinens.
- » **navis** BORNEMANN, 1855, Sept. Thon Hermsdorf; Zeitschr. deutsch. geol. Ges. 7, p. 338, t. 14, figg. 4—5; ad eandem *d* pertinens.

Nodosarina crepidula var. **italica** DEFR. p. 47.

- Syn. ? **Vaginulina anomala** BLAKE, 1876, Yorkshire Lias p. 464, t. 17, fig. 23.

Nodosarina calcar LIN. p. 50.

- Syn. **Cristellaria rotulata** BLAKE, 1876, Yorkshire Lias p. 467, t. 19, fig. 18.
- ? » **lituoides, spiroлина** BORNEMANN, 1854, Liasformation Göttingen p. 40, t. 4, figg. 29—30; ad var. *g* p. 55 forsau pertinentes.

Nodosarina complanata DEFR. p. 56.

- Syn. **Frondicularia complanata** BLAKE, 1876, Yorkshire Lias p. 468, t. 19, fig. 20.
- » **brizæformis** BORNEMANN, 1854, Liasformation Göttingen p. 36, t. 3, figg. 17, 18, 20.

Nodosarina complanata var. **striata** D'ORB. p. 42.

- Syn. **Frondicularia Terqvemi, sulcata** BLAKE, 1876, Yorkshire Lias p. 468, 469, t. 19, figg. 22—23.
- » **lignaria** BLAKE, loc. cit. p. 468, t. 17, fig. 28; ad β . p. 42 pertinens.

Nodosarina carinata D'ORB. p. 58.

- Syn. **Frondicularia intumescens, major** BORNEMANN, 1854, Liasformation Göttingen p. 36, t. 3, figg. 19, 21.

Bulimina pupoides D'ORB. p. 63.

Syn. ?*Bulimina textilariformis, arcuata* STACHE, 1865, Tert. Mergel Whaingar. Hafen; Novara Reise, geol. Th. 1. 2, p. 268, 269, t. 24, figg. 17—18 (an *Pleurostomella* Rss. sede incerta).

Textularia sagittula DEFR. p. 72.

Syn. *Textularia agglutinans* BLAKE, 1876, Yorkshire Lias p. 472, t. 17, fig. 37.
Bigenerina mitrata TRAUTSCHOLD, 1879, Kalkbrüche v. Mjatschkowa; Nouv. Mém. Soc. impér. nat. Mosc. 14, p. 47, t. 6, figg. 6a—c; eadem ac *B. patula* BRAD. p. 78 = *Cribrostomum patulum* v. MÖLLER 1880.

Textularia Pennatula BATSCH. p. 79.

a) typica:

Syn. *Nautilus* (Orthocer.) *Pennatula* BATSCH, 1791, Sechs Kupfertaf. etc. t. 4, figg. 13 a—c (sec. PARK. et JONES).
Vulvulina Capreolus D'ORB., 1826, Tabl. méth., Ann. Sc. Nat. 7, p. 264, N:o 1, t. 11, figg. 5—8.
 » *pupa* D'ORB., ibid. N:o 2.
 » ? *subrhomboidalis, textilis* SCHWAG., 1863, Jurass. Sch.; Würtemb. Nat. Ver. Jhrft. 21, p. 140, t. 7, figg. 17—18.
Grammostomum dilatatum Rss., 1851, Tert. Sch. Oberschles.; Ztschr. deutsch. geol. Ges. 3, p. 162, t. 8, fig. 8.

b) marginato-aculeata vel marg.-lobulata:

Grammostomum aculeatum EHRENB., 1854, Microgeol. t. 35 B, fig. B: A. p.
 » *apiculatum* EHRENB., ibid. t. 26, fig. 7.
 ? *Vulvulina alata* SEG., 1862, Rhizopod. Catania; p. 31, t. 2, fig. 5. (Accad. Gioena Atti (2) 18).
 » *pectinata* HKEN., 1875, For. Clav. Száb. Sch. p. 68, t. 7, fig. 10.
 ? *Bolivina draco* MARSS., 1876, Rügen. Schreibekr.; Greifsw. Nat. Verein. Mitth. 1877—78, p. 157, t. 3, fig. 25.

c) cameris acuminatis, productis:

Vulvulina elegans D'ORB., 1826, Tabl. méth.; Ann. Sc. nat. 7. p. 264, N:o 3.
 » *gramen* D'ORB., 1839, Cuba p. 148, t. 1, figg. 30—31; 1846, Bass. tert. Vienne p. 251, t. 21, figg. 46—47.
 ? *Ehrenbergina serrata* Rss., 1849, Neue Foramf. Wien. Beck.; Wien. Ak. Dkschr. 1. 1, p. 377, t. 48, fig. 7.

d) forma Bigenerinæ:

Schizophora Neugeboreni Rss., FRICS Model. N:o 80.

” ” KARR., 1877, Hochquell. Wasserleitung; Österr. geol. Reichsanst. Abh. 9, p. 386, t. 16, fig. 51.

Venilina nummulina, hæringensis GÜMB., 1868, Nordalp. Eocän.; K. Bayer. Ak. Wiss. 1. 10. 2, p. 648, 649, t. 2, figg. 84—84 bis.

Schizophora hæringensis HKEN., 1875, Clav. Száb. Sch. p. 68. t. 7, fig. 3.

d. β) cameris productis:

Bigenerina nicobarica SCHWAG., 1867, For. Kar. Nikobar.; Novara Reise, geol. Th. 2. 2, p. 196, t. 4, fig. 7.

Corrigenda.

- Pag. 14: **Fronicularia Stachei** KARR. is rather to be referred to e β) p. 24.
- » 16: **Dentalina subnodosa** Rss. is a **Pleurostomella** Rss., Westphäl. Kreide; Wien. Ak. Sitz.-Ber. 40, p. 204, t. 8, fig. 2, as is also partly **Nodosaria nodosa** Rss. p. 29.
- » 24: Under head e β second line stands 15, should be 14.
- » 32: 11th line from below stands, t. 12, fig. 13, should be t. 4, fig. 6.
- » 45: **Cristellaria Cassis, Soldanii** D'ORB. should rather be referred to **Nodosaria crepidula** var. **Cassis** FICHT. et MOLL. p. 49.
- » 46: **Planularia pauperata** PARK. et JONES may perhaps more properly be ranged under d) p. 37.
- » 72: 2nd line stands Tab. IV, should be Tab. V.
- » 76: **Textularia Mariæ** D'ORB. and its proximate forms could possibly be ranged as separate variety under *Text. sagittula* DEFR.
- » 96: Some of the synonyms under *Planorbulina lobatula* WALK. may be more properly referred to the *Truncatuline* form of *Planorb. Ungeriana* D'ORB.
- » 103: 17th line: (apertural) should be cancelled.
- » » 21st line: upper also to be cancelled.
- » » 22^d line: upper to be replaced by attached.
- » » 23^d line: apertural should be free.
- » 107: **Discorbina Berthelotiana**: Our form has its pores quite as fine and closely set as a **Pulvinulina**. In their »Nomenclature of Foraminifera« Messrs. PARKER & JONES also have referred EHRENBERG'S **Spiroplevrites nebulosus** to **Pulvinulina** (A. M. Nat. Hist. (4), 10) and notwithstanding its Discorbinalike habitus it may prove to be a distinct species of that genus.
- » 108: **Discorbina vesicularis** LMK. var. **elegans** D'ORB. may prove to be a starved **Polystomella crassula** WALK. var. **asterisans** FICHT. & MOLL. This species has its pores somewhat larger and more scattered than the most of this genus.
- » 111: **Pulvin. repanda** var. **punctulata** PARK. & JONES may prove to belong to another species.
- » 115: **Nonionina crassula** WILLIAMS. should be referred to d) **asterisans** p. 116 and replaced by **Non. Barleana** WILLIAMS. **N. umbilicata** D'ORB. and a few more of those synonyms placed under b) p. 115.
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Corrigenda.

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