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FORAMINIFERA
PART I. THE ICE-FREE AREA OF THE FALKLAND
ISLANDS AND ADJACENT SEAS

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By Edward Heron-Allen, F.R.S., and Arthur Earland, F.R.M.S.

(Plates VI–XVII, text-fig. 1)

INTRODUCTORY NOTE

THE bottom deposits received from the R.R.S. 'Discovery' and the R.R.S. 'William Scoresby' cover a very wide area. Apart from gatherings made *en route*, which are too widely scattered to yield much information except as regards new species contained therein, some of which have been already described by us in the *Journal of the Royal Microscopical Society*,¹ they include detailed surveys of the sea bottom in

- (1) the seas surrounding the Falkland Islands,
- (2) the South Georgia area,
- (3) the South Sandwich, the South Orkneys, the South Shetlands and off the coast of the Antarctic Continent.

The Falkland Islands, being entirely outside the region of ice, form a definite area and constitute the subject of the present report.

THE FALKLAND AREA AND ITS FORAMINIFERA

The Falkland Islands—"Les Îles Malouines" of d'Orbigny and the French geographers—are an extensive group consisting of two large and many small islands situated between the 51–53 parallels of S latitude and the 57–61 meridians of W longitude. They stand on the Continental Shelf which here extends for many hundreds of miles from the South American coastline, sweeping out in a broad tongue to include the islands. To the west and north of the group comparatively shallow water extends over an enormous area, but on the south and east of the islands deeper water approaches their shores and separates them from the great Burdwood Bank lying to the south of the islands. This is an outlier of the Continental Shelf and is separated from the mainland and from the Falkland Islands by over 100 miles of deep water. The 500-fathom line envelops both the bank and the islands.

The Falkland Islands are in the sub-Antarctic region, lying between the surface isotherms of 6° and 12° C., and are therefore well outside the northernmost extension of pack-ice. Most of the water passing Cape Horn and flowing up to the Falklands is of

¹ On the Pegididae, a new Family of Foraminifera, Vol. XLVIII, 1928, pp. 283–99, pls. i–iii, fig. 1. Some new Foraminifera from the South Atlantic, No. 1, Vol. XLIX, 1929, pp. 102–8, pls. i–iii: No. 2, Vol. XLIX, 1929, pp. 324–34, pls. i–iv: No. 3, Vol. L, 1930, pp. 38–45, pl. i.

6–8° C. temperature. It is of Pacific origin, and some of it probably comes down the western coast of South America and, being swept through the Drake Straits with the Pacific water of the West Wind Drift, would naturally turn up by the Falklands as soon as it passes Cape Horn, which, projecting southwards, to some extent dams back the flow of water. The West Wind Drift proper passes well to the south of the Falklands, through the deep channel separating the Falklands from South Georgia, and so into the Atlantic Ocean. The Pacific water, diverted northwards, forms the Falkland Islands Current, encircling the islands.

Evidence of the general low temperature of the water for the latitude is afforded by:

- (1) the types of Foraminifera dominant in the bottom deposits,
- (2) the absence or paucity of other types usual in such latitude.

As an example of (1) we may quote *Cassidulina crassa*, which is universally distributed in our material and frequently forms a major portion of the organic remains. Although of almost world-wide distribution, this species is definitely a "cold area" form, and is found in similar abundance in the cold areas of other oceans.

As an example of (2) we may quote the genus *Spiroloculina*, which is unrepresented in our Falkland material, although one of the commonest shallow-water forms in warm and temperate seas all over the world. In the northern hemisphere, under the influence of the warm Atlantic current (Gulf Stream), the genus is abundantly represented by several species at least as far north as the Shetland Islands, which are in about the same latitude as the Orkney Group in the southern hemisphere.

The area covered by the stations is very extensive, as they spread over the sea bottom roughly between 48–54° S and 57–68° W, which is more than the entire area of the North Sea from Texel to the Shetlands, and from the shores of Great Britain to the Continent. Nevertheless, owing to the enormous extension of the Continental Shelf and the uniformly low bottom temperature, there is no great variety in the samples, except as regards the fauna of the stations on the Shelf, and the fauna of the few deeper water stations outside the Continental Shelf, which are under more normal benthic conditions.

From the samples it would appear that the thousands of square miles of sea bottom on the Continental Shelf consist of comparatively barren wastes of gravel and sand, usually brown in colour. The larger grains are generally rounded, sometimes highly polished, notably so at stations WS 92, 95, 219, 221, indicating either that they have travelled a great distance, or that they are kept in constant motion by currents and wave action.

There is, as a rule, little mud¹ present in any of the deposits from the area to the south and the west of the islands, within a line from Eddystone Light to Cape Tres Puntas. Its absence may perhaps be due to the action of the current which passes to the west of the islands, for the percentage of mud increases to the north of the islands and in their lee, as it were, and the sand grains are smaller and more angular. Broken shells, often covered with sessile Foraminifera, form an important percentage of the total bulk at some stations, indicating a variety and abundance of organic life which is elsewhere absent.

¹ Samples taken in the conical dredge, which has a canvas bag, probably lose a small proportion of the mud present.

The number of Foraminifera present in these "Shelf" stations varies enormously, and as the bottom conditions are otherwise very similar, we are inclined to the view that they are influenced very largely by the Falkland Islands current, which no doubt brings with it large food supplies in the shape of diatoms and other micro-plankton. At stations WS 86 and 87 on the Burdwood Bank, and at station WS 88 which is in line with them to the westward, just within the curving southern extremity of the Continent, Foraminifera are abundant and form a large proportion of the bottom deposit. There is a similarly abundant fauna at stations WS 83, 84, 91, 92, farther north, where the current divides to encircle the islands. But as we get farther away from the entrance point of the current, and especially as we approach the Continental shore, the sand becomes increasingly barren of Foraminifera (stations WS 77, 78, 79, 80, 90, 94, 95, 108) until, at station WS 96, which is near Port Desire, they are practically absent. They reappear in some abundance in the stations to the north of the islands on the edge of the deeper water, near the mud line.

There is a monotonous sameness in the foraminiferal fauna over the whole of the Shelf area, and on a casual inspection it appears to be almost identical at the majority of stations and to consist of a few species only:

<i>Cassidulina crassa</i>	<i>Truncatulina lobatula</i>
<i>Cassidulina subglobosa</i>	<i>Truncatulina refulgens</i>
<i>Cassidulina parkeriana</i>	<i>Truncatulina akneriana</i>
<i>Ehrenbergina pupa</i>	<i>Truncatulina ungeriana</i>
<i>Uvigerina angulosa</i>	<i>Anomalina vermiculata</i>
<i>Globigerina</i> —several species	<i>Pulvinulina karsteni</i>
<i>Pullenia subcarinata</i>	

These few species as a rule, in one combination or another, form the bulk of the material with either *Cassidulina crassa* or *Uvigerina angulosa*, or the two together, assuming a dominant position, even among what appears to be a very limited fauna. At some of the stations, *Cassidulina crassa* was estimated to form 90–95 per cent of the cleaned material, at others *Uvigerina angulosa* probably formed an equally high proportion. The occurrence of a species in such overwhelming numbers might be expected to produce many abnormalities, and it is therefore worthy of mention that abnormal specimens are extremely rare.

It is only after the examination of a quantity of material that it becomes apparent that a really varied list of species is present at some of these stations, masked by the dominant forms. Station WS 83 may be quoted as an instance. The material was to all superficial appearances very unpromising, as *Cassidulinae* formed at least 90 per cent of the mass. But the remaining 10 per cent. proved to be extraordinarily rich and yielded some 200 species. The list could doubtless have been extended if time and more material had been available.

In a few instances, a species which usually occupies a subordinate position becomes almost dominant. As an example we may take *Spiroplectammmina bifornis*, a species of very wide distribution in many seas, though never common. It occurs at eleven stations,

often in considerable numbers, but always as an inconspicuous item in the fauna. But at station WS 76, where the fauna, though varied, was not rich, it appears as a dominant form. It does not occur at all at the nearest adjacent stations 51 and WS 73 which are in shallower water, and presumably the somewhat greater depth favoured its unusual development. But at present we know very little of the causes favouring the abnormal increase of a species in one locality as compared with another to all appearances identical.

Apart from the interest raised by the enormous development of these dominant forms, the Falkland fauna is itself full of interest. It includes many species of world-wide distribution as a matter of course, and many other species known from similar cold temperate waters in the northern hemisphere. As the Falkland Islands lie in approximately the same latitude as southern England it is not surprising that many typical British species figure in our lists. But it is rather a matter for wonder that some of the rarer British species (e.g. *Lagena millettii*, *Lingulina quadrata*, *L. translucida*) and others which we have known from British waters for many years but had not yet had an opportunity of describing (e.g. *Lingulina falcata*, *Patellinoides conica*, *P. depressa*) should also be found in such a distant locality. Considering their extreme rarity in each of these widely separated areas, it remains an insoluble problem how these species achieved their distribution across the deep water of the Atlantic, for their migration by the shore line would almost certainly be prevented by differences of temperature.

Yet in spite of general resemblances to the British fauna, there are certain species found in both areas which present differences in the Falklands suggesting a distinct local race, the variations seldom being sufficient in our opinion to justify varietal, much less specific distinction. *Lagena williamsoni* (Alcock) is one of the commonest British *Lagenae*. The type is a pyriform costate shell with 12-18 costae and hexagonal ornament on a collar round the neck. The Falkland form described under the name *L. vilardeboana* (d'Orbigny) is almost equally common in our area where we recorded it from eighteen stations. The costae are much more numerous but are weakly developed, and the hexagonal ornament is reduced to a series of pin-pricks on the collar. *Discorbis nitida* (Williamson), again, is a typical and fairly common British species. The Falkland Islands specimens are more concave on the ventral side, with an increased convexity of the dorsal side, generally more robust and less "*nitida*" than the type.

But in neither case should we have any hesitation in assigning the two races to the same species, and the differences are no doubt due to long isolation under somewhat varied conditions. Many similar cases could be quoted.

The Falklands possess several species which are either wholly or almost wholly peculiar to the area. Notable among these is *Ehrenbergina* (*Cassidulina*) *pupa*, first described by d'Orbigny in 1839 from these islands. He states that it is much rarer than *Cassidulina crassa*, but we record it from twenty-eight stations, and at some of them it is almost as common as that species. Outside the Falkland Islands it may be said to be almost unknown. The only records which can be accepted, even with suspicion, are from the west coast of Patagonia and from Rio de la Plata. Nor is it replaced in abundance

elsewhere by any other species of the genus. Its dominance in the Falklands is one more of those mysterious problems of distribution which need solution.

Elphidium (*Polystomella*) *lessonii* (d'Orbigny), which is a handsome species often common in the Falkland material, appears to be almost (if not wholly) confined to the area.

The species *Heronallenia* (*Discorbis*) *kempii*, which is one of the largest and certainly the handsomest species in the genus, appears to be confined to the Falklands, where it is found only in the southern area between the Burdwood Bank and a line running from the Magellan Straits round the southern shores of the islands. Its nearest relatives are almost wholly of Pacific habitat, and it appears unquestionable that this species is an immigrant of comparatively recent Pacific origin which has not yet had time to spread over the more distant parts of the Falkland area.

There are several other species which can be assumed to have migrated from the Pacific to the Falkland area, but in most cases there can be no definite proof owing to the paucity of records. We list several species which d'Orbigny recorded from the west coast of South America but not from the Falklands. But it would be very dangerous to regard these as immigrants on such evidence alone, in view of the notorious tendency of d'Orbigny to overlook, or disregard, species with which it is certain that he was familiar. The mere fact that he did not identify and name the dominant *Uvigerina angulosa*, one of the two commonest and most widely distributed of the Falkland species, is sufficient to prevent his records from being taken too seriously as evidence of extension of locality.

The species in regard to which there is the best and most definite evidence of extension of habitat is *Rotalia clathrata*, Brady. This is a common and typical species in Australian waters and is also found in the Miocene of Victoria. Between that area and the west coast of Patagonia, where it was found among the islands by the Challenger Expedition, there are no records of its occurrence. Now we record it from the Falklands at thirteen stations, nearly all of which are south of a line running from Magellan Straits round the southern shore of the islands. The finest examples, which are quite equal to the New Zealand types, came from the three stations WS 86, 87, 88, which lie stretched across the southern entrance to the Falkland area, between the extremity of the Continent and the Burdwood Bank, while at WS 89, 90, further north and nearer the Magellan Straits, the specimens are small and starved. The west of Patagonia specimens are stated by Brady to be smaller and weaker than the New Zealand type. It seems certain in this case that the species has reached the Falklands *via* the Horn and not by way of the Magellan Straits and that it is diminishing in size as it passes northwards into less favourable surroundings. If it had travelled *via* the Straits, its distribution would presumably have extended to the north of them as well as to the south.

There is of course an alternative possibility that the New Zealand, Patagonian and Falkland colonies are separate survivals from a Miocene sea in which the species occurred universally between these areas. But we have no geological information bearing on such a speculation beyond the fact that numerous fossil Foraminifera were found in the bottom deposits at several stations, particularly at station WS 87 on the Burdwood Bank, where they were found in such numbers as to suggest a submarine outcrop of some fossiliferous

strata in that locality. We have not attempted their identification, in fact it would be difficult to do so as many of the specimens are casts, and others so distorted by pressure and slipping as to be almost unrecognizable. In these features they bear a striking resemblance to the Foraminifera from some of the Naparima beds of Trinidad. The presence of *Rzehakina epigona* (Rzehak) among the Burdwood Bank specimens almost certainly indicates that these fossils are of Upper Cretaceous age, or Lowest Eocene at the latest. The specimens (with others) have been submitted to Dr W. A. Macfadyen who will report upon their geological significance in a later Part.

PREVIOUS WORK IN THE AREA

The Falkland Islands have a particular interest for students of the Foraminifera, inasmuch as they supplied material for one of the earliest regional surveys in the literature of the Order. D'Orbigny in his celebrated voyage to South America (1826-34) collected material in the Falkland Islands, and at many localities round the South American coast from St Blas on the Patagonian coast (*c.* 40° 60' S) to Payta on the Peruvian coast (*c.* 4° 07' S). We do not know much about the nature or extent of the material examined. D'Orbigny himself collected shore sands; he also obtained local gatherings from merchant captains, which may have been either shore sands or anchor muds. We know, from indications in his *Tableau Méthodique des Cephalopodes* (1826), that he derived many of his species from ballast sand (*sable de délestage*) obtained from ships, and we can only express the pious hope that such sands were not included in his South American material. Very few details as to depth are given. He records with pride the taking of a sounding "fait à de (*sic*) grandes profondeurs" in sight of land off Cape Horn. This sounding was taken at a depth of 160 m. only, with a deep-sea lead, and it is stated that forty specimens of Foraminifera belonging to five species were removed from the tallow of the arming. Elsewhere he records making a gathering in 12-20 m. depth, and with the exception of the Cape Horn sounding, which was evidently regarded as a great feat, this probably represents the limit of depth of his material, a factor of some importance in connection with any survey of his work.

After his return to France, d'Orbigny published his discoveries, including the celebrated monograph on the Foraminifera of South America (1839), a work of outstanding importance and deserving of study apart from its taxonomical value. Eighty-one species are described and mostly figured in this work, seventy-eight of which he regarded as new to science. Thirty-eight of the species were from the Falkland Islands, and fourteen from the adjacent coasts of Patagonia and Cape Horn, the remainder being from the Pacific coast. He naïvely remarks that his total of eighty-one species "sera sans doute augmenté lorsqu'on voudra soigneusement rechercher sur tout le littoral des deux océans," and after nearly a hundred years we are in the position to confirm his forecast by presenting a list of some 435 species from the Falkland area alone.

At great length d'Orbigny gives his views that the east and west coasts of South America constitute distinct faunal areas, and that with the exception of a few species, which, being of world-wide distribution, did not count, all the Foraminifera on the

Atlantic side are specifically distinct from those found on the Pacific coast. The celebrated sounding off Cape Horn forms an important link in the chain of his argument. Among the five species recovered from the tallow, he found four peculiar to the Falklands, and only one species, *Bulimina elegantissima*, proper to the Pacific. So he records his belief that "Le Cap Horn, recevant les eaux qui se divisent en suite pour aller dans chaque mer, devait être le point de départ des deux faunes dont nous venons de parler, et montrer des espèces appartenant aux deux séries".

D'Orbigny's theory has stood the test of time better than most of the evidence on which it was based. Many of the crucial species, which he regarded as peculiar to one or the other area, have since been proved to have a much wider distribution. But the fact remains, and is even more fully confirmed by our own investigations, that the Falkland area is faunistically distinct from the Pacific coast, and that, although it possesses species of Pacific ancestry, these appear to have been derived from more distant parts of the Pacific than the immediately adjacent coast of South America—"round the corner", so to speak.

Many of d'Orbigny's species have no great specific value. They are, at best, the local forms of other well-known and older species. But we have, in this report, for the most part accepted them for reasons of history and sentiment, while pointing out their affinities to better known forms.

An attempt was made to verify the determination of our specimens of the d'Orbigny species recorded in this report, by comparing them with his original Type specimens. With this object in view, one of us (E. H.-A.) spent a considerable time in Paris, where, by the courtesy of Prof. Marcellin Boule, he examined and compared such Types as are available in the Laboratoire de Paléontologie attached to the Musée d'Histoire Naturelle. Unfortunately, during the century which has elapsed since d'Orbigny deposited his Types in the Museum, vicissitudes which have considerably obscured the enquiry have occurred, not the least of which was the flooding of the whole of the lower floors of the Museum in the great rising of the Seine in the year 1910.

It is impossible, after this lapse of time, to say in what condition and in what form d'Orbigny left his specimens, and those preserved in the Musée Fleuriau de Bellevue at La Rochelle, which Heron-Allen also examined, do not throw light on the subject, so far as the Amerique Méridionale specimens are concerned. D'Orbigny, so far as we know, from observations at La Rochelle, mounted his specimens on oblong slips of brown paper, or enclosed them, when numerous, in small glass-topped boxes.¹

The Paris "Types" consist of selected specimens attached with copious gum-arabic (which is very hygroscopic) to slips of glass measuring $5\frac{1}{2} \times 1$ cm. Under this glass slip a piece of blue paper is inserted, which throws up the specimen, and the whole is enclosed in a small glass tube, which in turn is fastened with a heavy smear of cement to a board 8 cm. long, but of varying breadth, which board bears in manuscript the name and sometimes the locality of the enclosed specimens. This mounting and arrangement was,

¹ Heron-Allen, E. Alcide d'Orbigny, his Life and Work. *Journ. Roy. Micro. Soc.*, Presidential Address, 1917, pp. 1-105, pls. i-xiii, and pp. 433, 434.

we are informed, carried out about forty years ago by a retired naval officer, attached to the Musée d'Histoire Naturelle, and it is evident that he had some knowledge, however slight, of Foraminifera. The writing on the boards, however, is in different hands, indicating that various curators or workers, at various times, have overhauled the collections. It is known also that both Terquem and Schlumberger had unrestrained access to the collections and material deposited in the Museum by d'Orbigny.

The cement used to fasten the tubes is perishable—often indeed perished—and is very friable, with the result that scores of the tubes are at present lying separated from scores of boards to which they may, or may not, have been originally fastened. There is some evidence that unknown individuals have attempted, and not always with success, to match tubes against boards, guided apparently only by a comparison of the specimens with the plates to be found in d'Orbigny's various monographs. Moreover, in many cases, even where the specimens are the original Types, they have perished by degeneration of the glass, decomposition of the calcareous shell by fungoid outgrowths, or by the alternate expansion and contraction of the hygroscopic gum above referred to. Such Types as these are absolutely useless for purposes of comparison, and reliance will have to rest upon identification with d'Orbigny's figures.

By courtesy of Prof. Marcellin Boule, we have been privileged to examine, jointly, a considerable selection of such Types as are still recognizable as Foraminifera, at greater leisure in the Natural History Museum in London, and the results of this closer examination will appear in the notes appended to the individual species. We were also entrusted with eleven small bottles containing what is left of d'Orbigny's material, in which it has been satisfactory to find a considerable number of Topo-types, but we were warned that they had been already a good deal overhauled by Terquem and Schlumberger, and our examination of these arouses the suspicion that the contents of some of the bottles have become mixed, and contaminated with that of others.

Out of the eighty-one Types recorded in d'Orbigny's monograph, thirty-one are missing (as such). Of the fifty remaining Types, many are entirely destroyed by the agencies already mentioned.

Since d'Orbigny, very little work has been published on the Foraminifera of the Falkland Area. H.M.S. 'Challenger', on the homeward voyage, ran a line of stations Nos. 313-17 from Magellan Straits through the islands which may be briefly summarized:

St. 313. Jan. 20, 1876. $52^{\circ} 20' S$, $67^{\circ} 39' W$. 55 fms. Coarse sand.

This is very close to the position of our station WS 90. Brady (1884, FC, p. 106) writes: "Very muddy sand nearly barren of Foraminifera, contains only a few *Miliolinae*, *Truncatulinae*, *Discorbinae* and other shallow-water forms in starved condition". In the "Summary", p. 1172, there is a list of thirteen species of Foraminifera found at this station. They are all on our list for WS 90 except *Biloculina ringens* which was probably *B. globulus* as recorded by us.

St. 314. Jan. 21, 1876. $51^{\circ} 35' S$, $65^{\circ} 39' W$. 70 fms. Coarse sand.

Not far from our station WS 92. No records of the Foraminifera appear either in the "Summary" or in Brady.

St. 314 A. Jan. 22, 1876. $51^{\circ} 24' S$, $61^{\circ} 46' W$. 110 fms. Hard ground.

No material.

St. 315, 315 A, 316. Stanley Harbour. 6 fms. Blue mud.

Brady (1884, FC, p. 106) records "starved varieties of *Rotalia*, *Polystomella*, *Lagena* and *Bulimina*. The only species of any particular interest were *Patellina corrugata* and *Bulimina elegantissima*". In the "Summary", p. 1180, there is a list of twenty species, all of which figure in our report.

St. 317. Feb. 8, 1876. $48^{\circ} 37' S$, $55^{\circ} 17' W$. 1035 fms. Sandy gravel.

This is in the deep water outside our area. Brady (1884, FC, p. 106) records that the "Foraminifera were mostly North Atlantic or sub-Arctic cold-water types, but with very few arenaceous species".

The German expedition in the 'Gazelle' had a station 148 in $47^{\circ} 01' 30'' S$, $63^{\circ} 30' W$, 115 m. Egger in his report on the Foraminifera (E. 1893, FC, p. 22) gives brief details of the occurrence of *Cassidulina subglobosa*, *C. parkeriana*, *Uvigerina pygmaea* and *Pulvinulina elegans* on a bottom of grey-green sand with shells. This is on the Continental Shelf to the north of our area.

The Scottish National Antarctic Expedition of 1903-4 made two stations in the Falkland area. Pearcey gives brief details in his report on the Foraminifera (Pearcey, 1914, SNA, pp. 1031, 1034).

St. 118. Stanley Harbour. $2\frac{1}{4}$ fms. Brown mud with greenish tint.

Chief Foraminifera: *Bulimina elegantissima*, *Pulvinulina (Rotalia) karsteni* and *Polystomella striatopunctata*. *Protonina difflugiformis*, *Trochammina nitida* and *T. nana* represent the arenaceous forms.

St. 346. $54^{\circ} 25' S$, $57^{\circ} 32' W$. On the Burdwood Bank. 56 fms.

(This is near WS 82, a station from which we had no material.) Calcareous, shelly and foraminiferous sand. No fewer than eighty species of twenty-five genera of Foraminifera were obtained. With few exceptions, all of the typical Antarctic, shallow-water character, but arenaceous types are conspicuous by their absence, being represented by *Trochammina nitida* only.

A number of species including three new species are listed. *Heronallenia (Discorbis) kempii* was found at this station (see No. 354 *post*).

Since this Report went to press we have received a short paper by Dr J. A. Cushman and Frances L. Parker entitled "Recent Foraminifera from the Atlantic Coast of South America" (*Proc. U.S. Nat. Mus.* No. 2903, 1931, pp. 1-24, pls. i-iv). It deals with material collected in shallow water (maximum 15 fathoms) in two very different areas, three of the stations being sub-tropical, in Rio de Janeiro Harbour, the other eight stations being sub-Antarctic, six of them lying among the Falkland Islands, and the other two off the Argentine Coast, in the neighbourhood of our stations WS 95, and WS 221.

The thirty-two species and varieties recorded by the authors from their sub-Antarctic area are mostly cosmopolitan, and very few of the characteristic Falklands species figure in their list. Twenty-six of them are dealt with in our Report under the same names (Nos. 29, 46, 61, 90, 100, 102, 105, 110 A, 135, 160, 163, 170, 182, 187, 191, 200, 252, 326, 340, 358, 390, 395, 417, 418, 420, 422). Three others we regard as synonymous with species recorded by us.

Quinqueloculina isabellei, d'Orbigny, sub *M. seminulum* (Linné), (No. 12).

Lagena iota, Cushman, sub *L. annectens*, B. and H. (No. 215).

Bolivina plicatella, Cushman = *B. pseudo-plicata*, H.-A. and E. (No. 151).

(An interesting question of priority arises between the two species of *Bolivina*, both having been published in 1930. Up to the time of going to press, we have not been able to ascertain the date of publication of *B. plicatella*.)

Three species remain which do not figure in our Report:

Virgulina, ? sp.

Elphidium australis, sp.n.

Elphidium alvarezianum, var. nov. *serratulum*.

The authors record two other species without distinction of locality. Both of them occur in the Falklands area and figure in our Report:

Bulimina patagonica, d'Orbigny (No. 130).

Elphidium incertum (Williamson) (No. 415).

A characteristic Falklands species, *Lagena caudata* (d'Orbigny) (No. 184) is recorded from the Brazilian area only, but the figure does not agree with d'Orbigny's Type.

MATERIAL EXAMINED

The material examined by us consisted of bottom samples from Sounding Machine or Dredge and Trawl "Residues". The material was, with few exceptions, received in spirit, and in an admirable state of preservation. The supply was usually sufficient (except in the case of soundings) for an exhaustive study of each station, but in a few instances was hardly enough to elucidate new species. In addition we received many selected specimens of large species, notably *Protobotellina*, which by their size had attracted the attention of the zoologists on board the ships.

A list of the stations worked over is as follows:

STATIONS MADE BY THE R.R.S. 'DISCOVERY'

48. TS 494.¹ C III.²

3. v. 26. 8.3 miles N 53° E of William Point Beacon, Falkland Islands. Trawl, 105-115 m.

A few cc. of clean shell sand yielded a long list of species, including *Tubinella* (*Articulina*) *funalis*, *Lagena danica* and *Rotalia clathrata*.

51. TS 495. C III.

4. v. 26. Off Eddystone Rock, Falkland Islands, East. Nets on trawl, 105-115 m.

A few fragments of Hydroids were covered with sessile specimens of *Discorbis globularis* and *D. rosacea*, *Truncatulina lobatula* and *T. variabilis*. Some sand and organic debris (principally sponge) yielded a long list of the common Falkland species.

53. TS 519. C III.

12. v. 26. Port Stanley, East Falkland Islands. Mussel rake, 0-2 m.

A quantity of organic debris derived from washings of Hydroids and *Mytilus* clumps. Very little sand received, but it contained many Foraminifera. *Miliolina circularis*, *M. subrotunda*, *Tubinella funalis*, *Trochammina squamata* and *Cassidulina laevigata* were all very common. *Cassidulina crassa* was absent, and *Uvigerina angulosa* very rare. Over thirty species were obtained from the small quantity of material received.

¹ These numbers refer to the station slides in the Heron-Allen and Earland collection in the Natural History Museum.

² These numbers afford reference to the positions of the stations as shown in Fig. 1, p. 303.

228. TS 515. B IV.

2. v. 27. $53^{\circ} 33' 00''$ S, $61^{\circ} 49' 30''$ W. Baillie sounding rod, 660 m.

Ten cc. of tenacious dark grey mud, washed on 200 mesh silk, yielding about 1.5 cc. residue, largely Diatoms and Radiolaria. Quite a long list of species, many represented by single specimens. *Chilostomella oolina*, *Uvigerina angulosa*, and *Nonionella auris* figure among the rarer forms.

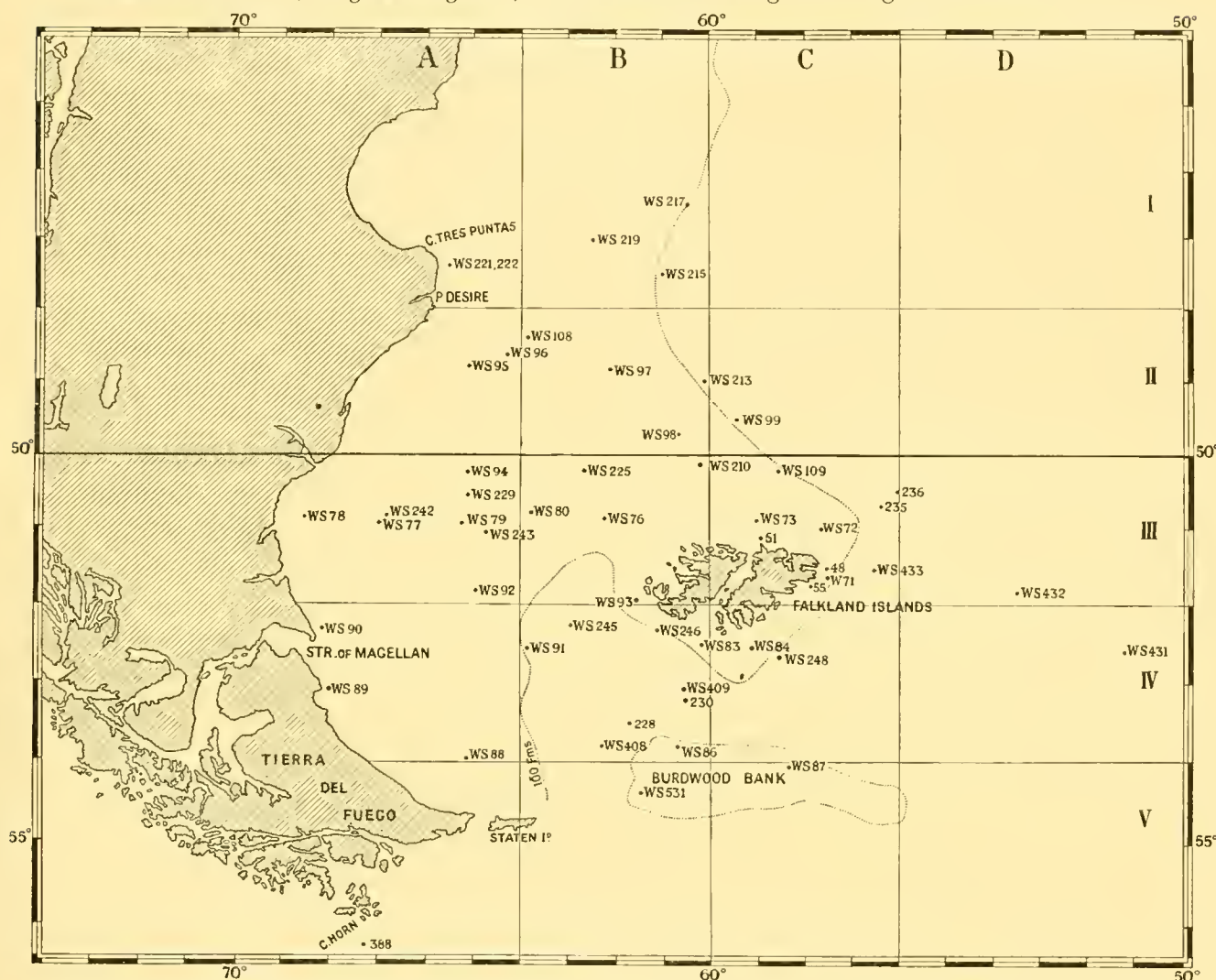


Fig. 1. Chart of the Falkland Islands and adjacent seas, showing positions where Foraminifera were obtained.

230. TS 511. B IV.

5. v. 27. $53^{\circ} 17' 00''$ S, $60^{\circ} 25' 00''$ W. Baillie sounding rod, 675 m.

Fifteen cc. of tenacious grey mud which was reduced to less than 0.5 cc. when washed on 200 mesh silk. The residue consisted of a few large sand grains, a few pyritic casts, and Foraminifera, mostly broken shells, *Globigerinae* and *Uvigerinae* being dominant. A good many species were recorded, many represented by a single specimen. Among the rarer forms were *Anomalina umbilicula*, sp.n., and *Virgulina schreibersiana*, var. *spinosa*, var.n.

235. TS 498. C III.

29. v. 27. $50^{\circ} 45' 00''$ S, $56^{\circ} 18' 30''$ W. Baillie sounding rod, 600 m.

About 9 cc. of grey mud, reduced to 2 cc. by washing on 200 mesh silk sieve, yielded quite a number of interesting species, including *Lagena quadralata*, spinous specimens of *Nodosaria laevigata* and *N. rotundata*, and *Uvigerina angulosa* var. *pauperata*, var.n.

236. TS 499. C III.

29. v. 27. 50° 35' 30" S, 55° 59' 15" W. Baillie sounding rod, 612 m.

About 12 cc. of dark grey mud reduced to 3 cc. by washing on 200 mesh silk sieve. The residue consisted of *Globigerinae* with glauconite and sub-angular sand grains. Varied and abundant Foraminifera, including *Ehrenbergina hystrix* var. *glabra* and *Virgulina schreibersiana* var. *spinosa*, var.n.

388. TS 517 E (1, 2). A V.

16. iv. 30. 56° 19' 30" S, 67° 09' 45" W. Dredge, 121 m.

Polyzoan and Molluscan shell sand with large rounded pebbles and angular sand grains. *Gypsina inhaerens* encrusting the pebbles, but no other sessile species seen. Quite 33 per cent of the finer material was made up of one species, *Cassidulina crassa*. The finest material contained an abundant and varied fauna, including many of the new and rarer species found elsewhere in the Falkland area.

This station is probably very near the spot on which d'Orbigny made his famous deep sounding within sight of Cape Horn (see *ante* p. 298).

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WS 71. TS 518. C III.

23. ii. 27. 6 miles N 60° E of Pembroke Light, East Falkland Islands. Trawl, 82–80 m.

About 12 cc. of coarse débris mixed with shell sand and rounded quartz grains. Foraminifera did not form a high percentage of the material, but were varied and in good preservation. *Cassidulina crassa*, *C. subglobosa*, *Truncatulina lobatula* and *T. akneriana* were the dominant forms. There was a long list of the commoner Falkland species with a few outstanding forms.

WS 72. TS 497. C III.

5. iii. 27. 51° 07' 00" S, 57° 34' 00" W. Snapper lead, 95 m.

A few grains of shell and mineral sand, and two worm tubes, yielded nine of the commoner species, mostly represented by single specimens.

WS 73. TS 496. C III.

6. iii. 27. 51° 01' 00" S, 58° 54' 00" W. Snapper lead, 121 m.

A small quantity of grey sand with many glauconite grains. *Uvigerina angulosa* was extremely common, other species (about twenty in all) mostly rare or very rare.

WS 76. TS 482. B III.

11. iii. 27. 51° 00' 00" S, 62° 02' 30" W. Dredge, 207 m.

Fine muddy sand, dark olive-green in colour, with very little coarser material. Foraminifera very few in numbers except *Cassidulina crassa* and *Uvigerina angulosa*. *Spiroplectammina biformis* was also common. Some interesting species were recorded, including *Bulimina ovula* and *Lagena hispida*.

WS 77. TS 478 A/B. A III.

12. iii. 27. 51° 01' 00" S, 66° 31' 30" W. Dredge, 110 m.

Dark brown sand with little mud. Foraminifera very scarce and generally pauperate.

WS 78. No TS (station slide). A III.

13. iii. 27. 51° 01' 30" S, 64° 04' 30" W. Dredge, 95 m.

Fine dark sand with little mud and practically devoid of organic remains. A few fragments of worm tubes were seen, and the following Foraminifera only were obtained from the cleaned material: *Psammosphaera fusca*, two coarsely built specimens; *Cassidulina crassa*, one small specimen; *Lagena squamosa*, one specimen.

WS 79. TS 479. A III.

13. iii. 27. 51° 01' 30" S, 64° 59' 30" W. Dredge, 132 m.

Dark sand with little mud and very few organic remains of any kind. Foraminifera very rare.

WS 80. TS 481. B III.

14. iii. 27. $50^{\circ} 57' 00''$ S, $63^{\circ} 37' 30''$ W. Dredge, 152 m.

Coarse dark sand with little mud and scanty organisms. Foraminifera scarce, except *Cassidulina crassa* and *Uvigerina angulosa*, both of which were abundant. A few selected specimens of *Protobotellina cylindrica* and a specimen of *Hyperammina friabilis* obtained from trawl residues at this station were also received.

WS 83. TS 507 A/B. B IV.

24. iii. 27. Fourteen miles S 64° W of George Island, East Falkland Islands. Dredge, 137 m.

Shell sand with rounded and highly polished sand grains. Very few Foraminifera in the coarser grades, but the finer grades consist very largely of *Cassidulinae* which formed an estimated 90 per cent. of the material, the species attaining a large size. Other Foraminifera present in great variety but smaller numbers, the genus *Lagena* being particularly varied. Among the rarer forms listed were *Cristellaria angulata*, *Lingulina translucida*, nom.nov., *L. falcata* and *Chilostomella oolina*.

WS 84. TS 521. C IV.

24. iii. 27. $7\frac{1}{2}$ miles S 9° W of Sea Lion Island, East Falkland Islands. Dredge, 75 m.

A large quantity of dried sand, about equal proportions of calcareous and siliceous particles. Foraminifera were not prominent in the material except *Cassidulina crassa* and *C. subglobosa*. A long list of the ordinary Falkland species, with few forms of special interest.

WS 86. TS 517. B IV.

3. iv. 27. $53^{\circ} 53' 30''$ S, $60^{\circ} 34' 30''$ W. Dredge, 151 m.

Coarse shell sand with plentiful Foraminifera in the finer material. *Cassidulina crassa*, *Ehrenbergina pupa* and *Uvigerina angulosa* the dominant types. Many Lagenidae and Miliolidae.

WS 87. TS 524. Fossils, TS 525. C V.

3. iv. 27. $54^{\circ} 07' 30''$ S, $58^{\circ} 16' 00''$ W. Dredge, 96 m.

Dark sand with stones and shells. The material yielded a long list of species, *Cassidulina crassa* and *Uvigerina angulosa* as usual very abundant. Among the notable records were *Heronallenia (Discorbis) kempii* and *Discorbis plana*, sp.n., *Cornuspira denticulata* and *Spirillina tuberculata*.

A great many species of fossil Foraminifera, perhaps derived from a submarine outcrop, were observed at this station.

WS 88. TS 512, 513, 514. A IV.

6. iv. 27. $54^{\circ} 00' 00''$ S, $64^{\circ} 57' 30''$ W. Dredge, 118 m.

Coarse sand, about equal proportions of Polyzoa and shell debris, and brown angular mineral sand with very little mud. The coarser material was encrusted with *Gypsina inhaerens*. Foraminifera abundant and varied. *Cassidulina crassa* very common and very large. *Anomalina vermiculata* common in all stages of growth. This was one of the richest gatherings received and yielded a very long list, including several new species and many rarities, especially among the Lagenidae.

WS 89. TS 508. A IV.

7. iv. 27. 9 miles N 21° E of Arenas Point Light, Tierra del Fuego. Dredge, 23 m.

Gravel with blue mud. Foraminifera fairly numerous and varied. Many species of *Lagena*, including *L. laureata*, sp.n., and *L. digitale*, sp.n.

WS 90. TS 504. A IV.

7. iv. 27. 13 miles N 83° E of Cape Virgins Light, Argentina. Dredge, 82 m.

Dark brown sand with some greenish mud. Little coarse material and few sessile forms. The finer material yielded a long list of species, but the specimens as a whole were small and starved. *Cassidulina crassa* very common, but none of the large individuals so typical of most Falkland dredgings. Among the rarer forms were *Lagena danica*, *L. digitale*, sp.n., *Nodosaria lepidula* and *Cristellaria tenuissima*, sp.n.

WS 91. TS 509. B IV.

8. iv. 27. $52^{\circ} 53' 45''$ S, $64^{\circ} 37' 30''$ W. Dredge, 191 m.

Dark sand with many shell fragments but little mud. Foraminifera fairly abundant, *Cassidulina crassa* being dominant, with *Uvigerina angulosa* almost equally numerous. A long list of species was recorded but few of particular interest, among them, however, being a specimen of *Nonionella chiliensis*.

WS 92. TS 502. A III.

8. iv. 27. $51^{\circ} 58' 30''$ S, $65^{\circ} 01' 00''$ W. Dredge, 145 m.

Gravel and sand with little mud. The sand grains rounded and polished, with the result that sessile forms were very rare. Foraminifera abundant and varied, but poorly developed as regards size. *Cassidulina crassa*, *C. parkeriana*, *Uvigerina angulosa*, *Globigerina bulloides*, *Truncatulina lobatula*, *T. variabilis* and *T. ungeriana*, all very common and forming a large proportion of the material. Among the more interesting species were *Heronallenia (Discorbis) kempii*, *Discorbis tricamerata*, sp.n., and *D. chasteri*, *Patellinoides conica*, gen. et sp.n., and many species of *Lagena*.

WS 93. TS 503. B III.

9. iv. 27. 7 miles S 80° W of Beaver Island, West Falkland Islands. Dredge, 133 m.

Shell sand with little mud. Very few Foraminifera in the coarser material, but the finer siftings contained an abundant fauna. Two or three species of *Cassidulina*, *Ehrenbergina pupa* and *Uvigerina angulosa* formed probably 95 per cent of the material. Miliolids were very infrequent though many species were recorded. *Lagena* abundant and varied. This was one of the richest gatherings examined and yielded over 100 species including many rare and new forms, *Lingulina falcata*, sp.n., *L. quadrata*, *L. vitrea*, sp.n., etc.

WS 94. No TS (station slide). A III.

16. iv. 27. $50^{\circ} 00' 15''$ S, $64^{\circ} 57' 45''$ W. Dredge, 110 m.

Brown sand with hardly any mud or coarse material, and practically devoid of organic remains. Nothing found except *Miliolina circularis* 1, *Tholosina bulla* 1, *Psammosphaera fusca* 2, *Truncatulina* sp. (worn) 2.

WS 95. TS 487. A II.

17. iv. 27. $48^{\circ} 58' 15''$ S, $64^{\circ} 45' 00''$ W. Dredge, 109 m.

Gravel and sand, with shell fragments but little mud. Foraminifera very scanty, the only species occurring in any number being various species of *Truncatulina* and *Pulvinulina karsteni*. Nothing of particular interest.

WS 96. No TS (station slide). A II.

17. iv. 27. $48^{\circ} 00' 45''$ S, $64^{\circ} 58' 00''$ W. Dredge, 96 m.

Coarse dark brown sand, without mud and devoid of organic remains. The only species observed was *Pulvinulina karsteni*, two specimens.

WS 97. TS 489. B II.

18. iv. 27. $49^{\circ} 00' 30''$ S, $61^{\circ} 58' 00''$ W. Residues from trawl, 146.

Muddy brown sand with pebbles, many covered with sessile species. Foraminifera abundant and varied. *Cassidulina* spp. dominant. Among the interesting novelties at this station were *Cassidulina crassa* var. *porrecta*, var.n., and *Cristellaria tenuissima*, sp.n.

WS 98. TS 485. B II.

18. iv. 27. $49^{\circ} 54' 15''$ S, $60^{\circ} 35' 30''$ W. Dredge, 173 m.

Dark olive-green sandy mud with abundant Foraminifera, *Uvigerina* spp. and *Cassidulina* spp. dominant, but not many other species and none of particular interest.

WS 99. TS 501. C II.

19. iv. 27. $49^{\circ} 42' 00''$ S, $59^{\circ} 14' 30''$ W. Dredge, 251 m.

Dark green tenacious mud, which, when washed on 200 mesh silk, left a residue of very fine angular grey sand with hardly any coarse particles. Foraminifera formed a very small proportion of

the residue and were principally dead shells. Among the more notable forms were *Bulimina ovula*, *Cyclammina cancellata*, *Pulvinulina umbonata* and *Anomalina umbilicatula*, sp.n. Many species of *Lagena*.

WS 108. TS 488. B II.

25. iv. 27. 48° 30' 45" S, 63° 33' 45" W. Dredge, 118 m.

Fine brown sand without mud, and practically devoid of organisms. Careful elutriation yielded twenty-four species of Foraminifera mostly represented by a few specimens only, none being of particular interest.

WS 109. TS 500. C III.

26. iv. 27. 50° 18' 48" S, 58° 28' 30" W. Dredge, 145 m.

Dark grey sand with little mud, and scanty organic remains. *Uvigerina angulosa* dominant, with *Cassidulina crassa*, *subglobosa* and *parkeriana* present in almost equal abundance. *Haplophragmoides crassimargo* and *Hyperammina friabilis* were common. Most other species sparingly represented, though the list was fairly long.

WS 210. TS 484. B III.

29. v. 28. 50° 17' 00" S, 60° 06' 00" W. Dredge, 161 m.

Fine olive-green muddy sand with abundant Foraminifera, *Uvigerina angulosa* dominant, all other species except *Cassidulina crassa*, *Truncatulina lobatula* and *Pulvinulina karsteni* scantily represented.

Some fragmentary hydroids encrusted with *Truncatulina* and three selected specimens of *Miliolina procera* were also received from nets on trawl.

WS 213. TS 486. B II.

30. v. 28. 49° 22' 00" S, 60° 10' 00" W. Nets on trawl, 249–239 m.

A small quantity of organic debris and sand yielded a few interesting species including *Tholosina protea*, sp.n., *T. vesicularis* and var. *erecta*.

A few specimens of *Probotellina cylindrica* were also received which had been selected from residues on the ship.

WS 215. TS 491. B I.

31. v. 28. 47° 37' 00" S, 60° 50' 00" W. Dredge, 219 m.

Fine sand, dark in colour and muddy. Foraminifera rather scanty, *Uvigerina* dominant. Among the species of interest were *Cyclammina cancellata* and *Nodosaria pauperata*, both megalo-spheric and microspheric, and *Vaginulina spinigera*.

WS 217. TS 493. B I.

1. vi. 28. 46° 28' 00" S, 60° 18' 00" W. Dredge, 146 m.

Dark olive-green muddy sand with very little coarse material. Foraminifera plentiful but pauperate. *Cassidulina* spp. and *Uvigerina* spp. as usual dominant. Many species of *Lagena* occurred at this station.

WS 219. TS 492. B I.

3. vi. 28. 47° 06' 00" S, 62° 12' 00" W. Dredge, 115 m.

Dark brown muddy sand with few organisms of any kind. The Foraminifera mostly dead and worn shells. Fragments of *Jaculella obtusa* were abundant, as also were *Cassidulina crassa* and *Truncatulina bradyana*. The few other species were of very rare occurrence.

WS 221. TS 490. A I.

4. vi. 28. 47° 23' 00" S, 65° 10' 00" W. Dredge, 76 m.

Muddy gravel with shells. Many sessile species on the larger fragments, including *Dendrophrya erecta*, *Dendronina papillata*, *Nubecularia lucifuga* and *Tholosina vesicularis* var. *erecta*. The finer material yielded a long list of interesting species, including *Webbinella hemisphaerica*, *Nodosaria pellita* and *Nonionella iridea*, sp.n.

WS 225. TS 483 A/B. B III.

9. vi. 28. 50° 20' 00" S, 62° 30' 00" W. Dredge, 162 m.

Dark olive-green muddy sand with stones which were encrusted with sessile species, *Placopsilina cenomana* being dominant. Foraminifera not very numerous in the finer material except *Cassidulina crassa*, *Ehrenbergina pupa*, *Uvigerina angulosa* and *Truncatulina lobatula*, all abundant.

A small quantity of organic debris and sand, from nets on trawl, yielded the same species with some additions, including *Biloculina globulus*, *Ammolagena clavata* and *Cornuspira denticulata*, sp.n.

WS 229. No TS (station slide). A III.

1. vii. 28. 50° 35' 00" S, 57° 20' 00" W. Nets on trawl, 210-271 m.

Some selected specimens of *Protobotellina cylindrica* and one specimen of *Hyperammina friabilis* were received from this station. No other material.

WS 242. No TS (station slide). A III.

17. vii. 28. 51° 06' 00" S, 66° 30' 00" W. Dredge, 119 m.

Dark brown sand. Among the coarser material a few pebbles yielded sessile species, including *Tholosina vesicularis* var. *erecta*. The finer material was pure sand.

WS 243. TS 480 A/B. A III.

17. vii. 28. 51° 06' 00" S, 64° 30' 00" W. 144 m. Residues from trawl and nets attached to trawl.

Organic debris of many kinds chiefly Polyzoan and sponge, often covered with sessile Foraminifera. *Tholosina protea*, sp.n., was common on Hydroids; *Psammatodendron indivisum*, sp.n., *Dendronina papillata* and *Tholosina vesicularis* also occurred. Many selected specimens of *Protobotellina cylindrica* were received from this station ranging up to 2½ inches in length. The muddy sand washed from the residues contained very few Foraminifera, all of the common Falkland types.

WS 245. TS 505. B IV.

18. vii. 28. 52° 36' 00" S, 63° 40' 00" W. Dredge, 304 m.

Dark olive-green muddy sand. Very few Foraminifera in the coarser material, but in the fine they were abundant, *Uvigerina angulosa*, *Cassidulina* spp. and *Ehrenbergina pupa* being dominant. Many species of *Lagena*, notably *L. clathrata*. *Patellinoides depressa*, sp.n. and *Anomalina umbilicatulula*, sp.n., were also found.

WS 246. TS 506 A/B. B IV.

19. vii. 28. 52° 25' 00" S, 61° 00' 00" W. Nets on trawl, 267-208 m.

Organic debris of all kinds with many shell fragments and some sand. The material was very difficult to work over, but yielded a great many species, including *Hyperammina clavigera*, sp.n., *H. novae-zealandiae*, *Reophax cushmani*, nom.nov., *R. distans* var. *pseudo-distans*, *Tholosina protea*, sp.n., *Webbinella depressa*, sp.n., *Polytrema* (?), etc.

WS 248. TS 522. C IV.

20. vii. 28. 52° 40' 00" S, 58° 30' 00" W. Dredge, 210 m.

Muddy green-grey sand with shell debris, containing abundant Foraminifera, estimated at 20 per cent of the total material. *Cassidulina crassa*, *C. subglobosa*, *Ehrenbergina pupa* and *Uvigerina angulosa* were dominant, and with *Globigerina conglomerata* and *G. pachyderma* formed the bulk of the gathering. *Lagenae* were varied, but with the exception *L. fimbriata* and *L. biancae* not plentiful.

WS 408. TS 516. B IV.

26. ii. 29. 53° 50' 00" S, 62° 10' 00" W. Baillie sounding rod, 454 m.

Dark grey muddy sand which yielded a very long list of species. *Cassidulina crassa*, *Uvigerina striata*, *Globigerina bulloides*, *G. dutertrei*, *G. triloba*, *Globovalia scitula*, *G. truncatulinoidea*, *Pulvinulina elegans* and *P. umbonata* were all extremely common. Among the rarer forms were *Patellinoides depressa*, sp.n., *Lingulina quadrata*, spinous forms of *Nodosaria laevigata* and *N. rotundata*, and *Lagena lagenoides* var. *radiata*.

WS 409. TS 510. B IV.

26. ii. 29. $53^{\circ} 10' 00''$ S, $60^{\circ} 31' 00''$ W. Baillie sounding rod, 567 m.

Three cc. of grey sandy mud which was washed on 200 mesh silk. Foraminifera were about 25 per cent of the residue, all small, specimens of *Globigerina* forming the bulk of the material. *Cassidulina laevigata* was much more abundant than *C. crassa*, contrary to the usual proportion. A good many species were listed but none of outstanding interest.

WS 431. TS 523. D IV.

1. v. 29. $52^{\circ} 18' 00''$ S, $50^{\circ} 59' 00''$ W. Baillie sounding rod, 3411 m.

A few grains of sand and glauconite with *Globigerinae* were collected on a filter paper. They yielded seven species of *Globigerina* and three other forms, viz. *Biloculina depressa*, *Psammosphaera fusca* and *Globorotalia crassa*.

WS 432. TS 520. D III.

2. v. 29. $51^{\circ} 56' 30''$ S, $53^{\circ} 28' 00''$ W. Baillie sounding rod, 2432 m.

A few grains of sand and glauconite with Foraminifera were collected on a filter paper. *Globigerinae* formed the bulk of the material, six species being present. *G. pachyderma* was dominant, being followed in order of frequency by *G. bulloides*, *G. dutertrei*, *G. conglomerata*, *G. triloba* and *G. elevata*, the last represented by a single specimen. *Pullenia obliquiloculata* was very plentiful. Five other species were recorded, mostly rare, or single specimens.

WS 433. TS 494 A. C III.

5. iv. 29. $51^{\circ} 44'$ S, $56^{\circ} 23'$ W. Bottom sample, 1035 m.

Light grey mud with dark spots. Residue *Globigerina* ooze, Radiolaria and glauconite granules in about equal proportions. Many interesting species of Foraminifera of deep water types.

WS 531. TS 517 A. B V.

5. iv. 30. $54^{\circ} 25' 30''$ S, $61^{\circ} 25' 30''$ W. Baillie sounding rod, 118 m.

A small quantity of grey shell sand with abundant Foraminifera. Among the rarities recorded are *Cornuspira foliacea*, *Technitella nitida*, sp.n., *Bifarina porrecta* and *Rotalia clathrata*.

No station no. TS 517 B.

5. iv. 30 (A). $54^{\circ} 33' 30''$ S, $61^{\circ} 22' 00''$ W. Baillie sounding rod, N.P.D. rod, 124 m.

About 1 cc. of grey shell sand yielded many Foraminifera, including five species of *Globigerina* and eight of *Lagena*.

No station no. TS 517 C.

6. iv. 30. $54^{\circ} 35' 30''$ S, $61^{\circ} 25' 00''$ W. Baillie sounding rod, 320 m.

A small quantity of greenish grey sand, the colour being due to the presence of glauconite. Foraminifera were abundant and varied. *Cassidulina*, *Globigerina* and *Uvigerina* spp. dominant. Among the rarer forms recorded are *Nodosaria capitata*, *Heronallenia (Discorbis) kempii* and *Rotalia clathrata*.

No station no. TS 517 D.

5. iv. 30 (B). $54^{\circ} 41' 05''$ S, $61^{\circ} 19' 00''$ W. Baillie sounding rod, 569 m.

A very small quantity of dark grey sand with shell fragments and abundant Foraminifera. *Uvigerina angulosa* and *Globigerina conglomerata* and *G. inflata* were the dominant species, *Cassidulina* being comparatively small and rare. The genus *Lagena* was represented by no fewer than fourteen species out of the forty-four species recorded from the station.

The material represented by TSS 517 B, C and D, was received too late for more than casual examination, or to be marked on the Chart. A few dominant forms, and noteworthy species only, are recorded. They are all in the same square BV on the chart.

LIST OF NEW GENERA, SPECIES AND VARIETIES

A few specimens, possibly new species, remain undescribed pending the arrival of further material.

- | | |
|--|---|
| <i>Sigmoilina obesa</i> , 38. | <i>Lagena revertens</i> , 238. |
| <i>Cornuspira denticulata</i> , 49. | <i>Lagena bisulcata</i> , 239. |
| * <i>Dendronina papillata</i> , 59. | <i>Lagena laureata</i> , 244. |
| <i>Technitella nitida</i> , 62. | <i>Lingulina falcata</i> , 262. |
| <i>Webbinella depressa</i> , 64. | <i>Lingulina translucida</i> (nom.nov.), 263. |
| <i>Tholosina protea</i> , 66. | <i>Lingulina vitrea</i> , 264. |
| * <i>Tholosina vesicularis</i> var. <i>erecta</i> , 68. | <i>Cristellaria tenuissima</i> , 269. |
| <i>Hyperammina clavigera</i> , 74. | <i>Uvigerina angulosa</i> var. <i>pauperata</i> , 302. |
| <i>Hyperammina malovens</i> , 76. | <i>Patellina corrugata</i> var. <i>formosa</i> , 327. |
| <i>Psammatodendron indivisum</i> , 77. | <i>Patellinoides</i> gen. nov. |
| * <i>Protopotellina</i> gen.nov. | <i>Patellinoides conica</i> , 328. |
| * <i>Protopotellina cylindrica</i> , 81. | <i>Patellinoides depressa</i> , 329. |
| <i>Reophax cushmani</i> (nom.nov.), 88. | <i>Discorbis plana</i> , 342. |
| <i>Trochammina glabra</i> , 106. | <i>Discorbis tricamerata</i> , 344. |
| * <i>Trochammina malovens</i> , 109. | <i>Discorbis malovens</i> , 351. |
| <i>Bulimina auricula</i> , 137. | <i>Discorbis australensis</i> (nom.nov. sub.), 351. |
| <i>Virgulina schreibersiana</i> var. <i>spinosa</i> , 139. | <i>Discorbis coronata</i> , 353. |
| <i>Bolivina malovens</i> , 153. | * <i>Heronallenia</i> (<i>Discorbis</i>) <i>kempii</i> , 354. |
| <i>Cassidulina crassa</i> var. <i>porrecta</i> , 161. | <i>Anomalina umbilicatula</i> , 372. |
| <i>Lagena digitale</i> , 203. | <i>Carpenteria lobosa</i> , 373. |
| <i>Lagena quadrata</i> var. <i>bispinosa</i> , 219. | <i>Nonionella iridea</i> , 410. |
| <i>Lagena uncinata</i> , 220. | <i>Elphidium</i> (<i>Polystomella</i>) <i>magellanicum</i> , 416. |
| <i>Lagena bicarinata</i> var. <i>occlusa</i> , 237. | |

SYSTEMATIC ACCOUNT

Order FORAMINIFERA

Family MILIOLIDAE

Sub-family NUBECULARIINAE

Genus Nubecularia, Defrance, 1825

1. *Nubecularia lucifuga*, Defrance.

Nubecularia lucifuga, Defrance, 1825, *Dict. Sci. Nat.* (Strasburg, 1816-30), xxxv, p. 210;

Atlas Zooph. pl. xlv, fig. 3.

Nubecularia lucifuga, Sidebottom, 1904, etc., RFD, 1904, p. 2, pl. ii, figs. 1-4.

Three stations: WS 87, 88, 221.

Small specimens attached to stones and shells are not uncommon at WS 88 and 221. They may have been overlooked at other stations.

* These species were figured and described in *Journal of the Royal Microscopical Society* in 1929 (Vol. XLIX, pp. 324-334, pls. i-iv). The descriptions and plates are repeated in this Report by the courtesy of the Council of the Society.

Sub-family *MILIOLININAE*Genus *Biloculina*, d'Orbigny, 18262. *Biloculina depressa*, d'Orbigny.

Biloculina depressa, d'Orbigny, 1826, TMC, p. 298, No. 7, Modèle no. 91.

Biloculina ringens var. *carinata*, Williamson, 1858, RFGB, p. 79, pl. vii, figs. 172-4.

Nine stations: 230, 236; WS 83, 91, 108, 245, 408, 431, 433.

Typical everywhere, but uncommon excepting at WS 408, where it is abundant and well developed.

3. *Biloculina murrhyna*, Schwager.

Biloculina murrhyna, Schwager, 1866, FKN, p. 203, pl. iv, figs. 15 *a*, *b*.

Biloculina murrhyna, Cushman, 1910, etc., FNP, 1917, p. 75, pl. xxviii, fig. 3; pl. xxix, fig. 1.

Seven stations: 228, 235, 236; WS 83, 215, 217, 408.

Generally rare, but abundant at WS 408, where a complete range, from the megalosphaeric and microsphaeric young to large individuals, was found. Very large specimens at WS 217. At some station it is very small and poorly developed.

4. *Biloculina serrata*, Bailey.

Biloculina serrata, Bailey, 1861, *Boston Journ. Nat. Hist.* vii (3), p. 350, pl. viii, E.

Biloculina depressa var. *serrata*, Brady, 1884, FC, p. 146, pl. iii, fig. 3.

Biloculina serrata, Cushman, 1910, etc., FNP, 1917, p. 75, pl. xxix, fig. 2.

Three stations: 228; WS 217, 408.

Good single specimens at each station. At 228 and WS 408, the serration is confined to the aboral half of the shell.

5. *Biloculina sarsi*, Schlumberger.

Biloculina ringens, Brady, 1884, FC, p. 139.

Biloculina sarsi, Schlumberger, 1891, BGF, p. 553 (in the reprints, p. 166), text-figs. 10-12, pl. ix, figs. 55-9.

One station: WS 221.

Occurs at this station, large and typical.

6. *Biloculina elongata*, d'Orbigny.

Biloculina elongata, d'Orbigny, 1826, TMC, p. 298, no. 4.

Biloculina elongata, Schlumberger, 1891, BGF, p. 571, figs. 35, 36, pls. xi and xii, figs. 87-9.

Twelve stations: 388; WS 71, 84, 86, 87, 88, 92, 93, 97, 109, 221, 246.

Generally distributed and very common.

7. *Biloculina patagonica*, d'Orbigny (Plate VI, figs. 4-6).

Biloculina patagonica, d'Orbigny, 1839, FAM, p. 65, pl. iii, figs. 15-17.

Biloculina ringens var. *patagonica*, Williamson, 1858, RFGB, p. 80, pl. vii, figs. 175, 176.

Eight stations: 388; WS 84, 86, 87, 88, 91, 97, 221.

This local form is the only representative of the species at WS 91. At the other stations it appears in company with typical *B. elongata*. Although d'Orbigny's specific name has been very little used, this pear-shaped form of *B. elongata* is not uncommon wherever that species occurs. At several stations it passes almost imperceptibly into *B. elongata*. The Type slide in Paris, labelled *B. patagonica*, does not contain any *Biloculina*, but only a stained Miliolid.

8. *Biloculina peruviana*, d'Orbigny (Plate VI, figs. 7-9).

Biloculina peruviana, d'Orbigny, 1839, FAM, p. 68, pl. ix, figs. 1-3.

Four stations: 48, 388; WS 84, 86.

A considerable number of specimens, agreeing generally with d'Orbigny's figures, but slightly less globular. The bifurcate tooth is very characteristic, and in this differs from d'Orbigny's figure of *B. bulloides*, which has a simple tooth. Brady regarded *B. peruviana* as a synonym of the latter species. *B. peruviana* does not occur in d'Orbigny's list of the Falkland Islands species, but is recorded from Peru only. It has apparently a wide distribution, probably recorded as *B. bulloides*. The Type was not to be found in Paris.

9. *Biloculina isabelleana*, d'Orbigny (Plate VI, figs. 1-3).

Biloculina isabelleana, d'Orbigny, 1839, FAM, p. 66, pl. viii, figs. 17-19.

Three stations: 388; WS 93, 246.

This species, which d'Orbigny found in the Falkland area "in the Polyp zone" and which he very justly describes as distinguished "par sa forme bombée", occurs at a few stations only. It is a very distinctive form, and the Paris Types conform in all respects with our specimens. Length, 0.70-0.80 mm.; breadth, 0.60-0.75 mm.

10. *Biloculina anomala*, Schlumberger.

Biloculina anomala, Schlumberger, 1891, BGF, p. 569 (in the reprints p. 182), text-figs. 32-4, pl. xi, figs. 84-6, pl. xii, figs. 101.

Biloculina anomala, Cushman, 1921, FP, p. 474, pl. xcvi, figs. 1 a, b, c.

One station: WS 87.

A few fairly large specimens at this station.

10 A. *Biloculina vespertilio*, Schlumberger.

Biloculina ringens, Brady, 1884, FC, p. 142, pl. ii, fig. 8.

Biloculina vespertilio, Schlumberger, 1891, BGF, p. 561 (in the reprints, p. 174), figs. 20-2, pl. x, figs. 74-6.

Biloculina vespertilio, Cushman, 1910, etc., FNP, 1917, p. 77, pl. xxx, fig. 1, text-figs. 37-9.

One station: 388.

Common, and of large size.

11. *Biloculina globulus*, Bornemann.

Biloculina globulus, Bornemann, 1855, FSH, p. 349, pl. xix, fig. 3.

Biloculina globulus, Schlumberger, 1891, BGF, p. 575 (in the reprints, p. 188), text-figs. 42-4, pl. xii, figs. 97-100.

Ten stations: WS 71, 80, 83, 86, 88, 90, 91, 92, 221, 225.

The specimens are large but not typical, being somewhat compressed. At WS 80, a single small specimen occurred, exactly comparable with Bornemann's original figure.

Genus *Flintia*, Schubert, 191111 A. *Flintia robusta* (Brady).

Spiroloculina robusta, Brady, 1884, FC, p. 150, pl. ix, figs. 7, 8.

Spiroloculina robusta, Flint, 1899, RFA, p. 296, pl. xlii, figs. 1, 2.

Flintia (*Spiroloculina*) *robusta*, Schubert, 1911, FFB, p. 124.

Flintia robusta, Cushman, 1918, etc., FAO, 1929, p. 75, pl. xx, figs. 1, 2.

One station: 388.

A single fine specimen.

Genus *Spiroloculina*, d'Orbigny, 1826

It is perhaps noteworthy that not a single specimen referable to this genus was found in the Falkland material. Although generally a warm-water form, in the northern hemisphere the genus attains much higher latitudes than in the Falkland area.

Genus *Miliolina*, Williamson, 185812. *Miliolina seminulum* (Linné) (Plate VI, figs. 25-40).

Serpula seminulum, Linné, 1767, SN (ed. xii), p. 1264, no. 791; SN (ed. xiii), p. 3739, no. 2.

Miliolina seminulum, Brady, 1884, FC, p. 157, pl. v, fig. 6 (references).

Quinqueloculina araucana, d'Orbigny, 1839, FAM, p. 76, pl. ix, figs. 13-15.

Quinqueloculina isabellei, d'Orbigny, 1839, FAM, p. 74, pl. iv, figs. 17-19.

Quinqueloculina magellanica, d'Orbigny, 1839, FAM, p. 77, pl. ix, figs. 19-21.

Twenty-four stations: 48, 51, 228, 388; WS 71, 73, 76, 83, 84, 86, 87, 88, 90, 91, 93, 95, 99, 109, 217, 219, 221, 225, 242, 246.

Universally distributed, often very abundant and attaining very large dimensions (Plate VI, figs. 34-36). It also presents nearly all the variations commonly associated with this species. Naturally the most abundant of the variations are those associated by d'Orbigny with the South American area (FAM, 1839), particularly his *Quinqueloculina magellanica*, of which we give figures (Plate VI, figs. 25-27), although specimens exactly comparable with his figures are not particularly abundant, the best occurring at WS 84, 86. The peculiarity assigned by the author to this species, "très lisse, brillante", is especially

characteristic of the *M. seminulum* group in the Falkland Islands material. *Q. araucana* (d'Orbigny) which was recorded by that author only from Valparaiso, on the Chilean coast, and which differs from *Q. magellanica* mainly in its narrower outlines and less acute peripheral edge, occurs but very rarely, the best being at WS 86, 108 and 221 (see Plate VI, figs. 28–30). The Types of *Q. araucana* are deeply stained with iron, but the sutures are very strongly marked and we have no doubt that they are in general agreement with d'Orbigny's figure. *Quinqueloculina isabellei* is characterized by a more compressed shell with inflated chambers and depressed sutures. We have notes of its occurrence at six stations only, viz. 388, WS 87, 88, 90, 91, 93. It is probably more widely distributed but escaped observation. The Type was not to be found in Paris.

Among the Paris Types the tube labelled "*Q. magellanica*, Îles Malouines", contains nine large Miliolids in good condition. Some of them are in agreement with d'Orbigny's figures, but the others cover a wide range of variation within the species *M. seminulum*, including the sigmoiline form referred to below. One of the specimens is nearer *M. vulgaris* than *M. seminulum*.

Among our specimens a form with somewhat recurved angular edge suggesting a sigmoiline structure arrests attention (Plate VI, figs. 31–3). It was at first assumed to be a *Sigmoilina*, although its general resemblance to *M. seminulum* and its constant association with that species brought it under suspicion. Its Milioline nature having been established, it seemed probable that it would prove to be the microspheric form of that species, in view of the fact that Schlumberger in his sections of *M. seminulum* (S. 1893, MGM, p. 67 [in the reprints, p. 209], figs. 15, 16) indicates a similar "pseudo-sigmoiline" curve in the external wall of the microspheric form. But a series of sections has proved the existence of both megalospheric and microspheric individuals in each form, the latter as usual being very uncommon (Plate VI, figs. 37–40). The megalosphere of the angular sigmoiline form appears to be invariably smaller than in the normal *M. seminulum*, and it seems probable that the species exhibits the "trimorphism" of Hofker, or "polymorphism", as has been alternately suggested for the phenomenon.

The best specimens of the sigmoiline form were obtained at 388 and WS 84, where large and highly polished individuals are common.

Goës in his Arctic and Scandinavian Foraminifera (G. 1894, ASF, p. 108, pl. xviii, figs. 838 c, d) gives sections of the two forms of *M. seminulum*, which, although less distinctive than Schlumberger's so far as external characteristics go, bring out what he regarded as a "sigmoiline" arrangement of the chambers in this species. Our own sections seem to prove that, while the microspheric form is distinctly sigmoiline in the arrangement of its chambers, no similar curve can be made out in the megalospheric form.

13. *Miliolina patagonica* (d'Orbigny) (Plate VI, figs. 10–12).

Quinqueloculina patagonica, d'Orbigny, 1839, FAM, p. 74, pl. iv, figs. 14–16.

Three stations: WS 83, 217, 245.

The occurrence of d'Orbigny's little form at these stations is worth recording,

although it has no very distinctive specific features. The specimens agree very well with d'Orbigny's figures, but, except at WS 217, the surface of the shell is invariably dull and rough, whereas d'Orbigny describes it as being bright and shining. The Type was not to be found in Paris.

14. *Miliolina vulgaris* (d'Orbigny).

Quinqueloculina vulgaris, d'Orbigny, 1826, TMC, p. 302, no. 33.

Quinqueloculina vulgaris, Schlumberger, 1893, MGM, p. 65 (in the reprints, p. 207), pl. ii, figs. 65-6, and woodcuts 13-14.

Seven stations: 388; WS 71, 84, 87, 88, 89, 215.

Common. Very fine and typical specimens at WS 87, identical with the Type-specimens in Paris. The figure in Soldani (S. 1789-98, T, pt iii, tab. 152, fig. E), upon which d'Orbigny based his species, is highly unsatisfactory, but d'Orbigny's localities, principally Mediterranean, were sufficient to justify Schlumberger in his identifications when he revived the name.

15. *Miliolina oblonga* (Montagu).

Vermiculum oblongum, Montagu, 1803-8, TB, p. 522, pl. xiv, fig. 9.

Miliolina semimulum var. *oblonga*, Williamson, 1858, RFGB, p. 86, pl. vii, figs. 186, 187.

Miliolina semimulum, Brady, 1884, FC, p. 160, pl. v, fig. 4.

Nine stations: 388; WS 71, 79, 84, 86, 87, 88, 90, 93.

Common. The best specimens at WS 87 and 88, where a complete series of individuals, from immature young to very large adult specimens, was obtained. The dominant type at all the stations is rather small and square-ended, a parallelogram with rounded corners.

16. *Miliolina bosciana* (d'Orbigny).

Quinqueloculina bosciana, d'Orbigny, 1839, FC, p. 191, pl. xi, figs. 22-4.

Miliolina bosciana, Chapman, 1900, FLF, p. 177, pl. xix, fig. 7.

One station: WS 88.

Typical specimens, rather thick-shelled, and quite in conformity with the Type in Paris.

17. *Miliolina procera*, Goës.

Miliolina procera, Goës, 1896, DOA, p. 82, pl. vii, figs. 7-9.

Miliolina procera, Cushman, 1910, etc., FNP, 1917, p. 45, pl. xix, fig. 2.

Two stations: WS 210, 215.

Two fine specimens from WS 215, and three from WS 210, agree very well with the figures of Goës, and even exhibit the faint longitudinal striation to which he refers in his text, but which is not shown in his figures. The aperture in all our specimens is normal, and not the undulating irregular slit which Goës reports as being usually characteristic of the species.

18. *Miliolina subrotunda* (Montagu).

Vermiculium subrotundum, Montagu, 1803-8, TB, pt 2, p. 521.

Miliolina subrotunda, Brady, 1884, FC, p. 168, pl. v, figs. 10, 11.

Miliolina subrotunda, Goës, 1894, ASF, p. 109, pl. xix, figs. 846, 847.

Thirteen stations: 48, 51, 53, 388; WS 71, 80, 88, 89, 90, 108, 225, 245, 248.

Frequent at most of the stations, the best at 53 and WS 71 and 88. At WS 248, a specimen with a hauerine development of the later chambers was observed. At 53 a specimen practically identical with the hauerine variety figured by us from south Cornwall (H.-A. & E. 1916, FSC, p. 35, pl. v, figs. 6-8) was found. As a general rule the specimens are small, tending towards the pauperate d'Orbignyian species, *Q. peruviana* and *Q. meridionalis*. The Falkland Islands specimens never attain the robust development and size which marks the species in British waters.

19. *Miliolina meridionalis* (d'Orbigny) (Plate VI, figs. 22-24).

Quinqueloculina meridionalis, d'Orbigny, 1839, FAM, p. 75, pl. iv, figs. 1-3 and 10-13.

The distribution follows that of *M. subrotunda* of which it is a local d'Orbignyian variation. In Paris the Type tube contains one specimen labelled "Amérique méridionale". It was encrusted with crystals of efflorescence. When these were very carefully removed, the specimen appeared in very fair condition, apparently *M. valvularis*, at any rate having no resemblance to d'Orbigny's figure.

20. *Miliolina lamarckiana* (d'Orbigny).

Quinqueloculina lamarckiana, d'Orbigny, 1839, FC, p. 189, pl. xi, figs. 14-15.

Quinqueloculina auberiana, d'Orbigny, 1839, FC, p. 193, pl. xii, figs. 1-3.

Miliolina auberiana, Goës, 1894, ASF, p. 109, pl. xix, fig. 844.

Miliolina lamarckiana, Heron-Allen and Earland, 1930, FPD, p. 57.

Two stations: WS 83, 87.

The specimens are far from typical and have somewhat inflated chambers. In Paris there are two Type tubes labelled "*Q. lamarckiana*, Cuba", and two labelled "*Q. auberiana*, Cuba". Of the *Q. lamarckiana*, one tube contains nothing but unrecognizable fragments, the other contains thirteen specimens, some in good condition, others more or less destroyed by efflorescence. It seems impossible that these can have been the original d'Orbigny Types, for they cover *Q. lamarckiana*, *auberiana*, and *cuvieriana*. One or two are excellent specimens of *Q. lamarckiana* as figured by d'Orbigny, the rest we think should be disregarded as being probably later additions to the tube. The *Q. auberiana* "Types" are even more unsatisfactory. One tube contains only a single specimen of *Massilina secans* (d'Orbigny), the other contains two smaller shells in a very bad state of preservation; one is quite unrecognizable, the other is *Miliolina subrotunda* (Montagu).

21. *Miliolina contorta* (d'Orbigny).

Quinqueloculina contorta, d'Orbigny, 1846, FFV, p. 298, pl. xx, figs. 4-6.

Miliolina contorta, Goës, 1894, ASF, p. 111, pl. xx, figs. 851, 852.

Eight stations: 48, 388; WS 71, 87, 88, 90, 93, 99.

The specimens are large and well developed, especially at WS 71 and 93. They are rather broader and shorter than the d'Orbigny figure suggests, but the Type specimen is not to be found in Paris for comparison.

22. *Miliolina inca* (d'Orbigny) (Plate VI, figs. 13-15).

Quinqueloculina inca, d'Orbigny, 1839, FAM, p. 75, pl. iv, figs. 20-2.

Three stations: WS 87, 88, 93.

A single specimen at each station, agreeing with d'Orbigny's figure. The striae rather faint in the specimens from WS 87, 88, which are young, but are much coarser in the adult specimen from WS 93. The Type is not to be found in Paris.

23. *Miliolina boueana*, d'Orbigny.

Quinqueloculina boueana, d'Orbigny, 1846, FFV, p. 293, pl. xix, figs. 7-9.

Miliolina boueana, Brady, 1884, FC, p. 173, pl. vii, figs. 13 a, b.

Miliolina boueana, Costa, 1853, etc., PRN, 1856, p. 329, pl. xxv, fig. 15.

Four stations: 48; WS 84, 93, 245.

Rare. The specimens are poorly developed, the best are at 48. This Type also is missing.

24. *Miliolina costata* (d'Orbigny).

Quinqueloculina costata, d'Orbigny, 1826, TMC, p. 301, no. 3.

Quinqueloculina costata, Schlumberger, 1893, MGM, p. 69 (in the reprints, p. 211), text-fig. 20, pl. iii, figs. 75-6.

Miliolina costata, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 579, pl. xlv, figs. 9-11.

One station: WS 88.

Several very good specimens, agreeing with the one remaining and recognizable Type in Paris.

25. *Miliolina pygmaea* (Reuss).

Quinqueloculina pygmaea, Reuss, 1849-50, FOT, p. 384, pl. v (1), fig. 3.

Quinqueloculina lucida, Karrer, 1868, MFKB, p. 147, pl. ii, fig. 7.

Miliolina pygmaea, Heron-Allen and Earland, 1916, FWS, p. 211, pl. xxxix, figs. 10-16 (only).

Fourteen stations: WS 80, 83, 88, 89, 90, 91, 93, 99, 108, 210, 215, 217, 225, 408.

The specimens are usually few in number, but at WS 83 they are extraordinarily abundant. All the specimens agree, on the whole, better with the description and figure of *Quinqueloculina lucida*, Karrer, *ut supra*, in which the chambers are slightly more inflated and the sutural depressions deeper than in Reuss's species. They are, moreover, rough in surface texture. Karrer draws attention to this, while Reuss ignores the point.

26. *Miliolina venusta* (Karrer).

Quinqueloculina venusta, Karrer, 1868, MFKB, p. 147, pl. ii, fig. 6.

Miliolina venusta, Brady, 1884, FC, p. 162, pl. v, figs. 5, 7.

Miliolina venusta, Flint, 1899, RFA, p. 298, pl. xlv, fig. 2.

Two stations: 53; WS 92.

Single specimens only at these stations.

27. *Miliolina trigonula* (Lamarck).

- Miliolites trigonula*, Lamarck, 1804, etc., AM, 1804, v, p. 351, no. 3.
Triloculina trigonula, d'Orbigny, 1826, TMC, p. 299, no. 1, pl. xvi, figs. 5-9.
Miliolina trigonula, Brady, 1884, FC, p. 164, pl. iii, figs. 14-16.

Four stations: WS 88, 99, 215, 217.

Rare. There are but few specimens at each station and they occur in two different forms, differing in their length. The long form appears at WS 88 and 217 and the short broad form at WS 99 and 215.

28. *Miliolina tricarinata* (d'Orbigny).

- Triloculina tricarinata*, d'Orbigny, 1826, TMC, p. 299, no. 7, Modèle no. 94.
Cruciloculina triangularis, d'Orbigny, 1839, FAM, p. 72, pl. ix, figs. 11 and 12.
Triloculina tricarinata, Brady, 1864, RFS, p. 466, pl. xlviii, fig. 3.

Four stations: 388; WS 245, 248, 433.

A few specimens at these stations. D'Orbigny recorded his *Cruciloculina triangularis* (*ut supra*), which has always been regarded as a synonym of *M. tricarinata*, as being fairly common in deep water off the Falkland Islands, on stony ground. None of our Falkland specimens are characterized by the cruciform aperture which gave rise to his generic name, but are normally milioline. In the South Georgia area, however, the cruciloculine aperture is normal and frequent. The Type of *Cruciloculina* was not to be found in Paris.

29. *Miliolina circularis* (Bornemann).

- Triloculina circularis*, Bornemann, 1855, FSH, p. 349, pl. xix, fig. 4.
Miliolina circularis, Brady, 1884, FC, p. 169, pl. iv, fig. 3; pl. v, figs. 13, 14 (?).

Fifteen stations: 48, 51, 53, 388; WS 71, 79, 83, 87, 88, 90, 93, 94, 95, 108, 213.

The specimens are generally rather small and feeble. Good at 53, 388 and WS 87. A fossil specimen was observed at WS 95.

30. *Miliolina seminuda* (Reuss).

- Quinqueloculina seminuda*, Reuss, 1866, FABS, p. 125, pl. i, fig. 11.
Miliolina subrotunda, Wright, 1885-6, BLP, p. 319, pl. xxvi, fig. 5.
Miliolina seminuda, Heron-Allen and Earland, 1913, CI, p. 27.

One station: WS 531.

A single weakly marked specimen only.

31. *Miliolina rosea* (d'Orbigny) (Plate VI, figs. 16-18).

- Triloculina rosea*, d'Orbigny, 1839, FAM, p. 69, pl. iii, figs. 18-20.

One station: WS 93.

A few specimens, white in colour, from this station. In spite of his specific name, d'Orbigny describes his specimens as being uniformly pink *or* white. One specimen shows, by the presence of a few feeble striae on the periphery, the relationship to

M. fichteliana (d'Orbigny) to which d'Orbigny alludes *ut supra*. The Paris Type tube contains three specimens, two entirely covered by efflorescence. The third is a specimen of *M. valvularis*, Reuss, and therefore not in the least resembling d'Orbigny's figure. Evidently a case of "rearrangement". The two effloresced specimens were carefully cleaned, and disclosed the remains of a compressed Miliolid, quite unidentifiable with the figure.

32. *Miliolina lutea* (d'Orbigny) (Plate VI, figs. 19-21).

Triloculina lutea, d'Orbigny, 1839, FAM, p. 70, pl. ix, figs. 6-8.

Two stations: WS 88, 246.

A single specimen at each station agreeing fairly well with d'Orbigny's description and figure. He records it as "rare" from the Falkland Islands sands. The Type is not to be found in Paris. Length, 0.50 mm., greatest breadth, 0.35 mm.

33. *Miliolina rotunda* (d'Orbigny).

Triloculina rotunda, d'Orbigny, 1826, TMC, p. 299, no. 4.

Triloculina rotunda, Schlumberger, 1893, MGM, p. 64, pl. i, figs. 48-50, text-figs. 11, 12.

Miliolina rotunda, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 568, pl. xlii, figs. 27-30.

Two stations: 388; WS 88.

Many well-developed specimens referable to this species, identical with the Type in Paris.

34. *Miliolina labiosa* (d'Orbigny).

Triloculina labiosa, d'Orbigny, 1839, FC, p. 178, pl. x, figs. 12-14.

Miliolina labiosa, Brady, 1884, FC, p. 170, pl. vi, figs. 3-5.

Triloculina labiosa, Cushman, 1918, etc., FAO, 1929, pt. 6, p. 60, pl. xv, figs. 2, 3.

Two stations: 388; WS 88.

A few small specimens. The Type is missing in Paris.

35. *Miliolina valvularis* (Reuss).

Triloculina valvularis, Reuss, 1851, FSUB, p. 85, pl. vii, fig. 56.

Miliolina valvularis, Brady, 1884, FC, p. 161, pl. iv, figs. 4, 5.

Miliolina valvularis, Goës, 1894, ASF, p. 115, pl. xxii, fig. 871.

Seven stations: 388; WS 71, 83, 84, 86, 88, 221.

Very good specimens. One, very fine and large at WS 84, quite typical. Other good ones at WS 71 and 221.

36. *Miliolina brongiartii* (d'Orbigny).

Triloculina brongiartii, d'Orbigny, 1826, TMC, p. 300, no. 23.

Triloculina brongiartii, Parker and Jones, 1859, etc., NF, 1871, p. 250, pl. viii, fig. 9.

Triloculina brongiartii, Cushman, 1918, etc., FAO, 1929, pt. 6, p. 63, pl. xvi, fig. 4.

Four stations: 388; WS 87, 88, 91.

Very good specimens in excellent condition at 388 and WS 87, 88. No Type-specimen to be found in Paris.

37. *Miliolina suborbicularis* (d'Orbigny).

Triloculina suborbicularis, d'Orbigny, 1826, TMC, p. 300, no. 12.

Triloculina suborbicularis, d'Orbigny, 1839, FC, p. 177, pl. x, figs. 9-11.

Miliolina suborbicularis, Schlumberger, 1893, MGM, p. 72 (in the reprints, p. 215), text-figs. 26-8; pl. ii, figs. 63, 64; pl. iii, fig. 67.

One station: WS 215.

A single specimen of this somewhat unsatisfactorily separated species, being the most fully striate of the *webbiana-fichteliana-suborbicularis* group. (See our observations in H.-A. & E. 1914 etc., FKA, 1915, p. 560.)

The Type of d'Orbigny's *Triloculina suborbicularis* could not be found, but the species is identifiable from his figure, and from Schlumberger's work (*ut supra*). It must not be confounded with d'Orbigny's *Quinqueloculina suborbicularis* (d'O. 1826, TMC, p. 302, no. 29) of which we are only told that it "inhabited the Mediterranean". The name has dropped into disuse, the Types, however, are in good condition in Paris, and fair (though damaged) at La Rochelle. They represent a stout, broad form of *M. semimulum*, the shell being quite free from striae.

Genus *Sigmoilina*, Schlumberger, 188738. *Sigmoilina obesa*, sp.n. (Plate VII, figs. 1-4).

Twelve stations: 48, 388; WS 72, 83, 84, 86, 87, 91, 93, 108, 219, 221.

Test free, porcellanous, broadly oval in side view with the aboral end somewhat projecting, elliptical in end view. Two chambers only, visible externally, the final chamber occupying nearly three-quarters of the visible surface, separated by a curved sutural line nearly flush with the surface of the test. The two surfaces are inequilaterally convex and the peripheral edge broadly rounded. Walls thick and devoid of ornament, the surface usually dull, but sometimes polished, though never to the same extent as in *Sigmoilina sigmoidea* (Brady). Aperture, a curved slit furnished with a simple tooth.

Both megalospheric and microspheric forms have been observed, the former as usual being the most abundant. Externally there is no very great difference except in size, the megalospheric form ranging up to 0.80 mm. in length and 0.70 mm. in breadth as compared with 1.45 mm. and 1.20 mm. for the length and breadth of the microspheric. In section, the megalospheric form shows only 2-3 pairs of chambers following the proloculum, while the microspheric has about 7-8 pairs.

Sigmoilina obesa is a fairly distinctive species, its nearest ally is unquestionably *S. sigmoidea* (Brady), but it can hardly be confused with that species externally, while, in section, the sigmoid curves of the two species are quite distinctive.

The species occurs at many stations in the Falkland area, though never in any great numbers.

39. *Sigmoilina schlumbergeri*, Silvestri.

Planispirina celata, Brady, 1884, FC, p. 197, pl. viii, figs. 1-4.

Planispirina celata, Schlumberger, 1887, P, p. 111, text-figs. 6-7; pl. vii, figs. 12-14.

Planispirina celata, Flint, 1899, RFA, p. 303, pl. xlvii, fig. 5.

Sigmoilina schlumbergeri, Silvestri, 1904, TB, p. 267.

Three stations: 236; WS 215, 413.

A few specimens identifiable with Brady's figures ascribed to *Planispirina celata* (Costa). Silvestri has separated these and named them after Schlumberger, who has gone in great detail into the minute structure of the form (*ut supra*). While preserving Silvestri's name *pro tem.*, we may say we have been unable to verify the existence of a microspheric form in *Sigmoilina celata* (Costa), *sensu stricto*. We have cut sections of a considerable number of specimens of both forms and found that *S. schlumbergeri* is, in our experience, invariably microspheric and *S. celata* megalospheric.

40. *Sigmoilina tenuis* (Czjzek).

Quinqueloculina tenuis, Czjzek, 1848, FWB, p. 149, pl. xiii, figs. 31-4.

Spiroloculina tenuis, Brady, 1884, FC, p. 152, pl. x, figs. 7-11.

Sigmoilina tenuis, Schlumberger, 1887, P, p. 118.

Spiroloculina tenuis, Heron-Allen and Earland, 1916, FWS, p. 208 (and *sub M. pygmaea*, p. 211, pl. xxxix, figs. 17-18).

Three stations: WS 217, 221, 408.

Fairly frequent at WS 217 and 408, where the specimens exhibit a great range of form, extending from the typical *Quinqueloculina tenuis*, Czjzek, with its somewhat narrow outline and marked sigmoid curves, to the very complanate *Spiroloculina tenuissima*, Reuss (R. 1867, FSW, p. 71, pl. i, fig. 11), in which the sigmoid curves are hardly recognizable. We have dealt with the relationships of this form with *Miliolina pygmaea* (Reuss) in our West of Scotland paper (*loc. cit.*, p. 211).

Sub-family HAUERININAE

Genus *Tubinella*, Rhumbler, 1906

41. *Tubinella funalis* (Brady).

Articulina funalis, Brady, 1884, FC, p. 185, pl. xiii, figs. 6-11.

Tubinella funalis, Rhumbler, 1906, FLC, p. 26.

Tubinella funalis, Cushman, 1918, etc., FAO, 1929, pt. 6, p. 54, pl. xii, fig. 8.

Five stations: 48, 53, 388; WS 71, 88.

A few specimens at each. Three of these stations, 48, 53 and WS 71, are close together in-shore to the north-east of the islands, WS 88 is far away (our furthest south-west station) close to the point of South America and 388 is right off Cape Horn. Its non-occurrence at intermediate stations is difficult to explain, as the species is abundant in Antarctic material, and, if occurring at all, would be expected to be universally distributed in the area.

Genus *Planispirina*, Seguenza, 188042. *Planispirina cryptella* (d'Orbigny).

Triloculina cryptella, d'Orbigny, 1839, FAM, p. 70, pl. ix, figs. 4, 5.

Two stations: WS 80, 225.

A single specimen at each station. The Type tube labelled "*T. cryptella*, Îles Malouines" in Paris contains eight specimens, all badly overgrown with efflorescence, some utterly destroyed. One or two were successfully cleaned, and the specimens agree fairly well with d'Orbigny's fig. 5. There is nothing which can be suggested as responsible for fig. 4 which, indeed, cannot be identified with either fig. 5 or the text. The species appears to be very closely related to his *Biloculina irregularis* but is more globular.

As already pointed out by Brady (B. 1884, FC, p. 171) the *Miliola* (*Triloculina*) *cryptella* of Parker and Jones (P. & J. 1865, NAAF, p. 410, pl. xv, fig. 39) is not d'Orbigny's form. This is the only occasion, as far as we are aware, on which d'Orbigny's specific name has been revived.

43. *Planispirina irregularis* (d'Orbigny).

Biloculina irregularis, d'Orbigny, 1839, FAM, p. 67, pl. viii, figs. 20, 21.

Biloculina irregularis, Brady, 1884, FC, p. 140, pl. i, figs. 17, 18.

Biloculina irregularis, Chapman, 1914, EDRS, p. 42, pl. v, fig. 2.

Four stations: WS 76, 225, 245, 248.

Rare. The largest at WS 245, the most typical at WS 76. The Type is not to be found in Paris.

44. *Planispirina sphaera* (d'Orbigny) (Plate VI, figs. 41, 42).

Biloculina sphaera, d'Orbigny, 1839, FAM, p. 66, pl. viii, figs. 13-16.

Biloculina sphaera, Brady, 1884, FC, p. 141 (fig.), pl. ii, fig. 4 *a, b*.

Planispirina sphaera, Schlumberger, 1891, BGF, p. 577 (in the reprints, p. 190), text-figs. 45, 46.

Biloculina sphaera, Chapman, 1906, GBI, p. 82, pl. iii, fig. 1 *a, b*.

One station: WS 217.

D'Orbigny records this species as not uncommon at the Falkland Islands, but we have found it in but a single dredging, where it is scantily represented, the specimens agreeing absolutely with d'Orbigny's figures, of small size (average 0.50 mm. in diameter), compared with the dimensions which the species attains in deep water round the British Isles, and in Discovery material from higher latitudes than the Falkland Islands. Two Types in the d'Orbigny collection, one very small. They are in good condition and of typical appearance. D'Orbigny's figure, incidentally, is poor.

45. *Planispirina bucculenta* (Brady).

Miliolina bucculenta, Brady, 1884, FC, p. 170, pl. cxiv, fig. 3 *a, b*.

Planispirina bucculenta, Schlumberger, 1892, FAM, p. 208 (in the reprints, p. 194), text-figs. 2, 3, pl. viii, figs. 6, 7.

Miliolina bucculenta, Goës, 1894, ASF, p. 118, pl. xxiii, figs. 890-903, pl. xxiv, figs. 904, 905.

One station: WS 88.

A single small specimen at this station; probably a young individual.

Sub-family *PENEROPLIDINAE*Genus *Cornuspira*, Schultze, 185446. *Cornuspira involvens*, Reuss.

Operculina involvens, Reuss, 1849-50, FOT, p. 370, pl. i (xlvi), fig. 20 (not 30).

Cornuspira involvens, Brady, 1884, FC, p. 200, pl. xi, figs. 1-3.

Eight stations: 51, 53, 388; WS 71, 88, 93, 217, 221.

Rare except at WS 88. With the exception of one specimen at WS 88, the whole of the individuals are megalospheric. They are all of a small neat type and there is a great range of size in the megalosphere.

47. *Cornuspira polygyra*, Reuss (Plate VII, fig. 5).

Cornuspira polygyra, Reuss, 1863, KTF, p. 39, pl. i, fig. 1.

Cornuspira polygyra, Reuss, 1870, FSP, p. 463, and Schlicht, 1870, FSP, p. 91, pl. xxxv, figs. 1-4.

Two stations: 388; WS 88.

The specimens are small, ranging up to 0.20 mm. only in diameter, but agree with Reuss's figure and description. They are all megalospheric and some run up to as many as twelve or thirteen convolutions. One or two specimens show a tendency to a slight increase in the diameter of the final convolution, as described by Reuss in his original diagnosis of the species.

48. *Cornuspira selseyensis*, Heron-Allen and Earland.

Cornuspira (?), Earland, 1905, FBS, p. 199, pl. xiii, figs. 2-4.

Cornuspira selseyensis, Heron-Allen and Earland, 1908, etc., SB, 1909, p. 319, pl. xv, figs. 9-11.

Cornuspira selseyensis, Cushman, 1918, etc., FAO, 1929, p. 82, pl. xx, fig. 9.

One station: 53.

At this station a few small individuals were found, rather more regularly coiled than is usually the case.

49. *Cornuspira denticulata*, sp.n. (Plate VII, figs. 6-8).

Three stations: WS 87, 88, 225.

Test discoidal, nearly flat, somewhat depressed at centre, peripheral edge rounded, wall very thin, consisting of a large proloculum followed by 4-6 embracing convolutions of a round tube slowly increasing in diameter. Where the inner edge of the tube overlaps the previous whorl, the shell substance extends over that whorl in minute denticulations. Aperture, an arched opening, over which the outer edge of the tube usually projects forward. Surface smooth and glistening, but showing lines of growth in the form of very faint striae. Colour white to pale straw, translucent. Diameter ranging up to 0.25 mm.

Only a few specimens, all in a good state of preservation, were found at each station, the best being at WS 88 and 225. They were at first regarded with some hesitation, as the denticulate markings and translucent wall were more suggestive of *Spirillina* than of *Cornuspira*. In fact the specimens bear some resemblance in their markings to the form

figured by Sidebottom (1904, etc. RFD, 1908, p. 7, pl. ii, fig. 2) as *Spirillina vivipara* var., or to Williamson's figure of *Spirillina margaritifera*. Careful examination of specimens in balsam under high powers failed, however, to give any evidence of perforations, and their pale amber colour in that medium seems conclusive evidence of the porcellanous nature of the shell.

50. *Cornuspira foliacea* (Philippi).

Orbis foliaceus, Philippi, 1844, EMS, p. 147, pl. xxiv, fig. 25 (error for 26).

Spirillina foliacea, Williamson, 1858, RFGB, p. 91, pl. vii, figs. 199-201.

Cornuspira foliacea, Brady, 1884, FC, p. 199, pl. xi, figs. 5-9.

One station: WS 531.

A single broken specimen, only, represents this very widely spread species in our material.

Genus *Opthalmidium*, Zwingli and Kübler, 1870

51. *Opthalmidium inconstans*, Brady.

Hauerina inconstans, Brady, 1879, RRC, p. 268.

Opthalmidium inconstans, Brady, 1884, FC, p. 189, pl. xii, figs. 5, 7, 8.

Opthalmidium inconstans, Flint, 1899, RFA, p. 302, pl. xlvii, fig. 3.

Two stations: WS 93, 245.

Single small individuals at each station. The occurrence of only single specimens of this widely distributed species is noteworthy.

Family ASTRORHIZIDAE

Sub-family ASTRORHIZINAE

Genus *Iridia*, Heron-Allen and Earland, 1914

52. *Iridia diaphana*, Heron-Allen and Earland.

Iridia diaphana, Heron-Allen and Earland, 1914, etc., FKA, 1914, p. 371, pl. xxxvi, 1915, p. 607.

Iridia diaphana, Heron-Allen and Earland, 1916, FSC, p. 37.

Iridia diaphana, Heron-Allen and Earland, 1930, FPD, p. 65, pl. iii, figs. 32, 33.

One station: WS 246.

Only a single specimen, attached to a Polyzoan fragment, which can be identified with practical certainty.

Genus *Storthosphaera*, F. E. Schulze, 1875

53. *Storthosphaera depressa*, Pearcey.

Storthosphaera depressa, Pearcey, 1900, RCA, p. 37, pl. i, fig. 1.

Storthosphaera depressa, Heron-Allen and Earland, 1922, TN, p. 231.

One station: WS 217.

Two specimens utilizing spicules more largely in their construction than is usual in British specimens. Like *Dendrophrya erecta* (post no. 58), it is probably widely distributed, but has only been recorded from Britain up to the present.

Genus *Crithionina*, Goës, 189454. *Crithionina granum*, Goës.

Crithionina granum, Goës, 1894, ASF, p. 15, pl. iii, figs. 28-33.

Crithionina granum, Rhumbler, 1903, ZRR, p. 231, fig. 58.

Crithionina granum, Cushman, 1918, etc., FAO, 1918, p. 69, pl. xxvi, figs. 6-7.

Three stations: WS 99, 109, 217.

The specimens are few but quite characteristic. Some of them show signs of having been attached, and others, from their irregular shape, probably lived in interstices between sand grains.

55. *Crithionina mamilla*, Goës.

Crithionina mamilla, Goës, 1894, ASF, p. 15, pl. iii, figs. 34-6.

Crithionina mamilla, Heron-Allen and Earland, 1912, etc., NSG, 1913, p. 9, pl. iii.

Three stations: 53; WS 225, 245.

The specimens are few and poorly developed, the best at WS 245, attached to a pebble and bristling with long sponge spicules. A similar spiculiferous specimen, but detached, at WS 225.

56. *Crithionina pisum*, Goës.

Crithionina pisum, Goës, 1896, DOA, p. 24, pl. ii, figs. 1, 2.

Crithionina pisum, Heron-Allen and Earland, 1909, TNS, p. 410, pl. xxxiv, fig. 6 a.

One station: 53.

Rare and very small but quite spherical.

Genus *Saccorhiza*, Eimer and Fickert, 189956 A. *Saccorhiza ramosa* (Brady).

Hyperammina ramosa, Brady, 1879, etc., RRC, 1879, p. 33, pl. iii, figs. 14, 15; 1884, FC, p. 261, pl. xxiii, figs. 15-19.

Saccorhiza ramosa, Eimer and Fickert, 1899, AVF, p. 670.

One station: WS 433.

A few fragments.

Genus *Dendrophrya*, Strethill Wright, 186157. *Dendrophrya radiata*, Strethill Wright.

Dendrophrya radiata, Strethill Wright, 1861, *Ann. Mag. Nat. Hist.* (3), VIII, p. 122.

Dendrophrya radiata, Brady, 1884, FC, p. 238, pl. xxvii a, figs. 10-12.

One station: WS 210.

A few rather doubtful specimens attached to zoophyte fragments were found at this station to the north of the Falkland Islands, in 161 m. They are not sufficiently well preserved to be identified with certainty.

58. *Dendrophrya erecta*, Strethill Wright (Plate VII, fig. 9).

Dendrophrya erecta, Strethill Wright, 1861, *Ann. Mag. Nat. Hist.* (3), VIII, p. 122, pl. iv, figs. 4, 5.

Dendrophrya erecta, Brady, 1884, FC, p. 239, pl. xxvii a, figs. 7-9.

One station: WS 221.

A single excellent specimen attached to a *Pecten* shell. It is quite possible that the species is widely distributed, but hitherto the only records are from shallow water round the British coasts.

Genus *Dendronina*, Heron-Allen and Earland, 192259. *Dendronina papillata* (Heron-Allen and Earland) (Plate XVI, figs. 33-38 and Plate XVII, figs. 1-3).

Diffusilina papillata, Heron-Allen and Earland, 1929, etc., FSA, 1929, p. 324, pl. i, figs. 4-6.

Six stations: WS 213, 221, 225, 242, 243, 245.

"Test attached to stones and other objects, generally roughly circular in outline, though the edges are frequently produced into irregular cusps. In form, more or less convex, built up of finely comminuted sand and mud, firmly compacted but without much cement, except in the outer layer which is very smooth, even polished, but with one or more well-marked, projecting papillae, formed of the same minute sand grains more loosely agglutinated. These papillae presumably form the avenues for the extrusion of the protoplasm, which, however, may perhaps also find an exit round the edges of the test, although these appear to be in close contact with the surface of attachment. Colour varying from dirty white to grey.

"Specimens broken open reveal a simple cavity with lobular extensions—in fact amoeboid in shape—filled with pale brown protoplasm. Larger sand grains are used in the construction of the interior, than of the outer layer of the wall. No passages connecting the central cavity with the papillae or the edges can be made out. Probably the protoplasm exudes in a fluid form between the sand grains, and digestion is carried on outside the test. The size varies up to about 2 mm. in diameter."

The foregoing extract from the original description of the species still holds good on the whole, but a much larger supply of material has demonstrated that the specimens originally described were young individuals constituting the first stage of a larger organism which can no longer be retained in the genus *Diffusilina*, but must be removed to *Dendronina*, a genus originally described by us from New Zealand and the Ross Sea in the Antarctic (H.-A. & E. 1922, TN, p. 78 *et seq.*). It was then suggested that the genus might prove to have a wide distribution.

Following on the early growth described above, the second stage consists in the prolongation of the central nipple into a short, stout, tubular outgrowth, furnished at its extremity with a constricted circular opening. The same fine material is employed. The walls of the tube are thin and the central cavity large, and the tube is apparently superimposed on the original papilla, forming a separate chamber of which the top of the papilla forms the base. Its height may be 2.00 mm. or more.

In the third and final stage the tube expands and forms an irregular body, either

bulbous or club-shaped, or irregularly branching, with terminal apertures. In this final stage the wall is reduced to almost papery thinness and is very fragile. No perfect specimens in this stage have been found, nor does it seem probable that they would survive the treatment of cleaning the material. A sufficient number of fragments representing the final stage, ranging up to 2.00 mm. in length, associated with specimens of the second stage with fractured terminal tube was, however, found at WS 225 to justify the foregoing reconstruction of the third or final stage of growth. The height of the complete organism is probably 4-5 mm. Perfect specimens may yet perhaps be found in sheltered crevices of sponges, etc.

One or two specimens have been seen with two diverging tubes on the same basal "pad", but these appear to be abnormal. The shape of the basal pad varies according to its *locus adhaerendi*. On stones and shells it is invariably circular and very depressed, but when the organism has started growth on the stem of a zoophyte, the pad increases in size conformably with the surface of attachment and becomes elongated and more rapidly conical. Such specimens were found at WS 225, but were very uncommon. Intermediate forms of the basal pad also occur.

In one very interesting specimen which we figure, the basal pad had probably been attached to some soft organism which had decayed. The branching passages of the earliest chamber are clearly seen through a thin chitinous film, which covers the base of the pad, and leaves no doubt as to the astrorhizid character of the organism. It measures 1.20 mm. in diameter.

Dendronina papillata is evidently very closely related to *Dendronina limosa* var. *humilis* (H.-A. & E. 1922, TN, p. 81, pl. ii, figs. 7-9), but differs from it in the spreading character of the basal pad, and by an invariably sessile habit.

The species is not uncommon at WS 225 and 242, less frequent at the other stations.

The removal of this species from the genus *Diffusilina* does not affect our original diagnosis of that genus and its genotype *D. humilis*.

Sub-family SACCAMMININAE

Genus *Psammosphaera*, F. E. Schulze, 1875

60. *Psammosphaera fusca*, Schulze (Plate VIII, figs. 1-4 and Plate XVII, figs. 4-6).

Psammosphaera fusca, Schulze, 1874-5, R, p. 113, pl. ii, fig. 8.

Psammosphaera fusca, Brady, 1884, FC, p. 249, pl. xviii, figs. 1-8.

Psammosphaera fusca, Heron-Allen and Earland, 1912, etc., NSG, 1913, p. 1, pls. i-iii.

Twenty-nine stations: 230, 388; WS 71, 73, 76, 77, 78, 79, 80, 83, 84, 87, 88, 90, 91, 92, 93, 94, 108, 109, 210, 215, 217, 221, 225, 246, 248, 431, 433.

The species is generally distributed and often common, and it presents an unusual amount of variation. What may be described as the normally spherical and regularly constructed type occurs at 230 and WS 71, 80, 92, 109. A similar form, but neatly constructed almost entirely of coarse sand grains occurs at WS 225. Fine material only is employed for a nearly spherical form at WS 84. At WS 210, the species was represented

by a single tiny almost spherical specimen. At WS 73, shell fragments are used producing a highly irregular test.

More characteristic of the Falkland area are the very roughly and irregularly formed specimens which are found at WS 76, 77, 79, 83, 84, 108, 215, 217, 221 and 248. These present a most extraordinary dissimilarity, but they all agree in the use of a very limited number of large sand and mineral grains agglomerated by cement, with a central cavity at their points of juncture, the body of the animal thus forming a very minute fraction of the bulk of the organism. Specimens thus incorporating four large sand grains are common, they have been seen with as few as three, or even two grains constituting the "house" (Plate VIII, figs. 31-3). In this last stage they approach very closely to the sessile forms which are found at WS 79, 87, 88, 225, 246; these occur both as finely and coarsely constructed forms; at WS 88 both coarse and fine forms occur together.

Genus *Proteonina*, Williamson, 1858

61. *Proteonina difflugiformis* (Brady).

Reophax difflugiformis, Brady, 1879, etc., RRC, 1879, p. 51, pl. iv, fig. 3; 1884, FC, p. 289, pl. xxx, figs. 1-5.

Proteonina difflugiformis, Rhumbler, 1903, ZRR, p. 245, figs. 80 *a*, *b*.

Ten stations: 228; WS 76, 77, 90, 99, 108, 210, 215, 217, 433.

Not very abundant, the largest and most typical at WS 90, most frequent at WS 433. Very neatly constructed, with much cement at WS 99; very rough and irregular at 228 and WS 217.

Genus *Thurammina*, Brady, 1879

61 A. *Thurammina castanea*, Heron-Allen and Earland.

Thurammina papillata, Brady, 1879, etc., RRC, 1879, p. 45, pl. v, figs. 4-8; 1884, FC, p. 321, pl. xxxvi, figs. 7-18.

Thurammina papillata var. *castanea*, Heron-Allen and Earland, 1912, etc. NSG, 1917, p. 545, pl. xxvi, figs. 14-18; pl. xxix, fig. 17.

One station: 388.

A single small specimen, so pauperate that the test is more or less collapsed.

Genus *Technitella*, Norman, 1878

62. *Technitella nitida*, sp.n. (Plate XVI, fig. 39).

One station: WS 531.

Test, monothalamous, an elongate oval, broadest below the middle, and narrowing towards the oral end, where there is a large simple aperture surrounded by a slightly thickened and everted lip. In section, roughly circular, but the surface of the dried test has one or two longitudinal depressions probably due to shrinkage. Constructed of fine acerate sponge spicules, mostly unbroken, neatly cemented together with a white cement, in a single layer, so that the spicules lie regularly parallel to the long axis of the

test. Surface smooth and without any projecting spicules. Colour, glistening white. Length 1.50 mm.; greatest breadth 0.80 mm.

This very interesting little form, of which only a single perfect specimen was obtained, appears to occupy a position intermediate between *T. legumen* Norman and *T. melo* Norman. It differs from *T. legumen* in its regularly oval form, and particularly in the absence of that inner layer of sponge spicules set at right angles to the outer layer which marks the high selective and constructional powers of that species,¹ while agreeing with that species in its superficial neatness and the longitudinal arrangement of the spicules in the external wall. It resembles *T. melo* in its general form and in the construction of its test in a single layer, but differs from that species in its extraordinary neatness. In *T. melo* the aboral end of the shell bristles with the projecting ends of the spicules, but in our species the aboral end is as neatly finished as the rest of the shell.

Genus *Webbinella*, Rhumbler, 1903

63. *Webbinella hemisphaerica* (Jones, Parker and Brady) (Plate VIII, fig. 9).

Webbina hemisphaerica, Jones, Parker and Brady, 1866, etc., MFC, 1866, p. 27, pl. iv, fig. 5.

Webbina hemisphaerica, Brady, 1884, FC, p. 350, pl. xli, fig. 11.

Webbinella hemisphaerica, Rhumbler, 1903, ZRR, p. 228, fig. 54.

Two stations: WS 221, 246.

A single specimen at each station of the original type, characterized by a high-domed, practically semi-globular test without any marginal extension. The specimen from WS 221 is snow white, that from WS 246 of the more usual dark, ferruginous colour. They differ greatly in appearance from the depressed, outspreading type which has sometimes been figured under this name and which we are now separating, being convinced of the absence of any relationship.

64. *Webbinella depressa*, sp.n. (Plate VII, figs. 10, 11).

Webbinella hemisphaerica, Cushman, 1910, etc., FNP, 1910, p. 51, fig. 56; 1918, etc., FAO, 1918, p. 62, pl. xxv, figs. 1-3; 1922, FHB, p. 6.

Five stations: WS 93, 221, 225, 245, 246.

Test sessile, very slightly convex, flattening towards the periphery which is usually more or less irregular in outline, and rarely circular as in *W. hemisphaerica*. Constructed of very fine sand grains without visible cement and rather thick walled, the central cavity being quite small. Exterior very smooth and neatly finished; colour varying from nearly white to dark grey, never ferruginous; no visible aperture. Size very variable, ranging from 1.0 up to 3.0 mm. in diameter.

Common on shell fragments at WS 246, more rarely at the other stations recorded, and probably widely distributed in the Falkland area, wherever conditions are suitable. Cushman (*supra*, 1922, FHB) records what is evidently the same form from shallow water in Hudson's Bay under the name *W. hemisphaerica*, but he draws attention to the many points of difference, and evidently regarded his specimens as a distinct organism.

¹ H.-A. & E. 1912, etc., NSG, 1912, pp. 382-3, pl. v, fig. 1, 2; pl. vi, fig. 1.

W. depressa is readily distinguished from *W. hemisphaerica* by (1) its low convexity, (2) its irregular contour, and (3) by the invariable absence of ferruginous cement. The minute sand grains, though firmly agglomerated, are not cemented together, and the test can be opened with a needle point without fracture, an impossibility with the firmly cemented hemisphere of *W. hemisphaerica*.

Genus *Tholosina*, Rhumbler, 1895

65. *Tholosina bulla* (Brady).

Placopsilina bulla, Brady, 1879, etc., RRC, 1881, p. 51; 1884, FC, p. 315, pl. xxxv, figs. 16, 17.

Tholosina bulla, Cushman, 1910, etc., FNP, 1910, p. 49, fig. 55.

Five stations: WS 213, 215, 225, 246, 433.

The semi-globular type of Brady is a deep-water organism, as evidenced by the shape of the test. No very typical examples occur, the best being at WS 246.

66. *Tholosina protea*, sp.n. (Plate VIII, figs. 5-8).

Five stations: WS 94, 213, 225, 243, 246.

Test normally adherent, sometimes becoming detached and assuming the free condition, consisting of a single thick-walled chamber composed of very fine sand and mud firmly agglutinated with cement; surface usually smooth but not polished; aperture one or more small holes situated at the extremities; shape protean, dependent upon the nature of the surface of attachment. Colour varying from snowy white, which is not uncommon, to nearly black, according to the material employed. Dimensions very variable, ranging up to 2.0 mm., but on an average about 1.0 mm. in greatest diameter.

We have given this name to an organism with which we have long been familiar in dredged material from our own coasts. The Falklands specimens show little difference except in their greater size and abundance.

It may be regarded as the shallow-water equivalent of the deep sea *T. bulla*. In shape it is truly protean, the form of the "house" being governed by the contour of the surface on which it is built. On flat surfaces it is semi-globular, sometimes nearly globular, with difficulty separable from *T. bulla*. When attached to the stalk of a zoophyte its length may be many times its breadth, and separate individuals are sometimes so closely situated as to give the impression of a multilocular organism. It is possible that the doubtful organism *Placopsilina kingsleyi*, Siddall (S. 1886, LMBC, p. 54, pl. i, fig. 1) may have been such a double specimen. The description and figure are poor, and the Type is missing from the Siddall collection now in our possession. A favourite position is in the forking angle of a branching zoophyte, where it becomes attached to both branches and forms a wedge-shaped and irregular "house". It sometimes surrounds a slender branch. Finally, it may become detached and continue a free existence as a more or less rounded object, usually showing traces of its original point of attachment.

It is probably abundant where conditions are favourable. Not much of our material was of a suitable nature, but it was common and varied at WS 243.

67. *Tholosina vesicularis* (Brady).

Placopsilina vesicularis, Brady, 1879, etc., RRC, 1879, p. 51, pl. v, fig. 2; 1884, FC, p. 316, pl. xxxv, figs. 18, 19.

Tholosina vesicularis, Rhumbler, 1903, ZRR, p. 227, fig. 53.

Seven stations: 235; WS 76, 77, 213, 215, 225, 243.

Probably generally distributed wherever conditions are suitable. It often occurs in enormous numbers, particularly at WS 225 and 243, where it encrusts the stones.

68. *Tholosina vesicularis* var. *erecta*, Heron-Allen and Earland (Plate XVII, figs. 7, 8)

Tholosina vesicularis var. *erecta*, Heron-Allen and Earland, 1929, etc., FSA, 1929, p. 325, pl. i, figs. 7, 8.

Six stations: WS 77, 213, 221, 225, 242, 243.

The characters of the variety are the same as those given by Brady for the species, but the tubular extensions, instead of being attached to the surface of the stone, are free and project above the organism like factory chimneys. Occasionally the tubes fork, a feature which Brady mentions in connection with the type, but which is, in our experience, very rarely seen.

The variety favours depressions and cavities in stones, and is accordingly less convex than the type. In many specimens it forms merely a flat arenaceous membrane enclosing a cavity and surrounded by vertical tubes as shown in fig. 8. The size is variable, but specimens have been seen up to 4 mm. in diameter.

T. vesicularis is abundant and widely distributed in the Falkland area, but the variety *erecta* has so far only been observed at those stations where the presence of many decomposing rock fragments favoured its growth. Probably it occurs in other suitable localities, as fragments of similar tubes have been observed at many stations which, until the discovery of the entire organism, were regarded as fragments of *Psammatodendron*, Norman.

Sub-family RHABDAMMININAE

Genus *Jaculella*, Brady, 187969. *Jaculella acuta*, Brady.

Jaculella acuta, Brady, 1879, etc., RRC, p. 35, pl. iii, figs. 12, 13; 1884, FC, p. 255, pl. xxii, figs. 14-18.

Two stations: WS 99, 217.

Single specimens.

70. *Jaculella obtusa*, Brady.

Jaculella obtusa, Brady, 1882, FKE, p. 714; 1884, FC, p. 256, pl. xxii, figs. 19-22.

Jaculella obtusa, Goës, 1894, ASF, p. 20, pl. iv, figs. 87-9; pl. v, figs. 90, 91.

Two stations: WS 217, 219.

A number of coarsely arenaceous specimens at WS 219, and one entirely constructed of spicules at WS 217.

Genus *Hyperammina*, Brady, 187871. *Hyperammina friabilis*, Brady.

Hyperammina elongata (*pars*), Brady, 1878, RRNP, p. 433; 1879, etc., RRC, 1879, p. 32.

Hyperammina friabilis, Brady, 1884, FC, p. 258, pl. xxiii, figs. 1-3, 5, 6.

Seven stations: WS 76, 80, 99, 109, 225, 229, 408.

With the exception of single very large specimens at WS 80 and WS 229, the specimens are very small. Most common at WS 109, but the best individuals at WS 80 and 408.

72. *Hyperammina elongata*, Brady.

Hyperammina elongata (*pars*), Brady, 1878, RRNP, p. 433, pl. xx, figs. 2 *a, b*; 1884, FC, p. 257, pl. xxiii, figs. 4, 7-10.

Hyperammina elongata, Balkwill and Wright, 1885, DIS, p. 328, pl. xiii, fig. 4.

Two stations: WS 215, 225.

A good many fragments and a few perfect specimens at WS 225. They resemble the specimens figured by Balkwill and Wright (*ut supra*) in their somewhat roughly and loosely agglutinated tests.

73. *Hyperammina laevigata*, Wright.

Hyperammina elongata var. *laevigata*, Wright, 1891, SWI, p. 466, pl. xx, fig. 1.

Hyperammina elongata var. *laevigata*, Cushman, 1910, etc., FNP, 1910, p. 61, fig. 75.

Hyperammina laevigata, Cushman, 1918, etc., FAO, 1918, p. 77, pl. xxix, fig. 5, 6.

Hyperammina elongata var. *laevigata*, Heron-Allen and Earland, 1922, TN, p. 88.

Three stations: WS 215, 408, 433.

A perfect specimen at WS 408 and fragments at the other stations.

74. *Hyperammina clavigera*, sp.n. (Plate VII, figs. 12-15).

One station: WS 246.

The test is very neatly constructed, principally of broken sponge spicules, occasionally including a few large sand grains or mineral flakes, and is firmly consolidated with little visible cement. It commences with a swollen proloculum which, owing to the rigid nature of the material employed, is often very irregular in shape and dimensions. The proloculum tapers gradually into a long narrow tube of uniform diameter composed of the same materials. The spicules are arranged either longitudinally or spirally. In the latter case the spiral arrangement tends to produce a curved tube, which in extreme instances may itself exhibit a distinct spiral twist.

Length of largest specimen found with proloculum, 3.40 mm. Diameter of tube ranges between 0.10 and 0.15 mm. Diameter of proloculum ranges between 0.25 and 0.40 mm.

Larger fragments without a proloculum have been found, but in its absence cannot be distinguished with certainty from *Marsipella cylindrica*, Brady.

The nearest relative of *H. clavigera* is possibly *H. laevigata*, Wright, to which it bears

a general resemblance in size and in the fusiform shape of the proloculum. It is possible that our Falkland form represents merely a variety of *H. laevigata* possessing selective powers.

The only organism with which we are acquainted in any way resembling *H. clavigera* is *H. calcilega*, Rhumbler (1906, FLC, p. 24, pl. ii, figs. 1, 2—*Saccorhiza calcilega* (Rhumbler), C. 1910, etc., FNP, 1910, p. 66, figs. after Rhumbler) from Laysan in the Pacific Ocean. Rhumbler's species, however, has a bulbous proloculum and the tube coated with projecting sponge spicules, thereby indicating its affinity with *H. ramosa*, Brady. It differs much in appearance from the neatly finished Falkland species.

75. *Hyperammina novae-zealandiae*, Heron-Allen and Earland (Plate VIII, figs. 10, 11).

Technitella mestayeri, Cushman, 1919, RFNZ, p. 595, pl. 74, fig. 4.

Hyperammina novae-zealandiae, Heron-Allen and Earland, 1922, TN, p. 89, pl. iii, figs. 1-5.

Two stations: WS 225, 246.

At WS 225 which is on the Continental Shelf to the north-west of the Falkland Islands and at WS 246, which is just off the Continental Shelf to the south, a number of specimens, mostly broken, were obtained of this interesting form. Among the fragments, both megalos- and microspheric forms occur, and the shell structure is characterized by the same selective powers as described by us *ut supra*. The test is almost entirely constructed of spicules in a double layer. The Falkland specimens must have been very much larger than those from New Zealand, as several fragments of the microspheric form attain the maximum size observed there, and one fragment is over 10 mm. in length. The absence of the species from the other gatherings is rather noteworthy.

76. *Hyperammina malovens*, sp.n. (Plate VIII, figs. 12-14).

One station: WS 88.

Test consisting of a slightly curved unseptate tube, with thin walls neatly built of very fine grey sand, in which much larger mineral grains are incorporated irregularly, but so as to preserve the smooth exterior of the tube. The walls being so thin, these larger sand grains project into the interior of the tube which is rough and irregular. The diameter of the test is fairly uniform throughout, but occasional specimens exhibit a tendency to form a bulbous swelling at about mid-length. The proloculum is not swollen, the initial end of the tube and sometimes both ends being closed with a "stopper" of material similar to that used for the walls. Colour dark grey-brown. Length unknown, the largest fragment 6 mm.

A good many fragments, but no perfect specimens, were found at WS 88. The organism is distinctive and its exact relationships are rather puzzling. The bulbous swelling in the tube would suggest *Rhabdammina linearis*, Brady, but the closed end of the tube forbids its inclusion in that genus. On the other hand it has few points in common with *Hyperammina* except this closed tube. The general texture of the wall and the nature of the proloculum make *H. elongata*, Brady, its nearest relative.

Genus *Psammatodendron*, Norman, 188177. *Psammatodendron indivisum*, sp.n. (Plate VII, fig. 16).

Three stations: WS 92, 213 (fragments ?), 243.

Test consists of a long, unbranching, very narrow thin-walled tube emerging from a rather large depressed circular primordial chamber. The tube increases slightly in diameter in the course of its growth and is composed of extremely minute sand grains mixed with cement, pale brown in colour, flexible in life, rather brittle in dried specimens. Aperture simple at the termination of the tube, which is here apparently somewhat constricted. Average length of tube 1.50 mm. Average diameter of primordial base 0.25 mm.

A few examples only of this little organism have been found attached to stones, etc. It is probably not uncommon, if specially searched for, but is not easily detected among other sessile organisms.

P. indivisum differs from the genotype *P. arborescens* (B. 1881, HNPE, p. 98) in its unbranching habit and large depressed primordial chamber. It might perhaps be assumed that the unbranching specimens found were merely young individuals of *P. arborescens*, but in that case it would be expected that plentiful fragments of the branching colonies would be found in the dredged material. This is not the case, nothing suggesting a branched fragment of *P. arborescens* has been seen. The depressed shape of the primordial chamber of *P. indivisum* is also very characteristic. Brady figures that of *P. arborescens* as a bulb, and describes it as a "more or less inflated chamber". From the many examples in our gatherings at Millport, we can say that the primordial chamber of *P. arborescens* is extremely difficult to find at all. The organism usually starts abruptly with a tubular outgrowth from its surface of attachment.

Genus *Marsipella*, Norman, 187878. *Marsipella cylindrica*, Brady.

Marsipella cylindrica, Brady, 1882, FKE, p. 714; 1884, FC, p. 265, pl. xxiv, figs. 20-22.

Marsipella cylindrica, Heron-Allen and Earland, 1912, etc., NSG, 1912, p. 388, pl. v, figs. 8, 9; pl. vi, figs. 8, 9.

Three stations: 228; WS 99, 215.

Fragments only. At WS 99 they are larger than usual and built up of sand grains and sponge spicules, whole and broken, irregularly arranged. At 228 the specimens are smaller and almost entirely constructed of spicules neatly cemented together.

Genus *Rhabdammina*, M. Sars, 186979. *Rhabdammina abyssorum*, M. Sars.

Rhabdammina abyssorum, M. Sars, 1868, LUHD, p. 248; G. O. Sars, 1871, HF, p. 251.

Rhabdammina abyssorum, Brady, 1884, FC, p. 266, pl. xxi, figs. 1-13.

One station: WS 225.

A single three-rayed specimen, more neatly constructed than is usually the case with the North Sea type, the sand grains being small and almost uniform in size.

80. *Rhabdammina discreta*, Brady.

Rhabdopleura sp. Dawson, 1870-1, G. St L., p. 177, text-fig. 7.

Rhabdammina discreta, Brady, 1879, etc., RRC, 1881, p. 48; 1884, FC, p. 268, pl. xxii, figs. 7-10.

Rhabdammina discreta, Cushman, 1918, etc., FAO, 1918, p. 21, pl. xi, fig. 1.

One station: WS 225.

Not uncommon, the specimens rather small. Fragments, probably referable to this species but not in a condition to be determined with certainty, occur at WS 96 and 210.

Genus *Protobotellina*, Heron-Allen and Earland, 192981. *Protobotellina cylindrica*, Heron-Allen and Earland (Plate XVII, figs. 9-13).

Protobotellina cylindrica, Heron-Allen and Earland, 1929, etc., FSA, 1929, p. 326, pl. ii, figs. 9-13.

Eight stations: WS 77, 80, 109, 213, 215, 229, 231, 243.

Test large, irregularly cylindrical, in the form of an unseptate tube with walls of even thickness, open at one extremity, closed at the other. Colour, dark grey to pale brown. The aboral extremity is abruptly truncated and exhibits no sign of a bulbous proloculum either externally or in section. The oral extremity is generally rounded off, but sometimes rather flattened and outspreading, and is furnished with a round or oval constricted aperture, which is reduced in size or defended by spicules, or larger sand grains projecting from the inner wall.

The wall is thick and built of fine sand grains and broken sponge spicules firmly agglutinated, but with little visible cement. The proportions of sand and spicules vary greatly; in some specimens the spicules predominate. The external surface is smooth and neatly finished. Feeble constrictions and swellings, visible externally, give an impression of internal septa which do not in fact exist. The central tube is unseptate and approximately of the same diameter throughout. Sections occasionally show a constriction of the inner tube due to a thickening of the wall, but these cannot be regarded as primitive or degenerate septa, nor do they coincide with the constrictions of the outer wall. In diameter the tube is about equal to the thickness of its surrounding wall.

The inner surface of the tube is extremely rough, owing to the projection of spicules and sand grains larger than those employed in the construction of the outer wall. These spicules and sand grains frequently project almost to the middle of the tube, but never across it, nor do they form a labyrinthic structure in the tube, as in *Botellina labyrinthica*. The entire tube is filled with a homogeneous mass of protoplasm, nearly black in colour.

The spicules and sand grains projecting from the inner wall are presumably so placed to exclude parasitic worms. These are a source of trouble to most large Foraminifera, and many devices are employed for their exclusion. That it is not entirely effective is proved by our finding a Sipunculid inside a large specimen. Whether such organisms resort to the tubes for food, or for shelter only we cannot say. They are not tube builders.

Externally *Protobotellina* bears considerable superficial resemblance to *Botellina labyrinthica*, Brady, but a close examination reveals generic differences. The fine sand and spicules, although firmly built into the wall of *Protobotellina*, can be scraped away

with a scalpel, and sections can be ground with little trouble. In *Botellina* the grains are larger and so firmly cemented together as to resist dislodgment without fracture, and sections are very hard to grind. Moreover, *Botellina*, on the rare occasions when it has been found perfect, exhibits a bulbous proloculum in strong contrast with *Protobotellina*, in which there is no increase in the diameter of the tube at the initial extremity. Sections of the two organisms exhibit a strong contrast between the projecting spicules of *Protobotellina* and the firmly built outgrowths which fill the tube of *Botellina* with a labyrinthine core.

The affinities of *Protobotellina* are not very evident. While placing it at present near *Botellina* on account of general resemblances and its primitive labyrinthic interior, we are not convinced that it lies in any direct relationship to that genus. The friable nature of the shell wall would suggest a connection with *Hyperammina* but for the absence of a bulbous proloculum, which is even more characteristic of that genus than of *Botellina*.

P. cylindrica is widely distributed over the sandy area between the Falkland Islands and the coast of South America, but is probably never very abundant. We have perfect specimens from a number of stations, depths ranging between 150 and 300 m., and fragments from others. The size varies greatly at different stations, but on the whole averages about 25 mm. in length and 4 mm. in diameter. A specimen from station WS 243 was over 2½ in. long, and fragments have been seen which suggest even larger dimensions.

The finding of living specimens with other Foraminifera and Polyzoa attached to the basal end indicates that the organism lies flat on the surface of the sandy bottom, and does not assume an erect position or attach itself basally to other objects.

Genus *Botellina*, Carpenter, 1869

81 A. *Botellina labyrinthica*, Brady.

Botellina sp. Carpenter, 1869, *Proc. Roy. Soc.* XVIII, p. 444; 1870, *Cat. of Objects*, R.M.S. p. 4, no. 3.

Botellina labyrinthica, Brady, 1879, etc., RRC, 1881, p. 48; 1884, FC, p. 279, pl. xxix, figs. 8-18.

Botellina labyrinthica, Cushman, 1918, etc., FAO, 1920, p. 88, pl. xviii, figs. 1-4.

One station: 388.

All the specimens are fragmentary and of the small thin-walled form found in shallow water, British dredgings.

Family LITUOLIDAE

Sub-family LITUOLINAE

Genus *Reophax*, Montfort, 1808

82. *Reophax scorpiurus*, Montfort.

Reophax scorpiurus, Montfort, 1808-10, CS, 1, p. 330, 83e genre.

Reophax scorpiurus, Brady, 1884, FC, p. 291, pl. xxx, figs. 12-17.

Twenty-two stations: 236; WS 73, 76, 86, 91, 92, 93, 97, 98, 99, 109, 210, 215, 217, 219, 225, 230, 235, 245, 248, 408, 433.

Almost universally distributed. The largest and most typical specimens at WS 97, 225 and 235. Very irregularly formed specimens at WS 76; long and narrow forms at WS 99 and 109. At WS 86, the specimens approach *R. pilulifera* in the globosity of the final chambers. The tests are nearly always constructed of angular quartz grains, but at WS 245, a black mineral is partially employed, giving a very distinctive appearance to the test.

82 A. *Reophax pilulifera*, Brady.

Reophax pilulifera, Brady, 1884, FC, p. 292, pl. xxx, figs. 18-20.

Reophax pilulifera, Brady, Parker and Jones, 1888, AB, p. 217, pl. xli, figs. 5-8.

Reophax pilulifera, Cushman, 1910, etc., FNP, 1910, p. 85, figs. 112-18.

One station: WS 433.

A few good specimens.

83. *Reophax fusiformis* (Williamson).

Protonina fusiformis, Williamson, 1858, RFGB, p. 1, pl. i, fig. 1.

Reophax fusiformis, Brady, 1884, FC, p. 290, pl. xxx, figs. 7-11.

Reophax fusiformis, Millett, 1898, etc., FM, 1899, p. 253, pl. iv, fig. 11.

Four stations: 228; WS 92, 99, 408.

Rare. The specimens are small, the best being at 228 and WS 408.

84. *Reophax dentaliniformis*, Brady.

Reophax dentaliniformis, Brady, 1879, etc., RRC, 1881, p. 49; 1884, FC, p. 293, pl. xxx, figs. 21, 22.

Reophax dentaliniformis, Cushman, 1910, etc., FNP, 1910, p. 87, fig. 121.

One station: 228.

A single specimen, as usual employing sponge spicules largely in the construction of its test.

84 A. *Reophax nodulosa*, Brady.

Reophax nodulosa, Brady, 1879, etc., RRC, 1879, p. 52, pl. iv, figs. 7-8; 1884, FC, p. 294, pl. xxxi, figs. 1-9.

Reophax nodulosa, Cushman, 1910, etc., FNP, 1910, p. 87, text-fig. 122.

Reophax nodulosa, Heron-Allen and Earland, 1922, TN, p. 95.

One station: WS 433.

Fragments of one or two large specimens.

85. *Reophax moniliforme*, Siddall.

Reophax ? sp. Balkwill and Wright, 1885, DIS, p. 328, pl. xiii, figs. 9, 22-4.

Reophax moniliforme, Siddall, 1886, LMBC, p. 54, pl. i, fig. 2.

Reophax moniliforme, Heron-Allen and Earland, 1913, CI, p. 43, pl. ii, fig. 12.

Three stations: WS 86, 88, 92.

Two minute specimens at WS 88 and 92, and one rather larger one at WS 86. So far as we are aware this is the first record of the species outside the British Isles, but we have specimens in our collection from the Gulf of St Lawrence (212 fms.). The Falkland Islands specimens, although so small, present all the well-known characters of the species, the bulbous proloculum, the cylindrical test, largely composed of sponge spicules, and the deep ferruginous colour.

86. *Reophax flexibilis*, Schlumberger (Plate VII, fig. 21).

Reophax flexibilis, Schlumberger, 1894, FMAR, p. 243, pl. iii, fig. 10.

Two stations: WS 90, 217.

A single specimen of fourteen chambers (length 0.40 mm.) at WS 90 and two at WS 217 one of which has seventeen chambers. Schlumberger's record was from the Bay of Kola, in Arctic Russia. It appears to be nothing more than a non-selective form of *R. scottii* (C. 1892, FS, p. 57, pl. i, fig. 1) using sand grains instead of mica flakes with the result that the chambers retain their spherical shape instead of collapsing on drying. Occasional specimens are to be found in British gatherings where *R. scottii* occurs.

87. *Reophax distans* var. *pseudodistans*, Cushman (Plate VII, figs. 17-20).

Reophax spiculifera, Brady var. *pseudodistans*, Cushman, 1919, RFNZ, p. 598, pl. 75, fig. 1.

Reophax spiculifera (*pars*), Heron-Allen and Earland, 1922, TN, p. 95.

Three stations: WS 93, 246, 408.

Single chambers built entirely of sponge spicules at WS 93 and WS 408, and many similar isolated chambers at WS 246, together with one or two specimens in which two successive chambers have remained unbroken. These give the clue to the nature of the organism as the individual chambers might otherwise have been regarded as "selective" varieties of *Marsipella elongata*, Norman, nearly all the fragments having chambers of great length as compared with their width. Individual chambers range up to 1.50, or even 2.00 mm. in length, against a width of 0.30 to 0.50 mm. The stolon tube between two chambers may be as long as 2.0 mm.

The shape of the chambers is naturally dependent on the length of the spicules employed. When the organism uses long unbroken needles the chamber must obviously conform to their rigid line. When shorter or broken fragments are employed, the chambers exhibit a natural tendency to form "beads" connected by stolon tubes. Minute fragments of spicules must be employed in the tapering junction of the chamber and stolon, and this is the weak point in construction which is responsible for the fragmentary condition in which specimens usually occur, as already noted by Cushman (*ut supra*). There appears to be a definite point of weakness in the stolon tube at which chambers separate. It is marked by a line of spicule fragments built together at right angles to the main axis of the test and the direction of the other spicules. When moist the test is flexible at these points.

We prefer to associate Cushman's varietal name *pseudodistans* with Brady's species

distans of which we regard it as merely a selective form. *R. spiculifera*, Brady is a very different organism, perhaps a selective form of *R. dentaliniformis*.

88. *Reophax cushmani*, nom.nov. (Plate VII, figs. 22-24).

Reophax advena, Heron-Allen and Earland (*non* Cushman), 1922, TN, p. 94, pl. iii, figs. 6, 7.

One station: WS 246.

At WS 246 were found a good many specimens of the very roughly constructed organism, which in our Terra Nova Report (*ut supra*) we referred tentatively to *R. advena*, Cushman. The Falkland Islands specimens present the same curious characteristic of a loosely constructed and labyrinthine chamber, and are even more roughly constructed. In view of the points of difference to which we then drew attention, we have thought it advisable to separate the Terra Nova and Falkland Islands specimens from *R. advena*, and have pleasure in associating them with the name of our friend Dr J. A. Cushman.

Test free, arenaceous, consisting of 2-4 chambers arranged in a more or less curving line and exhibiting little increase from first to last. Constructed of very large sand grains irregularly built together with quantities of brown cement in which smaller sand grains are plentifully incorporated. In the earlier chambers the particles are firmly built together with a simple cavity. The final chamber in perfect specimens, by contrast, has the sand grains very loosely held together in a labyrinthic mass without much visible cement, which probably represents material collected and in process of building into a new chamber.

Length, up to 4.0 mm. Greatest breadth ranges up to 1.50 mm. or even 2.0 mm.

Genus *Hormosina*, Brady, 1879

89. *Hormosina globulifera*, Brady.

Hormosina globulifera, Brady, 1879, etc., RRC, 1879, p. 60, pl. iv, figs. 4, 5; 1884, FC, p. 326, pl. xxxix, figs. 1-6.

Hormosina globulifera, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 617, pl. xlv, fig. 25.

Hormosina globulifera, Cushman, 1918, etc., FAO, 1920, p. 26, pl. vi, fig. 1.

One station: WS 210.

One large fragment probably representing the initial portion of a megalospheric individual.

Genus *Haplophragmoides*, Cushman, 1910

90. *Haplophragmoides canariensis* (d'Orbigny).

Nonionina canariensis, d'Orbigny, 1839, FIC, p. 128, pl. ii, figs. 33, 34.

Haplophragmium canariense, Brady, 1884, FC, p. 310, pl. xxxv, figs. 1-5.

Haplophragmium canariense, Heron-Allen and Earland, 1910, NBF, p. 425, fig. 2; 1913, CI, p. 45, pl. iii, fig. 5.

Haplophragmoides canariensis, Cushman, 1910, etc., FNP, 1910, p. 101, fig. 149.

Twenty-two stations: 48, 51, 388; WS 71, 76, 83, 84, 86, 87, 88, 89, 90, 92, 98, 99, 108, 109, 210, 213, 217, 225, 245.

Often very common yet at times surprisingly rare. It is most common at stations adjacent to the shores of the islands. The most usual type is a small flat evolute form, neatly constructed, mica flakes being largely used. The micaceous constituent is especially noticeable at WS 92, where the specimens are so thin-walled as to be collapsing. At WS 88 and 95 the specimens attain an unusual size for the area, and there is a complete series ranging from the smallest to the largest, all the specimens being of the flat type. At WS 71, large specimens with turgid chambers are rare, and the usual small compressed type is common, nothing intermediate between the two being found. It seems probable that the two forms may represent the megalo- and microspheric types; the Paris Type is missing.

91. *Haplophragmoides canariensis* var. *variabilis* (Heron-Allen and Earland).

Haplophragmium canariense, Heron-Allen and Earland, 1916, FWS, p. 223, pl. xl, figs. 12-13.

Haplophragmium canariense var. *variabilis*, Heron-Allen and Earland, 1916, FSC, p. 41, pl. vi, figs. 1-3.

One station: WS 88.

One small specimen in which a biserial mode of growth is adopted in the later chambers.

92. *Haplophragmoides crassimargo* (Norman).

Haplophragmium crassimargo, Norman, 1892, *Museum Normanianum*, pt. 8, p. 17 (note).

Haplophragmium crassimargo, Heron-Allen and Earland, 1910, NBF, p. 424, figs. 3, 4; 1913, FNS, p. 130, pl. x, figs. 5, 6.

Twelve stations: WS 83, 87, 97, 98, 99, 109, 210, 215, 217, 219, 225, 248.

Nearly all the stations at which the specimens occur lie to the north of the islands. At the stations to the south of the islands the species is extremely rare. The best specimens at WS 97-99 and 109.

93. *Haplophragmoides sphaeriloculum*, Cushman.

Haplophragmoides sphaeriloculum, Cushman, 1910, etc., FNP, 1910, p. 107, fig. 165.

Haplophragmium sphaeriloculum, Sidebottom, 1918, FECA, p. 15, pl. ii, figs. 15, 16.

Two stations: 228; WS 235.

Good specimens at 228, rare and less satisfactory at WS 235.

94. *Haplophragmoides scitulum* (Brady).

Haplophragmium scitulum, Brady, 1879, etc., RRC, 1881, p. 50; 1884, FC, p. 308, pl. xxxiv, figs. 11-13.

Haplophragmium scitulum, Chapman, 1914, FORS, p. 64, pl. iii, fig. 22.

Haplophragmoides scitulum, Cushman, 1910, etc., FNP, 1910, p. 103, figs. 153-5.

Two stations: WS 88, 408.

Very rare, but typical at WS 408.

95. *Haplophragmoides subglobosum* (G. O. Sars).

Lituola subglobosum, M. Sars, 1868, LUHD, p. 250; G. O. Sars, 1871, HF, p. 253.

Haplophragmium subglobosum, Brady, 1881, HNPE, p. 406.

Haplophragmium latidorsatum (non Bornemann), Brady, 1884, FC, p. 307, pl. xxxiv, figs. 7, 8, 10, 14.

Two stations: 230; WS 408.

Very rare, the specimens are small and poorly developed.

Genus *Ammobaculites*, Cushman, 191096. *Ammobaculites agglutinans* (d'Orbigny).

Spirolina agglutinans, d'Orbigny, 1846, FFV, p. 137, pl. vii, figs. 10-12.

Haplophragmium agglutinans, Brady, 1884, FC, p. 301, pl. xxxii, figs. 19-26.

Ammobaculites agglutinans, Cushman, 1910, etc., FNP, 1910, p. 115, fig. 176.

One station: WS 408.

Three rather roughly constructed individuals all of an elongate type. The Type of *Spirolina agglutinans* is missing in Paris.

97. *Ammobaculites americanus*, Cushman (Plate VIII, figs. 15-17).

Haplophragmium fontinense, Brady (non Terquem), 1884, FC, p. 305, pl. xxxiv, figs. 1-4.

Ammobaculites americanus, Cushman, 1910, etc., FNP, 1910, p. 117, figs. 184, 185.

Eight stations: WS 76, 98, 99, 109, 210, 215, 225, 408.

The chief distinction between Cushman's species and Terquem's *H. fontinense* appears to be in the size, for the convexity shown in Terquem's figure, to which Cushman draws attention, is not much greater than that often exhibited in his own species. Many of the Discovery specimens are in fact quite strongly curved. The species is neither widely distributed nor very abundant in the Falkland area, but very good specimens are found at WS 76 and 225, identical in fact with Cushman's figure. Equally good at WS 408, but using much finer material with correspondingly increased perfection of finish.

Genus *Placopsilina*, d'Orbigny, 185098. *Placopsilina cenomana*, d'Orbigny (Plate VII, fig. 25).

Placopsilina cenomana, d'Orbigny, 1850, etc., PP, vol. 11, 1850, p. 185, no. 758.

Placopsilina cenomana, Reuss, 1854, KO, p. 71, pl. xxviii, figs. 4, 5.

Placopsilina cenomana, Brady, 1884, FC, p. 315, pl. xxxvi, figs. 1-3.

Ten stations: 51; WS 76, 77, 91, 92, 93, 225, 243, 246, 248.

Generally distributed and often very abundant, notably at WS 225, where the stones and pebbles were encrusted with it. The specimens are of a small, feeble, elongate type such as are found in British seas. One or two larger individuals similar to those found in tropical and sub-tropical seas have been noted, especially at 51. At WS 91, a complete specimen, detached from its support and revealing a chitinous floor was obtained.

Placopsilina confusa, Cushman (C. 1918, etc., FAO, 1920, p. 71, pl. xiv, fig. 6), is based on feeble specimens similar to those found in the Falkland area and figured by Brady (B. 1884, FC, pl. xxxvi, fig. 3) and ourselves. But Cushman's figure, and to some extent his description, appear to us to represent a distinctive organism which does not occur in the Falkland area. It has however been found in some of the Discovery material from the Antarctic area and will be dealt with by us in a subsequent report.

Brady's fig. 3 does not in our opinion possess any specific points of difference from the typical *P. cenomana*. It represents only a less robust form of growth such as might be expected in a normally tropical species extending its range into colder seas.

Sub-family *TROCHAMMININAE*

Genus *Ammolagena*, Eimer and Fickert, 1899

99. *Ammolagena clavata* (Jones and Parker).

Trochammina irregularis clavata, Jones and Parker, 1860, RFM, p. 304.

Webbina clavata, Brady, 1884, FC, p. 349, pl. xli, figs. 12-16.

Ammolagena clavata, Eimer and Fickert, 1899, AVF, p. 602 (674).

One station: WS 225.

Two typical specimens. Its absence from other stations is somewhat extraordinary.

Genus *Tolypammina*, Rhumbler, 1895

100. *Tolypammina vagans* (Brady).

Hyperammina vagans, Brady, 1879, RRC, etc., 1879, p. 33, pl. v, fig. 3; 1884, FC, p. 260, pl. xxiv, figs. 1-9.

Tolypammina vagans, Rhumbler, 1903, ZRR, p. 277-8, fig. 125.

Nine stations: 51; WS 73, 88, 92, 97, 98, 225, 243, 246.

This species is generally extremely abundant in any material where stones or any suitable surfaces of attachment occur. Often every little crevice in a pebble contains its specimen.

Genus *Ammodiscus*, Reuss, 1861

101. *Ammodiscus incertus* (d'Orbigny) (Plate VIII, figs. 18-20).

Operculina incerta, d'Orbigny, 1839, FC, p. 49, pl. vi, figs. 16, 17.

Spirillina arenacea, Williamson, 1858, RFGB, p. 93, pl. vii, fig. 203.

Ammodiscus incertus, Brady, 1884, FC, p. 330, pl. xxxviii, figs. 1-3.

Eight stations: 388; WS 71, 76, 88, 93, 99, 215, 217.

All the specimens are very small and far from typical, being rather roughly constructed and almost grey in colour. The coils are seldom flat or so regularly convoluted as is usually the case, and there appears to be a very distinct local form, which, while hardly worth separation as a species, is intermediate between *A. incertus* and *A. gordialis* (Plate VIII, fig. 20). The best series is at WS 217, other good ones at WS 76 and 93.

A single specimen of the megalospheric form (*A. tenuis*, B. 1884, FC, pl. xxxviii, figs. 4–6) at WS 88, consisting of a proloculum and a single coil, and a slightly larger specimen at 388. The entire absence of the megalospheric form at the other stations is noteworthy.

The *Operculina incerta* of d'Orbigny has always seemed to us to be open to suspicion as an arenaceous form. Neither the figure nor the text give us any suggestion of an agglutinate test, and either might equally well refer to a weather-stained *Spirillina* or *Cornuspira*. We therefore turned to the Paris Type in the hope of settling the question of its nature, only to find ourselves confronted with an apparent blank wall. The tube contains three specimens. It is labelled “*Spirillina incerta* (*Operculina*), Cuba”. None of the three specimens can be recognized as the original of d'Orbigny's figure and they are all unmistakably *Cornuspira*. One is *C. involvens*, Reuss, the second probably the same but bearing striolations (these may be accidental), the third specimen is a narrow-tubed, square-edged form, suggesting *C. angigyra*, Reuss; they are all unmistakably fossils. The uncertainty is insoluble until d'Orbigny's original Cuba Type is perhaps identified among the tubes which have become separated from any identifying “boards”.

Genus *Glomospira*, Rzehak, 1885

NOTE. The date of the genus *Glomospira* is generally given as 1888, in which year the name *Ammodiscus* (*Glomospira*) *gordialis* figures in a list of species (*Verh. k. k. geol. Reichanst. Berlin*, 30 June, 1888, p. 191). But the genus appears to have been perfectly well defined in Rzehak's paper on certain Oligocene Foraminifera in 1885 (*Verh. Naturf. Vereines. Brunn*, xxiii (1885), p. 127) in which he separates the plano-spiral from the globular (knäuel-förmig=ball-of-wool-shaped) forms.

102. *Glomospira gordialis* (Jones and Parker) (Plate VIII, figs. 21, 22).

Trochammina squamata gordialis, Jones and Parker, 1860, RFM, p. 304.

Ammodiscus gordialis, Brady, 1884, FC, p. 333, pl. xxxviii, figs. 7–9.

Ammodiscus (*Glomospira*) *gordialis*, Rzehak, 1888 (see NOTE above).

Eight stations: 53; WS 71, 80, 88, 90, 217, 225, 246.

The majority of the specimens are small, grey in colour like *A. incertus*, but large ferruginous examples were found at WS 225. It occurs sessile on shell fragments at WS 246. It is never as common as *A. incertus*, the best (of the grey type) at WS 88.

103. *Glomospira charoides* (Jones and Parker).

Trochammina squamata charoides, Jones and Parker, 1860, RFM, p. 304.

Ammodiscus charoides, Brady, 1884, FC, p. 334, pl. xxxviii, fig. 10–16.

Glomospira charoides, Rhumbler, 1909, etc., FPE, 1913, p. 422, pl. iv, fig. 8 (1909).

One station: WS 86.

A single example much eroded at WS 86

Genus *Trochammina*, Parker and Jones, 1859104. *Trochammina squamata*, Jones and Parker.

Trochammina squamata, Jones and Parker, 1860, RFM, p. 304, and table.

Trochammina squamata, Heron-Allen and Earland, 1913, CI, p. 50, pl. iii, figs. 7-10.

Fourteen stations: 48, 51, 53; WS 71, 77, 87, 88, 89, 90, 91, 92, 93, 221, 248.

Less widely distributed and less abundant than *T. ochracea*. The best specimens at WS 87, 89, 92 and 93. Its distribution differs thus from that of *T. ochracea*. At most of the other stations it is represented by few and relatively small individuals. There are a good many specimens, notably at 53, which appear to be intermediate between *T. ochracea* and *T. squamata*. Sessile at WS 92.

105. *Trochammina rotaliformis*, J. Wright, MS.

Trochammina inflata (Montagu) var., Balkwill and Wright, 1885, DIS, pl. xiii, figs. 11, 12.

Trochammina rotaliformis, J. Wright, MS, Heron-Allen and Earland, 1913, CI, p. 52, pl. ii, figs. 11-13.

Four stations: 388; WS 83, 93, 408.

The specimens are small.

106. *Trochammina glabra*, sp.n. (Plate VII, figs. 26-28).

Two stations: 388; WS 88.

Test free, trochoid, spire somewhat elevated and dome-shaped, consisting of three whorls gradually increasing in diameter, the outer containing eight chambers. All chambers visible on the dorsal side, but the earlier series are often difficult to observe owing to the extreme smoothness of the surface, the slightly curved sutural lines on this side being thin and quite flush. On the ventral side the sutures are depressed and straight and the chambers of the last convolution are quite distinct. They slope inwards to a deeply sunk umbilicus. The aperture is large and loop-shaped on the inner edge of the final chamber. Colour, brown of various shades. Constructed of very fine sandy material with a large proportion of cement, the surface being very smooth and polished.

Diameter up to 0.50 mm. Thickness 0.20 mm.

This very handsome species was found in some numbers at 388 and WS 88, but not elsewhere. Its nearest ally is *T. rotaliformis*, J. Wright, which it resembles in form, differing principally in the number of chambers, which in Wright's species are only 4-5 in a whorl.

107. *Trochammina ochracea* (Williamson).

Rotalina ochracea, Williamson, 1858, RFGB, p. 55, pl. iv, fig. 112; pl. v, fig. 113.

Trochammina ochracea, Balkwill and Millett, 1884, FG, p. 25, pl. i, fig. 7.

Twenty-three stations: 48, 53, 228, 230, 388; WS 71, 77, 79, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 108, 213, 221, 245, 408.

Almost universally distributed. At southerly stations, WS 84, 87, 88, 89, the species attains fine and typical dimensions. At nearly all the other stations it is represented by comparatively small individuals. Sessile individuals were found at WS 77, 84, 87 and 88. The best specimens were at WS 88, where it was very common.

108. *Trochammina inflata* (Montagu).

Nautilus inflatus, Montagu, 1803-8, TB, Suppl. p. 81, pl. xviii, fig. 3.

Trochammina inflata, Brady, 1884, FC, p. 338, pl. xli, fig. 4.

Three stations: WS 83, 246, 409.

A single specimen at each station, none of them quite typical.

109. *Trochammina malovens*, Heron-Allen and Earland (Plate XVII, figs. 14-19).

Trochammina malovens, Heron-Allen and Earland, 1929, etc., FSA, 1929, p. 328, pl. iv, figs. 27-32.

Thirteen stations: 48, 51; WS 71, 76, 77, 80, 83, 88, 92, 93, 99, 108, 225.

Test free, minute, arenaceous, consisting of numerous chambers arranged in a trochoid spiral of four or five coils. About five chambers in each convolution, neatly constructed of fine sand and sponge spicules with more or less ferruginous cement, the colour of the whole test varying accordingly from white to brown. Sutures flush in early stages, but rather deeply depressed in the last convolution, owing to the rapid inflation of the chambers, which results in a lobulate periphery to the shell. All chambers visible on the superior face, only those of the last convolution on the inferior side, which is deeply excavated in the centre. Aperture a loop-like slit on the inner edge of the final chamber.

Dimensions: diameter, 0.16-0.25 mm.; height, 0.12 mm.

This pretty little species belongs to the *inflata* group. Its nearest allies are probably *T. rotaliformis*, J. Wright, a common British species, from which it differs in the greater height of the spire and in the number of chambers, and *T. pacifica*, Cushman, a very similar but much larger and more coarsely constructed form from British Columbia. It is one of the most characteristic of the Falkland Islands Foraminifera, occurring with more or less frequency at thirteen stations, the best specimens being found at 48 (105 m.) and WS 88 (118 m.). It is named after the Falkland Islands, the "Îles Malouines" of d'Orbigny's *Voyage dans l'Amérique Méridionale*. It occurs also, and even more frequently, in the South Georgia area.

110. *Trochammina nana* (Brady).

Haplophragmium nanum, Brady, 1879, etc., RRC, 1881, p. 50; 1881, HNPE, p. 99, pl. ii, figs. 1 a-c; 1884, FC, p. 311, pl. xxxv, figs. 6-8.

Trochammina nana, Cushman, 1918, etc., FAO, 1920, p. 80, pl. xvii, fig. 1.

One station: 48.

A few specimens, including one sessile individual.

110 A. *Trochammina globigeriniformis* (Parker and Jones).

Lituola nautiloidea var. *globigeriniformis*, Parker and Jones, 1865, NAAF, p. 407, pl. xv, figs. 46, 47; pl. xvii, figs. 96-8.

Haplophragmium globigeriniforme, Brady, 1884, FC, p. 312, pl. xxxv, figs. 10, 11.

Trochammina globigeriniformis, Cushman, 1910, etc., FNP, 1910, p. 124, figs. 193-5.

One station: WS 433.

Very rare but quite typical.

111. *Trochammina bradyi*, Robertson.

Trochammina robertsoni, Brady, 1887, SBRF, p. 893.

Trochammina robertsoni, Wright, 1891, SWI, p. 469, pl. xx, figs. 4 a, b.

Trochammina bradyi, Robertson, *Ann. Mag. Nat. Hist.*, 1891, S. 6, vii, p. 388.

One station: WS 76.

One typical specimen.

Genus *Globotextularia*, Eimer and Fickert, 1899112. *Globotextularia anceps* (Brady) (Plate VIII, figs. 23, 24).

Haplophragmium anceps, Brady, 1884, FC, p. 313, pl. xxxv, figs. 12-15.

Haplophragmium anceps, Heron-Allen and Earland, 1913, CI, p. 47, pl. iii, fig. 4.

Globotextularia anceps, Eimer and Fickert, 1899, AVF, p. 679 (in the reprints, p. 607), fig. 25.

Two stations: WS 88, 217.

Good specimens at WS 88, where it was not uncommon; they are small and of a very neatly constructed type, with three chambers to a convolution. One doubtful specimen at WS 217.

Genus *Nouria*, Heron-Allen and Earland, 1914113. *Nouria polymorphinoides*, Heron-Allen and Earland (Plate VIII, figs. 25, 26).

Reophax ampullacea, Millett, 1898, etc., FM, 1899, p. 253, pl. iv, fig. 9.

Nouria polymorphinoides, Heron-Allen and Earland, 1914, etc., FKA, 1914, p. 376, pl. xxxvii, figs. 1-15; 1915, p. 615.

Nouria polymorphinoides, Halkyard, 1919, BMB, p. 22, pl. i, figs. 6, 7.

Nouria polymorphinoides, Cushman, 1919, RFNZ, p. 601, pl. lxxv, figs. 4, 5.

One station: WS 88.

At WS 88 the species is not uncommon and, as usual, it presents a considerable range of form. Most of the variations figured by us in the Kerimba Monograph occur, but the most usual type is the compressed neat form originally described from New Zealand waters. The shell construction however is very different, the New Zealand specimens utilising obsidian flakes almost to the exclusion of other material, whereas the Falkland Islands specimens utilise sand grains, mica and sponge spicules in almost equal proportions. The occurrence of this Indo-Pacific species in the Falkland area is noteworthy.

It will be observed that we give Millett's *Reophax ampullacea* as a synonym of *N. polymorphinoides*. This is the result of an examination of his Types, now in our collection, which are clearly multilocular. It does not necessarily affect the original Types of Brady's *R. ampullacea* which we have not examined.

113 A. *Nouria harrisii*, Heron-Allen and Earland.

Nouria harrisii, Heron-Allen and Earland, 1914, etc., FKA, 1914, p. 376, pl. xxxvii, figs. 16-20.

Nouria harrisii, Cushman, 1924, SF, p. 10, pl. i, fig. 1.

One station: 388.

A single specimen found at St. 388 off Cape Horn is probably referable to our species. It differs from the original types in the absence of the basal anchoring spicules and a lesser display of selective power, the basal half of the test being constructed rather roughly of sand grains and cement, the upper half being constructed of spicules regularly arranged in vertical rows.

The specimen figured by Cushman from Samoa (*ut supra*) has a somewhat similar agglutinate base, but with a single anchoring spicule. Our record marks a wide extension of the range of the species.

Sub-family *LOFTUSINAE*

Genus *Cyclammina*, Brady, 1876

114. *Cyclammina cancellata*, Brady.

Cyclammina cancellata, Brady, 1879, etc., RRC, 1879, p. 62 (Nautiloid *Lituola*); 1884, FC, p. 351, pl. xxxvii, figs. 8-16.

Cyclammina cancellata, Cushman, 1910, etc., FNP, 1910, p. 110, figs. 168-171.

Seven stations: 228; WS 76, 99, 215, 245, 408, 433.

Occurs in both micro- and megalospheric forms, the latter only at WS 245. The microspheric specimens are very noticeable owing to their grey colour and polished surface, in which a minimum quantity of sand grains are imbedded in fine cement. In rare cases the sand grains are so few in number as to be barely noticeable. At WS 99, specimens of similar construction, but ferruginous in colour, occur; the best examples at WS 215, 433.

Family *TEXTULARIIDAE*

Sub-family *TEXTULARIINAE*

Genus *Spiroplectammina*, Cushman, 1927

115. *Spiroplectammina biformis* (Parker and Jones) (Plate VIII, figs. 27-31).

Textularia agglutinans var. *biformis*, Parker and Jones, 1865, NAAF, p. 370, pl. xv, figs. 23, 24.

Textularia biformis, Brady, 1878, RRNP, p. 436, pl. xx, fig. 8.

Spiroplecta biformis, Brady, 1884, FC, p. 376, pl. xlv, figs. 25-7.

Spiroplectammina biformis, Cushman, 1925, etc., LFR, 1927, 111, p. 23, pl. v, fig. 1.

Twelve stations: 388; WS 76, 77, 88, 90, 98, 109, 210, 215, 217, 225, 246.

Often very common, especially at WS 76. At most of the stations two distinct forms occur, one characterized by a small and outstanding crozier-shaped initial portion followed by a long series of biserial chambers regularly broadening. In the other, the crozier portion is much larger, and it is less prominent because it is immediately followed by a short series of biserial chambers all of approximately the same breadth as the initial spiral. These two forms represent respectively the micro- and megalospheric forms. The Falkland type is as a rule much more compressed than the usual run of specimens in northern waters. Highly compressed specimens at WS 88, 90, 98 and 246. At WS 217, where the species is common, the microspheric form predominates.

Genus *Textularia*, Defrance, 1824116. *Textularia agglutinans*, d'Orbigny.

Textularia agglutinans, d'Orbigny, 1839, FC, p. 144, pl. i, figs. 17, 18, 32-4.

Textularia agglutinans, Brady, 1884, FC, p. 363, pl. xliii, figs. 1-3; vars. figs. 4, 12.

Two stations: 388; WS 408.

One large specimen at 388 and a very small one at WS 408.

117. *Textularia candeiana*, d'Orbigny.

Textularia candeiana, d'Orbigny, 1839, FC, p. 143, pl. i, figs. 25-7.

Textularia candeiana, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 627, pl. xlvii, figs. 10-16.

Two stations: 388; WS 83.

A single specimen at each station.

118. *Textularia abbreviata*, d'Orbigny.

Textularia abbreviata, d'Orbigny, 1846, FFV, p. 249, pl. xv, figs. 7, 8, 10-12.

Textularia abbreviata, Cushman, 1910, etc., FNP, 1911, p. 14, fig. 20.

One station: WS 217.

A single specimen identical with the Type in Paris.

119. *Textularia gramen*, d'Orbigny.

Textularia gramen, d'Orbigny, 1846, FFV, p. 248, pl. xv, figs. 4-6.

Textularia gramen, Balkwill and Wright, 1885, DIS, p. 332, pl. xiii, figs. 13, 14.

Two stations: 388; WS 92.

Only a few specimens. The Paris Type is missing.

120. *Textularia fusiformis*, Chaster.

Textularia fusiformis, Chaster, 1892, FS, p. 58, pl. i, fig. 3.

Textularia fusiformis, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 623; 1916, FWS, p. 229.

Three stations: WS 77, 88, 217.

Single specimens at WS 77 and 88 and several at WS 217. They are all rather more compressed than is usual, but otherwise agree with Chaster's Types in our collection. The species, though never very common, is widely distributed, and we have specimens from localities as widely separated as the Barentz Sea and Tahiti.

Genus *Verneuilina*, d'Orbigny, 1840121. *Verneuilina advena*, Cushman.

Verneuilina polystropha, Heron-Allen and Earland, 1913, CI, p. 55, pl. iv, figs. 3-5.

Verneuilina advena, Cushman, 1918, etc., FAO, 1922, p. 57, pl. ix, figs. 7-9.

Verneuilina pusilla, Heron-Allen and Earland (*non* Goës), 1920, VP (*passim*), pl. xvi, fig. 11, pl. xvii, figs. 12, 13.

Verneuilina advena, Cushman, 1921, FHB, p. 141 (no pls.).

Five stations: WS 71, 83, 88, 93, 433.

Single specimens only, all of the short form as figured by us (fig. 13), in 1920 *ut supra*. The texture of the shell is somewhat coarser than is usually the case, but we have met with British specimens of similarly rough construction. Cushman's species is based upon the "minute type" which we figured first from Clare Island in 1913, and subsequently (in 1920) identified as *V. pusilla*, Goës. Cushman states (C. 1910, etc., FNP, 1911, p. 57) that he has examined the Types of Goës, and finds that they do not fit his description or figures at all well. He regards the Types as specimens of *V. polystropha* (Reuss). As the dimensions given by Goës for *V. pusilla* (length 0.50–0.66 mm.) are very much greater than those of our form (0.17–0.30 mm.) we feel compelled to abandon the attribution to *V. pusilla* and to accept the new specific name.

Genus *Valvulina*, d'Orbigny, 1826

122. *Valvulina conica*, Parker and Jones.

Valvulina triangularis, Parker and Jones, 1857, FCN, p. 295, pl. xi, figs. 15, 16.

Valvulina triangularis var. *conica*, Parker and Jones, 1865, NAAF, p. 406, pl. xv, fig. 27.

Valvulina conica, Brady, 1884, FC, p. 392, pl. xlix, figs. 15, 16.

Two stations: WS 71, 88.

A single very small specimen from WS 71, and another at WS 88.

Sub-family *BULIMININAE*

Genus *Bulimina*, d'Orbigny, 1826

123. *Bulimina pupoides*, d'Orbigny.

Bulimina pupoides, d'Orbigny, 1846, FFV, p. 185, pl. xi, figs. 11, 12.

Bulimina pupoides, Terrigi, 1880, SGP, p. 193, pl. ii, fig. 30.

Three stations: 230; WS 89, 221.

Rare everywhere. The best at WS 89.

124. *Bulimina fusiformis*, Williamson.

Bulimina pupoides var. *fusiformis*, Williamson, 1858, RFGB, p. 63, pl. v, figs. 129, 130.

Bulimina fusiformis, Millett, 1898, etc., FM, 1900, p. 275, pl. ii, fig. 2.

Five stations: WS 89, 90, 97, 215, 217.

Very good specimens at WS 90, less typical at WS 215, 217.

125. *Bulimina ovata*, d'Orbigny.

Bulimina ovata, d'Orbigny, 1846, FFV, p. 185, pl. xi, figs. 13, 14.

Bulimina ovata, Brady, 1884, FC, p. 400, pl. l, fig. 13.

Three stations: 228, 235; WS 217.

Very rare, but fine specimens at each station.

126. *Bulimina ovula*, d'Orbigny (Plate VIII, fig. 32).

Bulimina ovula, d'Orbigny, 1839, FAM, p. 51, pl. i, figs. 10, 11.

Bulimina ovula, Cushman, 1927, FWCA, p. 150, pl. ii, fig. 10.

Bulimina ovula, Cushman, 1925, etc., LRF, 1926, 11, p. 55, pl. vii, fig. 2.

Two stations: WS 76, 99.

A single specimen at WS 76, probably referable to d'Orbigny's species, which was originally recorded from the Peruvian coast. Two large and typical specimens at WS 99. The Type was not to be found in Paris.

127. *Bulimina elegans*, d'Orbigny.

Bulimina elegans, d'Orbigny, 1826, TMC, p. 270, no. 10, Modèle no. 9.

Bulimina elegans, Brady, 1884, FC, p. 398, pl. l, figs. 1-4.

Three stations: WS 90, 92, 95.

Never common and none of the specimens very typical. The chambers are, as a rule, somewhat inflated and with a tendency to form cusps approaching *B. marginata*.

128. *Bulimina elegans* var. *exilis*, Brady.

Bulimina elegans var. *exilis*, Brady, 1884, FC, p. 399, pl. l, figs. 5, 6.

Bulimina elegans var. *exilis*, Heron-Allen and Earland, 1916, FWS, p. 234, pl. xli, figs. 4-9.

One station: WS 210.

A single specimen, not very typical.

129. *Bulimina marginata*, d'Orbigny.

Bulimina marginata, d'Orbigny, 1826, TMC, p. 269, no. 4, pl. xii, figs. 10-12.

Bulimina pupoides var. *marginata*, Williamson, 1858, RFGB, p. 62, figs. 126, 127.

Bulimina marginata, Brady, 1884, FC, p. 405, pl. li, figs. 3-5.

Seven stations: 48; WS 83, 84, 90, 92, 210, 245.

Rare. The best at WS 83 and 90. There is, as usual, a tendency to run into *B. aculeata*.

130. *Bulimina patagonica*, d'Orbigny (Plate VIII, figs. 33, 34).

Bulimina patagonica, d'Orbigny, 1839, FAM, p. 50, pl. i, figs. 8, 9.

Bulimina patagonica, Cushman and Wickenden, 1929, FJF, p. 8, pl. iii, fig. 11.

Three stations: WS 86, 90, 248.

Rare, excepting at WS 248, and never very typical. D'Orbigny records it as "very rare" from the Bay of St Blas in Patagonia. The specimens figured by Cushman and Wickenden (*ut supra*) do not appear to have much in common with d'Orbigny's species. His Type is not to be found in Paris.

131. *Bulimina aculeata*, d'Orbigny.

Bulimina aculeata, d'Orbigny, 1826, TMC, p. 269, no. 7.

Bulimina aculeata, Brady, 1884, FC, p. 406, pl. li, figs. 7-9.

Bulimina aculeata, Cushman, 1910, etc., FNP, 1911, p. 86, fig. 139.

Four stations: 51; WS 80, 88, 89.

Represented by a few specimens only, the best at WS 80 and 89.

132. *Bulimina inflata*, Seguenza.

Bulimina inflata, Seguenza, 1862, RFC, p. 109 (p. 25 in the reprint), pl. i, fig. 10.

Bulimina inflata, Schwager, 1866, FKN, p. 246, pl. vii, fig. 91.

Three stations: 236; WS 408, 433.

Single typical specimens at the two former stations; common at WS 433.

133. *Bulimina minutissima*, Wright.

Bulimina minutissima, Wright, 1902, GFL, p. 190, pl. xiii, figs. 9-12.

Bulimina minutissima, Heron-Allen and Earland, 1913, CI, p. 62, pl. iv, figs. 11, 12.

One station: WS 71.

A single specimen. The occurrence of this well-marked little species so far from its original locus of origin is very remarkable.

134. *Bulimina subteres*, Brady.

Bulimina subteres, Brady, 1879, RRC, etc., 1881, p. 55; 1884, FC, p. 403, pl. 1, figs. 17, 18.

Bulimina subteres, Heron-Allen and Earland, 1913, CI, p. 62, pl. iv, figs. 13, 14.

Three stations: 388; WS 88, 93.

Very large and fine specimens at 388 and WS 88.

135. *Bulimina elegantissima*, d'Orbigny (Plate VIII, figs. 35-37).

Bulimina elegantissima, d'Orbigny, 1839, FAM, p. 51, pl. vii, figs. 13, 14.

Bulimina elegantissima, Williamson, 1858, RFGB, p. 64, figs. 134, 135.

Three stations: 53; WS 89, 90.

Never abundant. The best specimens at WS 89. They are as a rule less pointed at the aboral extremity than is shown in d'Orbigny's figure. The Type was not to be found in Paris.

136. *Bulimina seminuda*, Terquem (Plate VIII, figs. 38-41).

Bulimina seminuda, Terquem, 1882, FEP, p. 117, pl. xii (xx), fig. 21.

Bulimina elegantissima var. *seminuda*, Brady, 1884, FC, p. 403, pl. 1, figs. 23, 24.

Eight stations: 48, 388; WS 71, 84, 86, 87, 88, 89, 93.

The best specimens at WS 87 and 88, where it was quite common and exhibited a great range of size. The surface is as a rule absolutely smooth, the sutural lines being hardly visible. At WS 71 and 87, several specimens seem, from the appearance of the final chamber, to have been in a plastogamic condition, or to have undergone the process of budding. No specimens actually seen in either condition, except at 388 where two very fine plastogamic pairs were found.

137. *Bulimina auricula*, sp.n. (Plate IX, figs. 1, 2).

One station: WS 88.

Test minute, white, consisting of $2\frac{1}{2}$ convolutions only, of which the final convolution forms almost the entire bulk of the shell. This final convolution consists of five chambers

increasing rapidly in size and breadth. Sutures thick and distinct, very slightly depressed. Terminal face of final chamber large and flattened, furnished with pleated depressions running from the outer edge to the inner margin, where the aperture is situated in a slight depression.

Length, 0.24 mm.; breadth of oral face, 0.18 mm.

Although only a single specimen was found, it presents such characteristic features as to deserve specific mention. It belongs to the group *B. seminuda* with which, however, it cannot be confused. Its nearest ally is *B. auriculata* Terquem (T. 1882, FEP, p. 115, pl. xii, fig. 14), which, however, is more elongate, has flush sutures and an entirely different oral face. Terquem's specific name, it may be pointed out, had been anticipated by Bailey as far back as 1851 for a very different form (*B.* 1851, SAC, p. 12, pl. O, figs. 25-27).

Genus *Virgulina*, d'Orbigny, 1826

138. *Virgulina schreibersiana*, Czjzek.

Virgulina schreibersiana, Czjzek, 1848, FWB, p. 147, pl. xiii, figs. 18-21.

Virgulina pupoides var. *compressa*, Williamson, 1858, RFGB, p. 63, fig. 131.

Nineteen stations: 51, 228, 230; WS 76, 80, 83, 86, 87, 88, 92, 93, 98, 99, 210, 215, 221, 225, 245, 248.

Often very common and almost universally distributed. The best specimens and most numerous were obtained from WS 86 and 248. There is, as usual, a considerable amount of variation, a long narrow form, and a shorter, broader form with fewer, but more inflated chambers, which occurs with the type at most stations where it is abundant. They presumably represent the megalos- and microspheric types.

139. *Virgulina schreibersiana* var. *spinosa*, var.n. (Plate IX, figs. 3, 4).

Two stations: 230, 236.

At 230 and 236 (close together between Cape Horn and the Falkland Islands) a variety occurs sparingly, distinguished by the upper outer marginal edge of the chambers being drawn out into a sharp incurved point or cusp, somewhat resembling the awns on a grass seed. The shell is remarkably thin-walled, showing iridescent colours at 236, and this variation may be due to depauperation of the type, which is normally rather robustly built at 230. At 236, the type was conspicuous by its absence. The variety bears considerable resemblance to *V. schreibersiana* var. *marginata*, Heron-Allen and Earland, described and figured by us in 1922 from South Nigeria (*Geol. Survey of S. Nigeria*, Bull. no. 3, 1922, Appendix, p. 142, pl. xii, figs. 4 a, b), but the cusps are much more conspicuous and strongly developed in the Falkland specimens than in that variety.

140. *Virgulina subsquamosa*, Egger.

Virgulina subsquamosa, Egger, 1857, MSO, p. 295, pl. xii (pl. viii in the reprint), figs. 19-21.

Virgulina subsquamosa, Brady, 1884, FC, p. 415, pl. lii, figs. 10, 11.

Two stations: 228, 230.

At these stations, typical specimens of the original compressed type of Egger occur. His records are mainly from the South Pacific Ocean.

141. *Virgulina bradyi*, Cushman.

Virgulina subsquamosa, Brady (*non* Egger), 1884, FC, p. 415, pl. lii, figs. 9 a-c (? 7, 8).

Virgulina bradyi, Cushman, 1918, etc., FAO, 1922, p. 115, pl. xxiv, fig. 1.

Seven stations: 236; WS 77, 86, 221, 248, 408, 433.

Moderately common. Cushman has separated the sub-cylindrical and few-chambered forms figured by Brady (*ut supra*) from the compressed and more regularly disposed type originally figured by Egger (*ut supra*, No. 140) on what appear to be sufficient grounds, as the two forms do not always occur in company in our material.

Genus *Spiroplectoides*, Cushman, 1927

142. *Spiroplectoides rosula* (Ehrenberg) (Plate IX, figs. 5, 6).

Spiroplecta rosula, Ehrenberg, 1854, M, 11, Index, p. 24, pl. xxxii, fig. 26.

Textularia complexa, Brady, 1865, RFND, p. 101, pl. xii, fig. 6.

Spiroplecta demersa, Ehrenberg, *Abh. k. Ak. Wiss. Berlin*, 1872, p. 294; 1873, LMT, p. 391, pl. vii, fig. 26.

Spiroplectoides rosula, Cushman, LFR, 1927, 111, p. 114, pl. xxiii, figs. 6, 7.

One station: WS 408.

Several good specimens. The records of this species are very few, but the discovery of specimens in such a distant locality as the Falkland Islands may indicate that it is widely distributed, and that its very minute size may be the reason for the paucity of the records. We give *S. demersa* as a synonym doubtfully; the construction of the shell is not given by Ehrenberg, though the colour is stated to be yellow, suggesting an arenaceous shell, but the figure is clearly hyaline. The identity of *Textularia complexa* is also not above suspicion if the dimensions given by Brady (length $\frac{1}{50}$ inch) are correct. *S. rosula* is only about one-third of this length.

Genus *Bolivina*, d'Orbigny, 1839

143. *Bolivina punctata*, d'Orbigny.

Bolivina punctata, d'Orbigny, 1839, FAM, p. 63, pl. viii, figs. 10-12.

Bolivina punctata, Brady, 1884, FC, p. 417, pl. lii, figs. 18, 19.

Twenty-two stations: 48, 228, 236 and WS 71, 77, 78, 79, 83, 86, 88, 89, 90, 92, 93, 97, 215, 217, 221, 245, 248, 408, 433.

Universally distributed, often very common. Both megalos- and microspheric forms are represented, the best specimens at 236 and WS 83, 93, 217, 221 and 408. At some of these stations, the specimens are very large and remarkably hyaline. The Paris "Amérique méridionale" Type tube contains only a single small specimen: it is quite opaque and the punctuation is consequently not obvious, but it agrees on the whole with his figure.

144. *Bolivina textilarioides*, Reuss.

Bolivina textilarioides, Reuss, 1862, NHG, p. 81, pl. x, fig. 1.

Bolivina textilarioides, Brady, 1884, FC, p. 419, pl. lii, fig. 23 (only).

Bolivina textilarioides, Heron-Allen and Earland, 1916, FWS, p. 238, pl. xli, figs. 10-14.

Eleven stations: 53, 235, 236; WS 79, 83, 87, 89, 90, 93, 97, 433.

Never very common and never quite typical. At most of the stations the species is represented by a rough and thick-walled variety very similar to that figured by us (*ut supra*). At 235 and WS 87, 90, this roughness is confined to the upper margin of the chambers, approaching the form separated by Cushman under the specific name *spinescens*.

145. *Bolivina spinescens*, Cushman (Plate IX, figs. 7, 8).

Bolivina textilarioides, Brady, 1884, FC, p. 419, pl. lii, figs. 24, 25.

Bolivina spinescens, Millett, 1898, etc., FM, 1900, p. 542, pl. iv, fig. 5.

Bolivina spinescens, Cushman, 1910, etc., FNP, 1911, p. 46, fig. 76.

Three stations: 235, 236; WS 433.

At these stations, the variation referred to under the last species reaches its maximum development, and specimens unquestionably referable to Cushman's species are found, common at WS 433.

146. *Bolivina robusta*, Brady.

Bolivina robusta, Brady, 1879, etc., RRC, 1881, p. 57; 1884, FC, p. 421, pl. liii, figs. 7-9.

Bolivina robusta, Cushman, 1918, etc., FAO, 1922, p. 46, pl. vi, fig. 6.

Eight stations: WS 79, 83, 88, 97, 109, 210, 217, 245.

Rare, and as a rule rather pauperate. Good specimens at WS 97, and others, less typical, at WS 210, 217, 245.

147. *Bolivina compacta*, Sidebottom.

Bolivina compacta, Sidebottom, 1904, etc., RFD, 1905, p. 15, pl. iii, fig. 7.

Bolivina compacta, Cushman, 1910, etc., FNP, 1911, p. 36, fig. 58.

Two stations: 388; WS 88.

Several good specimens at each station.

148. *Bolivina dilatata*, Reuss.

Bolivina dilatata, Reuss, 1849-50, FOT, p. 381, pl. iii (xlvi), fig. 15.

Bolivina dilatata, Cushman, 1910, etc., FNP, 1911, p. 33, fig. 54.

Seven stations: WS 79, 80, 88, 90, 92, 99, 408.

At many stations the specimens are rather poor, but excellent and typical individuals occur at WS 88, smaller and less typical at WS 90 and 92.

149. *Bolivina difformis* (Williamson).

Textularia variabilis var. *difformis*, Williamson, 1858, RFGB, p. 77, pl. vi, figs. 166, 167.

Bolivina difformis, Brady, 1887, SBRF, p. 899.

Five stations: 48; WS 90, 92, 99, 408.

Rare. All the specimens are poorly developed, especially as regards the marginal spines so characteristic of British specimens.

150. *Bolivina variabilis* (Williamson).

Textularia variabilis (typica), Williamson, 1858, RFGB, p. 76, pl. vi, figs. 162, 163 (incorrectly numbered 161 and 162 on the plate).

Bolivina variabilis, Cushman, 1918, etc., FAO, 1922, p. 49, pl. iv, fig. 3.

Fifteen stations: 48, 51, 53, 228; WS 71, 77, 83, 89, 90, 91, 92, 221, 245, 408, 409.

Often common, and, as in British gatherings, subject to a good deal of variation in the smoothness of the external shell, which tends imperceptibly in the direction of *B. pseudo-plicata*. The best examples at WS 71, 83, 221. At this last station some specimens exhibited curvature of the long axis.

151. *Bolivina pseudo-plicata*, Heron-Allen and Earland (Plate IX, figs. 9-11).

Bolivina plicata, Brady, 1870, FTR, p. 302, pl. xii, figs. 7 a, b (*non* d'Orbigny, 1839, FAM, p. 62, pl. viii, figs. 4-7).

Bolivina plicata, Halkyard, 1889, RFJ, p. 65, pl. i, fig. 13.

Bolivina pseudo-plicata, Heron-Allen and Earland, 1930, FPD, p. 81, pl. iii, figs. 36-40.

Bolivina plicatella, Cushman, 1930, FCFF, p. 46, pl. viii, fig. 10.

Bolivina plicatella, Cushman and Parker, 1931, ACSA, p. 15, pl. iii, fig. 19.

Twelve stations: 48, 51; WS 71, 77, 88, 90, 91, 92, 93, 99, 221, 409.

Fairly frequent at the stations where it occurs and quite indistinguishable from British specimens. Like them it presents considerable range of form, two well-marked types predominating, long and narrow and short and broad respectively. These probably represent the megalos- and microspheric forms. The best specimens at 48 and WS 88, 90, 92 and 221. (See p. 302.)

152. *Bolivina inflata*, Heron-Allen and Earland.

Bolivina inflata, Heron-Allen and Earland, 1913, CI, p. 68, pl. iv, figs. 16-19; 1915, FKA, p. 648; 1916, FSC, p. 43; 1916, FWS, p. 240.

Bolivina inflata, Cushman, 1918, etc., FAO, 1922, p. 35, pl. ix, figs. 1-4.

Nine stations: 51, 388; WS 77, 83, 88, 90, 92, 93, 221.

Very rare, the best at WS 92, 93 and 221.

153. *Bolivina malovenssis*, sp.n. (Plate IX, figs. 12-15).

Twelve stations: 228, 230, 388; WS 71, 83, 88, 89, 91, 92, 93, 221, 408.

Test compressed, cuneate, broadening rather rapidly at the oral extremity. Containing from 8 to 10 pairs of parallel-sided chambers increasing regularly in size. The apex is bluntly rounded, with visible proloculum in the megalospheric stage, more pointed in the microspheric. Marginal edge thick and rounded, straight at first, becoming slightly lobulate towards the aperture. Aperture normal. Sutures distinct, slightly depressed; surface smooth but not polished, sometimes slightly frosted or

roughened. Colour nearly white but the earlier chambers are often brownish. The perforations are extremely minute.

Length, 0.27–0.31 mm.; breadth, 0.11–0.12 mm.; thickness, 0.06 mm.

The distribution of *B. malovens* appears to be confined to the southern area of the Falklands. It is not uncommon at those stations where it occurs, the best of the specimens being recorded from WS 71, 88 and 89. There is little variation except in the lobulation of the edge and the slightly roughened surface.

154. *Bolivina cincta*, sp.n. (Plate IX, fig. 16–18).

Fourteen stations: 228, 230, 235, 236; WS 76, 88, 93, 97, 221, 245, 248, 408, 409, 433.

Test leaf-shaped, the length being usually about double the breadth; compressed on both sides, consisting of about 5–7 pairs of flattened chambers separated by very strongly limbate sutural lines; marginal edge somewhat thickened, broad and flat, slightly recessed at each chamber; surface of the chambers between the limbate sutures, roughened and opaque, becoming smooth and more translucent in the final chambers. Aperture a large slit on the final chamber. Colour dirty white, opaque except at oral end.

Length, 0.25 mm.; breadth, 0.15 mm.; thickness, 0.03 mm.

This little species is widely distributed in the Falkland area but never very common. Most numerous and best at 228 and WS 245 and 408. Two distinct forms varying in length and breadth are found at most stations; the short, broad form is mostly about half the size of the larger, narrower form. There is no difference in their external appearance, and the proloculum is apparently identical. There is a certain amount of variation in the strength of the limbation, which may entirely disappear from the later chambers, but the species is, as a whole, very uniform and characteristic.

155. *Bolivina rhomboidalis* (Millett).

Textularia rhomboidalis, Millett, 1898, etc., FM, 1899, p. 559, pl. vii, fig. 4.

Textularia rhomboidalis, Sidebottom, 1904, etc., RFD, 1905, p. 8, pl. ii, figs. 2, (?)3.

Bolivina rhomboidalis, Cushman, 1922, FTR, p. 28.

One station: 51.

A single typical specimen was found at 51 which is close to the north shore of the islands. Its presence is difficult to account for, as it is believed that the precautions taken to prevent fouling of sieves are sufficient to ensure it not having been derived from a distant locality.

The species is of frequent occurrence in the tropical and sub-tropical Indo-Pacific region, in the Mediterranean, and more rarely in the West Indies and tropical Atlantic.

Genus *Bifarina*, Parker and Jones, 1872

156. *Bifarina porrecta* (Brady).

Bolivina porrecta, Brady, 1879, etc., RRC, 1881, p. 57; 1884, FC, p. 418, pl. lii, fig. 22.

Bolivina (Bifarina) porrecta, Cushman, 1918, etc., FAO, 1922, p. 39, pl. vii, fig. 2.

Two stations: WS 408, 531.

A single good specimen of this common North Atlantic form at each station.

Sub-family CASSIDULININAE

Genus *Cassidulina*, d'Orbigny, 1826157. *Cassidulina laevigata*, d'Orbigny.

Cassidulina laevigata, d'Orbigny, 1826, TMC, p. 282, no. 1, pl. xv, figs. 4, 5.

Cassidulina laevigata, Williamson, 1858, RFGB, p. 68, pl. vi, figs. 141, 142.

Cassidulina laevigata, Brady, 1884, FC, p. 428, pl. liv, figs. 1-3.

Twenty-eight stations: 48, 51, 53, 228, 230, 235, 236, 388; WS 71, 73, 77, 80, 83, 86, 87, 88, 89, 90, 97, 99, 215, 217, 221, 245, 248, 408, 409, 433.

Curiously rare and small at most stations, but becoming more common and larger at the stations to the north of the Falkland Islands. The best specimens and most numerous were found at 230, 235, 236 and WS 433, notably the last, where it was very common. Also at WS 86, 87 and 408 on the Burdwood Bank. The Paris Type is missing.

158. *Cassidulina pulchella*, d'Orbigny (Plate IX, figs. 19-21).

Cassidulina pulchella, d'Orbigny, 1839, FAM, p. 57, pl. viii, figs. 1-3.

Cassidulina pulchella, Cushman, 1927, FWCA, p. 166, pl. vi, fig. 1.

Thirteen stations: 388; WS 84, 86, 87, 88, 90, 91, 93, 95, 219, 245, 248, 408.

This is one of the species figured in d'Orbigny's *Amérique Méridionale*, but, curiously enough, he records it only from the Peruvian Coast, where it is, he says, "uncommon". How he can have failed to find it in the Falkland Islands material is not easily understood, as it is fairly generally distributed and quite typical. The best specimens occur at WS 86-88. At some of the other stations, notably WS 90, 93 and 95, the specimens are very small. D'Orbigny's figure is rather misleading, the peripheral edge showing a broken line due to the recurvature of the posterior edge of the chambers, but in our specimens, and in the Types in Paris, there is no sign of this, the periphery being rounded and unbroken.

159. *Cassidulina nitidula* (Chaster).

Pulvinulina nitidula, Chaster, 1892, FS, p. 66, pl. i, fig. 17.

Pulvinulina nitidula, Sidebottom, 1904, etc., RFD, 1909, p. 9, pl. iv, fig. 2.

Cassidulina nitidula, Heron-Allen and Earland, 1913, CI, p. 70, pl. v, figs. 6-9.

Two stations: 388; WS 88.

One specimen at 388 and two excellent specimens at WS 88. This little species appears to have a world-wide distribution, although owing to its small size it is probably often overlooked.

160. *Cassidulina crassa*, d'Orbigny (Plate IX, figs. 26-33).

Cassidulina crassa, d'Orbigny, 1839, FAM, p. 56, pl. vii, figs. 18-20.

Cassidulina crassa, d'Orbigny, 1846, FFV, p. 213, pl. xxi, figs. 42, 43.

Cassidulina crassa, Brady, 1884, FC, p. 429, pl. liv, figs. 4, 5.

Cassidulina crassa, Fauré-Fremiet, 1913-14, FMAF, 1913, p. 263, fig. 6 (c); 1914, p. 5, pl. O, fig. 7.

Forty stations: 48, 51, 228, 230, 236, 388; WS 71, 73, 76, 77, 78, 80, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 95, 97, 98, 99, 108, 109, 210, 213, 217, 219, 221, 225, 245, 246, 248, 408, 409, 433.

Universally distributed and, at certain stations, forming a considerable proportion of the whole bulk of the material. The species is evidently polymorphic, as two, or perhaps three, very distinct forms occur at most of the stations in company. The first is a large form which is the true d'Orbignyan Type as verified in Paris, although it is much less delicate than his figure suggests, the markings being as a rule rather obscure (Plate IX, figs. 26-28, 32, 33). It agrees in size with the d'Orbignyan dimensions, "Diam. 1 mm." The test is thick-walled, opaquely white, the sutural lines nearly flush, sometimes quite invisible, the peripheral edge generally showing no lobulation. Sections reveal both megalos- and microspheric forms, there being little observable external difference, save as regards size, the microspheric form being larger than the megalospheric, and generally flatter.

The second form is quite small as compared with the foregoing, rarely attaining one-fifth of its dimensions (Plate IX, figs. 29-31). It is thin-walled, very hyaline and the chambering is clearly visible as in d'Orbigny's figure, the peripheral edge being slightly lobulate, as he describes it to be. We have not been able to cut sections of this form, but owing to certain differences in size and external characteristics which we have observed in a series of specimens, we have every reason to believe that both micro- and megalospheric specimens occur in this small form as well. This smaller form is the type which has been usually met with by us in gatherings practically all over the world. The large type on the other hand we have only met with in high latitudes both north and south, so it is presumably confined to colder waters.

A third form, which may be described as intermediate, is in size from three to four times the diameter of the small form, and partakes of the external characters of the large form, of which it is probably an immature or pauperate stage, though it is occasionally found at stations where the large form is not recorded, viz. 51 and WS 86, 89, 98, 213, 217, 225. At stations 228, 230, 236, and WS 95, 221, 408, 409, only the small form was found, and few and poor specimens at that. As these stations are widely separated, we can offer nothing in explanation.

161. *Cassidulina crassa* var. *porrecta*, var. nov. (Plate IX, figs. 34-37).

Eleven stations: 388; WS 76, 83, 84, 88, 89, 91, 93, 97, 210, 225.

At many of the stations where the large type of *C. crassa* occurs, there is a tendency to a form of variation characterized by the drawing out of the final chamber into a more or less produced terminal portion. The variation is unquestionably a form of senile deterioration, as it affects only the last few chambers of large and mature specimens. No young individuals with drawn-out final chambers were observed. Seen by itself the variety would be sufficiently striking to warrant a separate specific name, but there is no doubt that it is merely a local and senile variation. The best and most characteristic specimens occur at stations WS 83 and 91 and especially at 388. At first sight the variety recalls *Cassidulina braziliensis*, Cushman (C. 1918, etc., FAO, 1922, p. 130, pl. xxv,

figs. 4, 5) so far as his fig. 5 is concerned, but it appears to be quite distinct. *C. brasiliensis* has a thin and translucent wall with very clear sutures and its length is only 0.35–0.40 mm. as compared with an average 0.80 mm. in our variety which has thick, opaque walls and indistinct sutures. Length, 0.75–0.82 mm.; breadth, 0.60–0.62 mm.; thickness, 0.35 mm.

162. *Cassidulina subglobosa*, Brady.

Cassidulina subglobosa, Brady, 1879, etc., RRC, 1881, p. 60; 1884, FC, p. 430, pl. liv, fig. 17.

Cassidulina subglobosa, Chapman, 1907, TFV, p. 33, pl. iv, fig. 84.

Thirty-seven stations: 48, 51, 53, 235, 236, 388; WS 71, 72, 73, 76, 77, 80, 83, 84, 86, 88, 89, 90, 91, 92, 93, 97, 98, 99, 108, 109, 210, 213, 215, 217, 219, 221, 225, 245, 248, 408, 409.

Universally distributed, but never occurring in such numbers as *C. crassa*. The best stations are WS 73, 76, 90, 92, 99. The specimens are fairly true to type, but on the whole rather small. At a few stations a variety occurs characterized by a somewhat compressed, or less than ordinarily inflated test. It usually occurs in company with the type, but at WS 86 it occurs without the type.

163. *Cassidulina parkeriana*, Brady (Plate IX, figs. 22–25).

Cassidulina parkeriana, Brady, 1879, etc., RRC, 1881, p. 59; 1884, FC, p. 432, pl. liv, figs. 11–16.

Cassidulina parkeriana, Cushman, 1910, etc., FNP, 1911, p. 100, fig. 154.

Cassidulina parkeriana, Chapman, 1914, EDRS, p. 30, pl. ii, fig. 13.

Thirty stations: 48, 51, 53, 388; WS 71, 73, 76, 77, 79, 80, 83, 86, 87, 88, 90, 91, 92, 93, 97, 98, 99, 109, 210, 213, 215, 217, 219, 225, 245, 248.

Almost universally distributed, never very common, but, except for a few stations, always present in moderate numbers. In the area between Cape Horn and the Burdwood Bank (WS 83, 86, 87, 88, 91, 92, 93) the species reaches its optimum development in size and beauty. At most of the stations two very distinct forms are present, the megalospheric form which is shorter, stouter and with comparatively few chambers in the straight series, and the microspheric form which is much more delicately constructed, and with a long rectilinear series. The young specimens of this species before the adoption of the linear method of growth are by no means easy to separate from *C. subglobosa*.

Genus *Ehrenbergina*, Reuss, 1850

164. *Ehrenbergina pupa* (d'Orbigny) (Plate IX, figs. 40–47).

Cassidulina pupa, d'Orbigny, 1839, FAM, p. 57, pl. vii, figs. 21–3.

Ehrenbergina pupa, Brady, 1884, FC, p. 433, pl. cxiii, fig. 10 a–c (not pl. lvi, fig. 1).

Thirty stations: 48, 51, 236, 388; WS 71, 77, 79, 80, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 97, 98, 210, 213, 215, 217, 225, 245, 246, 248, 408, 433.

Generally distributed, often very abundant. This typically Falkland Islands form is particularly rare elsewhere. In the Falkland Islands dredgings it occurs in great numbers, particularly at some of the stations, e.g. WS 83, 84, 87, 92, 93. At most of the stations there is considerable range of variation. D'Orbigny figures only a coarse triangular form. In the Falklands every range of variation is to be found, from short, broad, almost

sub-globular, to long and comparatively narrow individuals. It is probable that the extremes represent the micro- and megalospheric forms, and that the species is polymorphic. It may be noted that Brady's fig. 1 on pl. lvi, from a specimen from the Azores, certainly does not represent d'Orbigny's species. The d'Orbigny Types in Paris represent the long, adult form, the early stages not being represented.

165. *Ehrenbergina hystrix* var. *glabra*, Heron-Allen and Earland.

Ehrenbergina serrata, Chapman, 1914, FORS, p. 31, pl. ii, fig. 16 (only).

Ehrenbergina hystrix var. *glabra*, Heron-Allen and Earland, 1922, TN, p. 140, pl. v, figs. 1-6, 11.

Ehrenbergina hystrix var. *glabra*, Cushman, 1927, E, p. 4, pl. i, figs. 7, 8.

Two stations: 236; WS 79.

At these stations a few individuals with feebly spinous marginal edges were found, which we think should be attributed to the above. There is no doubt that they are merely spinous variations of the dominant local species *E. pupa*, and it would now seem probable to us that our variety is nearly related to that species and would have been more correctly placed as var. *spinosa* of *E. pupa*, than as var. *glabra* of *E. hystrix*.

166. *Ehrenbergina bradyi*, Cushman.

Ehrenbergina serrata, Brady (*pars*), 1884, FC, pl. lv, figs. 2, 3, 5 (?) not 4, 6, 7.

Ehrenbergina bradyi, Cushman, 1918, etc., FAO, 1922, p. 134, pl. xxvi, fig. 5.

Ehrenbergina bradyi, Cushman, 1927, E, p. 5, pl. ii, fig. 1.

One station: WS 88.

A single good specimen.

Family CHILOSTOMELLIDAE

Genus *Chilostomella*, Reuss, 1850

167. *Chilostomella oolina*, Schwager (Plate IX, figs. 38, 39).

Chilostomella oolina, Schwager, 1878, TDS, p. 528, pl. i, fig. 16.

Chilostomella ovoidea, Brady, 1884, FC, p. 436, pl. lv, figs. 14, 17, 18.

Chilostomella oolina, Cushman, 1925, LFR, 1, p. 74, pl. xi, figs. 3-10.

Four stations: 228, 230; WS 83, 408.

Two specimens at 230 and a single one at the remaining stations. It is rather curious that these four stations lie in the same area, and almost in a continuous line between the end of Staten Island and the southern extremity of the Falklands.

Genus *Seabrookia*, Brady 1890

168. *Seabrookia earlandi*, Wright (Plate X, figs. 1-3).

Seabrookia earlandi, Wright, 1891, SWI, p. 477, pl. xx, figs. 6, 7.

Seabrookia earlandi, Heron-Allen and Earland, 1913, CI, p. 72, pl. v, figs. 10-12.

One station: WS 83.

Two specimens. This little species has a curiously wide distribution. It is probably often overlooked owing to its small size.

Family LAGENIDAE

Sub-family LAGENINAE

Genus *Lagena*, Walker and Boys, 1784169. *Lagena globosa* (Montagu).

Serpula (Lagena) laevis globosa, Walker and Boys, 1784, TMR, p. 3, pl. i, fig. 8.

Vermiculum globosum, Montagu, 1803-8, TB, 1803, p. 523.

Lagena globosa, Brady, 1884, FC, p. 452, pl. lvi, figs. 1-3.

Eighteen stations: 48, 51, 228, 236, 388; WS 71, 83, 88, 89, 90, 92, 93, 95, 221, 245, 248, 408, 433.

As usual, extremely variable, the best specimens at WS 83 and 88. The variation extends to the surface of the test which varies from a smoothly hyaline to a rough "matt" surface. Ento-ecto-solenian individuals at WS 83, 88. Practically all the forms of aperture figured by Brady (B. 1884, FC, p. 441) can be found among our specimens. There is a Type tube in Paris labelled *Eutosolenia globosa*, from the Falkland Islands. This was probably added to the d'Orbigny collection at a later date as it is endorsed "Williamson, Britisch (*sic*) Forams. etc...." It contains a slightly compressed but otherwise typical *L. globosa*.

169A. *Lagena laevigata* (d'Orbigny) (Plate X, fig. 4).

Oolina laevigata, d'Orbigny, 1839, FAM, p. 19, pl. v, fig. 3.

One station: WS 248.

The single specimen which we figure has a solid conical neck of clear shell substance, and a basal stud of similar nature, both contrasting strongly with the milky white colour of the globular test. It is 0.50 mm. in length and 0.35 mm. in breadth. In spite of these dimensions we attribute our specimen to d'Orbigny's species which was described as "rare" in the Falkland Islands. It certainly agrees very well with d'Orbigny's description of his species—"un peu acuminée en avant, arrondie en arrière, . . . ouverture étroite, placée à l'extrémité d'un prolongement conique, et comme bordée par une partie plus transparent que le reste". D'Orbigny's description and figure, so far as the oral half is concerned, would very well correspond with our specimen. The agreement is not so complete as regards the basal portion, his figure having a line across the rounded base which suggests a *Glandulina*. But this may be an attempt to reproduce a solid basal stud such as our specimen possesses. The size of the original type is given as $\frac{1}{8}$ mm. diameter, the length not being stated. This is about a third of the size of our specimen.

There is a tube among the Paris Types labelled *Oolina laevigata*, "Îles Malouines", which does not represent the specimen from which d'Orbigny's figure was drawn. It is undoubtedly *Lagena globosa*, being quite globular, hyaline, at the oral and aboral extremities, but with a band of highly perforated shell substance surrounding its greater diameter and giving a false impression of a second chamber at the base.

The *Oolina laevigata* of d'Orbigny has in our opinion no zoological specific value, but is merely one of the many variations of the ubiquitous species *Lagena globosa* (Montagu).

D'Orbigny's name appears to have been entirely overlooked by subsequent authors as we cannot trace any reference to it. Most unfortunately the specific name *laevigata* was used by Reuss for a very different and ubiquitous species, and under the rules of priority *L. laevigata* Reuss must in future be abandoned (see No. 210).

170. *Lagena compressa* (d'Orbigny).

Oolina compressa, d'Orbigny, 1839, FAM, p. 18, pl. v, figs. 1, 2; 1846, FFV, p. 23, pl. xxi, figs. 1, 2.

One station: 48.

The species occurs at this station and almost certainly elsewhere. Having no very distinctive features, it was not separated from *L. marginata* until the last moment and after seeing the Type specimens in Paris. There are in Paris two separate Type tubes, one labelled *L. compressa*, with reference to FAM, endorsed. This specimen is entirely decomposed by acid degeneration of the glass, nothing but a chitinous film remaining, which suggests *L. orbignyana* or *L. bicarinata* or some other of the multi-keeled forms.

The other tube contains a single specimen, still in good preservation, of a turgid and almost keelless fissurine *Lagena* of the *L. marginata* group. It has no very distinctive features. D'Orbigny's figure exaggerates the keel—there is hardly any "keel" at all, but rather a thickened marginal edge to the shell, which, at the base, has a tendency to divide into two. It appears to have no specific value, but to be intermediate between *L. marginata*—the keelless type—and our species *L. revertens* (No. 238 *post*), which, however, has a pronounced neck.

171. *Lagena stewartii*, Wright.

Lagena stewartii, Wright, 1910-11, ECM, p. 12, pl. ii, fig. 8.

Lagena stewartii, Heron-Allen and Earland, 1913, CI, p. 81, pl. vi, figs. 2, 3.

Three stations: WS 88, 90, 245.

Occasional specimens at these, and probably at other stations. Wright's specific name, while probably having no zoological value, is useful for separating those specimens which have usually been recorded as "compressed" *L. globosa*. They are to be found wherever the type occurs.

172. *Lagena ovum* (Ehrenberg).

Miliola ovum, Ehrenberg, 1843, MMO, p. 166; 1854, M, pl. xxiii, fig. 2 (?); pl. xxvii, fig. 1; pl. xxix, fig. 45 (?); pl. xxxi, fig. 4.

Lagena ovum, Brady, 1884, FC, p. 454, pl. lvi, fig. 5.

Lagena ovum, Heron-Allen and Earland, 1913, CI, p. 73, pl. vi, fig. 1.

Two stations: WS 80, 83.

Good specimens at WS 83, where also what appears to be a compressed variety occurs. Ehrenberg's figures are all, with the exceptions of pl. xxvii, fig. 1, highly unsatisfactory, but the species is well identified by its specific name.

173. *Lagena botelliformis*, Brady.

Lagena botelliformis, Brady, 1879, etc., RRC, 1881, p. 60; 1884, FC, p. 454, pl. lvi, fig. 6.

Lagena botelliformis, Millett, 1898, etc., FM, 1901, p. 492, pl. viii, fig. 15.

Three stations: 228; WS 87, 433.

Rare and never very typical.

174. *Lagena apiculata* (Reuss).

Oolina apiculata, Reuss, 1851, FKL, p. 22, pl. i, fig. 1.

Lagena apiculata, Brady, 1884, FC, p. 453, pl. lvi, figs. 15, 16 (only).

Five stations: 228; WS 80, 83, 90, 92.

Extremely rare, seldom more than a single specimen at each station.

175. *Lagena inornata*, d'Orbigny (Plate X, fig. 5).

Oolina inornata, d'Orbigny, 1839, FAM, p. 21, pl. v, fig. 13.

Lagena inornata, Reuss, 1862, FFL, p. 320, pl. i, fig. 12.

Four stations: WS 83, 88, 89, 225.

The best at WS 88, where it was plentiful. It probably occurs at other stations where it was not separated from *L. globosa* or *L. apiculata*. We only record this species because it was originally described by d'Orbigny from the Falklands; it probably has no zoological value, the specimens passing gradually into *L. globosa* on the one hand and *L. apiculata* on the other. From d'Orbigny's description of the texture of the shell "son aspect est celui de verre dépoli", it would seem that his specimens were dead and worn shells. The Paris Type of *Oolina inornata* is hopelessly destroyed, but there is a tube obviously of later date than d'Orbigny labelled both "*Entosolenia marginata* var. *lucida* Will." and also "*Oolina inornata* F.A.M." It contains d'Orbigny's species and we have perfect metatypes from WS 88.

176. *Lagena elongata* (Ehrenberg).

Miliola elongata, Ehrenberg, 1844, *Ber. k. preuss. Ak. Wiss. Berlin*, p. 274; 1845, p. 371; 1854, M, pl. xxv, fig. 1 A 1.

Lagena elongata, Cushman, 1910, etc., FNP, 1913, p. 12, pl. i, fig. 5.

Two stations: 228; WS 217.

A single specimen at each station; that at 228 remarkably fine and large.

177. *Lagena gracillima* (Seguenza).

Amphorina gracilis, Costa, 1853, etc., PRN, 1856, p. 121, pl. xi, fig. 11.

Amphorina gracillima, Seguenza, 1862, FMMM, p. 51, pl. i, fig. 37.

Lagena gracillima, Brady, 1884, FC, p. 456, pl. lvi, figs. 19-28.

Three stations: WS 217, 225, 408.

The majority of the specimens at WS 217 and 225 are of the curious curved variety figured by Brady (1884) pl. lvi, figs. 20 and 24 (only). Straight specimens also occurred at WS 217.

178. *Lagena clavata* (d'Orbigny).

Oolina clavata, d'Orbigny, 1846, FFV, p. 24, pl. i, figs. 2, 3.

Lagena clavata, Reuss, 1862, FFL, p. 320, pl. i, fig. 13 (only).

Lagena clavata, Cushman, 1910, etc., FNP, 1913, p. 9, pl. ii, fig. 3.

Two stations: WS 89, 217.

Very rare but occurs typically at these stations, and quite conformable to the Paris Type which is of the rather pointed form.

179. *Lagena laevis* (Montagu).

Vermiculum laeve, Montagu, 1803-8, TB, p. 524.

Lagena laevis, Brady, 1884, FC, p. 455, pl. lvi, figs. 7, 8, 9, 12 (only).

Lagena laevis, Heron-Allen and Earland, 1913, CI, p. 77, pl. vi, fig. 5.

Seven stations: 48; WS 83, 86, 89, 90, 99, 225.

Curiously rare, as a rule only a single specimen at the stations where it occurs. Most frequent at WS 89 where, in addition to the type, the curved variety which we figured in 1913 (*ut supra*) is found. The same variety occurs at WS 86, where the type was not observed.

180. *Lagena hispidula*, Cushman (Plate X, fig. 6).

Lagena laevis, Brady (*pars*), 1884, FC, pl. lvi, figs. 10, 11.

Lagena hispidula, Cushman, 1910, etc., FNP, 1913, p. 14, pl. v, figs. 2, 3.

Six stations: WS 76, 88, 93, 215, 217, 433.

Very rare, usually only a single specimen at each station. Cushman founded his species on the two figures (10 and 11) of Brady's series of *L. laevis* in which the surface is "matt" or finely hispid. These Challenger specimens came from the Southern Ocean and the South Atlantic respectively. Cushman records it from many localities in the North Pacific. Length averages about 0.30 mm.

181. *Lagena hispida*, Reuss (Plate X, figs. 7, 8).

Lagena hispida, Reuss, 1858, FP, p. 434; 1862, FFL, p. 335, pl. vi, figs. 77-9.

Lagena hispida, Brady, 1884, FC, p. 459, pl. lvii, figs. 1-4; pl. lix, figs. 2-5.

Lagena hispida, Heron-Allen and Earland, 1916, FWS, p. 243, pl. xli, fig. 16.

Five stations: WS 76, 98, 210, 217, 225.

A few specimens at each. In dealing with *L. hispida* in 1916 (*ut supra*), we expressed our opinion that *L. hispida* is one of those species of *Lagena* with a compound shell structure, i.e. "the shell structure can be separated into distinctive layers. The internal layer is normally clothed with a dense 'pile' of most delicate needles, of equal length, their points coalescing to form a rough or 'matt' surface. The spirally ornamented neck is free from all exogenous growth. The 'matt' outer surface is very easily destroyed; the spines then fall off and only their bases are left, giving a faintly hispid surface to the test". We figured a British specimen showing this structure.

It is an interesting thing to have this observation confirmed by specimens from the other end of the world. The Falkland specimens of *L. hispida* are, however, different,

inasmuch as each of the delicate needles of the "pile" terminates in a triradial extension, over which, perhaps, an outer "skin" of shell substance was formed in life, the triradial terminations of the spines serving as its support (Plate X, fig. 7). The "pile" of needles is, of course, very fragile, but there is a complete range of specimens, from undamaged individuals to those on which only a few needles are left projecting (Plate X, fig. 8) from what would otherwise be normal *L. hispida* as figured by Brady (*ut supra*) (fig. 2). Length, 0.40–0.50 mm. Breadth of spinous specimen, 0.30 mm. Length of spines, about 0.02 mm.

182. *Lagena aspera*, Reuss.

Lagena aspera, Reuss, 1861, FKM, p. 305, pl. i, fig. 5.

Lagena aspera, Brady, 1884, FC, p. 457, pl. lvii, figs. 7–10.

Five stations: WS 88, 89, 90, 92, 99.

Rarely more than a single specimen, except at WS 89 and 99, where good specimens were found. They are all of a pronounced globular type without a produced neck. At WS 99, a specimen with the upper half smooth, suggesting the *Lagena balaniformis*, Heron-Allen and Earland of the Moorabool deposits (H.-A. & E. 1924, FQM, p. 147, pl. ix, figs. 30, 31) but with a greater proportion of the shell rough.

183. *Lagena lineata* (Williamson).

Entosolenia lineata, Williamson, 1848, BSGL, p. 18, pl. ii, fig. 18; 1858, RFGB, p. 9, pl. i, fig. 17.

Lagena lineata, Balkwill and Wright, 1885, DIS, p. 336, pl. xiv, figs. 13, 14.

Thirteen stations: WS 77, 83, 87, 88, 89, 90, 91, 92, 93, 99, 221, 225, 248.

Sometimes fairly common, the best at WS 88, 90 and 93. There is the usual range of variation in the coarseness of the markings, which vary from striae practically irresolvable under low magnifications to quite distinct costal lines. A complete range was observed at WS 93; at WS 92 all the specimens were coarsely, and at WS 88 all were feebly marked.

184. *Lagena caudata* (d'Orbigny) (Plate X, fig. 9).

Oolina caudata, d'Orbigny, 1839, FAM, p. 19, pl. v, fig. 6.

Lagena caudata, Reuss, 1862, FFL, p. 325, pl. iii, fig. 29.

Sixteen stations: 228; WS 76, 79, 80, 83, 89, 90, 91, 92, 93, 95, 98, 217, 221, 225, 408.

This little form which d'Orbigny described from the Falkland Islands as "pretty rare" occurs at a good many stations, often in considerable numbers. It appears to be a true local variation, for we cannot recall having seen it elsewhere, and the records are few and doubtful. At the same time it has probably no zoological value, for even in the Falkland area it is quite easy to obtain transition forms linking it with *L. gracilis* and *L. distoma*. But for the Falkland area, *L. caudata* remains a fitting name for those striate, or fully sulcate *Lagenae* characterized by a rapid diminution of the aboral end to a more or less produced spine or tube. The best specimens at WS 83 and 217. Length

averages 0.50 to 0.60 mm. In the Paris Type the striae are clearly marked over the whole length of the shell as in d'Orbigny's figure; but there is often considerable variation in the strength and extent of the striae even among specimens from the same station.

185. *Lagena gracilis*, Williamson.

Lagena gracilis, Williamson, 1848, BSGl, p. 13, pl. i, fig. 5; 1858, RFGB, p. 7, pl. l, figs. 12, 13.

Lagena gracilis, Brady, 1884, FC, p. 464, pl. lviii, figs. 2, 3, 7, 8, 9, 19, 23.

Fifteen stations: 228, 230, 235, 236; WS 80, 83, 89, 92, 210, 215, 217, 221, 225, 248, 408.

Frequent and variable. At many of the stations it seems to run into *L. caudata*, d'Orbigny, and at others into *L. distoma*, Parker and Jones. At WS 217, where the best range of specimens occurred, everything intermediate between these species could be found. Coarsely costate specimens at 235 and WS 221. The most typical at 230 and 235 and WS 83, 225, 248.

186. *Lagena distoma*, Parker and Jones.

Lagena distoma, Brady, 1864, RFS, p. 467, pl. xlviii, fig. 6; 1884, FC, p. 461, pl. lviii, figs. 11-15.

Lagena distoma, Cushman, 1918, etc., FAO, 1923, p. 14, pl. iii, fig. 3 (only).

Ten stations: 228, 236; WS 76, 80, 98, 109, 210, 217, 248, 433.

Never very common and never attaining the large dimensions which it sometimes reaches, notably in the North Sea. Very good and typical specimens are found at 236 and WS 217. [At Cushman's reference (*ut supra*) fig. 2 is a reproduction of our figure (H.-A. & E. 1913, CI, pl. vi, fig. 6) of *L. laevis* var. *distoma*, Silvestri, an entirely different form.]

187. *Lagena perlucida*, Williamson.

Lagena vulgaris var. *perlucida*, Williamson, 1858, RFGB, p. 5, pl. i, figs. 7, 8.

Lagena perlucida, Heron-Allen and Earland, 1908, etc., SB, 1911, p. 320, pl. x, fig. 13.

Seven stations: WS 83, 89, 92, 93, 225, 248, 408.

Often numerous, especially at WS 83 and 92. Some specimens approach *L. striaticollis* (d'Orbigny) in the development of minute basal spines arising from the costae. The Type of *Oolina striaticollis* could not be found in Paris.

188. *Lagena striata* (d'Orbigny) (Plate X, figs. 10-12).

Oolina striata, d'Orbigny, 1839, FAM, p. 21, pl. v, fig. 12.

Lagena vulgaris var. *substriata*, Williamson, 1858, RFGB, p. 7, fig. 14.

Lagena striata, Brady, 1884, FC, p. 460, pl. lvii, figs. 22, 24, 28, 29, etc.

Nineteen stations: 51, 228, 236; WS 79, 80, 83, 88, 89, 90, 91, 92, 93, 99, 210, 215, 217, 225, 408, 433.

The *Oolina striata* of d'Orbigny is described as from the Falkland Islands, where it is rare. D'Orbigny's Type is globular, covered with a great number of very fine striae. Typical specimens occur at seven stations only, the best being at WS 89, 215, 225. At these stations the globular form only is present; at other stations the globular form

occurs in company with the much commoner elongated type, first figured by Williamson (*ut supra*) which is dominant at most of the stations. Particularly good at WS 89 and 217. The dimensions vary considerably. Three typical specimens of the d'Orbigny type were, respectively, 0.40, 0.50 and 0.55 mm. long, and 0.26, 0.26 and 0.33 mm. broad.

189. *Lagena sulcata* (Walker and Jacob) (Plate X, figs. 13-15).

Serpula (Lagena) striata, Walker and Boys, 1784, TMR, p. 2, pl. i, fig. 6.

Serpula (Lagena) striata, Walker and Jacob, 1798, AEM, p. 634, pl. xiv, fig. 5.

Lagena sulcata, Brady, 1884, FC, p. 462, pl. lvii, figs. 23, 26, 33, 34.

Twenty-one stations: 51, 228, 235, 236, 388; WS 71, 79, 83, 88, 89, 90, 91, 92, 210, 213, 221, 225, 245, 248, 408, 433.

Generally distributed but never very common, and very variable both in the number and development of the costae. At WS 83, 221, 225 and 408, a very curious variety occurs characterized by a long neck, a basal "peg" and a small number (about 12) of very thin but strongly developed costae (Plate X, fig. 13). In a few perfect specimens found at WS 83, every third "costa" is extended in a straight flange up the neck (Plate X, fig. 14), but, as a rule, this delicate ornament is broken away so that in most of the specimens the costae are confined to the globular body. A somewhat similar form is figured by Sidebottom (S. 1912, etc., LSP, 1913, p. 173, pl. xv, fig. 24) who compared his specimen with *L. alifera*, Reuss (R. 1870, FSP, p. 467, v. S. 1870, FSP, pl. iii, figs. 15, 16, 21, 22). This variety usually represents the species in the stations mentioned above. At WS 91 and 245, single specimens of a very extraordinary form, 0.43 mm. long, 0.22 mm. broad, in which alternate costae are continued and form prominent flanges running straight up the neck. The flanges are bridged by annular outgrowths forming a ladder-like structure up the neck (Plate X, fig. 15). At 228 and WS 225, the costae are extended almost into wings.

190. *Lagena lyellii* (Seguenza).

Amphorina lyellii, Seguenza, 1862, FMMM, p. 52, pl. i, fig. 40.

Lagena lyellii, Balkwill and Millett, 1884, FG, p. 27, pl. ii, fig. 2.

Lagena lyellii, Heron-Allen and Earland, 1913, CI, p. 79, pl. vi, fig. 8.

Six stations: 388; WS 83, 89, 93, 221, 245.

Usually only a single specimen, but with some variation in the strength of the costae.

191. *Lagena vilardeboana* (d'Orbigny) (Plate X, figs. 16-18).

Oolina vilardeboana, d'Orbigny, 1839, FAM, p. 19, pl. v, figs. 4-5.

Nineteen stations: 48, 51, 53, 388; WS 71, 79, 80, 83, 88, 89, 90, 91, 92, 93, 95, 99, 225, 245, 408.

D'Orbigny's species has hitherto been regarded as a synonym for *L. sulcata* and as representing a short-necked variety of that species, a view justly based on the original figure and description, which merely describes a shell with 20-25 well-marked costae.

But an examination of the Types in Paris disclosed three specimens mounted in the usual tube. One may be summarily dismissed—it is a specimen of *L. squamosa* (Montagu). How and when it became associated cannot now be stated. The other two specimens, while agreeing in general form with d'Orbigny's figure, differ from it in the

possession of an ornament round the neck which d'Orbigny either failed to notice or could not see with the magnifications at his disposal. They agree with a form which is very generally distributed in the Falkland area, indeed often the commonest species of *Lagena*.

D'Orbigny's figure and the subsequent figures of Reuss (R. 1862, FFL, p. 329, pl. iv, fig. 53; R. 1863, FCA, p. 144, pl. i, fig. 15) must therefore be discarded as misleading representations of the type which he intended to figure, and d'Orbigny's original description of *L. vilardeboana* "ovale, très renflée, arrondie en arrière, un peu acuminée en avant, ornée en long de vingt à vingt-sept côtes saillantes très prononcées; ouverture ronde, placée à l'extrémité d'un prolongement médiocre. Couleur blanc uniforme" will require to be supplemented with the words "the costae merge round the neck and form a solid collar of shell substance which is covered with fine pitted depressions". We figure some typical specimens.

These depressions on the collar mark the very close affinity of d'Orbigny's species to *L. williamsoni* (Alcock). The two forms differ indeed only in the greater number of costae and the greater number and much smaller size of the depressions in the Falkland form. As the older species, *L. vilardeboana* must become the type of the costate *Lagenae* with hexagonal neck ornament, and *L. williamsoni* must be regarded as a more strongly marked variety of it.

L. vilardeboana is widely distributed in the area and very often abundant. The best stations are WS 88, 90, 92, 93, 245. The species is very variable in the number and acuteness of the costae, and at several stations, notably WS 93, there is a complete gradation between *L. vilardeboana* and *L. williamsoni*. On the other hand, there are several stations at which it occurs to the exclusion of *L. williamsoni*.

Average length, 0.40 mm.; breadth 0.22 mm.

192. *Lagena williamsoni* (Alcock) (*non* Harvey and Bailey).

[NOTE. In 1853, W. H. Harvey and J. W. Bailey published a description in Latin (*Proc. A. Nat. Sci. Philadelphia*, v. (1854), p. 431) of an organism under the name of *Lagena williamsoni*, which is clearly a *Nodosaria*, species problematical, but possibly *scalaris* (Batsch). We do not propose to interfere with the use of a name, which has been universally used for over half a century in favour of an incorrect diagnosis unaccompanied by any figure.]

Entosolenia williamsoni, Alcock, 1865, NHC, p. 195.

Lagena williamsoni, Wright, 1877, RFDA, p. 104, pl. iv, fig. 14.

Lagena williamsoni, Cushman, Stewart and Stewart, 1930, TFNC, p. 59, pl. viii, fig. 5.

Fourteen stations: 48, 51; WS 76, 80, 83, 89, 92, 93, 97, 99, 210, 217, 225, 248.

This very common British type, characterized by a pyriform shell which is decorated with 12-18 well-marked costae, merging into a collar of hexagonal ornament round the neck, is well distributed in the Falkland area, though never so abundant as *L. vilardeboana* (d'Orbigny). The best specimens were recorded at WS 217, 248, where it was the only type and at WS 92, 93, where the two forms occurred together with intermediate links.

193. *Lagena isabella*, d'Orbigny.

Oolina isabella, d'Orbigny, 1839, FAM, p. 20, pl. v, figs. 7, 8. (*O. isabelleana* on plate and in index.)

Lagena isabella, Reuss, 1862, FFL, p. 330, pl. iv, figs. 55, 56.

One station: WS 408.

It occurs probably at many other stations. The specimens have more numerous costae than in d'Orbigny's figure. It is an intermediate form between *L. sulcata* and *L. costata*, of no zoological value; and we merely record it because it was originally described by d'Orbigny from the Falkland Islands. The Paris Type tube contains seven specimens of no dominant character, the costae ranging in number from 8 to 10, giving us intermediate forms between *L. costata* and *L. sulcata*.

194. *Lagena raricosta* (d'Orbigny).

Oolina raricosta, d'Orbigny, 1839, FAM, p. 20, pl. v, figs. 10, 11.

One station: WS 408.

A single specimen, longer than d'Orbigny's figure suggests, but it agrees in the number of costae. D'Orbigny's name has no specific value, his species represents merely an intermediate variety like *L. isabella*. The Type of *L. raricosta* is missing.

195. *Lagena costata* (Williamson) (Plate X, figs. 19-24).

Entosolenia costata, Williamson, 1858, RFGB, p. 9, pl. i, fig. 18.

Lagena costata, Reuss, 1862, FFL, p. 329, pl. iv, fig. 54.

Lagena costata, Balkwill and Wright, 1885, DIS, p. 338, pl. xiv, figs. 3-5.

Twenty-two stations: 51, 235, 236, 388; WS 71, 83, 86, 88, 89, 90, 91, 92, 93, 97, 210, 213, 217, 221, 225, 245, 248, 408.

One of the most abundant *Lagenae* of the area, very variable, practically every variation in the number and strength of the costae being observed, and it would be possible to split up the specimens into a number of so-called species. It is best and most abundant at WS 83, 86.

196. *Lagena acuticosta*, Reuss.

Lagena acuticosta, Reuss, 1862, FFL, p. 331, pl. v, fig. 63.

Lagena acuticosta, Brady, 1884, FC, p. 464, pl. lvii, figs. 31, 32; pl. lviii, figs. 20, 21.

Seventeen stations: 48, 236, 388; WS 71, 80, 83, 84, 86, 87, 88, 91, 92, 93, 95, 97, 225, 248.

Large and very handsome specimens occur, especially at 48, WS 87, 88, 248. They all belong to the "collared" type figured by Brady (fig. 31) except at WS 91 and 225, where a few typical specimens also occurred.

196A. *Lagena squamoso-sulcata*, Heron-Allen and Earland.

Lagena melo (intermediate variety), Brady, Parker and Jones, 1888, AB, p. 237, pl. xlv, fig. 25.

Lagena squamoso sulcata, Heron-Allen and Earland, 1922, TN, p. 151, pl. v, figs. 15, 19.

One station: 388.

A single good specimen.

197. *Lagena squamosa* (Montagu).

Vermiculum squamosum, Montagu, 1803-8, TB, p. 526, pl. xiv, fig. 2.

Lagena squamosa, Brady, 1884, FC, p. 471, pl. lviii, figs. 28-31.

Seventeen stations: 48, 51, 388; WS 78, 80, 83, 86, 87, 88, 89, 92, 93, 99, 217, 221, 245, 248.

Never very abundant and, as might be expected, the species often varies in the direction of *L. melo*, one of d'Orbigny's local species. At different stations there is often a great difference in the size of the markings. At 51 they are all very coarse, at WS 89 all very small, but at WS 80 there is a complete range between coarsely and finely marked specimens. The best and most typical at WS 86 and 93.

198. *Lagena squamosa* var. *montagui* (Alcock).

Entosolenia montagui, Alcock, 1865, NHC, p. 196.

Lagena squamosa var. *montagui*, Heron-Allen and Earland, 1913, CI, p. 76, pl. vii, fig. 13.

Two stations: WS 92, 245.

A single specimen at each. That from WS 245 has the depressions arranged spirally round the shell.

199. *Lagena reticulata* (Macgillivray).

Lagenula reticulata, Macgillivray, 1843, HMAA, p. 38.

Lagena reticulata, Reuss, 1862, FFL, p. 333, pl. v, figs. 67, 68; 1863, FCA, p. 144, pl. i, fig. 16.

One station: WS 225.

Represented by a single specimen.

200. *Lagena melo* (d'Orbigny) (Plate X, figs. 25-27).

Oolina melo, d'Orbigny, 1839, FAM, p. 20, pl. v, fig. 9.

Entosolenia squamosa var. *catenulata*, Williamson, 1848, BSGL, p. 19, pl. ii, fig. 20; 1858, RFGB, p. 13, pl. i, fig. 31.

Lagena melo, Brady, Parker and Jones, 1888, AB, p. 222, pl. xlv, fig. 21 (only).

Fifteen stations: 48, 388; WS 71, 73, 83, 89, 90, 91, 97, 99, 210, 221, 225, 245, 248.

This is one of d'Orbigny's species from the Falklands, and although there is a good deal of variation in the shape of the specimens and in the number of the "rows of dimples" (*fossettes en ligne*) which he describes, yet at many stations perfectly typical examples can be found, notably at WS 73, 90 and 97. The specimens have been compared with the Types in Paris and are identical. Size very variable, up to 0.25 mm. long, 0.20 mm. broad.

201. *Lagena catenulata*, Reuss.

(Not *Entosolenia squamosa* var. *catenulata*, Williamson, 1848, BSGL, p. 19, pl. ii, fig. 20.)

Lagena catenulata, Reuss, 1862, FFL, p. 332, pl. vi, fig. 75 (only).

Lagena catenulata, Heron-Allen and Earland, 1922, TN, p. 152, pl. v, figs. 16-18.

Three stations: WS 93, 248, 433.

Very rare but good specimens. Although Reuss's figure purports to represent *L. catenulata*, Will., it is in our opinion quite a distinct form, and as such we have separated it.

The question as to whether Reuss's figure can be known as *L. catenulata*, Reuss, Williamson's early form *L. catenulata* being regarded as a synonym of *L. melo*, is one of those controversial points to which we are not inclined to devote our attention or studies.

202. *Lagena hexagona* (Williamson).

Entosolenia squamosa var. *hexagona*, Williamson, 1848, BSGL, p. 20, pl. ii, 32, fig. 23; 1858, RFGB, p. 13, pl. i, fig. 32.

Lagena hexagona, Brady, 1884, FC, p. 472, pl. lviii, figs. 32, 33.

Four stations: 236; WS 221, 248, 408.

Only a few specimens at each station, but very fine and typical.

203. *Lagena digitale*, sp.n. (Plate X, figs. 28-30).

Two stations: WS 89, 90.

Test an oval flask with produced neck almost as long as the body, The whole surface, including the neck, covered with small pits resembling those upon a thimble. The depressions run more or less regularly in vertical lines but cannot be confounded with the markings of any species of the *L. hexagona* group. The presence of the long neck indicates an affinity with the *L. laevis* group. The species is a very striking one, quite distinct from anything with which we have hitherto been acquainted.

Several specimens at WS 89 and a few at WS 90, both of which are close to the South American coast. Size and shape of test rather variable. Three specimens measured were 0.46, 0.37 and 0.38 mm. long, and 0.25, 0.20 and 0.22 mm. broad respectively.

204. *Lagena foveolata*, Reuss.

Lagena foveolata, Reuss, 1862, FFL, p. 332, pl. v, fig. 65.

Lagena foveolata, Millett, 1898, etc., FM, 1901, p. 11, pl. i, fig. 15.

Two stations: WS 408, 433.

One very fine specimen at each station.

205. *Lagena spumosa*, Millett.

Lagena spumosa, Millett, 1898, etc., FM, 1901, p. 9, pl. i, fig. 9.

Lagena spumosa, Heron-Allen and Earland, 1916, FWS, p. 245, pl. xli, figs. 19, 20.

Two stations: 228; WS 408.

A few very good specimens at 228 and several at WS 408.

206. *Lagena protea*, Chaster.

Lagena protea, Chaster, 1892, FS, p. 62, pl. i, fig. 14.

Lagena protea, Sidebottom, 1904, etc., RFD, 1906, p. 15, pl. ii, fig. 18; 1912, etc., LSP, 1912, p. 247.

Lagena protea, Heron-Allen and Earland, 1913, CI, p. 74, pl. vii, figs. 19, 20.

Lagena hispidiphilus, Pearcey, 1914, SNA, p. 1020, pl. ii, figs. 11-13.

Three stations: 388; WS 83, 88.

Two small specimens at WS 83 and two large ones at 388 and WS 88 respectively, all similar to the British type of this "protean" organism.

207. *Lagena cymbula*, Heron-Allen and Earland.

Lagena cymbula, Heron-Allen and Earland, 1913, CI, p. 90, pl. vii, figs. 16-18.

Lagena cymbula, Heron-Allen and Earland, 1913, NSH, p. 129, pl. x, figs. 10-12.

Two stations: 388; WS 93.

A single typical specimen at each station. Its occurrence so far from the locus of origin, and the only records in British Seas, is noteworthy.

208. *Lagena reniformis*, Sidebottom (Plate X, figs. 31, 32).

Lagena reniformis, Sidebottom, 1912, etc., LSP, 1913, p. 204, pl. xviii, figs. 14, 15.

Lagena reniformis, Heron-Allen and Earland, 1916, FWS, p. 255, pl. xli, figs. 30-4.

Two stations: WS 87, 93.

A few, but quite typical specimens. The species, though always rare, is widely distributed.

Length, 0.12 mm.; breadth, 0.16 mm.; thickness, 0.08 mm.

209. *Lagena millettii*, Chaster (Plate X, figs. 33, 34).

Lagena millettii, Chaster, 1892, CS, p. 61, pl. i, fig. 10.

Lagena millettii, Heron-Allen and Earland, 1913, CI, p. 83, pl. vi, fig. 10.

Five stations: 388; WS 71, 88, 92, 408.

A few specimens only. At WS 71 and 408, sharp-edged (length, 0.20 mm., breadth, 0.10 mm.), at WS 88 both sharp and round-edged, at WS 92, sharp-edged (length, 0.19 mm.; breadth, 0.13 mm.), and with a semicircular terminal hood instead of the circular hood characteristic of the other specimens, which agree in this respect with Chaster's type in our collection.

210. *Lagena biancae* (Seguenza) (Plate X, figs. 35-39).

Fissurina laevigata, Reuss, 1849-50, FOT, p. 366, pl. i (xlv), fig. 1.

Lagena laevigata, (Reuss *non* d'Orbigny) of subsequent authors.

Fissurina biancae, Seguenza, 1862, FMMM, p. 57, pl. i, figs. 48-50.

Fissurina biancae, A. Silvestri, 1902, LMT, p. 20, figs. 29-32.

Twenty-eight stations: 48, 51, 228, 236, 388; WS 71, 76, 79, 80, 83, 86, 87, 88, 90, 91, 92, 93, 97, 98, 99, 215, 217, 221, 225, 245, 248, 408, 409.

It is unfortunate that a specific name so long and generally recognized as *Lagena* (*Fissurina*) *laevigata* (Reuss) should have to be abandoned, but under the law of priority this is inevitable, d'Orbigny having employed the specific name for a different organism (see No. 169 A). The selection of an alternative name has not been easy and, although we have devoted some time to a search of the literature prior to 1862, it is quite possible that we have overlooked some species having a prior claim to *Fissurina biancae*, Seguenza, which we have selected as an alternative name.

Some earlier specific names were considered and dismissed for various reasons.

Fissurina alata, Reuss, 1851, has a pronounced carina being intermediate between *Lagena laevigata* and *L. marginata*. *Fissurina globosa*, Bornemann, 1855, is merely an inflated form of *F. laevigata* and the two can be connected by intermediate variations. It might have been accepted as an alternative. But again priority of publication intervenes, Bornemann's specific name having been used much earlier by Montagu (see No. 169).

Seguenza (S. 1862, FMMM) figured and described a long series of fissurine *Lagenae*, many of which are but forms of *Lagena laevigata* (Reuss), an extremely variable species. It appears therefore to be a case of selecting the earliest suitable specific name from his monograph. The first two species *Fissurina solida* and *F. rugosula* may be disregarded. They are too inflated for our purpose, and the surface of the test is described as rather rough, or rough, though the figures do not convey that impression to any extent. The next species *Fissurina simplex* would be very suitable for our requirements, but again priority intervenes, both Reuss (1851) and Terquem and Berthelin (1862) having used the specific name for two distinct forms. *Fissurina deltoidea* and *F. latistoma* which follow do not conform to requirements, but the sixth species *Fissurina biancae* bears a close resemblance, both in figure and description, to *Fissurina laevigata*, Reuss, and we have accordingly selected it to supersede that species.

Universally distributed and often very abundant. At WS 83, it exhibits practically all the variations found elsewhere in the area. Besides the typical Reuss form there are others, notably a strongly punctate form. Such punctation is one of the most constant features of the species in the Falkland area. This particular form, which is very variable in size, good specimens averaging 0.30 mm. in length, 0.25 in breadth, presents two sub-variations; in the first, the punctation is uniform all over the shell, in the second it is confined to the marginal area, the central area being hyaline and clear. Another variety is characterized by a limited number of much coarser perforations which may either be irregularly disposed, or arranged in lines upon the surface. The marginal edge varies enormously, from the acute angle of the type to a narrow, sharply produced keel in the one direction, and, in the other, to a bluntly rounded edge. A small variety common at WS 83 and occurring at several others is characterized by a roughly "matt" surface *not* due to the decomposition of the shell.

The aperture is normally fissurine, but hooded specimens, otherwise absolutely identical with the fissurine, are found here and at several other stations. A remarkably fine trigonal specimen was found at WS 83 (Plate X, fig. 39).

211. *Lagena acuta* (Reuss).

Fissurina acuta, Reuss, 1858, FP, p. 434; 1862, FFL, p. 340, pl. vii, figs. 90, 91.

Lagena acuta, Cushman, 1910, etc., FNP, 1913, p. 6, pl. xxxviii, fig. 6.

Thirteen stations: 48; WS 71, 76, 80, 83, 86, 87, 88, 90, 92, 210, 245, 248.

Fissurine *Lagenae* with pointed bases occur rarely at many of the stations, but no very typical specimens were found. The best were at WS 88 and 210. At WS 83, a specimen was seen with two basal spines.

212. *Lagena fasciata* (Egger).

Oolina fasciata, Egger, 1857, MSO, p. 270, pl. i (v), figs. 12-15.

Lagena fasciata, Millett, 1898, etc., FM, 1901, p. 495, pl. viii, fig. 19.

Six stations: 48; WS 80, 83, 90, 92, 93.

Occurs very infrequently as compared with the feebler type *L. annectens*, but occasional good and typical individuals were found, the best being at WS 80 and 90.

213. *Lagena fasciata* var. *faba*, Balkwill and Millett.

Lagena faba, Balkwill and Millett, 1884, FG, p. 81, pl. ii, fig. 10.

Lagena faba var. *fasciata*, Balkwill, and Millett, 1908, FG (reprint), p. 6, pl. ii, fig. 10.

Lagena faba var. *fasciata*, Heron-Allen and Earland, 1913, CI, p. 84.

Two stations: WS 71, 83.

A single specimen at each station.

214. *Lagena lucida* (Williamson).

Entosolemia marginata var. *lucida*, Williamson, 1858, RFGB, p. 10, pl. i, figs. 22, 23.

Lagena lucida, Sidebottom, 1904, etc., RFD, 1906, p. 6, pl. i, figs. 9-12.

Five stations: 48; WS 83, 87, 248, 408.

Only a few specimens at each station, but absolutely typical.

215. *Lagena annectens*, Burrows and Holland (Plate X, figs. 40-44).

Lagena annectens, Burrows and Holland, in Jones, Parker and Brady, 1866, etc., MFC, 1895, p. 203, pl. vii, fig. 11.

Lagena annectens, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 662.

Lagena annectens, Fornasini, 1901, NNI, p. 50, text-fig. 4.

Thirteen stations: 388; WS 71, 83, 87, 88, 89, 91, 93, 97, 215, 217, 248, 408.

Moderately frequent. This is the most abundant species of a little group, the members of which are zoologically inseparable though they have been differentiated according to the varying prominence or strength of the crescentiform surface markings. They would perhaps have all been described under the senior specific name *L. fasciata*, Egger, but typical specimens of that species are comparatively infrequent in the Falkland material.

The specimens referable to *L. annectens* are themselves subject to considerable variation. Apiculate forms are comparatively common, and the worthlessness of this feature as a specific, or even varietal difference, is illustrated by our specimens, which vary from a mere basal thickening to a strongly produced spine (Plate X, fig. 43). Doubly apiculate specimens are by no means infrequent. At many stations, notably WS 71, 87 and 93, many of the specimens are ornamented with opaque spots in the glassy central portion of the shell. These appear to be lacunae, but whether natural or due to some parasitic growth we cannot say. There is great difference in the inflation of the shell; in some the specimens are very thin with parallel faces, some are so inflated as to be semi-globular.

The size varies greatly, averaging up to 0.40 mm. in length, 0.25 mm. in breadth.

216. *Lagena quadricostulata*, Reuss.

Lagena quadricostulata, Reuss, 1870, FSP, p. 409; von S. 1870, FSP, pl. iv, figs. 25-30.

Lagena quadricostulata, Brady, 1884, FC, p. 486, pl. lix, fig. 15.

Three stations: 228; WS 88, 408.

Typical specimens are very rare but occur at 228 and WS 408, at which latter station a trigonal specimen was also found. At WS 88, a curious variety almost quadrate in shape and very compressed occurred.

217. *Lagena malcomsonii*, Wright.

Lagena laevigata var. *malcomsonii*, Wright, 1910-11, BCNI, p. 4, pl. i, figs. 1, 2.

Lagena malcomsonii, Heron-Allen and Earland, 1913, CI, p. 84, pl. vi, fig. 9.

Ten stations: 228, 388; WS 83, 86, 89, 91, 92, 93, 221, 245.

More generally distributed and more abundant than the sharp-edged *L. quadrata*, the best occurring at WS 88 where *L. quadrata* was also conspicuous. At the other two stations where *L. quadrata* was conspicuous, *L. malcomsonii*, though represented, was poorly developed.

218. *Lagena quadrata* (Williamson).

Entosolenia marginata var. *quadrata*, Williamson, 1858, RFGB, p. 11, pl. i, fig. 27.

Lagena quadrata, Balkwill and Millett, 1884, FG, p. 81, pl. ii, fig. 8.

Lagena quadrata, Sidebottom, 1904, etc., RFD, 1906, p. 8, pl. i, figs. 21, 22, pl. ii, figs. 1-3.

Six stations: 388; WS 83, 88, 93, 221, 245.

Often common, the best stations being WS 88, 93 and 221.

219. *Lagena quadrata* var. *bispinosa*, var.n. (Plate XI, figs. 1, 2).

Two stations: WS 88, 245.

Test typically compressed and quadrate, furnished with a long entosolenian tube extending down one side of the shell and up the other nearly to mid-way of the shell. Furnished at the basal corners with two stiff, short, projecting spines, which appear to be solid extensions of the side-walls of the test. Two specimens at WS 88 and one at WS 245. In those from the first station the basal spines are extensions of the margin. In that from WS 245, they are extended outwards at an angle of 45° .

Length of test, without spines, between 0.18 and 0.20 mm.; breadth, 0.13 mm.

The specimens strongly suggest our species *L. forficula* (H.-A. & E., 1913, CI, p. 87, pl. vi, fig. 11), which differs by the fact that that species has a rounded periphery and a long produced neck, with a hooked apertural end, and slightly incurving basal spines, suggesting its specific name.

220. *Lagena uncinata*, sp.n. (Plate XI, fig. 3).

One station: WS 93.

Test free, highly compressed, marginal edge acute but not carinate. Quadrate in form, the corners of the aboral end rounded off, the oral end produced into a curved

flat wing, furnished at the extremities with sharp hooks, which do not extend backwards beyond the wing. Aperture fissurine, with a short entosolenian tube.

Length, 0.17 mm. Greatest breadth, at hooks, 0.14 mm.

A single specimen. This very distinctive form bears a striking resemblance to No. 262, *Lingulina falcata*, a new species from the Falkland Islands, and was at first regarded as an immature stage of that species. But such can hardly be the case, as the hooks in *Lingulina falcata* are confined to the second chamber and would not appear on the first chamber, unless we are to suppose that they are formed and then resorbed.

Its nearest ally in the genus *Lagena* would be *L. falcata*, Chaster (C. 1892, S, p. 61, pl. i, fig. 7), which species, however, is characterized by a thick and solid neck, furnished with recurved hooks. The body of that species is also much less compressed.

221. *Lagena marginata* (Walker and Boys).

Serpula (Lagena) marginata, Walker and Boys, 1784, TMR, p. 2, pl. i, fig. 7.

Lagena marginata, Brady, 1884, FC, p. 476, pl. lix, figs. 21-3.

Twenty-three stations: 48, 51, 236, 388; WS 71, 77, 80, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 97, 99, 215, 245, 248, 408.

Often very abundant, the best at WS 88, at which station there was a considerable range in the width of the marginal carina. As a general rule the carinae of the Falkland area specimens are very poorly developed, often no more than a mere indication. At WS 71, 88, 91, 92, a few specimens occur with coarse punctations scattered irregularly over the test in addition to the ordinary fine punctation; this gives a spotted appearance to the test. A similar characteristic was noted in connection with *L. laevigata* (No. 210).

222. *Lagena marginata* var. *semimarginata*, Reuss.

Lagena marginata var. *semimarginata*, Reuss, 1870, FSP, p. 468; Schlicht, 1870, FSP, p. 11, pl. iv, figs. 4-6, 10-12.

Lagena marginata var. *semimarginata*, Brady, 1884, FC, p. 477, pl. lix, figs. 17-19.

Lagena marginata var. *semimarginata*, Millett, 1898, etc., FM, 1901, p. 619, pl. xiv, fig. 1.

Two stations: WS 210, 217.

Some very good specimens at these stations. It is probably widely distributed, but has escaped attention owing to its similarity to some of the local variations of *L. laevigata*.

223. *Lagena unguis*, Heron-Allen and Earland.

Lagena unguis, Heron-Allen and Earland, 1913, CI, p. 86, pl. vii, figs. 1-3; 1913, FNS, p. 135; 1916, FSC, p. 46.

Lagena unguis, Cushman, 1918, etc., FAO, 1923, p. 60, pl. xi, fig. 7.

Two stations: WS 88, 92.

Several good specimens at WS 88 and one at WS 92.

224. *Lagena staphyllearia* (Schwager).

Fissurina staphyllearia, Schwager, 1866, FKN, p. 209, pl. v. fig. 24.

Lagena staphyllearia, Brady, 1884, FC, p. 474, pl. lix, figs. 8-11.

Lagena staphyllearia, Millett, 1898, etc., FM, 1901, p. 619, pl. xiv, fig. 2.

Two stations: WS 88, 92.

One excellent specimen at each station.

225. *Lagena schlichti* (Silvestri).

Fissurina carinata (pars) Reuss, 1870, FSP, p. 469; Schlicht, 1870, FSP, pl. v, figs. 1-3.

Fissurina schlichti, Silvestri, 1902, LMT, p. 143, text-figs. 9-11.

Lagena schlichti, Chapman, 1914, FORS, p. 66, pl. iv, fig. 27.

Five stations: 48; WS 83, 90, 92, 93.

Well represented but never very common. The best at WS 93.

226. *Lagena lagenoides* (Williamson) (Plate XI, figs. 4, 5).

Entosolenia marginata var. *lagenoides*, Williamson, 1858, RFGB, p. 11, pl. i, figs. 25, 26.

Lagena lagenoides, Balkwill and Millett, 1884, FG, p. 82, pl. ii, fig. 11.

Ten stations: 48, 388; WS 83, 88, 92, 93, 210, 221, 248, 433.

The best specimens and the most numerous at WS 83 and 88, otherwise generally represented by a single specimen. They are all of the original British type, characterized by few tubuli in the peripheral wing.

Length, about 0.30 mm.; breadth, 0.20 mm.

Williamson's figures are, for him, surprisingly bad, but the British type is admirably figured by Balkwill and Millett (*ut supra*). It may be noted here that Reuss, in purporting to give reproductions of Williamson's figures (*ut supra*) (R. 1862, FFL, p. 324, pl. ii, figs. 27, 28) has named them on the plate "*L. appendiculata* Will." This is quite inexplicable, there being, so far as we know, no other record of this specific name.

227. *Lagena lagenoides* var. *radiata* (Seguenza) (Plate XI, figs. 6-8).

Fissurina radiata, Seguenza, 1862, FMMM, p. 70, pl. ii, figs. 42, 43.

Fissurina radiata, Silvestri, 1902, LMT, p. 145, figs. 20-2.

Lagena lagenoides, Brady, 1884, FC, p. 479, pl. lx, figs. 13, 14 (only).

Lagena sub-lagenoides, Cushman, 1910, etc., FNP, 1913, p. 40, pl. xvi, fig. 4.

Two stations: 228; WS 408.

At WS 408 the species is represented by three very fine specimens of the form separated by Seguenza (*ut supra*). We do not think they would be worth recording separately but for the fact that they differ so markedly from the normal Falkland type. Cushman in creating his species *L. sub-lagenoides* for two of Brady's series of figures has apparently overlooked Seguenza's species. The Falkland Islands specimens do not exhibit the sigmoid curve of the wing figured by Silvestri (*ut supra*). At 228, the variety is represented by a single trigonal specimen which we figure (Plate XI, fig. 8).

Average length, 0.70 mm.; breadth, 0.42 mm.; thickness, 0.15 mm.

228. *Lagena lagenoides* var. *tenuistriata*, Brady.

Lagena tubulifera var. *tenuistriata*, Brady, 1879, etc., RRC, 1881, p. 61.

Lagena lagenoides var. *tenuistriata*, Brady, 1884, FC, p. 479, pl. lx, figs. 11, 15, 16.

Lagena lagenoides var. *tenuistriata*, Cushman, 1910, etc., FNP, 1913, p. 39, pl. xvi, fig. 3.

Four stations: 230; WS 93, 217, 245.

A single specimen at each station, all of them identical in form with British specimens but somewhat larger.

229. *Lagena ornata* (Williamson).

Entosolenia marginata var. *ornata*, Williamson, 1858, RFGB, p. 11, pl. i, fig. 24.

Lagena ornata, Heron-Allen and Earland, 1913, CI, p. 88, pl. vii, fig. 8.

Two stations: WS 88, 90.

A single typical specimen of this very distinctive form at each station. Outside British seas, where it is abundant, the records are few and far apart.

230. *Lagena quadralata*, Brady (Plate XI, figs. 9-12).

Lagena quadralata, Brady, 1884, FC, p. 464, pl. lxi, fig. 3.

Four stations: 228, 235; WS 83, 93.

Brady lays stress on the fact that his species has four wings only, but we have specimens, not only from the Falklands but elsewhere, exhibiting a varying number of wings, between four and eight, but otherwise agreeing with his figure and description.

The number of wings appears therefore to be useless for the purposes of diagnosis. A more reliable feature is the constant presence of the conspicuous tubules in the wing to which he also refers. These appear to indicate an affinity with *Lagena lagenoides*, Will., and we think it probable that Brady's species is merely a polygonal form of that species. We therefore suggest as an amended description: "Test flask-shaped, with a produced and sometimes elongate neck, from the base of which a varying number of conspicuously tubulated wings originate, and vertically encircling the test, join at the base. The space between the wings is filled with weak vertical striae".

L. quadralata was found in some numbers at WS 83, single specimens only at the other stations.

Average length, 0.22 mm.; breadth, 0.11 mm.

231. *Lagena marginato-perforata*, Seguenza.

Lagena marginato-perforata, Seguenza, 1879-80, FTR, p. 332, pl. xvii, fig. 34.

Lagena marginato-perforata, Heron-Allen and Earland, 1913, CI, p. 86, pl. vii, figs. 5, 6.

Lagena marginato-perforata, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 663, pl. 1, figs. 24-30.

Five stations: WS 83, 88, 90, 92, 93.

A single strongly marked specimen at each station.

232. *Lagena fimbriata*, Brady (Plate XI, figs. 13-16).

Lagena fimbriata, Brady, 1879, etc., RRC, 1881, p. 61; 1884, FC, p. 486, pl. lx, figs. 26-8.

Lagena fimbriata, Sidebottom, 1912, etc., LSP, 1912, p. 422, pl. xx, figs. 24-6.

Eleven stations: 51, 236; WS 80, 83, 88, 92, 93, 97, 248, 408, 433.

The Falkland specimens are quite good and typical, the best at WS 88, 93 and 97. Trigonal specimens at WS 83 and 93 (Plate XI, fig. 16). At 236, the specimens have abnormally developed fimbriate bases. There is a constant tendency to pass into *L. auriculata* by the filling in of the basal excavation at its central point so as to form two separate loops. At WS 433 a specimen showing the fine spinous processes figured by Brady, pl. lx, fig. 26 and referred to by Sidebottom (*ut supra*).

Size varies greatly, ranging up to 0.35 mm. or more in length, 0.25 mm. in breadth.

233. *Lagena fimbriata* var. *occlusa*, Sidebottom (Plate XI, figs. 17, 18).

Lagena fimbriata, Brady, var.n. *occlusa*, Sidebottom, 1912, LSP, p. 423, pl. xx, figs. 27, 28.

One station: WS 89.

Two specimens of the broad variety (fig. 28 *supra*).

Length, 0.23 mm.; breadth, 0.20 mm.; thickness, 0.13 mm.

234. *Lagena danica*, Madsen (Plate XI, figs. 19, 20).

Lagena danica, Madsen, 1895, FDH, p. 196, pl. O, fig. 4.

Lagena danica, Goës, 1896, DOA, p. 53, pl. v, figs. 11, 12.

Four stations: 48, 388; WS 88, 90.

Single specimens at each, the best at WS 88. Although the basal wings are well marked in side view, they do not project, with the result that the edge view shows even less of a basal cleft than in Madsen's figure. The base of our specimen is flat, and abruptly truncated as shown in our figure 20.

235. *Lagena rizzae* (Seguenza).

Fissurina rizzae, Seguenza, 1862, FMMM, p. 72, pl. ii, fig. 50.

Lagena rizzae, Heron-Allen and Earland, 1913, CI, p. 89, pl. vii, fig. 9.

Lagena quadrata var. *rizzae*, Cushman, 1910, etc. FNP, 1913, p. 35, pl. xix, fig. 4.

Three stations: WS 83, 88, 90.

A single specimen at each. This little species has probably been overlooked at some of the other stations.

236. *Lagena bicarinata* (Terquem).

Fissurina bicarinata, Terquem, 1882, FEP, p. 31, pl. i (ix), fig. 24.

Lagena bicarinata, Heron-Allen and Earland, 1916, FSC, p. 46, pl. vii, figs. 2, 3.

Four stations: WS 77, 83, 90, 92.

Typical specimens are extremely rare. The best at WS 83 and 90. There is a considerable amount of variation, not only in the shape of the test, which varies from

circular to oval, but also in the texture of the shell. Usually glassy, though at some stations it varies from glassy, through "matt", to rough in surface texture.

237. *Lagena bicarinata* (Terquem) var. *occlusa*, var.n. (Plate XI, figs. 21, 22).

Two stations: WS 83, 88.

In this variety the marginal edges of the keels are more or less closed in. It bears the same relationship to the type as did Sidebottom's var. *occlusa* to the type of *L. fimbriata* (S. 1912, etc., LSP, 1912, p. 423, pl. xx, figs. 27, 28).

Length, 0.20 mm.; breadth, 0.15 mm.; thickness, 0.11 mm.

238. *Lagena revertens*, sp.n. (Plate XI, figs. 23-28).

Twelve stations: 48, 388; WS 71, 83, 86, 87, 88, 93, 221, 245, 248, 408.

Test flask-shaped, compressed, furnished with a more or less extended or compressed neck, terminating in a lipped extremity, which carries the fissurine aperture. From this lip extend two keels, which may, in rare instances, encircle the shell (fig. 27). Usually there is a solution of continuity at the aboral end of the shell, where the keels *return* upon themselves in independent loops, which are separated by a space of varying dimensions (fig. 28). This basal space in the periphery may be either smooth, or furnished with a knob or projecting spine of varying size. The texture of the two faces of the shell is very variable also, ranging from clear glassy transparency to a semi-opaque rugosity.

Size variable, averages about 0.45 mm. long, 0.30 mm. broad, 0.24 mm. thick.

The foregoing description is an attempt to portray one of the most frequent, yet variable of the Falkland Islands *Lagena*e. It is very typical of many stations, notably WS 83, 86, 93, 245 and 248, and at the same stations the full range of form and surface texture may be found, thus showing the futility of any attempt to separate varieties by these characteristics. It is not at all clear whether its affinities are with the keeled *L. bicarinata* group, or with the looped *L. auriculata* group, neither of which is strongly represented in the area.

239. *Lagena bisulcata*, sp.n. (Plate XI, figs. 29-32).

Four stations: WS 86, 90, 215, 217.

Test nearly circular, slightly produced at the oral extremity which covers a fissurine aperture; thick-walled, turgid, marginal wall thickened, rounded, and forming a solid thick keel round the basal half of the shell; the aboral half of each face of the shell is separated from the peripheral edge by a broad, rounded shallow groove which extends right round the basal half of the face; texture smooth and glassy, becoming opaque in dead shells; dull and roughened in the grooves.

Average length of good specimens about 0.30 mm.; breadth, the same; thickness, 0.20 mm.

This is a very characteristic species, never very abundant. Best and most numerous at WS 217. Its affinities are not very clear, but Brady figures a somewhat similar form (B. 1884, FC, pl. lix, fig. 7) under the name *Lagena quadricostulata*, Reuss (?), which,

however, differs from our species by the fact that the grooves are interrupted by a stout basal spine. No basal obstacle is present in the Falkland forms. Cushman also figures (C. 1910, etc., FNP, 1913, p. 33, pl. xviii, fig. 2) a very similar form which he regards as a variety of *L. alveolata*, Brady and calls "var. *plebeia*". The figure is not very clear and we have not been able to see the types. If, however, it is allied to *L. alveolata* it should not have continuous grooves round the base.

240. *Lagena orbignyana* (Seguenza).

Fissurina orbignyana, Seguenza, 1862, FMMM, p. 66, pl. ii, figs. 25, 26.

Lagena orbignyana, Brady, Parker and Jones, 1888, AB, p. 222, pl. xlv, fig. 20.

Lagena orbignyana, Chapman, 1914, FORS, p. 66, pl. iv, fig. 29.

Six stations: 51; WS 83, 84, 88, 217, 221.

Singularly rare and usually small and weak. Excellent specimens however at WS 217.

241. *Lagena orbignyana* var. *bifida*, Heron-Allen and Earland.

Lagena orbignyana var. *bifida*, Heron-Allen and Earland, 1924, FGM, p. 152, pl. ix, figs. 46-50.

Two stations: 388; WS 92.

A single specimen at each station referable to this variety. They differ from the Australian fossils only in being perfectly circular, instead of being oval, in plan.

242. *Lagena pulchella*, Brady (Plate XI, figs. 33, 34).

Lagena pulchella, Brady, 1866, *Rep. Brit. Ass.* (1867), p. 70.

Lagena pulchella, Brady, 1870, FTR, p. 294, pl. xii, fig. 1 a, b.

Lagena pulchella, Balkwill and Wright, 1885, DIS, p. 342, pl. xii, fig. 19.

Eleven stations: WS 76, 80, 83, 92, 93, 97, 99, 210, 221, 225, 248.

By contrast with the rarity of *L. clathrata*, the weakly developed *L. pulchella* is comparatively common in the Falkland material. The difference lies in the irregular distribution of the perpendicular costae, which in *L. clathrata* run in regular bars, whilst in *L. pulchella* they start from the upper and lower marginal edges, are slightly wavy, and often fade out to invisibility in the central area of the shell. The Falkland specimens vary considerably in the strength of their markings and there is often a tendency on the part of the costae to coalesce and form a reticulate marking linking it with *L. laureata*, Heron-Allen and Earland (No. 244 *post*).

Length, about 0.20 mm.; breadth, 0.18 mm.

243. *Lagena clathrata*, Brady (Plate XI, figs. 35, 36).

Lagena clathrata, Brady, 1884, FC, p. 485, pl. lx, fig. 4.

Lagena clathrata, Balkwill and Millett, 1884, FG, p. 82, pl. ii, fig. 14.

Three stations: 388; WS 88, 245.

An excellent specimen at WS 88, very strongly marked, and several similar specimens

at 388 and WS 245. In all of them the central carina is double, the intervening space being divided into cellules by transverse bars.

Length, 0.45 mm.; breadth, 0.28 mm.; thickness, 0.22 mm.

244. *Lagena laureata*, sp.n. (Plate XI, figs. 37-40).

Thirteen stations: 51; WS 71, 83, 86, 88, 89, 90, 92, 93, 221, 225, 248, 408.

Test compressed, oval, increasing in width slightly towards the base. Furnished with a median keel, with or without subsidiary keels. From the median point of the base, costae diverge and follow the line of curvature of the edge of the shell: they are most strongly marked near the edges, and more feebly in the median area, where they rarely extend to more than one-third the length of the shell. The surface of the shell beyond the points to which the costae extend is somewhat coarsely areolated, the strength of the markings varying between coarse punctation of the shell and definite hexagonal ornament. The proportion of surface covered by costate or punctate markings varies greatly; as a rule the most strongly costate forms have otherwise the smoothest surface, whereas specimens with feeble surface costation often have strongly marked hexagonal pits. The whole ornamentation strongly suggests a laurel wreath encircling a "hammered" plaque.

This is one of the most typical of the Falkland species, often abundant, notably at WS 83, 88. It varies greatly in size, the finest specimen, which we figure (fig. 37) from WS 86, is 0.35 mm. long, and 0.33 mm. broad as compared with average dimensions of about 0.20 mm. long, and 0.18 mm. broad.

245. *Lagena auriculata*, Brady (Plate XI, figs. 41-46).

Lagena auriculata, Brady, 1879, etc., RRC, 1881, p. 61; 1884, FC, p. 487, pl. lx, figs. 29, 31, 33.

Lagena auriculata, Millett, 1898, etc., FM, 1901, p. 625, pl. xiv, fig. 15 (only).

Eleven stations: 48, 388; WS 71, 76, 83, 88, 91, 92, 93, 221, 245.

The best specimens at WS 83 and 93. At most of the stations the specimens are of the same form as the local variety of *L. alveolata*, and are with difficulty separable without a close examination of the basal excavations. But at WS 83 and some other stations another, and very distinctive variety occurs, in which the auricles are very widely separated and tightly compressed.

Size variable, average length about 0.25 mm.; breadth, 0.22 mm.

246. *Lagena alveolata*, Brady, var. *separans*, Sidebottom (Plate XI, figs. 47-49).

Lagena alveolata var. *separans*, Sidebottom, 1912, etc., LSP, 1912, p. 425, pl. xxi, fig. 5.

Seven stations: WS 83, 88, 91, 92, 93, 221, 248.

Frequent, and very handsome specimens, especially at WS 83 and 88. The type, *L. alveolata*, as figured by Brady, does not occur in the Falkland material. Sidebottom's specimens were from the South-west Pacific.

Average length about 0.30 mm.; breadth, 0.28 mm.; thickness, 0.25 mm.

Sub-family *NODOSARIINAE*Genus *Nodosaria*, Lamarck, 1812

NOTE. *Nodosariae* with basal spines are not uncommon, but the Falkland material has furnished specimens of *N. laevigata* and *rotundata* in which the spinous outgrowths attained a development which we have not seen elsewhere, and which does not appear to have been figured by other authors, although Millett has figured *N. laevigata* with fine spines (M. 1898, etc., FM, 1902, pl. xi, fig. 1), also Cushman (C. 1910, etc., FNP, 1913, pl. xxiv, fig. 1) and Flint (F. 1899, RFA, pl. lv, fig. 3) have figured *L. rotundata* with one or more stout basal spines. In the Falkland specimens, however, these spines attain a length and strength which constitute a very remarkable and outstanding feature of the test. We do not regard this spinous ornament as having any specific or varietal value: it is no doubt connected with the depth and conditions of the deposits.

247. *Nodosaria rotundata* (Reuss) (Plate XII, fig. 1).

Glandulina rotundata, Reuss, 1849-50, FOT, p. 366, pl. xlvii (1), fig. 2.

Nodosaria (G.) *rotundata*, Brady, 1884, FC, p. 491, pl. lxi, figs. 17-19.

Six stations: 230, 235, 236; WS 99, 408, 433.

The normal type is found only at WS 99. At all the other stations the specimens are large, and strongly spinous.

Length, 1.32 mm. without spines, which are more than 0.15 mm. long.

248. *Nodosaria laevigata*, d'Orbigny (Plate XII, fig. 2).

Nodosaria (G.) *laevigata*, d'Orbigny, 1826, TMC, p. 252, no. 1, pl. x, figs. 1-3.

Nodosaria (G.) *laevigata*, Brady, 1884, FC, pp. 490, 493, pl. lxi, figs. 17-22, 32.

Nodosaria (G.) *laevigata*, Millett, 1898, etc., FM, 1902, p. 509, pl. xi, fig. 1.

Three stations: 235; WS 215, 408.

The best at WS 408, where the specimens bear from one to many spines. Length, 1.45 mm. without spines, which were probably 0.20 mm. in length when perfect. The Type is missing.

249. *Nodosaria radricula* (Linné).

Nautilus radricula, Linné, 1767, etc., SN (ed. xii), p. 1164.

Nodosaria radricula, Brady, 1884, FC, p. 495, pl. lxi, figs. 28-31.

One station: WS 215.

A single specimen.

250. *Nodosaria scalaris* (Batsch).

Nautilus (Orthoceras) scalaris, Batsch, 1791, CS, p. 2, pl. ii, fig. 4.

Nodosaria scalaris, Brady, 1884, FC, p. 510, pl. lxiii, figs. 28-31; pl. lxiv, figs. 16-19.

Nodosaria scalaris, Cushman, 1910, etc., FNP, 1913, p. 58, pl. xxiv, fig. 7.

Seven stations: 388; WS 71, 83, 88, 93, 221, 408.

Never very abundant, the best at WS 83. The general type at all the stations is similar to those commonly found in British dredgings, in which the sides of the test are practi-

cally parallel, there being no rapid increase in the diameter of the successive chambers. The typical form, in which the chambers are few in number and increase rapidly in diameter towards the oral extremity, occurs at WS 71 and 93, but is much more finely costate than is usually the case. There is the usual variation, especially at WS 83, where the species is common, and included a marginuline specimen which might be attributed to *Amphicoryne falx*, Jones and Parker, but is doubtless merely a local sport of a common species. At the same station a complete series might be obtained linking up *N. simplex* and *N. scalaris*.

251. *Nodosaria simplex*, Silvestri.

Nodosaria simplex, O. Silvestri, 1872, NFVI, p. 95, pl. xi, figs. 268-72.

Nodosaria simplex, Brady, 1884, FC, p. 496, pl. lxii, figs. 4-6.

Nodosaria simplex, Heron-Allen and Earland, 1913, CI, p. 91, pl. viii, fig. 1.

Two stations: WS 83, 221.

Very good specimens at WS 83.

252. *Nodosaria calomorpha*, Reuss.

Nodosaria calomorpha, Reuss, 1865-6, FABS, p. 129, pl. i, figs. 15-19.

Nodosaria calomorpha, Brady, 1884, FC, p. 497, pl. lxi, figs. 23-7.

Seven stations: 388; WS 80, 83, 88, 89, 221, 225.

Rare except at WS 83 and 88. The specimens seldom have more than two chambers.

253. *Nodosaria filiformis*, d'Orbigny.

Nodosaria filiformis, d'Orbigny, 1826, TMC, p. 253, no. 14.

Nodosaria filiformis, Brady, 1884, FC, p. 500, pl. lxiii, figs. 3-5.

One station: WS 89.

One broken specimen.

254. *Nodosaria communis*, d'Orbigny.

Nodosaria (Dentalina) communis, d'Orbigny, 1826, TMC, p. 254, no. 35.

Nodosaria communis, Brady, 1884, FC, p. 504, pl. lxii, figs. 19-22.

Nodosaria communis, Heron-Allen and Earland, 1916, FWS, p. 256, pl. xlii, figs. 1-2.

Nine stations: 228, 388; WS 83, 88, 92, 213, 217, 245, 433.

Occasional specimens, the best at WS 88 and 217. At WS 83, 217 and 245, they are all of the compressed vaginuline type figured by us (*ut supra*). The Type is missing.

254 A. *Nodosaria roemeri* (Neugeboren).

Dentalina roemeri, Neugeboren, 1856, OLS, p. 82, pl. ii, figs. 13-17.

Nodosaria roemeri, Brady, 1884, FC, p. 405, pl. lxiii, fig. 1.

Nodosaria roemeri, Cushman, 1910, etc., FNP, 1913, p. 55, pl. xxiv, figs. 4-6.

One station: 388.

Frequent.

255. *Nodosaria pauperata* (d'Orbigny).

Dentalina pauperata, d'Orbigny, 1846, FFV, p. 46, pl. i, figs. 57, 58.

Nodosaria pauperata, Brady, 1884, FC, p. 500, text-figs. 14 *a, b, c*.

Fifteen stations: 230, 235, 388; WS 76, 80, 91, 92, 97, 98, 99, 215, 217, 225, 248, 408.

Occasional specimens, often very large, and then generally broken. Except at 235 and WS 99 and 408, all the specimens are megalospheric. At WS 99 and 408, both megalospheric and microspheric specimens occur; at 235 the microspheric form only. The finest specimens are from 235 and WS 215 and 217. The Paris Type is missing.

256. *Nodosaria soluta* (Reuss).

Dentalina soluta, Reuss, 1851, FSUB, p. 60, pl. iii, fig. 4.

Nodosaria soluta, Brady, 1884, FC, p. 503, pl. lxii, figs. 13-16; pl. lxiv, fig. 28.

Five stations: 228; WS 76, 245, 248, 433.

An occasional specimen only, the best at WS 248. All megalospheric.

257. *Nodosaria capitata*, Boll.

Nodosaria capitata, Boll, 1846, GDO, p. 177, pl. ii, fig. 13.

Nodosaria capitata, Reuss, 1855, TNMD, p. 223, pl. i, fig. 4; 1865, FDO, p. 454, pl. i, figs. 8-10.

Nodosaria capitata, Millett, 1898, etc., FM, 1902, p. 517, pl. xi, fig. 6.

One station: 6 April 30. 54° 35' 30" S, 61° 25' 00" W. 320 m.

A single megalospheric fragment of three chambers. The species is apparently very rare in the recent condition, indeed Millett's record of a single fragment from the Malay Archipelago appears to constitute the only published record. But it is not uncommon at several "Goldseeker" stations in deep water round the Scottish coast, and we have also specimens in our collection from "Challenger" station (No. uncertain),¹ 620 fms., and from the Bay of Naples, 1000 m. The species has many synonyms, of which Millett (*supra*) gives a selection.

258. *Nodosaria pellita*, Heron-Allen and Earland (Plate XII, figs. 3, 4).

Nodosaria pellita, Heron-Allen and Earland, 1922, TN, p. 173, pl. vi, figs. 28, 29.

Three stations: WS 83, 221, 248.

Two specimens exactly comparable with the Type were found at WS 248. At WS 221 a single specimen from which the characteristic outer layer had almost entirely disappeared, leaving a very feeble hispid surface. A specimen in the same condition was found at WS 83, but this ran to four chambers arranged in a slightly curved series (fig. 4). The original description of the species, which was based on specimens dredged at 289 fms. off the Continental Shelf to the south-east of New Zealand (51° 30' 04" S, 172° 12' 00" E), will therefore require amendment in respect of the number of chambers, which was stated to be "two only".

¹ Our slide (from the Millett collection) is labelled "Chall. 8", but Challenger Stn. 8 is in the mid-Atlantic, 2700 fms.

The occurrence of this species so far from its original, and, as far as we know, its only recorded habitat, is noteworthy.

Largest specimen (of two chambers) was 0.35 mm. long, and 0.16 mm. at its greatest breadth. The four-chambered specimen was 0.52 mm. long, and 0.16 mm. broad.

259. *Nodosaria lepidula*, Schwager (Plate XII, fig. 5).

Nodosaria lepidula, Schwager, 1866, FKN, p. 210, pl. v, figs. 27-8.

Nodosaria (Sagrina?) lepidula, Schubert, 1911, FFB, p. 75, figs. 5 a-f.

Nodosaria lepidula, Cushman, 1921, FP, p. 203, pl. xxxvi, fig. 6.

One station: WS 90.

A small specimen 0.28 mm. long, clearly referable to Schwager's species. *N. lepidula* appears to be merely a straight form of the earlier dentaline *N. adolphina* of d'Orbigny.

Genus *Lingulina*, d'Orbigny, 1826

260. *Lingulina biloculi*, Wright.

Lingulina carinata var. *biloculi*, Wright, 1910-11, ECM, p. 13, pl. ii, fig. 10.

Lingulina biloculi, Heron-Allen and Earland, 1913, CI, p. 94, pl. viii, figs. 5-7.

Five stations: 388; WS 71, 83, 88, 92.

Occasional specimens only. At WS 71 and 83, they are of the sharp-edged *L. quadrata* type. At 388 and WS 88, of the rounded-edged *Lagena malcomsonii* type. At WS 92, both forms occur together.

261. *Lingulina quadrata*, Heron-Allen and Earland.

Lingulina quadrata, Heron-Allen and Earland, 1913, CI, p. 95, pl. viii, fig. 11.

Lingulina quadrata, Cushman, 1918, etc., FAO, 1923, p. 94, pl. xvii, fig. 12.

Three stations: 388; WS 93, 408.

Very rare; at WS 93 some of the specimens are very narrow and hardly separable from *L. biloculi*.

262. *Lingulina falcata*, sp.n. (Plate XII, figs. 6-8).

Four stations: 388; WS 83, 88, 93.

Test hyaline, highly compressed, bilocular. The first chamber nearly circular in plan, furnished with a thickened edge. The second chamber varying in shape from an irregularly quadrate to an almost obtusely rounded chevron. The broad, curving anterior edge is solid and furnished at the outer extremities with a recurved hook, and is perforated with a fissurine aperture, sometimes connecting with a short entosolenian tube.

Length, about 0.22 mm.; breadth, 0.14 mm.

Occasional specimens at each station. This is a very distinctive little form. It may perhaps be a linguline and compressed development of *Lagena falcata*, Chaster (*vide ante* No. 220), which normally has a broad solid neck very similar in appearance to, though less extensive than, the final chamber of *Lingulina falcata*. In a single abnormal specimen,

from WS 83, which we also figure (fig. 8), the anterior margin of the final chamber is simple, except at the line of junction of the initial chamber, where there are two projecting solid beads, probably replacing the normal marginal hooks. This specimen is more quadrate in shape, being 0.21 mm. long, by 0.18 mm. broad.

263. *Lingulina translucida*, nom.nov. (Plate XII, figs. 9-11).

Lingulina carinata var. *seminuda*, Heron-Allen and Earland (*non* Hantken), 1916, FWS, p. 259, pl. xlii, figs. 6, 7.

Lingulina seminuda, Cushman, 1918, etc., FAO, 1923, p. 95, pl. xvii, fig. 11 (only).

One station: WS 83.

The pretty little form which we figured from Scottish waters (*ut supra*) occurs in some numbers at WS 83, and in view of its wide range and minute size we think Cushman's suggestion (*ut supra*) that it is distinct from Hantken's species is probably correct. The original description was: "The test is bilocular, the last chamber forming quite three-fourths of the total bulk of the shell, and furnished with a long curving entosolenian tube which runs diagonally to the lower outer edge of the chamber. The margin of the entire shell is thickened and slightly constricted on its inner edge, so as to form a fine groove running round inside the edge of the shell. These markings we consider homologous with the sulci of the deep water form".

The only comments suggested by the examination of the Falkland Islands specimens are that the oral end of the initial chamber appears to be absorbed, so as to form a large eroded aperture. This was also the case in the Scottish specimens, but as the eroded edge coincided with the sutural line it was overlooked. The groove round the edge is so slight as to be negligible. The original drawing over-emphasized it. The test is very hyaline, and lenticular in section like the original model of *L. carinata* (d'Orbigny, 1826, Modèle no. 26) to which our species is undoubtedly allied.

Length, about 0.18 mm.; breadth, 0.15 mm.; thickness, 0.10 mm.

264. *Lingulina vitrea*, sp.n. (Plate XII, figs. 12-14).

Three stations: 388; WS 88, 93.

Test vitreous, smooth, compressed, consisting of a large reniform proloculum, followed by seven to ten chevron-formed chambers slightly embracing and very gradually increasing in size. Peripheral edge rounded and continuous (without lobulation). The central line of the shell is somewhat depressed, as if gouged out, and the terminal aperture is simple, without entosolenian tube.

Length, up to 0.35 mm.; greatest breadth, about 0.10 mm.

This is a very distinctive form by reason of its depressed median line; in some respects this is suggested by the section of the figures of *L. carinata* published by Haeusler (H. 1890, FST, pl. xiv, fig. 33 a). He refers to the *L. elisa* of Schwager (S. 1865, FJS, p. 115, pl. iv, figs. 20, 20 a) and his *L. ovalis* (*loc. cit.* p. 116, pl. iv, figs. 21-24) of which the several figures exhibit a tendency, more or less pronounced, to present this feature, which he describes as "biscuit-shaped".

One of the specimens figured probably represents the megalospheric form, the proloculum being equal in breadth to the subsequent chambers, which are only four in number. It is rare everywhere.

Frondicularia, Defrance, 1824

264 A. *Frondicularia sidebottomi*, Cushman.

Frondicularia spathulata, Sidebottom, 1904, etc., RFD, 1907, p. 5, pl. i, fig. 26.

Frondicularia spathulata, Heron-Allen and Earland, 1913, CI, p. 97, pl. viii, fig. 12.

Frondiculari sidebottomi, Cushman, 1918, etc., FAO, 1923, p. 140, pl. xxi, fig. 6.

One station: 388.

Two good specimens.

Genus *Vaginulina*, d'Orbigny, 1826

265. *Vaginulina legumen* (Linné).

Nautilus legumen, Linné, 1788, SN (ed. XIII), p. 3373, no. 22.

Vaginulina legumen, Brady, 1884, FC, p. 530, pl. lxvi, figs. 13-15.

Vaginulina legumen, Burrows, Sherborn and Bailey, 1890, RC, p. 559, pl. x, fig. 16.

Eleven stations: 48, 388; WS 82, 86, 87, 88, 93, 217, 221, 248, 408.

Only occasional specimens, excepting at WS 88, where it is abundant and variable, including many monstrous individuals, due usually to the fusion of two or more primordial chambers.

266. *Vaginulina spinigera*, Brady.

Vaginulina spinigera, Brady, 1884, FC, p. 531, pl. lxvii, figs. 13, 14.

Vaginulina spinigera, Cushman, 1921, FP, p. 259, pl. xlii, fig. 1.

Three stations: 235; WS 215, 408.

No perfect specimens, but fragments of the initial portions at each of the stations. Brady appears to lay stress on the presence of two or more spines as a specific feature. Two-spined specimens are, we must admit, the rule in British dredgings, but the present fragments, though possessing only a single spine, agree in other respects with the type, with which we are familiar from our own dredgings, and it does not seem worth while to separate the two forms on so trivial a point.

267. *Vaginulina badenensis*, d'Orbigny.

Vaginulina badenensis, d'Orbigny, 1846, FFV, p. 65, pl. iii, figs. 6-8.

Vaginulina badenensis, Neugeboren, 1856, OLS, p. 98, pl. v, figs. 7, 8, 9.

Vaginulina badenensis, Costa, 1853, etc., PRN, 1856, p. 181, pl. xii, figs. 16, a, A.

One station: WS 88.

A few megalospheric specimens only, conforming fairly well to d'Orbigny's type though the spine is either absent or poorly developed. It may be a local variety. There is a Type tube in Paris labelled "*V. badenensis*, d'Orbigny Ipoly Sagh (Haut Hongrie)"

which is probably not the original Type, coming as it does from Upper Hungary. These specimens in the tube agree on the whole with d'Orbigny's figures; both megalos- and microspheric individuals are represented; the spine being either absent or broken, but the sutures are limbate, not depressed as indicated in d'Orbigny's figure.

Genus *Cristellaria*, Lamarck, 1812

268. *Cristellaria crepidula* (Fichtel and Moll) (Plate XII, fig. 15).

Nautilus crepidula, Fichtel and Moll, 1798, TM, p. 107, pl. xix, figs. *g-i*.

Cristellaria crepidula, Brady, 1884, FC, p. 542, pl. lxvii, figs. 17, 19, 20; pl. lxviii, figs. 1, 2.

Cristellaria crepidula, Heron-Allen and Earland, 1916, FSC, p. 47, pl. vii, figs. 5-10.

Twelve stations: 48, 388; WS 71, 83, 84, 86, 87, 88, 92, 93, 245, 246.

Frequently abundant, particularly good at WS 84, 86, 87, 88. At the latter station an extraordinary series of specimens was obtained, ranging from megalospheric individuals attaining a large size to microspheric individuals of tiniest proportions. At this station also three specimens, one of which we figure, were obtained of paired individuals, attached to each other by a development of fine hair-like processes. The largest pair was 0.20 mm. in length, 0.18 mm. extreme width of pair. Two similar pairs were found at 388 where the species is frequent.

269. *Cristellaria tenuissima*, sp.n. (Plate XII, figs. 16-20).

Eight stations: 388; WS 88, 90, 93, 97, 221, 246, 248.

Test minute, hyaline, extremely compressed, consisting of eight to twelve long, narrow, wedge-shaped and tapering chambers, arranged in a curve from the proloculum, each chamber, in turn, forming the chord of the arc, and extending almost the whole length of the shell. Peripheral edge rounded, aperture normally radiate, sutural lines flush but distinct.

Length, 0.30-0.40 mm.; breadth, 0.8-0.14 mm.; thickness, about 0.03 mm.

Many specimens of this extremely delicate and graceful little form, but it is rare everywhere. A single specimen which we figure (fig. 20) from WS 248 may represent the megalospheric form. It has only five chambers following a large reniform proloculum and agrees with the Type in its high degree of compression, and in the shape of the chambers. On the other hand it may be referable to *C. cymboides*, d'Orbigny, with which it is otherwise in agreement. There is considerable variation in the size of the proloculum in the other specimens, which we have regarded as the microspheric form of *C. tenuissima* (figs. 16-19).

C. tenuissima is fairly distinctive, its nearest relative being probably *C. cymboides* d'Orbigny (d'O. 1846, FFV, p. 85, pl. iii, figs. 30, 31), from which it differs by its extreme compression. A somewhat similar object is figured by Sidebottom under the name *Vaginulina costata* (Cornuel) (S. 1918, FECA, p. 139, pl. v, figs. 4, 5), but the test is very much larger. The form of the chambers is also more vaginuline and the sutures limbate.

270. *Cristellaria acutauricularis* (Fichtel and Moll).

Nautilus acutauricularis, Fichtel and Moll, 1798, TM, p. 102, pl. xviii, figs. *g-i*.

Cristellaria acutauricularis, Brady, 1884, FC, p. 543, pl. cxiv, fig. 17.

Cristellaria acutauricularis, Cushman, 1910, etc., FNP, 1913, p. 69, pl. xxxv, fig. 2.

One station: WS 225.

A single typical individual.

271. *Cristellaria hauerina*, d'Orbigny.

Cristellaria hauerina, d'Orbigny, 1846, FFV, p. 84, pl. iii, figs. 24, 25.

Cristellaria hauerina, Reuss, 1866, FABS, p. 140, pl. iii, figs. 2-4; 1870, FSP, p. 481; S, 1870, FSP, p. 47, pl. xiv, figs. 27-30; pl. xv, figs. 1-12.

Cristellaria hauerina, Heron-Allen and Earland, 1915, FSC, p. 47, pl. viii, figs. 2-4.

One station: WS 88.

A number of very variable specimens which are nearer to von Schlicht's figures than to d'Orbigny's original illustration, but the species seems to be extraordinarily variable, hardly any of the Falkland Islands specimens being identical. The Type is missing in Paris so we have not been able to single out any particular variation as fundamental.

272. *Cristellaria obtusata*, Reuss.

Cristellaria obtusata, Reuss, 1870, FSP, p. 479; S, 1870, FSP, pl. xi, figs. 16-18.

Cristellaria obtusata, Brady, 1884, FC, p. 536, pl. lxvi, fig. 17.

One station: WS 88.

One typical specimen.

273. *Cristellaria lata* (Cornuel).

Marginulina lata, Cornuel, 1848, NFM, p. 252, pl. i, figs. 34-7.

Cristellaria lata, Brady, 1884, FC, p. 539, pl. lxvii, fig. 18 *a, b*.

Cristellaria lata, Burbach, 1886, etc., FLS, p. 500, pl. x, figs. 10-11.

Two stations: 388; WS 88.

Some good specimens at each station, but the species is, zoologically, merely a broad variety of *C. crepidula*, which species, at this station, runs imperceptibly into it.

274. *Cristellaria gibba*, d'Orbigny.

Cristellaria gibba, d'Orbigny, 1839, FC, p. 40, pl. vii, figs. 20, 21.

Cristellaria gibba, Brady, 1884, FC, p. 546, pl. lxix, figs. 8, 9.

Cristellaria gibba, Chapman, 1914, EDRS, p. 44, pl. v, fig. 8.

Fifteen stations: WS 71, 76, 80, 83, 84, 86, 87, 88, 89, 91, 217, 221, 225, 408, 433.

The finest specimens at WS 86 and 408, others almost equally good at WS 84, 87 and 88. At the remaining stations the specimens are as a rule very small. At WS 86, the specimens are large and more compressed than usual, forming a link between typical *C. gibba* and *C. crepidula*. The Type is missing.

275. *Cristellaria orbicularis* (d'Orbigny).

Robulina orbicularis, d'Orbigny, 1826, TMC, p. 288, no. 2, pl. xv, figs. 8, 9.

Cristellaria orbicularis, Brady, 1884, FC, p. 549, pl. lxix, fig. 17.

Cristellaria orbicularis, Cushman, 1910, etc., FNP, 1913, p. 67, pl. xxxvi, figs. 4, 5.

Three stations: 48; WS 91, 93.

Extremely rare but quite conformable to the Type in Paris. One good specimen at 48, and one individual at WS 93.

276. *Cristellaria rotulata* (Lamarck) (Plate XII, fig. 21).

Lenticulites rotulata, Lamarck, 1804, AM, p. 188, no. 3; 1816, TEM, pl. 466, fig. 5.

Cristellaria rotulata, Parker and Jones, 1865, NAAF, p. 345, pl. xiii, fig. 19.

Cristellaria rotulata, Brady, 1884, FC, p. 547, pl. lxix, fig. 13.

Twenty-three stations: 48, 236, 388; WS 71, 80, 83, 84, 86, 87, 88, 91, 92, 93, 95, 97, 99, 109, 217, 221, 225, 246, 248, 408.

Universally distributed and often fairly common. The finest and largest specimens at WS 408; very good at WS 83, 84, 86, 87, 88. At 236 and WS 217, 221, the species is represented by very small individuals. At WS 88 an abnormal specimen occurs, which we figure, representing the fusion of two megalospheres each of which has continued independent growth.

277. *Cristellaria vortex* (Fichtel and Moll).

Nautilus vortex, Fichtel and Moll, 1798, TM, p. 33, pl. ii, figs. d-i.

Cristellaria vortex, Brady, 1884, FC, p. 548, pl. lxix, figs. 14-16.

Cristellaria vortex, Cushman, 1910, etc., FNP, 1913, p. 68, pl. xxxii, fig. 3.

One station: WS 84.

One or two good specimens at this station.

278. *Cristellaria cultrata* (Montfort).

Robulus cultratus, Montfort, 1808-10, CS, 1, p. 214, 54^e genre.

Robulina sub-cultrata, d'Orbigny, 1839, FAM, p. 26, pl. v, figs. 19, 20.

Robulina canariensis, d'Orbigny, 1839, FIC, p. 127, pl. iii, figs. 3, 4.

Cristellaria cultrata, Brady, 1884, FC, p. 550, pl. lxx, figs. 4-6.

Cristellaria cultrata, Cushman, 1910, etc., FNP, 1913, p. 64, pl. xxxix, fig. 4.

Eleven stations: 235, 388; WS 83, 84, 87, 88, 91, 92, 97, 245, 408.

The best specimens at WS 408. Other good ones at 388 and WS 88, but as a rule the specimens are poorly developed with scarcely apparent "keels".

There are two Type tubes in Paris, one labelled *R. cultrata*, as on the Plate (pl. v, figs. 19, 20), "Amérique méridionale" in which the specimen is destroyed. In the other, labelled *R. sub-cultrata*, as in the Text, "Îles Malouines", there are seven specimens, some of which agree, in the depth of their keel, with d'Orbigny's figure on pl. v. The others have narrow keels and may be compared with his figure of *R. canariensis* which he himself identified with *R. sub-cultrata*. It is evident that d'Orbigny was not hide-bound in his views upon the importance of the development of the keel.

279. *Cristellaria articulata* (Reuss).

Robulina articulata, Reuss, 1863-4, KTF, p. 53, pl. v, fig. 62; pl. vi, fig. 63.

Cristellaria articulata, Brady, 1884, FC, p. 547, pl. lxix, figs. 10-12.

Six stations: 388; WS 71, 87, 88, 95, 97.

A few specimens only, the best at 388 and WS 87 and 88. At nearly all the stations the species is represented by wild-growing individuals such as are figured by Brady (B. 1884, FC, pl. lxix, figs. 1-4).

280. *Cristellaria crassa*, d'Orbigny.

Cristellaria crassa, d'Orbigny, 1846, FFV, p. 90, pl. iv, figs. 1-3.

Cristellaria crassa, Brady, 1884, FC, p. 549, pl. lxx, figs. 1 a, b.

Three stations: WS 97, 246, 408.

Occasional specimens at each station. Very large and fine at WS 408, smaller, but typical, at WS 97, quite in conformity with the Type in Paris.

281. *Cristellaria convergens*, Bornemann.

Cristellaria convergens, Bornemann, 1855, FSH, p. 327, p. xiii, figs. 16, 17.

Cristellaria convergens, Brady, 1884, FC, p. 546, pl. lxix, figs. 6, 7.

Cristellaria convergens, Heron-Allen and Earland, 1916, FWS, p. 262, pl. xlii, figs. 13, 14.

One station: WS 83.

Two very small specimens only.

282. *Cristellaria angulata*, Reuss (Plate XII, figs. 22, 23).

Robulina angulata, Reuss, 1851, PTO, p. 154, pl. viii, fig. 6.

Cristellaria convergens (pars), (*non* Bornemann) Heron-Allen and Earland, 1916, FWS, p. 262, pl. xlii, figs. 11, 12 (only).

One station: WS 83.

A few small and weak specimens at this station, characterized by the straight peripheral edges of the chambers, forming an angled margin to the test. They appear to be nearer to *C. angulata* (Reuss) from the Tertiary Shales of Upper Silesia (*ut supra*) than to any other form with which we are acquainted. Maximum breadth, about 0.30 mm.

They are identical with some of the specimens which we figured from the West of Scotland (*ut supra*) under the name *C. convergens*, Born., but which we are now satisfied cannot be retained under that name.

Sub-family POLYMORPHININAE

Genus Polymorphina, d'Orbigny, 1826

283. *Polymorphina lactea* (Walker and Jacob).

Serpula lactea, Walker and Jacob, 1798, AEM, p. 634, pl. xiv, fig. 4.

Polymorphina lactea, Brady, 1884, FC, p. 559, pl. lxxx, typical fig. 11 var. fig. 14.

Five stations: 388; WS 83, 88, 89, 245.

Few and usually very small, the best at WS 88.

284. *Polymorphina plancii* (d'Orbigny) (Plate XII, figs. 24, 25).

Guttulina plancii, d'Orbigny, 1839, FAM, p. 60, pl. i, fig. 5.

Guttulina spicaeformis (Roemer), *sub* Cushman and Ozawa, P, 1930, p. 31, pl. v, figs. 1, 2.

One station: WS 83.

Two very good specimens from this station, recorded as a separate species, merely because the original record (*Guttulina plancii*) was made by d'Orbigny from the Bay of St Blas in Patagonia where it was described as "rare".

The largest specimen is 0.35 mm. long, 0.18 mm. broad.

The Paris Type tube contains two specimens, both rather affected by efflorescence but they were successfully cleaned. One is a fusiform type very much like d'Orbigny's figure in outline, but more compressed and not exhibiting that inflation of the central chamber which is so strongly brought out in d'Orbigny's figure. It is noteworthy that his description says only that the characters are "peu convexe, séparées par des sutures peu profondes". The Type specimen agrees therefore with the text much better than it does with the figure. Another specimen in the same tube is *Lagena globosa*. There appears little doubt that it is the actual specimen from which fig. 1 on pl. i was drawn. According to the text this figure is *Globulina australis*, d'Orb. as also figs. 2, 3 and 4, which are true *Polymorphinae* and not in the least resembling fig. 1. It would seem to be a case in which the survival of a Type specimen has justified the artist at the expense of the writer, who in this case are identical. D'Orbigny had two separate organisms, drew them correctly, and then mixed them up.

Cushman and Ozawa (*ut supra*) have associated d'Orbigny's species *G. plancii* with the earlier *P. spicaeformis*, Roemer (R. 1838, CNTM, p. 386, pl. iii, fig. 31), this presumably on comparison of the figure, as Roemer's species has inflated chambers and sunken sutures like d'Orbigny's drawing, but *not* like his type specimen.

285. *Polymorphina williamsoni*, Terquem (Plate XII, figs. 26-28).

Polymorphina lactea var. *oblonga*, Williamson, 1858, RFGB, p. 71, pl. vi, figs. 149, 149 a.

Polymorphina williamsoni, Terquem, 1878, FIR, p. 37.

Polymorphina oblonga, Heron-Allen and Earland, 1913, CI, p. 100, pl. viii, fig. 17.

Polymorphina williamsoni, Heron-Allen and Earland, 1930, FPD, p. 175.

Sigmomorphina williamsoni (Terquem), Cushman and Ozawa, 1930, P, p. 139, pl. xxxviii, figs. 3, 4.

Five stations: 388; WS 83, 88, 92, 408.

Except at 388 and WS 88 and 92, the specimens are very small, and have an entosolenian tube in the final chamber. At WS 88, some very large specimens were found, and, at the same station, a small hyaline individual, furnished with a globular accessory chamber attached to the final one (fig. 28). A similar variation was figured by Millett (M. 1898, etc., FM, 1903, p. 262, pl. v, fig. 5), who described it as "evidently a monstrosity", otherwise the specimens would have to be ascribed to the genus *Dimorphina*. Sidebottom having found a few similar growths held the view that it could no longer be regarded as a

monstrosity and named it *Dimorphina millettii* (S. 1918, FECA, p. 145, pl. v, figs. 13, 14). We think this was a mistaken view, although Cushman and Ozawa accept the name in their recent monograph (*ut supra*). None of the figured individuals are identical as regards the exact position and size of the accessory chamber. In the Falkland Islands specimens the accessory chamber, instead of being attached to the apex of the shell, projects from the side of the final chamber, and, although itself furnished with a distinct aperture, connects with that chamber by absorption of the intermediate walls, and not through the oral aperture of the terminal chamber. At WS 408 a specimen, 0.4 mm. long, which is presumably megalospheric. It has only three chambers including the proloculum, which occupies about one-half of the entire test.

286. *Polymorphina sororia*, Reuss.

Polymorphina (Guttulina) sororia, Reuss, 1863, FCA, p. 151, pl. ii, figs. 25-9.

Polymorphina sororia, Brady, 1884, FC, p. 562, pl. lxxi, figs. 15, 16.

One station: WS 88.

Many excellent specimens.

287. *Polymorphina gibba*, d'Orbigny.

Polymorphina (Globulina) gibba, d'Orbigny, 1826, TMC, p. 266, no. 20, Modèle no. 63.

Polymorphina gibba, Brady, 1884, FC, p. 561, pl. lxxi, fig. 12 *a, b*; fistulose, pl. lxxiii, fig. 16.

Two stations: 388; WS 88.

A few small typical specimens. The Type is missing.

288. *Polymorphina communis*, d'Orbigny.

Polymorphina (Guttulina) communis, d'Orbigny, 1826, TMC, p. 266, nos. 14 and 15, pl. xii, figs. 1-4, Modèles nos. 61, 62.

Polymorphina communis, Brady, 1884, FC, p. 568, pl. xxii, fig. 19.

Four stations: 388; WS 84, 88, 93.

Uncommon except at WS 88 where it is plentiful, but nearly all the specimens are abnormal. The original Type is missing.

289. *Polymorphina problema*, d'Orbigny.

Polymorphina problema, d'Orbigny, 1826, TMC (*Guttulina*), p. 266, no. 14, Modèle no. 61 (*Polymorphina*).

Polymorphina problema, Brady, 1884, FC, p. 568, pl. lxxii, fig. 20; pl. lxxiii, fig. 1.

One station: WS 71.

A single small specimen. This Type is also missing.

290. *Polymorphina oblonga*, d'Orbigny.

Polymorphina oblonga, d'Orbigny, 1846, FFV, p. 232, pl. xii, figs. 29-31.

Polymorphina oblonga, Brady, 1884, FC, p. 569, pl. lxxiii, figs. 2-4.

Three stations: 48; WS 71, 93.

The specimens are very few in number and far from typical. The best are found at WS 93. The d'Orbigny Types in Paris, three in number, are in splendid condition and agree perfectly with his Plate, *ut supra*.

291. *Polymorphina rotundata* (Bornemann).

Guttulina rotundata, Bornemann, 1855, FSH, p. 346, pl. xviii, fig. 3.

Polymorphina rotundata, Brady, 1884, FC, p. 570, pl. lxxiii, figs. 5-8.

Three stations: 388; WS 88, 92.

A single large specimen at WS 88 and WS 92, many at 388.

292. *Polymorphina compressa*, d'Orbigny.

Polymorphina compressa, d'Orbigny, 1846, FFV, p. 233, pl. xii, figs. 32-4.

Polymorphina compressa, Brady, 1884, FC, p. 565, pl. lxxii, figs. 9-11.

Three stations: 388; WS 88, 221.

Single specimens, generally small, at each station. The Type is missing. At 388 a very large and irregularly formed individual probably referable to this species.

293. *Polymorphina complexa*, Sidebottom.

Polymorphina (?) *complexa*, Sidebottom, 1904, etc., RFD, 1907, p. 16, text-figs. 3-7, pl. iv, figs. 1-9.

Polymorphina complexa, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 673, pl. li, figs. 1-3; FSC, p. 48, pl. viii, figs. 5-7.

One station: WS 88.

A few quite characteristic specimens of this very variable species. They generally resemble the forms figured by Sidebottom (figs. 3 and 4). The curious apertural pores are quite distinctive, and the colour is the characteristic "pale delicate ivory", semi-transparent as in the Delos specimens.

Genus *Uvigerina*, d'Orbigny, 1826

294. *Uvigerina canariensis*, d'Orbigny, 1826.

Uvigerina canariensis, d'Orbigny, 1839, FIC, p. 138, pl. i, figs. 25-7.

Uvigerina canariensis, Brady, 1884, FC, p. 573, pl. lxxiv, figs. 1-3.

Uvigerina canariensis, Cushman, 1910, etc., FNP, 1913, p. 92, pl. xlii, fig. 6.

Three stations: 48; WS 83, 92.

Represented by a single specimen at each station, very fine and typical at the last two. The Paris Type is missing.

295. *Uvigerina asperula*, Czjzek.

Uvigerina asperula, Czjzek, 1848, FWB, p. 146, pl. xiii, figs. 14, 15.

Uvigerina asperula, Brady, Parker and Jones, 1888, AB, p. 225, pl. xlv, fig. 5 (only).

Uvigerina asperula, Cushman, 1910, etc., FNP, 1913, p. 101, pl. xliii, fig. 1.

Five stations: 230, 235, 236; WS 408, 433.

Very good specimens especially at 236, but the markings are usually weaker than in Czjzek's figure, and much weaker than in Brady's illustrations. Some of the specimens at 230 and 236 showed a tendency to separate the later chambers, approaching *U. interrupta*, Brady.

296. *Uvigerina interrupta*, Brady.

Uvigerina interrupta, Brady, 1879, etc., RRC, 1879, p. 274, pl. viii, figs. 17, 18; 1884, FC, p. 580, pl. lxxv, figs. 12-14.

Uvigerina interrupta, Cushman, 1910, etc., FNP, 1913, p. 103, pl. xlv, fig. 1.

One station: 236.

A few feeble individuals, which may be merely attenuated variations of *U. asperula*.

297. *Uvigerina pygmaea*, d'Orbigny.

Uvigerina pygmaea, d'Orbigny, 1826, TMC, p. 269, pl. xii, figs. 8, 9; Modèle no. 67.

Uvigerina pygmaea, Brady, 1884, FC, p. 575, pl. lxxiv, figs. 11-14.

Uvigerina peregrina, Cushman, 1918, etc., FAO, 1923, p. 166, pl. xlii, figs. 7-10.

Uvigerina pygmaea, Cushman, 1925, etc., LFR, vi (1930), p. 62, pl. ix, figs. 14-20.

Nineteen stations: 48, 235, 236; WS 73, 76, 83, 86, 87, 92, 98, 99, 108, 109, 210, 213, 215, 217, 225, 408.

Far from common and never very typical. The best specimens at WS 86, 92, 210, 215 and 217. At some stations, notably 48 and WS 87 and 99, there is a tendency towards angularity of the test indicating an affinity with *U. angulosa*. Otherwise the specimens are all of the common Atlantic type, so well figured by Brady, and re-named *U. peregrina* by Cushman, to distinguish it from the more slender fossil type of d'Orbigny which he figures (*ut supra*). There is no Type to be found in Paris.

298. *Uvigerina bifurcata*, d'Orbigny (Plate XII, fig. 29).

Uvigerina bifurcata, d'Orbigny, 1839, FAM, p. 53, pl. vii, fig. 17.

Seventeen stations: 228, 230; WS 73, 76, 83, 88, 93, 98, 99, 109, 210, 215, 217, 225, 245, 248, 408.

D'Orbigny's species is merely an elongate form of *U. pygmaea* to which he admits the affinity, but it is a characteristic feature of the Falkland area where d'Orbigny refers to it as "very common". It is not common in the sense that *U. angulosa* is common, but a fair number of specimens are to be found at the many stations where it is recorded. The best were at WS 76, 88, 93, 99, 210 and 248, notably at the two latter, where the tests were often very long. The shells are frequently twisted or otherwise deformed.

Average size, about 1.0 mm. long; 0.38 mm. maximum breadth.

The Paris Type tube contains five specimens, only two of which can be said to have much resemblance to d'Orbigny's figure. They are many-chambered and very finely striate. Of the other specimens, one appears to be a specimen of d'Orbigny's *U. raricosta*, the others being smooth forms in no way referable to any of d'Orbigny's Falkland species.

299. *Uvigerina raricosta*, d'Orbigny (Plate XII, fig. 30).

Uvigerina raricosta, d'Orbigny, 1839, FAM, p. 53, pl. vii, fig. 15.

Three stations: WS 76, 215, 408.

A few specimens which may perhaps be referred to d'Orbigny's species, characterized by a few widely separated costae. D'Orbigny's name has no specific value, the shells being merely variants of *U. pygmaea*.

Length, about 0.30 mm.

The Type was not to be found in Paris.

300. *Uvigerina striata*, d'Orbigny (Plate XII, fig. 31).

Uvigerina striata, d'Orbigny, 1839, FAM, p. 53, pl. vii, fig. 16.

Uvigerina tenuistriata (non Reuss fide Cushman), Bagg, 1908, FHI, p. 151 (no fig.).

Uvigerina striata, Cushman, 1910, etc., FNP, 1913, p. 94, pl. xliii, fig. 5.

Nine stations: 48; WS 84, 87, 91, 92, 93, 98, 246, 408.

D'Orbigny's species was described from the Falkland Islands. He does not refer to its frequency. We have a few specimens referable to his form, which is distinguished by its doubly-pointed extremities. The best one from WS 93. It cannot be described as common and must not be confused with *U. striata*, Costa (C. 1853, etc., PRN, 1856, p. 266, pl. xv, fig. 3), which is a form of *U. pygmaea*. The specimen figured by Cushman (*ut supra*) is more coarsely costate than the d'Orbignyan figure suggests. The Type tube in Paris, labelled "Patagonia", contains one specimen. This, while conforming to d'Orbigny's drawing in some respects, e.g. the spindle shape acutely pointed at both ends, differs from it in the lesser inflation of the chambers. It is, in fact, one of the many varieties of *U. angulosa* occurring in the Falkland area, characterized by sub-angular edges, slightly inflated chambers and very fine striation. Another tube, labelled merely "Amérique méridionale", contains one of the very finely striate forms of *U. angulosa* and two of the variety separated as *U. bifurcata*.

Length, up to 0.80 mm.; breadth, 0.30 mm.

301. *Uvigerina angulosa*, Williamson (Plate XII, figs. 32-39).

Uvigerina angulosa, Williamson, 1858, RFGB, p. 67, pl. v, fig. 140.

Uvigerina angulosa, Chapman, 1914, EDRS, pp. 32, 44, pl. iii, fig. 22.

All stations with the exception of 236 and WS 72, 78, 79, 94, 243.

This is one of the most characteristic species of the Falkland area, often occurring in enormous numbers and ranging up to 1.0 mm. or more in length; moreover it is polymorphic, and any attempt to separate its variations in the fashion so prevalent to-day would end in the production of quite a number of new species. The variations depend, primarily, on the size of the primordial chamber. In the microspheric form the proloculum is followed by a closely aggregated bunch of chambers and the complete test is short and broad. In the megalospheric test the earlier chambers are much more elongate, and result in a long drawn-out test almost parallel sided in the central part of its length. At nearly all the stations both the long and the short form occur in company. The long (or megalospheric) test usually predominates, often almost to the exclusion of the microspheric. At a few stations, notably WS 99 and 217, the short (or microspheric) form is more abundant. Very long individuals occur at WS 83, 84, 86, 87, 88, 91, 92, 93.

At some of the stations, notably WS 92, 93, 213, 219, 245, the alternation of the shell is carried to such an extent that the final chambers are linear, i.e. it has become a *Sagrina*.

The surface markings show a like range of variation, though the variations are not of very frequent occurrence. The general average of specimens resemble Williamson's figure, but at WS 88 and 91 smooth individuals occur with the type. At WS 97, 109, 210, 245, very coarsely sulcate specimens were observed. At WS 91 many of the individuals of the long type had curved tests. Other abnormalities noticed included a specimen at WS 108, in which, in addition to the normal final chamber, an accessory chamber with an oral aperture had budded out from the penultimate chamber (fig. 38). At WS 217, a specimen in which one of the later chambers was ornamented with coarse spines was found (fig. 39).

302. *Uvigerina angulosa* var. *pauperata*, var.n. (Plate XII, figs. 40-43).

Six stations: 228, 230, 235, 236; WS 408, 433.

Test minute, trihedral in the later stages, tending to inflation in the earlier chambers. In the arrangement of the chambers, it is similar to the type *U. angulosa*, presenting a short, broad microspheric and a long narrow megalospheric form. The surface of the chambers is marked with feeble intermittent costae, between which the surface of the shell is weakly hispid. The later chambers are sometimes somewhat undercut, and the final chamber terminates in a well-marked neck with a reverted lip. The aboral end sometimes terminates in a delicate spine.

Length, up to 0.30 mm.; average breadth, 0.10 mm.

This is probably only a pauperate form of *U. angulosa*. It bears a very close resemblance to that species in the sectional views of its test and the general character of its ornament, but it appears to be separable as occupying a distinct region. All the stations at which it has been recorded lie just outside the continental shelf on which the Falkland Islands stand. The variety is probably almost co-extensive with the type, which it may replace in deeper waters. We have very similar examples from the "Albatross" station 2550 (39° 44' 30" N, 70° 30' 45" W) at 1081 fms, and from Cyprus (believed to be a fossil).

Genus *Siphogenerina*, Schlumberger, 1883

303. *Siphogenerina dimorpha* (Parker and Jones) (Plate XII, fig. 44).

Uvigerina (Sagrina) dimorpha, Parker and Jones, 1865, NAAF, p. 364, pl. xviii, fig. 18.

Siphogenerina dimorpha, Egger, 1893, FG, p. 317, pl. ix, fig. 30.

Sagrina dimorpha, Heron-Allen and Earland, 1916, FWS, p. 266, pl. xlii, figs. 17, 18.

Seven stations: WS 77, 87, 88, 91, 93, 221, 245.

Except at WS 87 and 88, the species is represented by single individuals. At these two stations, notably WS 88, it was more abundant, and shewed extraordinary variation in length, ranging from the short type of Parker and Jones with only three final chambers, to a very long individual with no less than nine chambers in the linear series, which was 0.95 mm. long, and 0.20 mm. at the maximum breadth.

Family GLOBIGERINIDAE

Genus *Globigerina*, d'Orbigny, 1826304. *Globigerina bulloides*, d'Orbigny.

Globigerina bulloides, d'Orbigny, TMC, p. 277, no. 1; Modèles no. 17 and 76.

Globigerina bulloides, Brady, 1884, FC, p. 593, pl. lxxvii; and pl. lxxix, figs. 3-7.

All stations with the exception of 53, 230 and WS 72, 77, 78, 94, 95, 108, 219, 243, 246.

Universally distributed. At the same time it is not one of the common Falkland Islands species, excepting at WS 433. The specimens call for no particular comment except that at a few stations (WS 73, 98, 217 and 409) only very small individuals were found. The general average is large. Very large at WS 91 and 99. At 48 and 228, and WS 79 and 225, pelagic specimens still bearing their superficial spines were found. The Type tube in Paris labelled "Amérique méridionale" contained seven specimens, a mixed collection, probably not d'Orbigny's selection at all. One specimen was typical *G. bulloides*, three were typical *G. triloba*, one *G. sacculifera*, Brady, one probably *G. conglomerata*, but much encrusted, and one too much encrusted for identification.

305. *Globigerina triloba*, Reuss.

Globigerina triloba, Reuss, 1849-50, FOT, p. 374, pl. ii (xlvii), fig. 11.

Globigerina triloba, Brady, 1884, FC, p. 595, pl. lxxix, figs. 1, 2; pl. lxxx, figs. 2, 3.

All stations with the exception of 48 and WS 73, 77, 84, 94, 98, 108, 219, 221, 243.

Universally distributed. The specimens are more abundant than those of *G. bulloides* and are very uniform in character. Pelagic (spinous) individuals were found at WS 71, 217, 246. At WS 80 and 217, specimens in which the final chamber was still in the thin glassy condition, denoting the process of formation, occurred.

306. *Globigerina inflata*, d'Orbigny.

Globigerina inflata, d'Orbigny, 1839, FIC, p. 134, pl. ii, figs. 7-9.

Globigerina inflata, Brady, 1884, FC, p. 601, pl. lxxix, figs. 8-10.

Twenty-seven stations: 51, 53, 228, 230, 235, 388; WS 71, 76, 83, 86, 87, 88, 89, 90, 91, 92, 93, 95, 97, 99, 217, 221, 225, 245, 248, 408, 433.

Quite the commonest species of *Globigerina* in the Falkland area and very uniform in character, practically the only variation lying in the comparative roughness of the surface. Very rough specimens at WS 93, 97, 99, 217 and 248. The Type is missing.

307. *Globigerina dutertrei*, d'Orbigny (Plate XIII, figs. 1-4).

Globigerina dutertrei, d'Orbigny, 1839, FC, p. 84, pl. iv, figs. 19-21.

Globigerina dutertrei, Brady, 1884, FC, p. 601, pl. lxxx, fig. 1.

All stations with the exception of 230, 235 and WS 77, 84, 98, 108, 109, 210, 213, 219, 243, 245, 246.

The typical d'Orbignyan form with the high dome and inflated chambers with lobulate margin occurs at most of the stations. It merges by gradation, the height of the dome decreasing and the chambers becoming less inflated, until it assumes a more or less regularly quadrate form, hardly distinguishable from the young stages of *G. conglomerata*, Schwager.

Average diameter, 0.30 mm.; height, 0.20 mm.

D'Orbigny's figure, when compared with his Type specimen in Paris, was found to be considerably idealised; the inflation of the chambers and the depths of the sutures are exaggerated. On the other hand, the figure given by Brady *ut supra* is hardly sufficiently marked as regards these same characteristics; but we have little doubt that it represents the same form as d'Orbigny's type. The Falkland specimens as figured by us are fairly typical, but thinner shelled and more delicate, as might be expected from the difference in latitude, compared with the Cuba types.

308. *Globigerina conglomerata*, Schwager (Plate XIII, figs. 5-8).

Globigerina conglomerata, Schwager, 1866, FKN, p. 255, pl. vii, fig. 113.

Globigerina dutertrei, Brady, 1884, FC, p. 601, pl. lxxxi, fig. 1.

Globigerina dubia, Brady, 1884, FC, p. 595, pl. lxxix, fig. 17.

Globigerina eggeri, Rhumbler, 1900, NPF, p. 19, fig. 20.

Globigerina conglomerata, Cushman, 1927, FWCA, p. 172.

Universally distributed, the best stations being perhaps WS 91 and 248, but in most of the gatherings fine, typical specimens are to be found.

The *Globigerinae* presenting quadrate bases, i.e. the last four chambers, usually of even size, fully visible as a perfect lobulated quadrangle, appear to be characteristic of the Falkland area, where they are very common, and widely distributed. It is not easy to settle upon the nomenclature. The earliest quadrate form, d'Orbigny's *G. quadri-lobata* (d'O. 1846, FFV, p. 164, pl. ix, figs. 7-10), does not seem to fit into the scheme of growth of the Falkland types. Rhumbler has figured, but not described, *G. quadrangularis* nom.nov.¹ (R. 1909 etc., FPE, pl. xxx, figs. 18-21, *nom.nov.*), which agrees in plan but is too coarse in surface, and has not the large aperture characteristic of Schwager's species *G. conglomerata*. Under this name Schwager gives a basal view only, which is clearly identical with the basal view of our Falkland Islands specimens. Cushman, working on topo-types of Schwager's species, has identified *G. conglomerata* as the young stage of the form figured by Brady as *G. dubia* (*non* Egger), the intermediate stages being the form figured by Brady as *G. dutertrei*, but differing from d'Orbigny's type of that species in its depressed spire and comparatively continuous (not lobulated) periphery but, as will be seen from what we have stated, *sub G. dutertrei* (No. 307) Brady's figure of that species is, in our opinion, reconcilable with that species. Schwager's specific name *conglomerata* has therefore priority and includes *G. dubia*, Brady (*non* Egger).

309. *Globigerina helicina*, d'Orbigny.

Globigerina helicina, d'Orbigny, 1826, TMC, p. 277, no. 5.

Globigerina helicina, Brady, 1884, FC, p. 605, pl. lxxxi, figs. 4-5.

Globigerina helicina, Cushman, 1910, etc., FNP, 1914, p. 12, pl. iii, figs. 1, 2.

One station: WS 88.

¹ Our friend Dr Rhumbler has been good enough to send us the MS. of his unpublished text, from which it appears that his figured species is founded on *Globigerina regularis*, Egger (E. 1893, FG, p. 163, pl. xiii, figs. 15-18), *non Globigerina regularis*, d'Orbigny (d'O. 1846, FFV, p. 162, pl. ix, figs. 1-3).

A single thick-walled specimen, very like Soldani's original figure (S. 1789, etc., T. 1791, I, pt II, p. 118, pl. 130, figs. *qq, rr*). See, however, our remarks upon this species in our 'Terra Nova' Report (H.-A. & E. 1922, TN, p. 192). In many of the Discovery materials, the affinity of this so-called species to *G. dutertrei* is very marked, and many specimens might have been ascribed to it. The Type tube of *G. helicina* in Paris from the "Sub-appenine of Rimini" contains a single large thick-walled *Globigerina* in good condition. It does not correspond at all with the Soldanian figures, nor with the irregular forms usually associated with the species, but is a high-domed, square (four chambers to the convolution) test, with but slightly inflated chambers. It is no doubt the specimen from which the "Planche inédite" was prepared and which is reproduced in outline by Fornasini (F. 1898, GFI, p. 209, fig. 4). But so far as the specific name *helicina* goes the species must rest on Soldani's figures substantiated by Brady's later figures which are in general agreement. D'Orbigny's Type specimen never having been described or figured, except in the unpublished *Planche*, must be disregarded. Fornasini who was acquainted with the *Planche*, but not with the Type specimen, considered it to be identical with his own species *G. adriatica* (F. 1899, GA, p. 582, pl. iii, figs. 6, 7).

310. *Globigerina pachyderma* (Ehrenberg) (Plate XIII, figs. 9-13).

Aristospira pachyderma, Ehrenberg, 1873, LMT, p. 386, pl. i, fig. 4.

Globigerina bulloides, Brady, 1878, RRNP ("Arctic variety"), p. 435, pl. xxi, fig. 10.

Globigerina bulloides, var. *borealis*, Brady, 1882, FKE, pp. 716, 717.

Globigerina pachyderma, Brady, 1884, FC, p. 600, pl. cxiv, figs. 19, 20.

Globigerina pachyderma, Heron-Allen and Earland, 1922, TN, p. 190 (references).

Twenty-six stations: 51, 53, 228, 230, 235, 236; WS 71, 83, 86, 87, 88, 90, 92, 95, 97, 99, 215, 217, 219, 221, 225, 245, 248, 408, 409, 432.

Universally distributed and often very common, presenting every stage in the reduction of the aperture, from an incurved arch on the final chamber to an almost imperceptible depression in the centre of the basal plane. A full series illustrating these changes at WS 86, 87 and 245. At 230 a very curious thick-walled form occurs (figs. 12, 13), in which the sutural lines have almost vanished and the shell is almost spherical. The same feature, but in a less thick-walled form, occurs at WS 225 and 408.

311. *Globigerina rubra*, d'Orbigny.

Globigerina rubra, d'Orbigny, 1839, FC, p. 82, pl. iv, figs. 12, 14.

Globigerina canariensis, d'Orbigny, 1839, FIC, p. 133, pl. ii, figs. 10-12.

Two stations: 51; WS 88.

A small specimen at each station. They have the characteristic pink colour; in form they agree fairly well with d'Orbigny's *G. canariensis* which Brady and others have regarded as a synonym of *G. rubra*. D'Orbigny however gives the colour of *G. canariensis* as white, but both Types are missing. The Falkland specimens are not furnished with the subsidiary apertures that are characteristic of tropical specimens.

312. *Globigerina elevata*, d'Orbigny.

Globigerina elevata, d'Orbigny, 1840, CBP, p. 34, pl. iii, figs. 15, 16.

Globigerina sp. (?) *rubra*, Brady, 1884, FC, p. 603, pl. lxxxii, figs. 8, 9.

Globigerina rubra, Heron-Allen and Earland, 1913, FNS, p. 131, pl. x, figs. 13-15.

Nineteen stations: 228, 235, 236; WS 71, 73, 79, 83, 86, 88, 90, 92, 109, 221, 245, 248, 408, 409, 432, 433.

Often very abundant, especially in the muddier gatherings. Particularly well-developed and plentiful at WS 71, 83, 88, 92 and 409.

313. *Globigerina digitata*, Brady.

Globigerina digitata, Brady, 1879, RRC, p. 72; 1884, FC, p. 599, pl. lxxx, figs. 6-10; pl. lxxxii, figs. 6-7.

Globigerina digitata, Cushman, 1918, etc., FAO, 1924, p. 11, pl. ii, figs. 9-11.

One station: WS 108.

A single, young, but unquestionable individual of this species, from WS 108. This station is well to the north of the Falkland Islands and close to the American coast, but a long way south of any Atlantic record known to us. The species is much commoner in the Pacific than in the Atlantic Ocean, but never of very frequent occurrence.

Genus *Orbulina*, d'Orbigny, 1826314. *Orbulina universa*, d'Orbigny.

Orbulina universa, d'Orbigny, 1839, FC, p. 3, pl. i, fig. 1.

Orbulina universa, d'Orbigny, 1839, FIC, p. 123, pl. i, fig. 1.

Orbulina universa, Brady, 1884, FC, p. 608, pl. lxxviii; pl. lxxxii, figs. 8-26; pl. lxxxii, figs. 1-3.

Nine stations: 388; WS 88, 91, 92, 93, 108, 210, 221, 248.

The species is extraordinarily rare, never more than two or three specimens at a station, usually a single one. With the exception of WS 88, where a single thin-walled specimen with internal globigerine chambers was found, all the specimens are thick-walled, bottom-living individuals, mostly smaller than the average size.

Genus *Pullenia*, Parker and Jones, 1862315. *Pullenia sphaeroides* (d'Orbigny).

Nonionina sphaeroides, d'Orbigny, 1826, TMC, p. 293, no. 1, Modèle no. 43.

Pullenia sphaeroides, Carpenter, Parker and Jones, 1862, IF, p. 184, pl. xii, figs. 11, 12.

Pullenia sphaeroides, Brady, Parker and Jones, 1888, AB, p. 266, pl. xliii, figs. 21, 24.

Pullenia sphaeroides, Cushman, 1910, etc., FNP, 1914, p. 20, pl. xi, fig. 2.

Eight stations: 388; WS 86, 88, 90, 92, 408, 409, 433.

The distribution of this species is curiously restricted. At three stations WS 86, 88 and 92 (which are on the Burdwood Bank, or on the Continental Shelf close to the American Coast), the species is represented by single small individuals (two at 388), but at the remaining stations, which are beyond the Continental Shelf, the species is frequent, large

and typical (identical with the Type specimens in Paris), except at WS 409, which, although beyond the Continental Shelf, is near the Falkland Islands. Here the specimens are small and similar to those found upon the Shelf.

316. *Pullenia subcarinata* (d'Orbigny) (Plate XIII, fig. 14-18).

Nonionina subcarinata, d'Orbigny, 1839, FAM, p. 28, pl. v, figs. 23, 24.

Nonionina quinqueloba, Reuss, 1851, FSUB, p. 71, pl. v, fig. 31.

Pullenia quinqueloba, Brady, 1884, FC, p. 617, pl. lxxxiv, figs. 14, 15.

Twenty-seven stations: 48, 51, 228, 236, 388; WS 71, 72, 76, 80, 84, 86, 88, 90, 91, 93, 97, 98, 99, 109, 210, 215, 217, 225, 245, 248, 408, 433.

Often very common and attaining a very large size, the best being at WS 71, 76, 84, 88 and 91. At WS 84, there was an extraordinary amount of variation in the inflation of the chambers and lobulation of the peripheral edge.

D'Orbigny's species *Nonionina subcarinata* was described from the Falklands where he says it is not uncommon. It appears to have been entirely overlooked by subsequent authors, as we cannot trace any reference to the species, even in the synonymies of the subsequently created, and generally accepted, *Nonionina quinqueloba*, Reuss, 1851. It must not be confused with *Nonionina subcarinata*, Seguenza (S. 1862, RFC, p. 98, pl. i, fig. 3), which, although also a *Pullenia*, is quite distinctive, having an inflated umbilical region and ten visible chambers.

Pullenia subcarinata (d'Orbigny) is characterized by the possession of six visible external chambers and a somewhat inflated shell. Both of these characters are subject to great variation and we are unable to recognize any specific distinction between it and *P. quinqueloba*. The Falkland specimens show every gradation between the figures of Reuss and those of d'Orbigny and, much as we dislike to replace a name which has been generally accepted, we think that under the law of priority the name *P. quinqueloba* (Reuss) must be regarded as a synonym of *P. subcarinata* (d'Orbigny). As the records stand, there is no doubt that many of the records of *P. quinqueloba* were made from, or include specimens of *P. subcarinata*. Several authors refer to the variable number of chambers in their specimens; Brady included (B. 1884, FC, p. 617, pl. 84, fig. 15) a figure which might have been copied from d'Orbigny's.

The size is very variable at different stations, ranging up to 0.70 mm. in diameter, and 0.40 mm. in thickness.

Although the six-chambered d'Orbignyan type is dominant nearly everywhere, five-chambered shells of the *quinqueloba* type only were noted at WS 80 and 245. Also at 228, 236 and WS 408, where the only specimens were few and very small. As these stations are off the Continental Shelf it would seem possible that the depth of water may have an influence on the number of chambers formed. It would seem desirable to take special notice of this feature in the examination of deeper water collections.

There are two Type tubes in Paris, one labelled "Amérique méridionale" containing a single six-chambered specimen. In the other, labelled "Îles Malouines", there are five specimens, two of which are so mounted that the chambers cannot be counted, and of

the other three, two appear to be five-chambered, and the third six-chambered. All are of the inflated type with no marked lobulation at the periphery.

317. *Pullenia obliquiloculata*, Parker and Jones.

Pullenia obliquiloculata, Parker and Jones, 1865, NAAF, pp. 368, 421, pl. xix, fig. 4.

Pullenia obliquiloculata, Brady, 1879, etc., RRC, 1879, p. 294; 1884, FC, p. 618, pl. lxxxiv, figs. 16-20.

Pullenia obliquiloculata, Cushman, 1918, etc., FAO, 1924, p. 43, pl. viii, fig. 10.

Five stations: 235, 236; WS 408, 432, 433.

Confined to these stations which are beyond the Continental Shelf. Very common when it occurs, especially at 236. The shells are rather rougher externally than is usual in this species.

Genus *Sphaeroidina*, d'Orbigny, 1826

317 A. *Sphaeroidina dehiscens*, Parker and Jones.

Sphaeroidina dehiscens, Parker and Jones, 1865, NAAF, p. 369, pl. xix, fig. 5 a, b.

Sphaeroidina dehiscens, Brady, 1884, FC, p. 621, pl. lxxxiv, figs. 8-11.

Sphaeroidina dehiscens, Cushman, 1918, etc., FAO, 1924, p. 38, pl. vii, fig. 7; pl. viii, figs. 1, 2.

One station: WS 433.

A single immature specimen; the record is of interest as being far to the south of its previously known distribution.

Genus *Candeina*, d'Orbigny, 1839

318. *Candeina nitida*, d'Orbigny.

Candeina nitida, d'Orbigny, 1839, FC, p. 108, pl. ii, figs. 27, 28.

Candeina nitida, Brady, 1884, FC, p. 622, pl. lxxxii, figs. 13-20.

One station: WS 108.

A single specimen at this station which is to the north-west of the Falkland Islands and close to the American coast. Its presence may perhaps be explained by drift, as the locality is well to the south of previous records in the Atlantic. The Type specimen is missing in Paris.

Family ROTALIIDAE

Sub-family *SPIRILLININAE*

Genus *Spirillina*, Ehrenberg, 1841

319. *Spirillina vivipara*, Ehrenberg.

Spirillina vivipara, Ehrenberg, 1841, SNA, p. 442, pl. iii, fig. 41.

Spirillina vivipara, Brady, 1884, FC, p. 630, pl. lxxxv, figs. 1-4.

Spirillina vivipara, Heron-Allen and Earland, 1914, etc., FKA, 1915, p. 683, pl. li, figs. 19-21.

Six stations: 48, 53, 388; WS 71, 87, 88.

Represented by occasional specimens only, excepting at 388 and WS 88 where it was abundant.

320. *Spirillina vivipara* var. *revertens*, Rhumbler.

Spirillina vivipara (*pars*) Brady, 1884, FC, pl. lxxxv, fig. 5 (only).

Spirillina vivipara var. *revertens*, Rhumbler, 1906, FLC, p. 32, pl. ii, figs. 8-10.

Spirillina vivipara var. *revertens*, Cushman, 1910, etc., FNP, 1915, p. 4, pl. i, fig. 3-6.

Four stations: 48, 388; WS 88, 245.

Occasional specimens, the best at 388 and WS 88.

321. *Spirillina obconica*, Brady.

Spirillina obconica, Brady, 1879, etc., RRC, 1879, p. 279, pl. viii, fig. 27; 1884, FC, p. 630, pl. lxxxv, figs. 6, 7.

Spirillina obconica, Heron-Allen and Earland, 1913, CI, p. 108, pl. ix, figs. 8, 9.

Two stations: 388; WS 88.

One or two specimens only at each station, very fine at 388.

321 A. *Spirillina obconica*, Brady, var. *carinata*, Halkyard.

Spirillina obconica var. *carinata*, Halkyard, 1889, RFJ, p. 71, pl. ii, fig. 6.

Spirillina obconica var. *carinata*, Heron-Allen and Earland, 1913, CI, p. 108, pl. ix, figs. 6, 7.

Spirillina lateseptata, Cushman, 1918, etc., FAO, 1931, p. 6, pl. i, figs. 12, 13, pl. ii, fig. 1.

One station: 388.

A single rather weak specimen. Cushman (*ut supra*) has referred this very characteristic little form to *Spirillina lateseptata* Terquem (T. 1875, APD, p. 21, pl. i, fig. 6). But whatever the nature of Terquem's organism, we do not think it can be identical with Halkyard's. Terquem gives the dimensions of his species as 0.80 mm. \times 0.84 mm. which for a *Spirillina* is enormous. Only the giant species *S. tuberculata* ever attains such dimensions. The largest specimen of the series of var. *carinata* in our collection measures only 0.31 mm. in greatest diameter, and the average is much less.

322. *Spirillina decorata*, Brady.

Spirillina decorata, Brady, 1884, FC, p. 633, pl. lxxxv, figs. 22-5.

Spirillina decorata, Sidebottom, 1904, etc., RFD, 1908, p. 8, pl. ii, fig. 6.

One station: WS 88.

Represented by a single rather doubtful specimen.

323. *Spirillina margaritifera*, Williamson.

Spirillina margaritifera, Williamson, 1858, RFGB, p. 93, pl. vii, fig. 204.

Spirillina margaritifera, Heron-Allen and Earland, 1930, FPD, p. 180.

One station: WS 88.

Two specimens only which agree with Williamson's figure. It still remains an open question whether Williamson's form is anything more than a pauperate condition of *S. tuberculata*. See our observations *ut supra*.

324. *Spirillina tuberculata*, Brady.

Spirillina tuberculata, Brady, 1879, etc., RRC, 1879, p. 279, pl. viii, fig. 28 (see also Siddall, 1878, FRD, p. 49); 1884, FC, p. 631, pl. lxxxv, figs. 12-16.

Spirillina tuberculata, Cushman, 1910, etc., FNP, 1915, p. 4, pl. i, figs. 7-9; pl. ii, fig. 3; Text-figs. 3, 4.

Three stations: WS 84, 87, 88.

Large individuals, but few in number, at these stations, the best at WS 88.

325. *Spirillina limbata*, Brady.

Spirillina limbata, Brady, 1879, etc., RRC, 1879, p. 278, pl. viii, fig. 26; 1884, FC, p. 632, pl. lxxxv, figs. 18-21.

Spirillina limbata, Flint, 1899, RFA, p. 326, pl. lxxi, fig. 5.

Two stations: 388; WS 88.

Several very fine specimens.

Sub-family *ROTALIINAE*Genus *Patellina*, Williamson, 1858326. *Patellina corrugata*, Williamson (Plate XIII, figs. 19-22).

Patellina corrugata, Williamson, 1858, RFGB, p. 46, pl. iii, figs. 86-9.

Patellina corrugata, Heron-Allen and Earland, 1913, CI, p. 109, pl. ix, fig. 11.

Patellina corrugata, Cushman, 1925, etc., LFR, vii, 1930, p. 15, pl. iii, fig. 5.

Patellina corrugata, Parr and Collins, 1930, ANZF, p. 90, pl. iv, figs. 1-5.

Nineteen stations: 48, 51, 53, 388; WS 71, 86, 87, 88, 89, 90, 92, 93, 99, 217, 221, 225, 245, 248, 408.

Never very common. The Falkland type is very constant in its circular shape from which there is little variation, except in the height of the shell. At many stations a direct connection between the height and the size of the proloculum can be observed, the microspheric stage being high, and the megalospheric low and depressed, sometimes almost scale-like. This connection can be seen best at WS 88, where the species attains its maximum development of size (up to 0.80 mm. in diameter) and is most frequent. The megalospheric proloculum is often prominent here, as a bead standing above the contour of the test (fig. 22). The microspheric proloculum (fig. 21) is generally followed by a greater length of unseptate tube than the megalospheric; instances showing as much as two to four distinct convolutions of unseptate tube have been observed.

327. *Patellina corrugata* var. *formosa*, var.n. (Plate XIII, figs. 23-25).

Three stations: WS 88, 90, 92.

A few specimens at each station, the best at WS 88. Test large, hyaline, nearly circular in plan, rather depressed or scale-like, ventral side flat, dorsal side convex, becoming less convex towards the margin. Following the proloculum which is large, and either globular or reniform, is a simple flattened tube, about 0.08 mm. in diameter, wound in a spreading spiral of about three convolutions, which occupy from about one-third to

one-half the dorsal side (fig. 23). The tube is fimbriated, or broken up by solid partitions starting from the outer edge of the tube and separating it into finger-shaped or forked pockets, which give a very ornamental appearance to the test. After about three convolutions the test assumes the normal patelline mode of growth, and, except for size and distinctness of markings does not differ from Williamson's Type.

Diameter, up to 0.70 mm.

It is not uncommon to find specimens of *P. corrugata* in which the early portion of the test following the proloculum consists of an undivided tube, but it is rare to see more than one or two convolutions of the spiral, and we have never before met with specimens in which the spiral portion is fimbriated. The fimbriations are similar in nature to those causing the markings which give its characteristic appearance to the dorsal view of *P. corrugata*.

Genus *Patellinoides*, gen.n.

Test free and conical, more or less depressed, more or less oval in plan, commencing with a proloculum, followed by a simple spiral chamber of 1-2 convolutions; the growth then becomes alternate, crescentiform chambers being arranged opposite to one another as in *Patellina corrugata*, but remaining entire throughout the growth. There are no internal septa dividing the chambers into chamberlets, but the outer margins of the chambers on the dorsal side are sometimes marked by an irregularly scattered line of minute dots, which look like perforations, but in balsam and under a high power appear to be pillars of solid shell-substance, which may represent vestigial secondary septa. The ventral side is slightly concave, filled with a glassy shell-substance, to one side of the centre of which is a small arched aperture communicating with the final chamber, apparently by a curved tube. The aperture is alternately to the right and left of the centre, and facing in opposite directions with the addition of each chamber.

Several authors (e.g. B. 1884, FC, p. 633; C, 1928, F, p. 268) have referred to the existence of specimens of *Patellina* without divisions to the chambers. It is not clear whether they are referring to *P. corrugata*, Will., or to the very minute *P. campanaeformis* (B. 1884, FC, p. 634, Text-fig. 19). At any rate we are not aware of any figures of unseptate specimens other than *P. campanaeformis*, which is an organism of such extreme rarity that it is unlikely to have come under frequent observation. Cushman, it is true, in 1928, created a genus *Patellinella* in which the chambers alternate, two to a whorl, and are free from secondary septa. But it is based on *Textularia inconspicua*, Brady, an organism of somewhat doubtful affinities, but probably not closely related to *Patellina*.

Unseptate *Patellinae* do however exist, though they are extremely rare by comparison with the ubiquitous *P. corrugata*. For many years past we have met with an occasional example in British gatherings, but have hitherto regarded them as abnormal individuals of the type. The occurrence of two very distinct forms in the Falkland material, and in sufficient numbers to indicate their character, has forced us to the conclusion that the form must be recognized as generically distinct. There are no transition forms in the Falkland material, in which *Patellina corrugata* is very generally distributed and very true to type.

Patellinoides we take to be intermediate between *Spirillina* and *Patellina*. The latter genus is obviously a derivative of *Spirillina*, and the proloculum is normally followed by a simple unseptate tube which may attain to as many as four convolutions before the secondary septa begin to form. But we take the view that *Patellinoides* is probably not on the line of evolution between *Spirillina* and *Patellina*, but is more likely to be a degeneration from the latter genus, in which the alternate plan of growth has been preserved and the secondary septa have been abandoned. This theory is perhaps best supported by the fact that balsam-mounted specimens under high magnification sometimes show a line of minute beads round the peripheral edge of some of the chambers, which beads may represent vestigial septa.

Patellina campanaeformis, Brady, should on the diagnosis of Brady be transferred to *Patellinoides*. But it is quite possible that it represents yet another separate and undescribed genus. It is unlike either of our species, and nothing is known of the organism beyond what Brady has written.

328. *Patellinoides conica*, sp.n. (Plate XIII, figs. 26–29).

Three stations: WS 88, 92, 408.

Test conical, oval in plan, high-domed, the proloculum and spiral tube being followed by a succession of alternate, undivided chambers, up to five to six pairs, which are placed somewhat diagonally across the long axis of the oval base. Sutural lines distinct but flush. The minute dots which, when viewed under a high power, are seen to be scattered round the lower peripheral edge of the chambers are apparently solid pillars of shell substance inside the chambers. Seen through the glassy shell they have the appearance of a line of pores.

Average length, 0.20 mm.; breadth, 0.13 mm.; height, 0.05 mm.

P. conica occurs at WS 408 at 454 m. It is rare, but many specimens were found. Very rare at the other stations. It appears to be identical with specimens in our cabinet from Plymouth, and from the Faroe Channel, and the species is therefore probably of very wide distribution. The British specimens are larger than those from the Falklands, and the peripheral pores are more distinct, but they show no evidence of the definite septation proper to *Patellina*.

329. *Patellinoides depressa*, sp.n. (Plate XIII, figs. 30–33).

Four stations: 388; WS 88, 245, 408.

Test free, a long oval in plan, conical, but very depressed or scale-like, consisting of a proloculum followed by a short simple tube, then by unseptate chambers arranged alternately to the number of 3–5 pairs. Each chamber surrounded by a carina which persists in the form of strongly limbate sutural lines. Texture hyaline.

Length, up to 0.40 mm.; breadth, 0.25 mm.; height, 0.04 mm.

Very rare, but a good many specimens have been found, principally at 388 and WS 88. They appear to be identical with two specimens in our cabinet from the Faroe-Shetland Channel at 128 m., and the species may therefore have a very wide distribution.

Genus *Discorbis*, Lamarck, 1804

 330. *Discorbis cora* (d'Orbigny) (Plate XIII, figs. 34-36).

Rosalina cora, d'Orbigny, 1839, FAM, p. 45, pl. vi, figs. 19-21.

Discorbina cora, Heron-Allen and Earland, 1922, FGA, p. 133, pl. i (numbered pl. ii), figs. 33-5.

Four stations: 51, 388; WS 88, 93.

This very pauperate form described by d'Orbigny from the Peruvian coast, where it was rare, is extremely rare in the Falkland area. Two quite typical specimens at WS 88 (greatest breadth, 0.38 mm.), and single very good specimens were found at 388 and WS 93, less typical at 51. The specimens from WS 88 are practically identical with d'Orbigny's figure, and there can be no question as to their discorbine affinities. The *Truncatulina cora* (d'Orbigny) of Cushman (1922, FTR, p. 48, pl. vii, figs. 3-5; 1925, FTCP, p. 133) appears to be quite a different organism, having little resemblance to d'Orbigny's figure. The Type could not be found in Paris.

 331. *Discorbis globularis* (d'Orbigny).

Rosalina globularis, d'Orbigny, 1826, TMC, p. 271, pl. xiii, figs. 1-4, Modèle no. 69.

Discorbina globularis, Möbius, 1880, FM, p. 96, pl. ix, fig. 18.

Discorbina globularis, Brady, 1884, FC, p. 643, pl. lxxxvi, figs. 8, 13.

Thirteen stations: 51, 53, 388; WS 84, 88, 89, 90, 92, 97, 215, 217, 225, 408.

Not particularly abundant except at some stations, notably WS 88, where it was abundant, large, and well developed. The type here is very compressed in contrast to those at WS 225, which are very highly domed. Often sessile on Algae and Polyzoa.

 332. *Discorbis mediterraneensis* (d'Orbigny).

Rosalina mediterraneensis, d'Orbigny, 1826, TMC, p. 271, no. 2.

Discorbina mediterraneensis, Fornasini, 1898, RFI, p. 264 (text-fig).

Discorbina mediterraneensis, Heron-Allen and Earland, 1913, CI, p. 118, pl. ix, figs. 12-14; pl. x, fig. 1.

Seven stations: WS 79, 83, 91, 97, 221, 225, 248.

Sparingly distributed and never very common. Very good specimens at WS 97 and 221. The Paris Types are quite unrecognizable.

 333. *Discorbis vilardeboana* (d'Orbigny) (Plate XIII, figs. 37-39).

Rosalina vilardeboana, d'Orbigny, 1839, FAM, p. 44, pl. vi, figs. 13-15.

Discorbina vilardeboana, Brady, 1884, FC, p. 645, pl. lxxxvi, figs. 9, 12.

Discorbis vilardeboana, Cushman, 1910, etc., FNP, 1915, p. 14, text-fig. 14, pl. ix, fig. 2.

Five stations: 388; WS 71, 83, 88, 93.

This is one of d'Orbigny's species from the Falkland Islands, where he describes it as rare. It is probably widely distributed and has been more or less overlooked among the many varieties of *D. rosacea* occurring in the Discovery material. But records have been kept of its occurrence at these four stations, at all of which d'Orbigny's typical form is common and well developed. Average breadth, 0.33 mm.; height, 0.17 mm.

We figure specimens which have been compared with the Type in Paris, and are identical. D'Orbigny's figure is not particularly good—the punctuation appearing as too marked. The test is hyaline and very finely punctate, and the characteristic feature is the very large and pronounced terminal chamber.

334. *Discorbis rosacea* (d'Orbigny).

Rotalia rosacea, d'Orbigny, 1826, TMC, p. 273, no. 15, Modèle no. 39.

Rotalia rosacea, Parker, Jones and Brady, 1859, etc., NF, 1865, p. 25, pl. ii, fig. 71.

Discorbina rosacea, Brady, 1884, FC, p. 644, pl. lxxxvii, figs. 1, 4.

Twenty-six stations: 48, 51, 388; WS 71, 73, 76, 77, 80, 83, 84, 86, 88, 89, 90, 91, 92, 95, 97, 99, 210, 213, 217, 221, 225, 245, 248.

Universally distributed, often very abundant. The best stations probably 51, WS 71, 83, 84, 91 and 225. Often very variable, though the general form is rather high-domed. At WS 217 the type is lower and more squamous. Sessile at many stations, especially 51.

335. *Discorbis peruviana* (d'Orbigny) (Plate XIV, figs. 1-4).

Rosalina peruviana, d'Orbigny, 1839, FAM, p. 41, pl. i, figs. 12-14.

Discorbina peruviana, Heron-Allen and Earland, 1913, CI, p. 122, pl. xi, figs. 1-3.

Three stations: 48, 51; WS 245.

Few specimens but good examples at WS 245. D'Orbigny's original record was from the Bolivian coast. In Paris, the Type tube from Acapulco contains four specimens, three of them are decomposed and unrecognizable, and the fourth is a typical *Discorbina globularis*.

Average breadth, 0.40 mm.; height, 0.10 mm.

336. *Discorbis araucana* (d'Orbigny).

Rosalina araucana, d'Orbigny, 1839, FAM, p. 44, pl. vi, figs. 16-18.

Discorbina araucana, Brady, 1884, FC, p. 645, pl. lxxxvi, figs. 10, 11.

Discorbina araucana, Egger, 1899, KOA, p. 163, pl. xxv, figs. 22-4.

Seven stations: 53, 228; WS 83, 84, 86, 88, 408.

Specimens which appear to be attributable to d'Orbigny's species occur sparingly, but are not very typical. The original record was from the Chilean coast. The d'Orbigny Type is a dead shell of thick white texture, the structure rather obscure, but generally agreeing with d'Orbigny's figures.

337. *Discorbis praegeri* (Heron-Allen and Earland).

Discorbina praegeri, Heron-Allen and Earland, 1913, CI, p. 122, pl. x, figs. 8-10; 1914, etc., FKA, 1915, p. 692; 1916, FWS, p. 270; 1916, FSC, p. 50.

Nine stations: WS 71, 76, 80, 91, 93, 213, 217, 221, 245.

This form of *D. rosacea*, characterized by a solid, prominent, umbilical stud, is often very common in the Falkland gatherings, notably at WS 91 and 93, where large and typical specimens occur in considerable numbers.

338. *Discorbis isabelleana* (d'Orbigny) (Plate XIV, figs. 5-8).

Rosalina isabelleana, d'Orbigny, 1839, FAM, p. 43, pl. vi, figs. 10-12.

Thirteen stations: 388; WS 76, 83, 84, 86, 87, 88, 91, 97, 225, 245, 246, 248.

This is one of the largest and most handsome of the Falkland species. It is usually represented by a few worn and dead shells only, but was common at WS 246 where it reached a large size, and still more abundant at 388 where the specimens were variable and handsome, owing to the development of tubercular ornament on the dorsal surface. Equally varied, but less abundant, at WS 88 and 225. Sessile specimens were seen at WS 225 and 246. There is great variation in the degree of convexity of the dorsal side, which is sometimes almost flat. The dorsal surface also varies, from glassy smoothness to rough, according to the amount of limbation and development of solid beads of shell. The ventral surface is invariably smooth and glassy, the umbilical cavity often more or less filled with solid beads of shell-substance or projections from the umbilical margins of the chambers. But there is always a noticeable cavity, never a solid stud of shell-substance, such as is suggested by Brady's figure (B. 1884, FC, p. 646, pl. lxxxviii, fig. 1).

The punctuation is extremely fine, not coarse, as suggested by d'Orbigny's figures which are extremely unsatisfactory, and must be regarded as responsible for most of the confusion which has arisen over his species. His description, on the other hand, is quite good, and, taken in conjunction with the measurements which he gives as 2 mm. diameter, should have obviated some of the errors which have arisen over the identity of his species.

Even so it is difficult to understand on what grounds Jones and Parker (J. & P. 1872, FFR, p. 115) assigned d'Orbigny's species to the company of his *Rosalina rugosa* and *Rosalina vilardeboana*, in the group of *Discorbina turbo*. This appears to have been the initial stage of an error, which since that date has continually recurred.

Brady, *loc. cit.*, follows suit with a description of *D. isabelleana* as a "*minute* (italics ours) thin shelled variety belonging to the *rosacea* group". His figure is not unlike d'Orbigny's, but the umbilical cavity is filled with a solid stud of shell matter. It represents a delicate little species, 0.75 mm. in diameter, not uncommon in coral sands, which we have recorded from several localities, following the Brady figures.

Egger's figure (E. 1893, FG, p. 386, pl. xv, figs. 36-8) is very poor, but the description and size 0.25 mm. are sufficient evidence that he was not dealing with d'Orbigny's species. He himself assigns his specimens to Brady's form.

Cushman's (C. 1910, etc., FNP, 1915, p. 15, pl. vi, fig. 1) figure appears to be even farther from the d'Orbignyan type. It represents a high conical shell with almost flat base. The size is again given as 0.25-0.40 mm. diameter.

Later papers, as, for example, those of Cushman (C. 1927, FWCA, p. 160, pl. iv, fig. 4), Cushman and Kellett (C. & K. 1929, WCSA, p. 9, pl. iii, fig. 12), Cushman and Valentine (C. & V. 1930, FGC, p. 23, pl. vi, figs. 6-8) show a remarkable diversity of figures, none bearing much resemblance to those of d'Orbigny, while the sizes recorded and the descriptions indicate that the organisms dealt with are various forms allied to

D. vilardeboana. Their sizes range between 0.25 and 0.50 mm. which alone would exclude them from *D. isabelleana*.

It is fortunate, in the circumstances, that the original Types have survived in good condition. The Type tube labelled "*Rosalina Isabelleana*, Îles Malouines" contains seven specimens of varying sizes; the largest, when perfect, probably exceeded 3 mm. in diameter. They represent a form with which we had become very familiar in the examination of our material, without, up to that time, associating it with d'Orbigny's figure. The definite punctation shown in the figures had misled us, as it had done others.

Apart from this punctation the figures, though weak, are not faulty, though they give a poor impression of a large and handsome species. They also fail to convey the fact, also overlooked in the descriptions, that the dorsal surface of the chambers, though sometimes smooth, is generally more or less roughened with studs of solid shell substance, which occasionally merge to form ridges of ornament approaching those found in *Heronallenia (Discorbis) kempii*. The perforations on the other hand are extremely minute, the shell being quite glassy in spite of its thickness.

The colour to which d'Orbigny alludes, "d'un rose violacé", has almost completely faded from the Types, but is a very noticeable feature in fresh specimens from our material. It is due to the chitinous lining of the chambers.

There can be no doubt that d'Orbigny's species is a well-marked and definite type. Beyond the few incorrect records which we have noted *supra* it appears to have no history as *isabelleana*. But we suspect that some records of *Pulvinulina repanda* var. *concamerata*, and possibly of *Pulvinulina punctulata*, would have been more correctly assigned to the species under consideration.

339. *Discorbis turbo* (d'Orbigny).

Rotalia (Trochulina) turbo, d'Orbigny, 1826, TMC, p. 274, no. 39, Modèle no. 73.

Discorbina turbo, Brady, 1884, FC, p. 642, pl. lxxxvii, fig. 8.

Discorbina turbo, Sidebottom, 1904, etc., RFD, 1908, p. 11, pl. iii, figs. 1, 2.

Fifteen stations: 48, 51; WS 77, 83, 84, 86, 87, 88, 89, 91, 97, 99, 225, 245, 248.

Generally distributed, often quite frequent. It attains a large size and very fine development at several stations, especially 48, WS 84 and 88. Limbate forms predominate at some stations, notably WS 83 and 248. No Type to be found in Paris.

340. *Discorbis nitida* (Williamson).

Rotalina nitida, Williamson, 1858, RFGB, p. 54, pl. iv, figs. 106-8.

Discorbina nitida, Sidebottom, 1904, etc., RFD, 1908, p. 13, pl. iv, fig. 6.

Discorbina nitida, Heron-Allen and Earland, 1916, FWS, p. 269, pl. xlii, figs. 26-30.

Ten stations: 51, 388; WS 87, 88, 89, 90, 91, 92, 221, 408.

Generally distributed, often very common. The best at WS 87, 88, 89, 90, particularly at WS 88. The Falkland type is rather more concave on the oral side than in British specimens, but has all the other characteristics of Williamson's form.

341. *Discorbis millettii* (Wright).

Discorbina millettii, Wright, 1910-11, ECM, p. 13, pl. ii, figs. 14-17.

Discorbina millettii, Heron-Allen and Earland, 1913, CI, p. 121, pl. x, figs. 5-7.

Four stations: 48; WS 84, 87, 88.

Never occurring in any numbers, but excellent specimens at WS 87 and 88.

342. *Discorbis plana*, sp.n. (Plate XIV, figs. 9-12).

Four stations: 388; WS 71, 87, 88.

Test nearly circular, highly polished, plano-convex, much compressed; peripheral margin sub-acute, but not carinate; superior surface exhibiting about three convolutions, 4-5 chambers in each, increasing somewhat rapidly in size, sutural lines recurved and flush but distinct; inferior surface depressed towards the umbilicus, exhibiting the chambers of the last convolution only, sutural lines somewhat depressed; the interior margins of the chambers on this side are rather plicated, and sometimes have a few beads in the umbilicus; aperture, a slit on the inner edge of the last chamber. Colour yellowish when young, becoming glassy white.

The size is very variable, large specimens range up to breadth, 0.50 mm.; height, 0.10 mm.

Not uncommon at 388 and WS 88, rarer at the other stations.

This is rather a striking species, and not very near any of the other local forms. It is perhaps most closely related to *D. nitida* and *D. millettii*, but cannot be confused with them. A specimen "budding" was found at WS 88 (fig. 12) and a sessile specimen at WS 87.

343. *Discorbis orbicularis* (Terquem).

Rosalina orbicularis, Terquem, 1875, etc., APD, 1876, p. 75, pl. ix, fig. 4.

Discorbina orbicularis, Brady, 1884, FC, p. 647, pl. lxxxviii, figs. 4-8.

Discorbina orbicularis, Balkwill and Wright, 1885, DIS, p. 349, pl. xiii, figs. 31-3.

Six stations: 388; WS 71, 84, 88, 89, 245.

This species, so abundant in the West Indies and Pacific and also widely distributed in higher latitudes, is strangely rare in the Falkland area. Moreover specimens are small and not very typical. Not uncommon at WS 88, and almost equally good at WS 245; a sessile specimen at WS 84.

344. *Discorbis tricamerata*, sp.n. (Plate XIV, figs. 13-16).

Three stations: 388; WS 88, 92.

Test free, hyaline, plano-convex; a depressed cone of two convolutions only, each consisting of three chambers rapidly increasing in size. On the dorsal side all the chambers are visible; they are slightly inflated, and separated by somewhat depressed, recurved sutural lines; on the ventral side only the three chambers of the final convolution are visible, slightly turgid and curving inwards to a large elongate and deeply sunk

umbilical area, within which the aperture, a loop-shaped slit, is situated under the inner edge of the final chamber. The sutural lines on the ventral side are short, nearly straight, and slightly depressed; the peripheral margin is sub-acute with a narrow, thickened edge on the dorsal side. Texture of the shell whitish, and opaque like ground glass on the dorsal side, very hyaline on the ventral side.

Length of largest specimens up to 0.30 mm.; breadth, 0.20 mm.; height, 0.10 mm.

Seven specimens of this very distinctive species were found at WS 88, and single good specimens at 388 and WS 92. It is quite unlike any other species known to us in the paucity of chambers forming its spiral.

345. *Discorbis bertheloti* (d'Orbigny).

Rosalina bertheloti, d'Orbigny, 1839, FIC, p. 135, pl. i, figs. 28-30.

Discorbina bertheloti, Brady, 1884, FC, p. 650, pl. lxxxix, figs. 10-12.

Discorbis bertheloti, Cushman, 1910, etc., FNP, 1915, p. 20, pl. vii, fig. 3.

Fifteen stations: 51, 388; WS 71, 77, 83, 86, 87, 88, 89, 90, 97, 99, 221, 245, 408.

Widely distributed but never very common. The best and most typical specimens occur at the range of stations WS 83-88, very fine at WS 86, and equally good at WS 221 and 245. The Paris Type is missing.

346. *Discorbis bertheloti* var. *baconica*, Hantken.

Discorbina baconica, Hantken, 1875, CSS, p. 76, pl. x, figs. 3 a, b.

Discorbina baconica, Brady, 1884, FC, p. 651, pl. xc, fig. 1.

Discorbina bertheloti var. *baconica*, Heron-Allen and Earland, 1916, FSC, p. 50, pl. viii, figs. 10-12.

Six stations: 388; WS 71, 86, 88, 91, 92.

This limbate variety is very much rarer than the type, but excellent specimens occur at 388 and WS 86, and one, extraordinarily limbate, at WS 91.

347. *Discorbis bertheloti* var. *complanata*, Sidebottom (Plate XIV, figs. 17, 18).

Discorbina bertheloti var. *complanata*, Sidebottom, 1918, FECA, p. 253, pl. vi, figs. 1-3.

One station: WS 88.

A few specimens only.

348. *Discorbis valvulata* (d'Orbigny).

Rosalina valvulata, d'Orbigny, 1826, TMC, p. 271, no. 4; 1839, FIC, p. 136, pl. ii, figs. 19-21.

Discorbis valvulata, Cushman, 1921, FNCJ, p. 59, pl. xiv, figs. 4-5.

One station: 51.

One fairly typical specimen. The species appears to be widely distributed. The Type is missing.

349. *Discorbis parisiensis* (d'Orbigny).

Rosalina parisiensis, d'Orbigny, 1826, TMC, p. 271, Modèle no. 38.

Discorbina parisiensis, Parker, Jones and Brady, 1866, etc., MFC, 1866, pl. ii, figs. 13-15; 1896, p. 296.

Discorbina parisiensis, Brady, 1884, FC, p. 648, pl. xc, figs. 5, 6, 9-12.

One station: WS 88.

Two small but fairly typical specimens at this station.

 350. *Discorbis obtusa* (d'Orbigny) (Plate XIV, figs. 19-21).

Rosalina obtusa, d'Orbigny, 1846, FFV, p. 179, pl. xi, figs. 4-6.

Discorbina obtusa, Brady, 1884, FC, p. 644, pl. xci, fig. 9 a, b, c (?).

Discorbina obtusa, Cushman, 1918, SFP, p. 68, pl. xiii, fig. 1.

One station: WS 88.

A few excellent and typical specimens, identical with the Type in Paris. Breadth, 0.25 mm. Height, 0.15 mm.

 351. *Discorbis malovens*is, sp.n. (Plate XIV, figs. 22-24).

Four stations: WS 71, 86, 88, 89.

Test circular, plano-convex, very finely perforate and polished; consisting of three or four convolutions each containing four (rarely five) narrow recurving chambers, increasing rapidly in size: peripheral edge entire (unbroken), subacute; dorsal surface highly polished and exhibiting all chambers, sutures recurved, flush but distinct; ventral side nearly flat, slightly sunk at the umbilicus, only the chambers of the final convolution visible, sutures recurved and rather depressed, distinct round the peripheral edge but largely obscured by a secondary deposit of beads covering all but the final chamber and the outer margins of the preceding chambers; aperture a curved slit under the anterior edge of the final chamber; colour yellowish to glassy white.

Dimensions up to 0.40 mm. in diameter; height about 0.10 mm.

A few specimens only from each Station, the best at WS 71, 86, 88. Many of them show signs of plastogamy but no actual pairs were seen.

The species is closely allied to *D. plana* sp.n. (No. 342) with which its distribution practically agrees, all the stations being confined to the southern areas. It differs from *D. plana* in its greater convexity, in the dome-like smoothness of the dorsal surface, and in its unbroken peripheral margin.

*D. malovens*is is allied both to *D. pileolus* (d'Orbigny) and to the very different organism figured by Brady under the name *D. pileolus* (d'Orbigny) (B. 1884, FC, p. 649, pl. lxxxix, figs. 2-4) and generally associated since with d'Orbigny's species. But it differs from Brady's organism in many features, notably in the lesser number of chambers to the convolution and its highly polished dorsal surface. The organism figured by Brady is a well known type in the Indo-Pacific Region and is of frequent occurrence in the New Zealand and Australian area. In the Northern Pacific it appears to be replaced by a somewhat similar organism which is found on American shores and has been described

by Cushman (C. 1925, etc., LFR, vol. 1 (1925), p. 42, pl. vi, figs. 11-12) as *D. ornatisima*. From their distribution, it seems possible that both *D. malovens* and *D. plana* are species of Southern Pacific ancestry which have not as yet attained much extension on the Atlantic side of Cape Horn.

Brady's identification of his form with the *Valvulina pileolus* of d'Orbigny (d'O. 1839, FAM, p. 47, pl. i, figs. 15-17) has always seemed to us to be doubtful and can no longer be entertained. The Type of *Valvulina pileolus* could not be found in Paris, but by the courtesy of Prof. Marcellin Boule we were allowed to examine d'Orbigny's material from Arica, Peru, the original locality for the species. The sample was a coarse Molluscan and Echinoderm sand with very little fine material, in which, however, we succeeded in finding four specimens which are unquestionably d'Orbigny's organism. It is evident that his figures are much conventionalized, particularly the side view (fig. 17). The large boss shown in the basal view (fig. 16), to which may be attributed the incorrect assignation of the species to his genus *Valvulina* (he refers in his text to the "valvule arrondie, assez saillante"), was, almost certainly, a young attached specimen, or bud. The whole of the group of *Discorbis* characterized by beaded dorsal sides is subject both to budding and plastogamy, and two of our specimens from Arica show evidence of it in the shape of eroded umbilici.

D'Orbigny's species is thus found to be very different from the organism figured by Brady. It has but four or five chambers to the convolution as against eight or more in Brady's and in this respect is much nearer to *D. malovens*, but it cannot be confused with either. The ventral aspect of d'Orbigny's species, with its rows of beads converging to a deeply sunk umbilicus, is very distinctive, and, except in the differing number of chambers, very suggestive of the base of *D. pulvinata*, Brady, another Pacific species. Altogether the *D. pileolus* of Brady is such a well marked form, and possesses such a definitely localized range, that it deserves specific separation, and we propose for it the new name *Discorbis australensis*.

352. *Discorbis chasteri* (Heron-Allen and Earland).

Discorbina minutissima, Chaster, 1892, FS, p. 65, pl. i, fig. 15.

Discorbina chasteri, Heron-Allen and Earland, 1913, CI, p. 128, pl. xiii, figs. 1-3.

Six stations: 388; WS 79, 83, 88, 92, 409.

This minute but very widely distributed species is not uncommon at WS 92, rare at the other stations. The specimens are quite typical and all of the round type. No oval or spinous forms were found.

353. *Discorbis coronata*, sp.n. (Plate XIV, figs. 25-30).

Two stations: WS 88, 245.

Test free, minute, hyaline, depressed, almost scale-like, inaequilateral, consisting of $1\frac{1}{2}$ -2 convolutions with nine chambers in the final convolution; sutural lines distinct and curving, peripheral edge broadly carinate and recurved.

The dorsal side is convex, but flattened in the centre. The chambers of the outer

whorl rising at a sharp angle from the carina; at about half their width they are flattened out, and so continue to the inner margin. At the point of curvature there is a second carina, projecting upwards and running parallel to the peripheral edge. The sutural lines, which are flush between the two carinae, become limbate between the secondary carina and the inner margin, so that the inner half of each chamber is surrounded by a raised wall. Within these walls the surface of the test is rough, thus obscuring the earlier convolutions, which can, however, be made out on careful examination. Between the inner and outer carinae the shell surface is smooth and hyaline.

Owing to superficial ornament, only the chambers of the final convolution are exposed on the ventral side, which is flat and somewhat depressed at the umbilical region. This part of the test is thickly studded with minute beads of shell-substance. The aperture is obscure, but is believed to be a minute slit on the inner ventral side of the final chamber opening into the umbilical region.

Two or three specimens only were found at WS 88, and a single one at WS 245, both stations lying between Tierra del Fuego and the Falkland Islands. The structure will be most readily understood from the figures (figs. 25–27). The two specimens from WS 88 appear to be megalospheric; the nature of the third cannot be stated. The dimensions of the largest test are: greatest breadth, 0.30 mm.; least breadth, 0.25 mm.; thickness, 0.09 mm.

A single large specimen from WS 88 (greatest diameter, 0.40 mm.), which we also figure (figs. 28–30), may be abnormal, or it may be a further stage in the development of the species. The peripheral carina is much reduced and the inner carina has disappeared. The ventral area of the dorsal side is covered with oval pits surrounded by raised edges. Each pit apparently marks a chamber. From the pits a series of radiating grooves extends to the carina. The ventral side is very similar to our Type but the beaded ornament is only slightly developed.

The exact relationships of this remarkable organism must await the discovery of further material, as it is quite unlike anything with which we are acquainted. It has been tentatively assigned to *Discorbis* mainly on the evidence of its beaded base, but it has a general likeness to some Truncatulinae, such as *T. tenuimargo* and *T. altocamerata*, and might equally well have been assigned to that genus.

Genus *Heronallenia*, Chapman and Parr, 1931

354. *Heronallenia* (*Discorbis*) *kempii* (Heron-Allen and Earland) (Plate XVII, figs. 20–28).

Discorbis kempii, Heron-Allen and Earland, 1929, etc., FSA, 1929, p. 332, pl. iv, figs. 40–8.

Heronallenia kempii, Chapman and Parr, 1931, NAF, p. 236, pl. ix, figs. 6–8.

Eleven stations: 48, 388; WS 84, 86, 87, 88, 89, 91, 92, 93, 248 (see also p. 309).

Test free, perforate, white in colour, consisting of flattened chambers arranged in a rapidly expanding coil of at most $1\frac{1}{2}$ convolutions. On the dorsal side, which is rather convex, the marginal edges of the chambers are strongly limbate, and the whole surface between these limbations is decorated with exogenous beads and zig-zag ornament which conceal the arrangement of the earliest chambers. There appear to be about eight chambers

in the final convolution, perhaps twelve or thirteen in the whole shell. The peripheral edge is rounded and lobulate. On the ventral side, which is concave, the sutural lines are increasingly depressed with the growth of the shell, and the otherwise smooth surface is furrowed with lines converging on the oral aperture, which is situated in a depression and is a strongly arched opening (sometimes furnished with a tooth) at the centre of the inner marginal edge of the final chamber. There is a considerable amount of variation at different stations in the development of the external ornament and in the relations of length to breadth, but not sufficient, in our opinion, to justify even varietal separation.

One specimen found at WS 87, where the species occurs most frequently, has the dorsal side smooth, the sutural lines being limbate but almost flush. The arrangement of the chambers, which is usually obscured by the surface ornament, is easily made out in this specimen.

A complete series in all stages of growth was obtained at WS 87. There is no marked difference except in the strength of the ornament, which increases with age.

The dimensions vary between 0.24 mm. length, 0.2 mm. breadth in the smallest specimen found, and 1.4 mm. length, 1.05 mm. breadth in the largest, which is about 0.35 mm. in thickness.

We have pleasure in associating this species, which is perhaps the most striking of the new species of Foraminifera from the Falkland Islands, with the name of Dr Stanley Kemp, F.R.S., the Director of the "Discovery" Investigations.

Heronallenia (Discorbis) kempii occupies rather an isolated position, and a study of further material may necessitate the creation of a new genus.¹ It has little in common with other species of *Discorbis*, and the only species with which we are acquainted having any close affinity is *Discorbis pulvinulinoides*, Cushman (C. 1910, etc., FNP, 1915, p. 23, pl. vi, fig. 3), which was described by the author from "off Japan, 59 fms." Cushman's species resembles *H. (D.) kempii* in the structure of the ventral side, but differs in size, number of chambers, and markings. We have recorded some specimens from New Zealand and the Antarctic, with reservations, under the name *D. pulvinoides*² (H.-A. & E. 1922, TN, p. 206). They may be specifically distinct from *D. pulvinulinoides* and *H. (D.) kempii*, as probably are some allied organisms in our collection from other localities (Torres Straits; Stewart Island, New Zealand). On the other hand, the Miocene specimens described by us from the Moorabool River, Victoria, Australia (H.-A. & E. 1924, FQM, p. 172), under the name *Discorbina pulvinoides*,² Cushman, appear to be identical with that author's recent specimens from Japan.

The distribution of *Heronallenia (Discorbis) kempii* is very interesting. It occurs at 48, depth 105 m., and WS 84, 86, 87, 88, 89, 91, 92, 93, 248, at depths ranging between 23 and 191 m. The best series of specimens are from WS 86, 87, 88, where it attains splendid dimensions. At most other stations the specimens are small, poorly developed, and very rare. All these stations are situated within an area bounded by Cape Horn, the

¹ This entire paragraph was written in 1929 when the species was described as a *Discorbis*. For the subsequent change, see final paragraph.

² An obvious misprint.

Burdwood Bank, the Falkland Islands, and a line between the Falklands and Magellan Straits. It has not, so far, been discovered outside this area, and in view of the Pacific habitat of its allies, we can hardly doubt that it is a form of Pacific ancestry which has succeeded in weathering the Horn and establishing itself in the Atlantic Ocean, without as yet obtaining any wide distribution there.

We have, in the Pearcey Collection (which is now incorporated with ours), typical specimens of this species from the "Scotia" material, which appear to have escaped Pearcey's notice. They came from the Burdwood Bank, 56 fms. ("Scotia" stn. 346).

Since this species was described in 1929 (*ut supra*) Messrs Chapman and Parr have created a new genus *Heronallenia* for certain species of *Discorbis* and *Discorbina*, which they propose to separate, chiefly on account of the distinctive character of the aperture. The genotype is declared to be *Discorbina wilsoni*, Heron-Allen and Earland (H.-A. & E. 1922, TN, p. 206, pl. vii, figs. 17-19), and other species transferred to the new genus are *Discorbis kempii* (H.-A. & E. 1929), *D. pulvinulinoides* (Cushman, *ut supra*), *D. lingulata* (Burrows and Holland, 1895, J. P. & B. 1866, etc., MFC, 1895, pl. vii, fig. 33, text, 1896, p. 297), and *D. lingulata* var. *unguiculata* (Sidebottom, 1918, FECA, p. 256, pl. vi, figs. 12-14). We had no doubt as to the close relationships of *D. kempii*, *D. pulvinulinoides*, and *D. wilsoni*, but were not so convinced as regards *D. lingulata* and its variety, which we suspected of possessing a more complex internal structure connected with the dorsal vesicles distinctive of the species. But the authors, to whom we communicated our views, inform us that they have gone into this matter, and are convinced that the vesicles are really bead-like thickenings on the distal margins of the chambers, and that they see no reason for altering their views.

Genus *Truncatulina*, d'Orbigny, 1826

355. *Truncatulina refulgens* (Montfort).

Cibicides refulgens, Montfort, 1808-10, CS, 1, p. 122, 31^{me} genre.

Truncatulina refulgens, d'Orbigny, 1826, TMC, p. 279, no. 5, pl. xiii, figs. 8-11, Modèle no. 77.

Truncatulina refulgens, Brady, 1884, FC, p. 659, pl. xcii, figs. 7-9.

Twenty-seven stations: 48, 51, 228, 235; WS 71, 72, 76, 77, 79, 83, 84, 86, 87, 89, 90, 91, 92, 95, 97, 109, 213, 217, 243, 246, 248, 408, 409.

Very small specimens are quite common, but none of the very large individuals so common on the North Atlantic coasts occur. The best specimens are found at WS 97 and 248. Sessile individuals are not uncommon on Algae.

356. *Truncatulina lobatula* (Walker and Jacob) (Plate XIV, fig. 31).

Nautilus lobatulus, Walker and Jacob, 1798, AEM, p. 642, pl. xiv, fig. 36.

Truncatulina lobatula, Jones, Parker and Brady, 1866, etc., MFC, 1866, pl. ii, figs. 4-10, pl. iv, fig. 19; text and references, 1896, p. 304.

Truncatulina lobatula, Brady, 1884, FC, p. 660, pl. xcii, fig. 10; pl. xciii, figs. 1, 4, 5; pl. cxv, figs. 4, 5.

All stations except 228, 230; WS 72, 73, 76, 108, 109, 219, 243, 431, 432.

Almost universally distributed, but fading out at the deeper stations. It is often excessively abundant, and, as usual, exhibits extreme variability, according to the nature of its environment. Perhaps the best and most typical and regular specimens occur at WS 93. Sessile individuals have been recorded at several stations, some show signs of having been encysted. Abnormal and irregularly grown individuals are often very abundant. At WS 246, a very curious and interesting specimen, consisting of an aggregated mass of young individuals of varying sizes up to four to five chambers tightly bound together occurs. It is apparently the contents of a reproductive cyst which has disappeared, as the remains of an agglutinate covering are still visible.

357. *Truncatulina dispars*, d'Orbigny (Plate XIV, figs. 32-34).

Truncatulina dispars, d'Orbigny, 1839, FAM, p. 38, pl. v, figs. 25-7.

Twelve stations: 388; WS 71, 83, 86, 88, 91, 93, 95, 221, 225, 245, 248.

The pretty little species which d'Orbigny described from the Falklands as frequent ("mais pas rare") is fairly widely distributed in the gatherings, occurring not only on the Continental Shelf but also in deep water. Structurally it appears to be nothing else than a diminutive form of *T. lobatula*, but all the specimens are very typical; they show no sign of variation or of transition forms running into *T. lobatula* or *T. ungeriana*, and it would therefore appear to be a true and constant local species. The best specimens are at WS 71 and 88; at the latter station it is not uncommon. The Type could not be found in Paris.

Greatest diameter, about 0.30 mm.; height, 0.06 mm.

358. *Truncatulina variabilis*, d'Orbigny (Plate XIV, figs. 36-39).

Truncatulina variabilis, d'Orbigny, 1826, TMC, p. 279, no. 8.

Truncatulina variabilis, Brady, 1884, FC, p. 661, pl. xciii, figs. 6, 7.

Truncatulina variabilis, Sidebottom, 1904, etc., BFD, 1909, p. 2, pl. i, figs. 5, 6; pl. ii, figs. 1-3.

Twenty-three stations: 48, 51, 388; WS 71, 76, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 97, 210, 213, 221, 225, 243, 246, 248.

Very generally distributed and often very common. D'Orbigny's species has no real specific value. In the generality of specimens, the variability is merely an index to the nature of the surface on which the animal has lived. This is best proved by the examination of sessile individuals which are quite common at some stations, notably WS 225 and 246. It will then be seen that the contour and arrangement of the chambers follows the line of least resistance, as the protoplasm spreads itself out over the surface of attachment. Disregard of this has led to the creation of what appears to us to be two unnecessary genera, one, *Cibicidella*, Cushman, 1927, the genoholotype of which is stated to be *T. variabilis*, d'Orbigny, though neither d'Orbigny nor the author state which of the innumerable Soldanian figures represents the type (S. 1789, etc., T, 1789, 1, p. 77, pls. lxix-xciii). Later, in 1930, Cushman and Valentine have created a further genus *Dyocibicides*, for those individuals in which the later chambers assume a roughly biserial arrangement (C. & V. 1930, FSC, p. 30, pl. x, figs. 1-3). Such specimens occur in numbers in the Falkland dredgings, notably at WS 76, 84 and 88.

A Type tube at Paris is labelled "*Truncatulina variabilis*, Magellan Straits", and contains some neat, elongate forms, still recognizable, the other specimens being decomposed.

359. *Truncatulina tenuimargo*, Brady.

Truncatulina tenuimargo, Brady, 1884, FC, p. 662, pl. xciii, figs. 2, 3.

Truncatulina tenuimargo, Heron-Allen and Earland, 1908 etc., SB, 1909, p. 680, pl. xx, fig. 2.

Eight stations: WS 71, 81, 89, 91, 93, 97, 99, 245.

An occasional specimen only at each station except WS 245, where a good many were found. They are practically identical with fig. 2 of Brady's original description.

360. *Truncatulina tenuimargo* var. *alto-camerata*, Heron-Allen and Earland.

Truncatulina tenuimargo, Brady, 1884, FC, p. 662, pl. xciii, fig. 2.

Truncatulina tenuimargo, Sidebottom, 1918, FECA, p. 257, pl. vi, figs. 20, 21.

Truncatulina tenuimargo var. *alto-camerata*, Heron-Allen and Earland, 1922, TN, p. 209, pl. vii, figs. 24-7.

Six stations: 48, 388; WS 88, 225, 245, 246.

Usually only a single specimen at each of these stations, with the characteristic highly inflated chambers typical of our variety. The best at WS 88 and 246.

361. *Truncatulina wuellerstorfi* (Schwager).

Anomalina wuellerstorfi, Schwager, 1866, FKN, p. 258, pl. vii, fig. 105.

Truncatulina wuellerstorfi, Brady, 1884, FC, p. 662, pl. xciii, figs. 8, 9.

Truncatulina wuellerstorfi, Cushman, 1910, etc., FNP, 1915, p. 34, pl. xii, fig. 3.

Ten stations: 228, 230, 235, 236; WS 99, 245, 246, 248, 408, 433.

All the stations at which it is recorded are in deep water, and it is moderately common at all of them except WS 245, where the only specimens are remarkably small. At 230 and 236, and WS 248 and 408, particularly large and fine specimens were obtained.

362. *Truncatulina akneriana* (d'Orbigny).

Rosalina akneriana, d'Orbigny, 1846, FFV, p. 156, pl. viii, figs. 13-15.

Truncatulina akneriana, Brady, 1884, FC, p. 663, pl. xciv, fig. 8.

Truncatulina akneriana, Flint, 1899, RFA, p. 333, pl. lxxvii, fig. 5.

Twenty-six stations: 48, 51, 53; WS 71, 72, 73, 76, 77, 79, 80, 83, 84, 86, 87, 88, 89, 91, 92, 93, 97, 99, 219, 221, 225, 245, 408.

Almost universally distributed, often very common. Most numerous and typical at WS 71, 83, 86, 87, 92, 93. Sessile specimens are quite common. The Type is missing.

363. *Truncatulina pseudoungeriana*, Cushman (Plate XIV, fig. 35).

Truncatulina ungeriana, Brady (*non* d'Orbigny), 1884, FC, p. 664, pl. xciv, fig. 9.

Truncatulina pseudoungeriana, Cushman, *U.S. Geol. Surv. Prof. Paper*, 129 E, 19, 22, p. 97, pl. xx, fig. 9.

Cibicides pseudoungeriana, Cushman, 1918, etc., FAO, 1931, p. 123, pl. xxii, figs. 3-7.

Forty stations: 48, 51, 53, 228, 230, 388; WS 71, 72, 73, 76, 77, 79, 80, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 95, 97, 98, 99, 108, 109, 210, 213, 215, 217, 221, 225, 245, 246, 248, 408, 409.

Universally distributed, often very abundant, especially at WS 84, 87, 88, 91, 93, 97, 248, where the best sessile specimens were obtained. The tubes of zoophytes and small pebbles are often thickly covered with small sessile individuals, particularly at 51, 228, and WS 246. Wild growing specimens are not uncommon. At WS 83, an abnormal specimen, which we figure, with an accessory balloon-shaped chamber attached to the ventral side of the final chamber, occurred. A similar abnormality is figured in connection with *Rotalia soldanii* (?) d'Orbigny (S. 1918, FECA, p. 261, pl. vi, fig. 27).

364. *Truncatulina dutemplei* (d'Orbigny).

Rotalia dutemplei, d'Orbigny, 1846, FFV, p. 157, pl. viii, figs. 19-21.

Truncatulina dutemplei, Cushman, 1910 etc., FNP, 1915, p. 37, pl. xv, fig. 2.

One station: WS 86.

A single not very typical specimen, considerably smaller than the Type in Paris.

365. *Truncatulina haidingerii* (d'Orbigny).

Rotalia haidingerii, d'Orbigny, 1846, FFV, p. 154, pl. viii, figs. 7-9.

Truncatulina haidingerii, Brady, 1884, FC, p. 663, pl. xcv, fig. 7.

One station: WS 86.

One small, and very far from typical, specimen. The Type is missing.

366. *Truncatulina tumidula*, Brady.

Truncatulina tumidula, Brady, 1884, FC, p. 666, pl. xcv, figs. 8 a, b, c, d.

Truncatulina tumidula, Cushman, 1910, etc., FNP, 1915, p. 38, pl. xv, fig. 3.

Five stations: 235, 236; WS 83, 408, 433.

A few specimens of this minute deep-water form were found. They agree fairly well with Brady's types. Owing to its size it may have been overlooked at some of the other deep-water stations. Records, though few in number, show that it is widely distributed in the Atlantic and Pacific Oceans.

367. *Truncatulina bradyana* (Cushman).

Truncatulina pygmaea, Brady (*non* Hantken), B. 1884, FC, p. 666, pl. xcv, figs. 9, 10.

Pulvinulinella bradyana, Cushman, 1927, FWCA, p. 165, pl. v, figs. 11-13.

Nine stations: WS 86, 88, 90, 108, 109, 210, 217, 219, 225.

Often not uncommon, but the specimens are, as a rule, very small and pauperate, the best at WS 90 and 210. They all belong to the type so well figured by Brady (*ut supra*), but do not resemble the original figure of Hantken, which has a depressed umbilicus (*Truncatulina pygmaea*, von Hantken, 1875, CSS, p. 78, pl. x, fig. 8).

Genus *Anomalina*, d'Orbigny, 1826

368. *Anomalina semi-punctata* (Bailey).

Rotalia semi-punctata, Bailey, 1851, SAC, p. 11, pl. O, figs. 17-19.

Anomalina polymorpha, Costa, 1853, etc., PRN, 1856, p. 252, pl. xxi, figs. 7-9.

Anomalina polymorpha, Brady, 1884, FC, p. 676, pl. xcvi, figs. 3-6 (only).

Anomalina polymorpha, Heron-Allen and Earland, 1915, FKA, p. 712, pl. liii, figs. 2-5.

Anomalina semi-punctata, Cushman, 1918, etc., FAO, 1931, p. 106, pl. viii, figs. 1, 2.

Three stations: 48; WS 91, 97.

Only a single typical specimen of Costa's species, as characterized by spinous processes, was found at 48, and a few young and more doubtful specimens at WS 91 and 97.

The non-spinous form doubtfully ascribed by Brady (fig. 7) to this species is on the other hand sometimes very common. It appears to have much more in common with *A. coronata* than with *A. polymorpha*, and to be identical with *Truncatulina vermiculata*, d'Orbigny, which is obviously an *Anomalina* (see No. 369).

369. *Anomalina vermiculata* (d'Orbigny) (Plate XV, figs. 1-15).

Truncatulina vermiculata, d'Orbigny, 1839, FAM, p. 39, pl. vi, figs. 1, 2, 3.

Anomalina polymorpha, Costa (?), Brady, 1884, FC, p. 676, pl. xcvi, fig. 7.

Sixteen stations: 48, 388; WS 80, 83, 84, 86, 87, 88, 91, 92, 93, 97, 225, 245, 246, 248.

D'Orbigny's figures are very misleading and are probably responsible for the fact that his species, although very abundant in the Falkland area, and probably elsewhere, was never recorded again until 1927, when Cushman (C. 1927, FWCA, p. 177, pl. vi, fig. 11) figured a specimen from the west coast of America under the name of *Cibicides vermiculata* (d'Orbigny). His figure shows one view only, but the fact that he assigns his specimen to *Cibicides* is conclusive evidence that it is not d'Orbigny's species, which is an unquestionable *Anomalina*.

The Paris Types are contained in two separate tubes. One marked "Îles Malouines" must be disregarded. It contains some depressed, scale-like forms, which could not be identified with either d'Orbigny's description or figures. They probably represent an empirical attempt by some curator to identify unnamed specimens by comparison with d'Orbigny's plate. (It may be noted that d'Orbigny's figures of *T. vermiculata* are Nos. 1, 2 and 3 on plate vi, but are not at the top of the plate where they might be expected, but in the middle. The figures at the top of the plate are of *Truncatulina depressa* and *T. ornata*, both depressed species.) The second tube, which is labelled "Amérique méridionale", contains quite typical specimens of a form which is common in our material and deserving of particular notice.

In 1884, Brady (*ut supra*) figured a specimen which is undoubtedly d'Orbigny's species, under the name *Anomalina polymorpha*, Costa (?). His figure differs in many essential points from Costa's species, notably in the complete absence of marginal spines or processes, and in the more or less regularly involute mode of growth assumed by the adult shell.

D'Orbigny's description of *Truncatulina vermiculata* is, on the whole, good, and sufficient for the identification of his species when compared with the actual specimens, instead of with his figures. But it is based upon mature specimens, and as the species passes through very dissimilar stages in the course of growth, we supplement it with a full description.

Test, usually free, but often sessile, especially in the earlier stages; irregularly nautiloid in the adult form, exhibiting 8–9 chambers in the final convolution which partly enfolds the earlier growth; dorsal side convex, very coarsely punctate, the septation of the earlier chambers often obscured; the later chambers becoming inflated, and separated by sunken sutures as growth progresses, until in the last half convolution the shell becomes involute. The umbilical margins of the later chambers on the dorsal side are smooth and thick-walled. The ventral side is nearly flat, thick-walled, finely perforate, and glassy. The umbilical region is concave on both sides, but deeper on the ventral side; the aperture is a well-marked slit extending right round the inner face of the final chamber.

The stages of growth, both of the megalospheric and microspheric forms, have been identified. They present such varied aspects at different stages of growth that they might easily be mistaken for distinct species. In the megalospheric forms the proloculum is large and followed by three other chambers of equal size, the whole forming a quadrate test with rounded corners, thick-walled, and coarsely punctate on the dorsal side, with hardly noticeable sutural lines; on the ventral side it is thick-walled but smooth or glassy, the sutures rather depressed. The aperture is a small hole on the peripheral margin. In the next stage, chambers are added which rapidly increase in size and height, particularly on the dorsal side, the test becoming inaequilateral. As growth progresses the height of the chambers becomes more equally distributed on both dorsal and ventral sides, until finally, in edge view, the peripheral margin of the first convolution disappears in the middle of the slit-like aperture of the final chamber. The megalospheric form has only $1\frac{1}{2}$ convolutions with 8 chambers in the final convolution.

The microspheric form appears to be rare, and no very young individuals were observed. Balsam-mounted specimens, however, show that it commences with a very minute proloculum, followed by a large number of small chambers gradually increasing in size and inflation for two convolutions before entering upon the final convolution, which is similar to that of the megalospheric form. There is not any noticeable difference in the two adult stages.

As with many species of *Anomalina* and *Truncatulina*, the chitinous lining is very thick and dark in colour; the chambers are thus rendered very clear on the ventral side of the shell up to a considerable size. In the words of d'Orbigny: "La teinte est d'un rose violacé d'autant plus foncé qu'on s'éloigne de la dernière loge; le côté interne de chaque loge est aussi plus foncé".

Estimated diameter of microsphere, 0.01 mm.; of megalosphere, 0.08 mm. Microspheric young, one convolution about 0.44 mm. long; 0.36 mm. broad. Four-chambered megalospheric young, about 0.30 mm. long; 0.25 mm. broad; 0.15 mm. thick. Adult test averages about 1.20 mm. long, 1.0 mm. broad, 0.70 mm. thick at oral surface.

D'Orbigny recorded the species from the Falklands as "common", and also from his sounding off Cape Horn in 160 m. It is quite common at many of our stations, notably WS 83, 84, 88, 91, 93, 246, and sessile specimens in all stages of growth are of frequent occurrence.

Anomalina vermiculata bears much more resemblance to *A. coronata*, Parker and Jones, than it does to *A. polymorpha*, Costa, to which species Brady doubtfully attributed his Bermuda specimen. In fact large specimens of *A. vermiculata* can best be separated from *A. coronata* by the narrow width of their peripheral edge when looking at the apertural face, compared with the broad edge of *A. coronata*. Young individuals, on the contrary, are quite distinctive in appearance as compared with *A. coronata*, but bear some resemblance to *A. grosserugosa*, Gmbel, so far as the dorsal surface is concerned, though differing in the ventral aspect.

It is possible that *A. vermiculata* has a more southerly distribution than *A. coronata*. Brady's figure 7 on Plate 97, *Anomalina polymorpha* (?), was drawn from a specimen dredged off Bermuda at 435 fms. His figured specimens of *A. coronata* are from Prince Edward's Island and the Canary Islands. The majority of the records of *A. coronata* are from northern seas, and although Brady gives some southern records for that species, including the Falkland Islands, it is impossible to say, without examination of his specimens, to what extent *A. vermiculata* figures among them. If, as seems possible, the specimens figured by Cushman and Wickenden (C. & W. 1929, FJF, p. 14, pl. vi, figs. 6 a, b, c) from Juan Fernandez Island under the name "*Anomalina* (?) species" are *A. vermiculata*, the range of the species extends into the Pacific also.

At WS 246, close to the Falkland Islands, but outside the Continental Shelf, a very interesting specimen was found, in which the final chamber terminated in a cyst formed of very fine mud, which cyst was tightly packed with a young brood of individuals, each apparently consisting of a proloculum and one or two subsequent chambers (fig. 15). It is presumably a case of the formation of a young brood by the *Anomalina*, but, in the present state of our knowledge, one cannot be certain that the cyst and its contents do not represent a separate organism, which had become attached to the *Anomalina*.

370. *Anomalina coronata*, Parker and Jones.

Anomalina coronata, Parker and Jones, 1857, FCN, p. 294, pl. x, figs. 15-16.

Anomalina coronata, Brady, 1884, FC, p. 675, pl. xcvi, figs. 1, 2.

Anomalina coronata, Cushman, 1910, etc., FNP, 1915, p. 47, pl. xviii, fig. 5.

Three stations: WS 88, 90, 93.

Represented by single typical specimens only at each station. The original figure of Parker and Jones represents a form in which, even at its narrowest point, the peripheral edge is flat and broad throughout, and coarsely perforated. The two surfaces of the shell are comparatively devoid of perforations. Since the original publication, figures of the species have often shown a narrowing of the edge of the earlier chambers of the last convolution. This may be due to confusion of a northern species *A. coronata* with the distinctive southern form described under the name of *A. vermiculata*.

371. *Anomalina sinuosa*, Sidebottom.

Anomalina sinuosa, Sidebottom, 1918, FECA, p. 258, pl. vi, figs. 22-5.

Anomalina sinuosa, Heron-Allen and Earland, 1922, TN, p. 213.

One station: WS 93.

A single good specimen at this station, which is just within the edge of the Continental Shelf to the west of the Falkland Islands at 133 m. The occurrence of this species so far from its original habitat off the East coast of Australia is very striking. The only other records we know are our own from the Terra Nova Expedition material, between the south end of New Zealand and the Antarctic.

372. *Anomalina umbilicatula*, sp.n. (Plate XIV, figs. 40-42).

Fourteen stations: 228, 230, 235, 236; WS 91, 99, 210, 215, 217, 245, 248, 408, 409, 433.

Test free, almost exactly symmetrical and involute, consisting of $1\frac{1}{2}$ -2 convolutions with 12-15 chambers in the final convolution; peripheral edge entire, narrow, rounded. Sutural lines curving very distinctly, slightly swollen, much broader at the umbilicus than at the periphery; surface of the chambers coarsely punctate; both umbilici depressed; apertural face heart-shaped; aperture a V-shaped narrow slit on the inner edge of the final chamber. Colour, white, glassy and highly polished.

Width, 0.30-0.50 mm.; breadth, 0.28-0.38 mm.; thickness at oral face, 0.15 mm.

This handsome form is not uncommon at several stations, the best series being at WS 408 and the four "Discovery" stations. All the stations at which it was recorded are either outside or just within the Continental Shelf. It so strongly resembles some large varieties of *Nonion umbilicatula* (Montagu) that it might easily pass for that species but for its size and the flare of the umbilical recess, sometimes slightly revealing the inner extremities of the previous convolution.

It belongs to the group of *Anomalina ammonoides*, Reuss, but differs in its umbilical region, which is so nearly closed that hardly any part of the previous convolution is exposed. Many more or less involute *Anomalinae* have been described, but none of them appear to meet all the features of the Falkland form. Perhaps its nearest relation is *Anomalina complanata*, Reuss (R. 1851, FKL, p. 36, pl. iii, fig. 3) which resembles our form in the number and markings of the chambers, but is not bilaterally symmetrical and has a sharper peripheral edge and a more open umbilical region.

Genus *Carpenteria*, Gray, 1858

373. *Carpenteria lobosa*, sp.n. (Plate XV, fig. 19).

One station: WS 225.

Test large, adherent, very thin-walled especially at the surface of attachment, spreading over a branchlet of *Cellaria* sp. which it almost encircles in its growth, consisting of a few (number uncertain) of irregularly formed, dichotomously branching chambers, spreading over each other in a roughly spiral fashion, and extending at the extremities into finger-like processes closed at the ends. From the summit of the final chamber a tube extends in the direction away from the periphery. This tube, which is not vertical but horizontal, and lies in a depression between two of the earlier chambers, appears to be the principal aperture. The surface of the thin walls is polished but pustular in appearance, owing to the presence of great numbers of minute irregularly shaped papillae formed of shell-substance. The colour of individual chambers varies from pale yellow to

glassy white, but the colour is probably due to protoplasmic contents, as it is most marked in the final chamber.

Breadth of specimen, about 3.6 mm.

A single almost perfect specimen, and a fragment only were found in spite of exhaustive search among the trawl refuse from WS 225, at a depth of 162 m., but the species being sessile on zoophytes may be of more frequent occurrence than our single specimen suggests. Pending the arrival of further material, we have placed the form in the genus *Carpenteria*. It appears to have some affinities with *C. monticularis*, Carpenter, in the arrangement of its chambers and its tubular aperture, but differs very widely in its delicate shell-wall and in the lobose subdivision of the separate chambers.

Genus *Globorotalia*, Cushman, 1927

374. *Globorotalia* (*Pulvinulina*) *hirsuta* (d'Orbigny).

Rotalina hirsuta, d'Orbigny, 1839, FIC, p. 131, pl. i, figs. 37-9.

Pulvinulina canariensis, Brady (*non* d'Orbigny), B. 1884, FC, p. 692, pl. ciii, figs. 8-10.

Pulvinulina canariensis, Cushman, 1910, etc., FNP, 1915, p. 56, pl. xxiii, fig. 1.

Globorotalia hirsuta, Cushman, 1918, etc., FAO, 1931, p. 99, pl. xvii, figs. 6 a-c.

Ten stations: 53, 228, 236, 388; WS 76, 88, 90, 92, 245, 409.

Rare, and never very typical; all the specimens are small. This station is considerably to the south of 46° 40' 00" S which Brady gives as the southern limit of the species as identified by him. But he appears to have regarded *Rotalina hirsuta* as identical with *R. canariensis*, and to have adopted the latter name. D'Orbigny's figures and description indicate some marked differences, especially as regards size, and Cushman appears to be justified in reviving d'Orbigny's earlier name *R. hirsuta*, which is unmistakably the type so abundant all over the Atlantic Ocean. There is unfortunately no Type of *R. hirsuta* to be found in Paris, and the Type tube marked *R. canariensis* contains only a dead shell, opaque and obscurely marked, which throws no light upon the identity of d'Orbigny's *R. canariensis*. A single feeble specimen occurs at WS 92, which might be ascribed to *P. canariensis*, on the strength of the borders to the chambers on the dorsal side. All the other specimens are clearly *R. hirsuta*, characterized by the four chambers visible on the ventral side.

375. *Globorotalia scitula* (Brady).

Pulvinulina scitula, Brady, 1882, FKE, p. 716.

Pulvinulina patagonica, Brady (*non* d'Orbigny), B. 1884, FC, p. 693, pl. ciii, fig. 7.

Pulvinulina scitula, Balkwill and Millett, 1884, FG, p. 85, pl. iv, fig. 12 (revision *P. patagonica*, p. 4).

Globorotalia scitula, Cushman, 1927, FWCA, p. 175.

Five stations: 235; WS 88, 89, 225, 408.

Usually a few specimens only, the best at WS 88. The Falkland Islands specimens represent a common and widely distributed type, found in *Globigerina* oozes and

occasionally in in-shore deposits, all over the world. It is unfortunate that Brady, having first described this form as a distinct species, should subsequently have confused it with a quite distinct d'Orbigny type. Yet a third form has been brought into the question, which we have figured and described in our South Cornwall paper. This third form, as suggested by us, is probably the same as Terquem's *Rotalina excavata*. We are now convinced that it differs from d'Orbigny's species, and from Brady's (see H.-A. & E. 1916, FSC, p. 51, pl. ix, figs. 2-5).

376. *Globorotalia* (*Pulvinulina*) *crassa* (d'Orbigny).

Rotalina crassa, d'Orbigny, 1840, CBP, p. 32, pl. iii, figs. 7, 8.

Pulvinulina crassa, Cushman, 1910, etc., FNP, 1915, p. 58, pl. xxvii, fig. 1.

Globorotalia crassa, Cushman, LFR, IV, 1927, p. 75.

Nine stations: 48, 388; WS 90, 92, 245, 409, 431, 432, 433.

Rare; occasional specimens only, the best at 48. These stations are within, but very close to, the southern limit of the species, which Brady gives as $53^{\circ} 50' 00''$ S. The Type is missing.

377. *Globorotalia* (*Pulvinulina*) *truncatulinoides* (d'Orbigny).

Rotalina truncatulinoides, d'Orbigny, 1839, FIC, p. 132, pl. ii, figs. 25-7.

Rotalina micheliniana, d'Orbigny, 1840, CBP, p. 31, pl. iii, figs. 1-3.

Pulvinulina micheliniana, Brady, 1884, FC, p. 694, pl. civ, figs. 1-2.

Pulvinulina truncatulinoides, Rhumbler, 1900, NPF, p. 17, figs. 16-18.

Globorotalia truncatulinoides, Cushman, 1927, FWCA, p. 176.

Twenty-two stations: 48, 228, 230, 235, 236, 388; WS 83, 86, 87, 88, 89, 90, 91, 92, 93, 99, 225, 245, 248, 408, 432, 433.

Very unevenly distributed so far as frequency is concerned. At many of the stations it is represented by one or two specimens only, at others, notably 236 and WS 91, 245, 248, it is more or less plentiful, very frequent at WS 433. As a rule the specimens are small, and often very thin-walled, but at 228, 235, 236, WS 88, 432, the normal thick-walled type occurs. The Type could not be found in Paris.

378. *Globorotalia* (*Pulvinulina*) *menardii* (d'Orbigny).

Rotalia menardii, d'Orbigny, 1826, TMC, p. 273, No. 26, Modèle no. 10.

Pulvinulina menardii, Brady, 1884, FC, p. 690, pl. ciii, figs. 1, 2.

Globorotalia menardii, Cushman, 1927, FWCA, p. 175.

One station: WS 89.

Three specimens only were found at this station, which is in shallow water close to the entrance to the Magellan Straits— $53^{\circ} 01' 00''$ S, $68^{\circ} 07' 00''$ W is its exact position. This is just south of the extreme southern boundary recorded by Brady for this species, $51^{\circ} 36' 00''$ S in the South Atlantic. The specimens are much smaller than the average of bottom specimens, and one of them is apparently pelagic. The Type could not be found in Paris.

379. *Globorotalia* (*Pulvinulina*) *tumida* (Brady).

Pulvinulina menardii var. *tumida*, Brady, 1877, FNB, p. 535.

Pulvinulina tumida, Brady, 1884, FC, p. 692, pl. ciii, figs. 4-6.

Globorotalia tumida, Cushman, 1927, FWCA, p. 175.

One station: WS 245.

A single small and very feeble specimen.

Genus *Pulvinulina*, Parker and Jones, 1862

380. *Pulvinulina auricula* (Fichtel and Moll).

Nautilus auricula, var. *a*, Fichtel and Moll, 1798, TM, p. 108, pl. xx, figs. *a*, *b*, *c*.

Pulvinulina auricula, Goës, 1882, RRCS, p. 109, pl. viii, figs. 273-5.

Pulvinulina auricula, Brady, 1884, FC, p. 688, pl. cvi, fig. 5.

Seven stations: 388; WS 71, 83, 88, 92, 93, 221.

Rare and very small, the best specimens at WS 92 and 93.

381. *Pulvinulina haliotideia*, Heron-Allen and Earland.

Pulvinulina haliotideia, Heron-Allen and Earland, 1908, etc., SB, 1911, p. 338, pl. xi, figs. 6-11; 1913, CI, p. 136; 1916, FWS, p. 276.

Lamarckina haliotideia, Cushman, 1918, etc., FAO, 1931, p. 36, pl. vii, figs. 8, 9.

Six stations: 48; WS 87, 88, 92, 217, 408.

Occasional specimens only at each station; the best were seen at WS 92 and 217.

382. *Pulvinulina brongniartii* (d'Orbigny).

Rotalia brongniartii, d'Orbigny, 1826, TMC, p. 273, no. 27; 1846, FFV, p. 158, pl. viii, figs. 22-4.

Pulvinulina brogniarti (*sic*), Hantken, 1875, CSS, p. 78, pl. ix, fig. 5 (*P. budensis* in plate).

Five stations: 48; WS 86, 89, 90, 92.

Represented by single specimens at most stations. Limbate at WS 86 and 90, small and depressed at WS 92.

383. *Pulvinulina berthelotiana* (d'Orbigny).

Rotalia berthelotiana, d'Orbigny, 1839, FIC, p. 130, pl. i, figs. 31-3.

Pulvinulina berthelotiana, Brady, 1884, FC, p. 701, pl. cvi, figs. 1 *a-c*.

Pulvinulina berthelotiana, de Amicis, 1893, CFP, p. 455, pl. iii, figs. 12 *a-c*.

Two stations: 51; WS 86.

Very rare but fairly typical specimens at WS 86. The Type could not be found in Paris.

384. *Pulvinulina concentrica*, Parker and Jones.

Pulvinulina concentrica, Parker and Jones (MS.), Brady, 1864, RFS, p. 470, pl. xlviii, fig. 14.

Pulvinulina concentrica, Brady, 1884, FC, p. 686, pl. cv, fig. 1.

Pulvinulina concentrica, Heron-Allen and Earland, 1908, etc., SB, 1909, p. 683, pl. xx, fig. 4 *a-c*.

Two stations: 388; WS 88.

Very rare, but the specimens are large and quite typical. Exceptionally fine at 388.

385. *Pulvinulina elegans* (d'Orbigny).

Rotalia (Turbinulina) elegans, d'Orbigny, 1826, TMC, p. 276, no. 54.

Rotalia partschiana, d'Orbigny, 1846, FFV, p. 153, pl. vii, fig. 28-30 and pl. viii, figs. 1-3.

Pulvinulina elegans, Brady, 1884, FC, p. 699, pl. cv, figs. 4-6.

Epistomina elegans, Cushman, 1925, etc., LFR, III, 1927, p. 182, pl. xxxi and xxxii.

Eleven stations: 228, 230, 235, 236; WS 73, 76, 86, 90, 99, 408, 433.

Large and perfectly typical specimens are numerous at 228, 230, 235, 236 and WS 408, all beyond the Continental Shelf. From the remaining stations, all of which except WS 99 are on the Shelf, only very small feeble specimens occur, which are referred with some hesitation to this species. The Type is missing.

386. *Pulvinulina umbonata* (Reuss) (Plate XV, figs. 16-18).

Rotalina umbonata, Reuss, 1851, FSUB, p. 75, pl. v, figs. 35 a-c.

Pulvinulina umbonata, Hantken, 1875, CSS, p. 77, pl. ix, fig. 8.

Truncatulina tenera, Brady, 1884, FC, p. 665, pl. xcv, fig. 11.

Pulvinulina umbonata, Brady, 1884, FC, p. 695, pl. cv, fig. 2 a-c.

Pulvinulina umbonata, Cushman, 1910, etc., FNP, 1915, p. 60, pl. xxvii, fig. 2.

Twelve stations: 228, 230, 235, 236; WS 88, 90, 99, 215, 217, 408, 409, 433.

Excellent specimens are found at all the stations, perhaps the best at WS 99. With the exception of WS 88, 90, 215, 217, all the stations are beyond the Continental Shelf. We had originally identified the majority of the specimens as *Truncatulina tenera*, Brady, but after a further close examination and a comparison with Brady's own mounts of the two species from adjacent localities off the west coast of Patagonia, we are unable to see any material, much less specific, difference between the two forms, and consider that Brady's species must lapse in favour of the earlier name of Reuss. Brady's specimens differ only in the fact that *T. tenera* is thin-walled and hyaline compared with *P. umbonata*.

387. *Pulvinulina exigua*, Brady.

Pulvinulina exigua, Brady, 1884, FC, p. 696, pl. ciii, figs. 13, 14.

Pulvinulina exigua, Cushman, 1910, etc., FNP, 1915, p. 60, pl. xxiii, fig. 5.

Twenty-three stations: 51, 53, 228, 230, 236; WS 76, 77, 79, 80, 83, 88, 89, 90, 92, 93, 95, 97, 98, 99, 109, 215, 217, 245.

Widely distributed and very often abundant in the finer material. The best series of specimens was obtained at WS 97, almost equally good at WS 76, 83, 92, 93 and 217.

388. *Pulvinulina patagonica* (d'Orbigny) (Plate XV, figs. 20-22).

Rotalina patagonica, d'Orbigny, 1839, FAM, p. 36, pl. ii, figs. 6-8.

Eponides patagonica, Cushman, 1927, FWCA, p. 162, pl. v, figs. 1, 2.

One station: WS 221.

A single specimen only. D'Orbigny records his species from the coast of Patagonia and from the sounding off Cape Horn, but does not refer to its presence in the Falkland Islands. His specific name has been used by Brady for a very different form (*vide Globorotalia scitula* (Brady), No. 375).

The Type tube in the Paris collection contains two specimens, which are in themselves evidence that the collection has been mishandled by some curator without much knowledge of the subject. One of them is *Rotalina (Pulvinulina) patagonica*, a very good specimen comparable with d'Orbigny's figure. The other is an equally good specimen of *Rosalina (Discorbina) peruviana*.

389. *Pulvinulina consobrina* (d'Orbigny).

Rosalina consobrina, d'Orbigny, 1839, FAM, p. 46, pl. vii, figs. 4-6.

One station: WS 83.

At this station a specimen was found which seems to be referable to d'Orbigny's *Rosalina consobrina*, originally described from the Peruvian coast. The specimens in the Type tube in Paris appear to be of varied origin and none agree very closely with d'Orbigny's figures. It is possible that other specimens have been overlooked owing to their general similarity to *P. karsteni*.

390. *Pulvinulina alvarezii* (d'Orbigny) (Plate XV, figs. 23-25).

Rotalina alvarezii, d'Orbigny, 1839, FAM, p. 35, pl. i, fig. 21; pl. ii, figs. 1, 2.

Two stations: WS 87, 89.

D'Orbigny's species was described from Patagonia and the Falkland Islands as "very rare". Our specimens are assigned with some hesitation to this species, as his figures are apparently conventionalized, especially that showing the inferior or oral surface. It seems probable that the species represents only a transition form between *P. karsteni* and *P. peruviana*. The Type so designated could not be found in Paris as such, but in a tube labelled "*Rotalina ungeriana* (Baden-Vienne)" are four shells, three of which are in good condition, and which agree quite well with d'Orbigny's figure, *ut supra*, and may perhaps be the missing Types.

391. *Pulvinulina karsteni* (Reuss) (Plate XV, figs. 26-36).

Rotalia karsteni, Reuss, 1855, KKM, p. 273, pl. ix, fig. 6.

Pulvinulina karsteni, Brady, 1864, RFS, p. 470, pl. xlviii, fig. 15; 1884, FC, p. 698, pl. cv, figs. 8, 9.

Pulvinulina karsteni, Heron-Allen and Earland, 1916, FWS, p. 276, pl. xlii, figs. 34-7.

Pulvinulina frigida, Cushman, 1922, FHB, p. 12.

Thirty-four stations: 48, 51, 53; WS 71, 73, 76, 77, 79, 80, 83, 86, 87, 88, 89, 90, 91, 92, 93, 95, 96, 97, 98, 108, 109, 210, 213, 215, 217, 219, 221, 225, 245, 246, 248.

Almost universally distributed and often very abundant. The best and most typical at WS 86, 87, 88, 210. The species is subject to great variation. Reuss's species was from the Chalk of Mecklenberg, and the recent specimens are generally more in agreement with the figures of Brady, which indicate an organism with a more flattened base. Cushman (*ut supra*) has suggested the separation of the recent forms under the name of *P. frigida*, but in view of the great range of variation which we have observed in the Falkland material, we have no hesitation in continuing to use Reuss's specific name to cover the group.

Reuss's original figure shows an almost equally biconvex test with seven chambers in the final convolution. This typical form occurs at nearly every station, but often in company with well marked variations. At WS 73, 97, 98, 109, 210, 217, either with or without the type, a form in which the superior face is only slightly curved, almost flat in some specimens, is found. The inferior or oral face has the normal convexity, which appears accentuated by contrast with the other face. At WS 79, 86, 219, the variation takes the form of a highly convex superior, and nearly flat inferior, or oral face. The number of chambers also occasionally varies. At WS 210, the specimens are very large, both typical and flat-topped varieties occur, and many have as many as nine chambers in a convolution. At WS 215 and 248, the same variation occurs, 8-9 chambers being found. This increase in the number of chambers is not in our opinion sufficient to modify the allocation of the specimens to *P. karsteni*, although it seems to indicate a form intermediate between *P. karsteni* and *P. peruviana*, in which latter species eleven chambers go normally to the convolution. Occasional specimens occur with limbate sutures on the superior face, a feature otherwise characteristic of *P. peruviana*.

392. *Pulvinulina peruviana* (d'Orbigny) (Plate XV, figs. 37-39).

Rotalina peruviana, d'Orbigny, 1839, FAM, p. 35, pl. ii, figs. 3-5.

Eponides peruviana, Cushman and Kellett, 1929, WCSA, p. 10, pl. iv, fig. 5.

One station: WS 73.

At this station which is in-shore to the north of the Falkland Islands, two specimens were found, which appear to be attributable to d'Orbigny's species, which was described originally from the coasts of Peru and Bolivia, and has recently been recorded, after the lapse of many years, from the west coast of South America, in its original locality (*ut supra*).

The difference between *P. peruviana* and *P. karsteni* lies in the greater convexity and fewer chambers of the latter species. In *P. peruviana*, there are eleven chambers *per* convolution, and the sutural lines are also slightly limbate on the superior face. It seems very possible that *P. peruviana* represents a Pacific, and *P. karsteni* an Atlantic form, and that the two species are very closely related.

Paris Types: there are two tubes both labelled "Amérique méridionale". The first contains two specimens, one of which is broken and unrecognizable, the other is a broken and dead shell, of which it can only be said that it may at one time have been recognizable as d'Orbigny's species. Now, the dorsal face is too decomposed to count the numbers of chambers on which identification would primarily rest; but it is certain that the specimen never had the limbate sutures of which d'Orbigny makes a point. The second tube contains five specimens, four of which are in good condition. They do not conform to d'Orbigny's description in so far as the sutures are concerned, these being nearly flush or even depressed, but they do generally agree with the form of the species, although none of them has more than ten chambers against the eleven shown in d'Orbigny's figure. There is no particular constancy in the specimens, and they show a considerable range in convexity.

Genus *Rotalia*, Lamarck, 1804

393. *Rotalia beccarii* (Linné).

Nautilus beccarii, Linné, 1767, SN (ed. xi), p. 1162, no. 276.

Rotalia beccarii, Brady, 1884, FC, p. 704, pl. cvii, figs. 2, 3.

One station: 228.

Only a single small but quite typical specimen at this station, which is between the Falkland Islands and the Burdwood Bank. The extraordinary absence of this cosmopolitan form from the area is quite inexplicable, especially as no other local species replaces it.

394. *Rotalia broeckiana*, Karrer.

Rotalia broeckiana, Karrer, 1878, FTTL, p. 98, pl. v, fig. 26.

Rotalia broeckiana, Brady, 1884, FC, p. 705, pl. cvii, fig. 4 a-c.

One station: WS 86.

A single rather small individual.

394 A. *Rotalia soldanii*, d'Orbigny.

Rotalia (Gyroidina) soldanii, d'Orbigny, 1826, TMC, p. 278, no. 5, Modèle no. 36.

Rotalia soldanii, Brady, 1884, FC, p. 706, pl. cvii, figs. 6 and 7.

Gyroidina soldanii, Cushman, 1918, etc., FAO, 1931, p. 38, pl. viii, figs. 3-8.

One station: WS 433.

A few pauperate specimens.

395. *Rotalia clathrata*, Brady (Plate XVI, figs. 1-4).

Rotalia clathrata, Brady, 1884, FC, p. 709, pl. cvii, figs. 8, 9.

Rotalia clathrata, Jones and Chapman, 1900, MCI, p. 232, pl. xx, fig. 2.

Rotalia clathrata, Heron-Allen and Earland, 1922, TN, p. 220.

Fourteen stations: 48, 388; WS 71, 83, 84, 86, 87, 88, 89, 90, 91, 92, 225, 245 (see also p. 309).

Moderately frequent at many stations, the best at WS 84, 86, 87, 88. At the latter, in particular, some exceptionally fine specimens were found, up to 1.0 mm. in diameter (fig. 1), quite indistinguishable from those of the New Zealand area. At WS 89 and 90, which are at the entrance to the Magellan Straits, the specimens are all very small and starved. The average size of specimens in the area is between 0.40 and 0.50 mm. in greatest diameter.

The occurrence of *R. clathrata* in the Falkland area is of extreme interest, as apparently representing the migration of a species from its original habitat. It will be noted that nearly all the stations are situated in the area to the south of the Falkland Islands, and between them and the entrance to the Pacific, and the best stations, WS 86, 87, 88, are at the entrance to the Falkland area. The species reaches its maximum development in the Australian and New Zealand seas. Brady also records its occurrence from the islands off the west coast of Patagonia, and figures specimens from that area to contrast them with those from New Zealand, which are larger and more strongly marked

and also more convex on the dorsal side. The general form and markings of the Falkland Islands specimens vary considerably, ranging from the very strong specimens already referred to at WS 88, to specimens even more depressed than Brady's Patagonian figure. In some instances the specimens are so flat that they might easily be taken, at a glance, for *Polystomella macella* (F. & M.). In the low elevation of the dorsal side, the specimens generally conform to the Patagonian type, but there are a sufficient number of intermediate and high-domed specimens to indicate that the height of the spire is not a feature of specific value.

Sub-family *TINOPORINAE*

Genus *Gypsina*, Carter, 1877

396. *Gypsina inhaerens* (Schultze).

Acerculina inhaerens, Schultze, 1854, OP, p. 68, pl. vi, fig. 12.

Gypsina inhaerens, Brady, 1884, FC, p. 718, pl. cii, figs. 1-6.

Gypsina inhaerens, Goës, 1894, ASF, p. 91, pl. xv, fig. 787.

Three stations: 388; WS 84, 88.

Common on shell fragments and stones, the best at 388 and WS 88. The specimens grow, usually, in a more or less heaped-up, but at the same time depressed cone, and are extremely difficult to separate from the few larger specimens which are suspected of being a primitive form of *Polytrema* q.v.

397. Genus *Polytrema*, Risso, 1826.

At 388, WS 225 and 246, a few specimens of an organism of suggestive appearance, attached to shell fragments and Polyzoa, conveyed an impression that it might be *Polytrema*. The fragments were sent to Dr S. H. Hickson, F.R.S., who expressed the opinion that he could determine with sufficient certainty the presence of the "pillar pores" characteristic of that genus to assign them thereto. They will not be referable to the species *P. miniaceum*, but they may represent a much more primitive and hitherto undescribed species in the genus. The Falkland area is far removed from any hitherto recorded locality for the genus, and the matter must remain in abeyance pending the arrival of more material.

Family NUMMULINIDAE

Sub-family *POLYSTOMELLINAE*

Genus *Nonion*, Montfort, 1808

398. *Nonion incrassatum* (Fichtel and Moll) (Plate XVI, figs. 5, 6).

Nautilus incrassatus, Fichtel and Moll, 1798, TM, p. 38, pl. iv, figs. a-c.

Nonionina incrassata, Terrigi, 1883, CQ, p. 205, pl. iv, fig. 52.

Nonionina incrassata, Gümbel, 1885, GB, 1, pt ii, p. 421, composite fig. 266 (24).

Two stations: 48; WS 215.

A single specimen at 48 and two very fine specimens at WS 215 appear to be nearer to Fichtel and Moll's figure than to any other with which we are acquainted. They are

characterized by the large number of chambers (14–16) visible in the final convolution, and a thick rounded edge, but they have a rather sunken umbilicus marked by granulations instead of the umbilical boss indicated by Fichtel and Moll. The chambers are inflated and the sutures depressed. When the shell is glassy, the light on the highest points of the chambers gives a false impression of stellate limbation to the test.

Very similar specimens occur in British material, and have usually been recorded as *N. asterizans*. The Falkland specimens of *N. asterizans*, however, present so many differences that we have thought it desirable to separate them. Fichtel and Moll's name has been little used, but is the geno-holotype of *Nonion*.

399. *Nonion depressulum* (Walker and Jacob).

Nautilus depressulus, Walker and Jacob, 1798, AEM, p. 641, pl. xiv, fig. 33.

Nonionina depressula, Brady, 1884, FC, p. 725, pl. cix, figs. 6, 7.

Nonionina depressula, Chapman, 1914, FORS, p. 70, pl. v, fig. 41.

Fourteen stations: 48, 51, 228, 235, 388; WS 88, 90, 92, 221, 245, 248, 408, 409, 433.

The specimens are often numerous but never very large, nor are they particularly typical. They are generally small and pauperate, the best being at WS 88. Very good also at WS 408, but here they are small though typical. There is as usual considerable variation, especially in the direction of *N. stelligera*, many of the specimens, especially at WS 92, showing limbate markings at the umbilicus.

400. *Nonion asterizans* (Fichtel and Moll).

Nautilus asterizans, Fichtel and Moll, 1798, TMI, p. 37, pl. iii, figs. e–h.

Polystomella crispa var. (*Nonionina*) *asterizans*, Parker and Jones, 1865, NAAF, p. 403, pl. xiv, fig. 35; pl. xvii, fig. 54.

Nonionina asterizans, Heron-Allen and Earland, 1913, CI, p. 143, pl. xiii, figs. 12, 13.

Six stations: 51; WS 83, 88, 90, 93, 408.

Never very common and, as with all the genus, the specimens are as a rule small. Good and typical specimens at WS 88 and 93.

401. *Nonion umbilicatum* (Walker and Jacob).

Nautilus umbilicatus, Walker and Jacob, 1798, AEM, p. 641, pl. xiv, fig. 34.

Nautilus umbilicatus, Montagu, 1803–8, TB, p. 191; Suppl. p. 78, pl. xviii, fig. 1.

Nonionina barleeani, Williamson, 1858, RFGB, p. 32, figs. 68, 69.

Nonionina umbilicatus, Terrigi, 1883, CQ, p. 203, pl. iv, fig. 48.

Nonion barleeanum, Cushman, 1918, etc., FAO, 1930, p. 11, pl. iv, fig. 5.

Nine stations: 236; WS 88, 91, 99, 215, 221, 248, 408, 409.

Rare: all the specimens are very small. The figures of Walker and Jacob, and of Montagu are more or less unrecognizable, but the specific name has become definitely associated with a species very common in northern waters. This species was first admirably illustrated by Williamson (*ut supra*).

402. *Nonion pompilioides* (Fichtel and Moll).

Nautilus pompilioides, Fichtel and Moll, 1798, TM, p. 31, pl. ii, figs. a-c.

Nonionina pompilioides, Brady, 1884, FC, p. 719, pl. cix, figs. 10, 11.

Nonionina pompilioides, Cushman, 1910, etc., FNP, 1914, p. 25, pl. xvii, fig. 2.

One station: WS 86.

A single small but typical specimen.

403. *Nonion sloanii* (d'Orbigny) (Plate XVI, figs. 7, 8).

Nonionina sloanii, d'Orbigny, 1839, FC, p. 46, pl. vi, figs. 18 and 18 bis.

Nonion sloanii, Cushman, 1918, etc., FAO, 1930, p. 9, pl. iii, figs. 6-8.

Four stations: WS 80, 83, 99, 225.

This is not a very satisfactory species. It appears to be merely a form of *N. grateloupi* characterized by greater turgidity and fewer chambers. It is possibly intermediate between *N. grateloupi* and *N. scapha*. Specimens referable to it are infrequent, but a good series was obtained at WS 83 and 225. It is nowhere common. The Type specimen in Paris is much encrusted, but is recognizable, the sutures being comparatively shallow.

404. *Nonion stelligerum* (d'Orbigny).

Nonionina stelligera, d'Orbigny, 1839, FIC, p. 128, pl. iii, figs. 1, 2.

Nonionina stelligera, Brady, 1884, FC, p. 728, pl. cix, figs. 3-5.

Nonionina stelligera, Heron-Allen and Earland, 1916, FWS, p. 280, pl. xliii, figs. 8-10.

Seventeen stations: 48, 51, 53, 236, 388; WS 83, 86, 88, 89, 90, 91, 92, 93, 217, 221, 245, 408.

This is probably the most abundant and characteristic species of the genus, often fairly numerous and better developed and larger than most of the other species. The local type is characterized by six chambers, and appears to be present in two distinct forms which probably represent the megal- and microspheric stages. The larger form is characterized by chambers rapidly increasing in the degree of inflation, so that the final chamber is very often very greatly swollen. In the smaller form, the shell is compressed throughout its growth. The finest series was found at WS 88, where both forms were observed. The larger form was noted at 48 and WS 93 and 245, the smaller form at WS 89, 90 and 92. The Type is missing in Paris.

405. *Nonion boueanum* (d'Orbigny).

Nonionina boueana, d'Orbigny, 1846, FFV, p. 108, pl. v, figs. 11, 12.

Nonionina boueana, Terrigi, 1889, CP, p. 119, pl. x, fig. 5.

Nonionina boueana, Fornasini, 1900, FA, p. 400, fig. 49.

Two stations: WS 92, 245.

Excellent specimens at WS 245, identical with the Paris Type, less typical at the other stations.

406. *Nonion grateloupi* (d'Orbigny) (Plate XVI, figs. 9, 10).

Nonionina grateloupi, d'Orbigny, 1826, TMC, p. 294, no. 19; 1839, FC, p. 46, pl. vi, figs. 6, 7.

Nonionina grateloupi, Fornasini, 1904, SOF, p. 12, pl. iii, fig. 5.

Seven stations: 235; WS 76, 83, 88, 89, 93, 99.

This species, so common in the warmer waters of the West Indian region, is comparatively rare in the Falkland area, and at most of the stations the specimens are very small and pauperate. Very good and typical specimens were obtained however at WS 83, 88 and 93, particularly at the latter station. The Type is missing.

407. *Nonion scapha* (Fichtel and Moll).

Nautilus scapha, Fichtel and Moll, 1798, TM, p. 105, pl. xix, figs. d-f.

Nonionina scapha, Brady, 1865, RFND, p. 106, pl. xii, fig. 10; 1884, FC, p. 780, pl. cix, figs. 14, 15.

Sixteen stations: 228, 230, 235; WS 76, 83, 99, 210, 215, 217, 221, 225, 245, 248, 408, 409, 433.

Widely distributed and often fairly common. Excellent specimens at WS 83, 99, 215, 217, 221 and 245; WS 217, in particular, furnishing a striking series. There is, as usual, great variation both in the length and thickness of the test at the oral face, even in specimens from the same station. At some stations, particularly 228 and WS 76, 408, specimens approaching *N. labradorica* (J. W. Dawson) (D. 1860, TFL, p. 191, fig. 4; D. 1870, GStL, p. 174, fig. 5) (*G. M. Dawson, N. scapha* var. *labradorica*) occur.

408. *Nonion pauperatum* (Balkwill and Wright).

Nonionina pauperata, Balkwill and Wright, 1885, DIS, p. 353, pl. xiii, figs. 25, 26.

Nonionina pauperata, Heron-Allen and Earland, 1908, etc., SB, 1911, p. 342, pl. xi, figs. 16, 17.

Nonion pauperatum, Cushman, 1918, etc., FAO, 1930, p. 13, pl. v, figs. 4, 5, 7.

Seven stations: 51, 388; WS 88, 89, 90, 92, 245.

Never very common, but quite typical. An excellent series at WS 88. The specimens are absolutely indistinguishable from those found in its locality of origin, the British Isles. It is clearly a very widely distributed species, although the records are so few.

Genus *Nonionella*, Cushman, 1926

Whilst this paper was in course of preparation we had occasion to publish the following paragraph (H.-A. & E. 1930, FPD, p. 193): "The genus *Nonionella* was instituted by Cushman in 1926 (C. 1925, etc., LFR, II, 1926, p. 64) supplementing *Nonionina*. It includes those species having inaequilateral tests due to the chambers developing lobed extensions on the ventral side at their umbilical ends, which cover the umbilicus itself. It is questionable whether the genus has biological significance, because the formation of inaequilateral tests is a common feature of variation in many species of *Nonionina*, but for systematic purposes *Nonionella* is useful for the separation of species which are normally asymmetrical". The much extended experience derived from the examination of the Discovery material has amply confirmed our views.

409. *Nonionella auris* (d'Orbigny) (Plate XVI, figs. 17-19).

Valvulina auris, d'Orbigny, 1839, FAM, p. 47, pl. ii, figs. 15-17.

Nonionella auris, Cushman and Kellett, 1929, WCSA, p. 5, pl. i, fig. 9; pl. ii, figs. 2, 3.

Seven stations: 228; WS 76, 83, 86, 210, 215, 225.

Never frequent, indeed generally rare, but a good many specimens have been obtained. Most numerous at WS 83, where it was found of all sizes. The best specimens at WS 215, 225; at 228 and WS 210 all the specimens were very small. Large specimens measured 0.50 mm. in breadth, 0.40 mm. in width and 0.30 mm. in thickness at the oral face.

D'Orbigny's species is a typical Pacific form. He does not record it at all from the Falkland Islands, but only from the Chilean and Peruvian coasts "between 34° S and the equator", and he records it as very common, in fact at Payta the species "formed $\frac{9}{10}$ ths of the material gathered". There are two Type tubes in Paris. One marked "Chile and Peru" contained no specimens of *N. auris*, but varieties of *N. scapha* and *N. boueana*. The second tube labelled "Amérique méridionale" contains specimens identical with those which we figure.

410. *Nonionella iridea*, sp.n. (Plate XVI, figs. 14-16).

Six stations: 236; WS 93, 217, 221, 248, 433.

Test minute, hyaline, consisting of about 12-14 chambers, arranged inaequilaterally in an evolute spiral. Six or seven of the chambers are exposed on one side of the test, the whole of the series more or less visible on the other. The primordial chamber often appears as a central boss. Sutures depressed, and chambers more or less inflated. Peripheral edge broad, slightly lobulate. Colour glassy to white, often iridescent owing to diffraction spectra caused by the thinness of the shell.

In appearance this little shell bears considerable resemblance to *Nonionella auris* (d'Orbigny), though differing in the number of chambers and size. It was at first thought that it might have some connection with the life-history of that species, but this theory was abandoned when its distribution was found to be quite different. Zoologically, we think that it is probably no more than a starved and pauperate form of *N. scapha* (Fichtel and Moll) which has assumed the inaequilateral (*Nonionella*) mode of growth perhaps as a result of unfavourable conditions of existence. It is much more abundant in the South Georgia area, where it is frequently one of the dominant species, than in the Falklands; its limited distribution in the latter area may perhaps indicate that it is an introduced form which has not yet succeeded in establishing itself widely.

There is a considerable amount of variation in the degree of inflation of the chambers, and this, in its turn, affects the general appearance of the shell.

Breadth averages 0.20 mm.; width, 0.15 mm.; thickness at oral face, 0.11 mm.

411. *Nonionella chiliensis*, Cushman and Kellett (Plate XVI, figs. 11-13).

Nonionella chiliensis, Cushman and Kellett, 1929, WCSA, p. 6, pl. ii, figs. 4 a-c.

One station: WS 91.

At this station, which is just on the edge of the Continental Shelf between the Falkland Islands and the Straits of Magellan, a single specimen was found which appears to agree with the figure and description of *N. chiliensis*, recently described from the Chilean coast. The specimen is a dead and worn shell and may have drifted a long way. The specimen measures 0.65 mm. in breadth, and 0.55 mm. in width.

The authors remark that "at first glance this might not be thought to be a *Nonionella*". With this we agree, but in the absence of further material are not prepared to question the assignment.

Genus *Elphidium*, Montfort, 1808

412. *Elphidium* (*Polystomella*) *incertum* (Williamson) (Plate XVI, figs. 20, 21).

Polystomella umbilicatula var. *incerta*, Williamson, 1858, RFGB, p. 44, fig. 82 a.

Polystomella decipiens, Heron-Allen and Earland (*non* Costa), 1916, FWS, p. 282, pl. xliii, figs. 20-22.

Elphidium incertum, Cushman, 1918, etc., FAO, 1930, p. 18, pl. vii, figs. 4-9.

Four stations: 51; WS 86, 89, 90.

Williamson's variety (*P. umbilicatula* var. *incerta*) which, in the absence of any specimens of the typical *P. striato-punctata* (Fichtell and Moll), may claim the earliest name for the cooler water types so generally assigned to Fichtel and Moll's species, is by no means common in this material compared with its abundance in northern waters, but excellent specimens in considerable numbers occur at WS 89 and 90.

413. *Elphidium* (*Polystomella*) *excavatum* (Terquem) (Plate XVI, figs. 22, 23).

Polystomella umbilicatula, Williamson (*non* W. & J.), 1858, RFGB, p. 42, fig. 81.

Polystomella excavata, Terquem, 1875, etc., APD, 1875, p. 25, pl. ii, fig. 2.

Elphidium excavatum, Cushman, 1918, etc., FAO, 1930, p. 21, pl. viii, figs. 1-7.

Two stations: WS 89, 92.

Under this name Terquem separated the very common northern type which Williamson had earlier figured admirably under the erroneous designation *P. umbilicatula*, Walker (and Boys). The specimens are curiously rare in the Falkland Islands material, probably owing to the water being of too high a salinity. On the British Coasts, the species reaches its maximum development in numbers and size under estuarine conditions.

414. *Elphidium* (*Polystomella*) *articulatum* (d'Orbigny).

Polystomella articulata, d'Orbigny, 1839, FAM, p. 30, pl. iii, figs. 9, 10.

Elphidium articulatum, Cushman, 1918, etc., FAO, 1930, p. 26, pl. x, figs. 6-8.

Three stations: 51, 235; WS 217.

This species, recorded by d'Orbigny from the Falkland Islands, is rare in our material, probably on account of the too great depth, as Cushman reports it as being common in the shallow water gatherings made by Dr Waldo Schmitt in the same area. The Type in Paris appears to have been transposed. The tube labelled *P. articulata* contains only a single specimen covered with efflorescence; when this was removed by careful washing,

it disclosed a sharp-edged form with twelve slightly inflated chambers; the sutures and fossettes are deeply stained with iron, the rest of the shell white. It is clearly *not* the Type of *P. articulata*, but is possibly a fossil from the Vienna beds, suggesting *P. flexuosa* (d'O. 1846, FFV, p. 127, pl. vi, figs. 15, 16) although the chambers are not so numerous as in d'Orbigny's figure.

415. *Elphidium* (*Polystomella*) *alvarezianum* (d'Orbigny) (Plate XVI, figs. 24, 25).

Polystomella alvareziana, d'Orbigny, 1839, FAM, p. 31, pl. iii, figs. 11, 12.

Elphidium alvarezianum, Cushman, 1918, etc., FAO, 1930, p. 18, pl. vii, figs. 1-3.

Eight stations: 48, 51; WS 83, 86, 92, 99, 215, 408.

D'Orbigny recorded his species from the coast of Patagonia and the Falkland Islands. It is a fairly distinctive form, and is probably widely distributed in shallower waters than that from which most of the Discovery material emanated. But it is fairly abundant, and excellent specimens occur at several stations, notably 48 and WS 86. D'Orbigny records the colour as being "bluish white", presumably this merely refers to a hyaline condition. The majority of specimens present this appearance.

Breadth, about 0.65 mm.; width, 0.55 mm.; thickness at oral face, 0.25 mm.

The Type specimen is not to be found in Paris.

416. *Elphidium* (*Polystomella*) *magellanicum*, sp.n. (Plate XVI, figs. 26-28).

Two stations: WS 89, 90.

Test free, hyaline, compressed, exhibiting five to six chambers in the outer convolution. Sutures strongly depressed, chambers slightly inflated, giving a markedly lobulate peripheral edge. The sutural depressions are filled with very finely granular matter, giving a somewhat snow-like surface, contrasting strongly with the inflated glassy chambers, which are generally quite transparent. Underneath the granular snow-like matter in the sutures, the "fossettes" are concealed, but in young specimens they are plainly visible.

Dimensions, breadth, up to 0.35 mm.; width, 0.30 mm.; thickness at oral face, 0.12 mm.

The species occurs only at WS 89 and 90, which are in shallow water (23 and 82 m.) on the opposite (north and south) sides of the eastern entrance to the Straits of Magellan. In some respects they resemble the specimens figured by us from the West of Scotland (H.-A. & E. 1916, FWS, p. 281, pl. xliii, figs. 11-19) as *P. faba*, Fichtel and Moll, but they are more compressed and more lobulate, and the "fossettes" are much more distinct.

417. *Elphidium* (*Polystomella*) *lessonii* (d'Orbigny) (Plate XVI, figs. 29, 30).

Polystomella lessonii, d'Orbigny, 1826, TMC, p. 284, no. 6; 1839, FAM, p. 29, pl. iii, figs. 1, 2.

Polystomella macella, Brady, 1884, FC, pl. cx, fig. 9.

Polystomella lessonii, Fornasini, 1904, SOF, p. 13, pl. iii, fig. 9.

Elphidium lessonii, Cushman, 1918, etc., FAO, 1930, p. 22, pl. ix, figs. 1-4.

Fourteen stations: 48, 51; WS 71, 73, 76, 83, 86, 88, 93, 97, 210, 225, 246, 248.

Widely distributed, and often large and common. The best at WS 86, excellent specimens also at 48 and WS 83, 248. The Type was not to be found in Paris.

P. lessonii is usually regarded as a synonym of *P. macella*, but it is fairly distinctive, and is certainly a very localized form. It cannot be confused with the *P. macella* of European seas. D'Orbigny's records are from the coast of Patagonia and the Falkland Islands, and the species is apparently confined to this area.

418. *Elphidium* (*Polystomella*) *macellum* (Fichtel and Moll).

Nautilus macellus (var. *a*), Fichtel and Moll, 1798, TM, p. 66, pl. x, figs. *e-g*.

Polystomella macella, Brady, 1884, FC, p. 737, pl. cx, figs. 8, 11 (only).

Elphidium macellum, Cushman, 1925, etc., LFR, v, 1929, p. 18, pl. iv, figs. 1, 2.

Six stations: 53; WS 84, 88, 91, 93, 215.

Very rare, but excellent specimens, in no way distinguishable from the *P. macella* of European waters, were obtained at 53 and almost equally good at WS 88. At WS 93, a young specimen with a minutely spinous periphery occurred. *P. macella* may be distinguished from *P. lessonii* by the sharp peripheral edge. Both species are compressed, but in *P. lessonii* the periphery is rounded.

419. *Elphidium* (*Polystomella*) *owenianum* (d'Orbigny) (Plate XVI, figs. 31, 32).

Polystomella oweniana, d'Orbigny, 1839, FAM, p. 30, pl. iii, figs. 3, 4.

Elphidium owenianum, Cushman, 1918, etc., FAO, 1930, p. 21, pl. viii, figs. 10-12.

Fifteen stations: 48; WS 71, 72, 83, 84, 86, 87, 88, 90, 91, 93, 95, 210, 225, 248.

Widely distributed and often very common, the best at WS 71, 86, 88, 91 and 93, particularly WS 71.

We record our specimens under this name merely in deference to the fact that d'Orbigny recorded his species from the adjacent coast of Patagonia, where he describes it as "rare". He does not mention its occurrence in the Falkland Islands. *P. oweniana* has usually been regarded as a synonym of *P. crista* and, as a matter of fact, at least 75 per cent of the Falkland specimens would pass without hesitation for the British form, which since 1848 at least has been universally known as *P. crista*. The most recent school of taxonomy inclines to the separation under separate specific names of what the old school regarded merely as local varieties, and hence in the recently published monograph of the Atlantic Foraminifera (Cushman, FAO, 1918 etc., 1930) we find that *P. crista* hardly figures at all, the author preferring to reserve his opinion of the identity of the numerous records of that species for a more intensive study of the genus. For ourselves, we take the view that *P. crista* (or *Elphidium crispum*) (Linn.) is a polymorphic species, and we should prefer to retain this long established name, whether dealing with the larger Mediterranean form with the clear prominent and central umbo such as, no doubt, Plancus had before him when he drew the miserable figure upon which the species is based (*De conchis minus notis*, Venice, 1739, p. 10, pl. i, fig. 2), or whether dealing with the more flattened form which Williamson figured so admirably in 1858 (W. 1858, RFGB, p. 40, pl. iii, figs. 78, 79), and upon which so many hundreds

of records must have been established. We regard them merely as the local types of one species of almost world-wide distribution. Between these two extremes almost every conceivable variation can be found, and no scientific purpose appears to be served by the multiplication and resuscitation of useless specific names.

The Falkland specimens present considerable variation in the thickness of the shell. D'Orbigny separated his species from *P. lessonii* "par son centre ombilical convexe au lieu d'être concave", but, as a matter of fact, the Falkland specimens show great range of variation. In some the umbilicus is highly convex and clear, and except for the smaller size of the specimens, are of the Mediterranean type; in the others the shell is almost flattened on both sides, and at WS 86 the flattening goes to the extent of a depressed umbilicus. Between these extremes every possible variation is to be found.

The Paris Type tube contained five specimens; one of them is entirely destroyed by efflorescence, and one is *P. alvareziiana*, a very good specimen from which the figure of that species might have been drawn. Of the other three, one is identical with d'Orbigny's figure, the other two represent transitional stages towards the formation of the central umbo which distinguishes *P. crista*.

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The number of authorities referred to in the synonymies of the 435 species described in this Monograph is so great that it has been necessary to make every effort to economise space. The principle, therefore, first adopted by us in the Clare Island Monograph, has been followed here.

Names of authors, titles of articles, and full bibliographical references to the Transactions and Proceedings in which they are to be found are given in this Bibliography, some lengthy titles being shortened, as follows:

AMNH. = Annals and Magazine of Natural History, London.

JRMS. = Journal of the Royal Microscopical Society, London.

JQMC. = Journal of the Quekett Microscopical Club, London.

MASIB. = Memorie della Reale Accademia delle Scienze dell' Istituto di Bologna.

QJGS. = Quarterly Journal of the Geological Society, London.

SAWW. = Sitzungsberichte der Kaiserliche Akademie der Wissenschaften Wien. (D = Denkschrift.)

The titles of papers and books are indicated by initials only, after the date of publication, and the first letter of the author's name: thus, A. 1865, NHC. = T. Alcock, *Notes on Natural History Specimens*, etc., the page, etc., only being given, and all further details being found under that initial and date in the Bibliography. In the case of long or short series of papers, the date of the first is given and the initials are followed by the year in which the paper referred to appeared: thus, M. 1898, etc. FM, 1900 = the papers of Millett's series beginning in 1898, which were published in JRMS. in 1900.

Brady, when quoting d'Orbigny's Cuba Monograph of 1839, nearly always gave the page in the Spanish edition of 1840. We have invariably given the pagination of the original French edition of 1839. When plates have two numbers, as in some of the Memoirs of the Société Géologique de France, both numbers are given, e.g., T. 1878, FIR, pl. ix (xiv).

Again, much confusion has crept into synonymies by reason of the re-pagination of reprints, a practice which reaches its worst development and results in Parker and Jones' "Nomenclature of the Foraminifera" (P. & J., etc., 1859, etc., NF.) and in Schlumberger's consecutively re-paginated series of reprints. We have endeavoured in every case to give the original page of the journal in which the papers were published.

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PLATES VI—XVII

PLATE VI

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PLATE VIII

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PLATE IX

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PLATE X

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PLATE XIV

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PLATE XV

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FROM
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TO THE PRESENT TIME
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JOHN B. HENRY

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PLATE XVI

- Fig. 1. *Rotalia clathrata*, Brady (No. 395). Dorsal view of large specimen: $\times 48$.
 Fig. 2. *Rotalia clathrata*, Brady (No. 395). Ventral view of normal specimen: $\times 48$.
 Fig. 3. *Rotalia clathrata*, Brady (No. 395). Dorsal view of normal specimen: $\times 48$.
 Fig. 4. *Rotalia clathrata*, Brady (No. 395). Edge view of normal specimen: $\times 48$.
 Fig. 5. *Nonion incrassatum* (Fichtel and Moll) (No. 398). Side view: $\times 64$.
 Fig. 6. *Nonion incrassatum* (Fichtel and Moll) (No. 398). Front-edge view: $\times 64$.
 Fig. 7. *Nonion sloanii* (d'Orbigny) (No. 403). Side view: $\times 64$.
 Fig. 8. *Nonion sloanii* (d'Orbigny) (No. 403). Front-edge view: $\times 64$.
 Fig. 9. *Nonion grateloupi* (d'Orbigny) (No. 406). Front-edge view: $\times 64$.
 Fig. 10. *Nonion grateloupi* (d'Orbigny) (No. 406). Side view: $\times 64$.
 Fig. 11. *Nonionella chiliensis* (?) Cushman and Kellett (No. 411). Dorsal view: $\times 74$.
 Fig. 12. *Nonionella chiliensis* (?) Cushman and Kellett (No. 411). Ventral view: $\times 74$.
 Fig. 13. *Nonionella chiliensis* (?) Cushman and Kellett (No. 411). Edge view: $\times 74$. The final chamber is broken away.
 Note. The final chamber is broken and the surface eroded.
 Fig. 14. *Nonionella iridea*, sp.n. (No. 410). Dorsal view: $\times 74$.
 Fig. 15. *Nonionella iridea*, sp.n. (No. 410). Ventral view: $\times 74$.
 Fig. 16. *Nonionella iridea*, sp.n. (No. 410). Front-edge view: $\times 74$.
 Fig. 17. *Nonionella auris* (d'Orbigny) (No. 409). Ventral view: $\times 74$.
 Fig. 18. *Nonionella auris* (d'Orbigny) (No. 409). Dorsal view: $\times 74$.
 Fig. 19. *Nonionella auris* (d'Orbigny) (No. 409). Front-edge view: $\times 74$.
 Fig. 20. *Elphidium incertum* (Williamson) (No. 412). Side view: $\times 64$.
 Fig. 21. *Elphidium incertum* (Williamson) (No. 412). Front-edge view: $\times 64$.
 Fig. 22. *Elphidium excavatum* (Terquem) (No. 413). Side view: $\times 64$.
 Fig. 23. *Elphidium excavatum* (Terquem) (No. 413). Front-edge view: $\times 64$.
 Fig. 24. *Elphidium alvarezianum* (d'Orbigny) (No. 415). Side view: $\times 64$.
 Fig. 25. *Elphidium alvarezianum* (d'Orbigny) (No. 415). Front-edge view: $\times 64$.
 Figs. 26, 27. *Elphidium magellanicum*, sp.n. (No. 416). Side views: $\times 64$.
 Fig. 28. *Elphidium magellanicum*, sp.n. (No. 416). Front-edge view: $\times 64$.
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 Fig. 30. *Elphidium lessonii* (d'Orbigny) (No. 417). Front-edge views: $\times 64$.
 Fig. 31. *Elphidium owenianum* (d'Orbigny) (No. 419). Side view: $\times 64$.
 Fig. 32. *Elphidium owenianum* (d'Orbigny) (No. 419). Front-edge view: $\times 64$.
 Figs. 33, 34, 36. *Dendronina papillata* (Heron-Allen and Earland) (No. 59). Specimens in secondary stage of growth showing development of tubular outgrowth: $\times 28$.
 Fig. 35. *Dendronina papillata* (No. 59). A detached basal pad seen from below, showing branching "astrorhizid" primordial chamber: $\times 28$.
 Figs. 37, 38. *Dendronina papillata* (No. 59). Detached fragments believed to represent the terminal chamber of the organism: $\times 28$.
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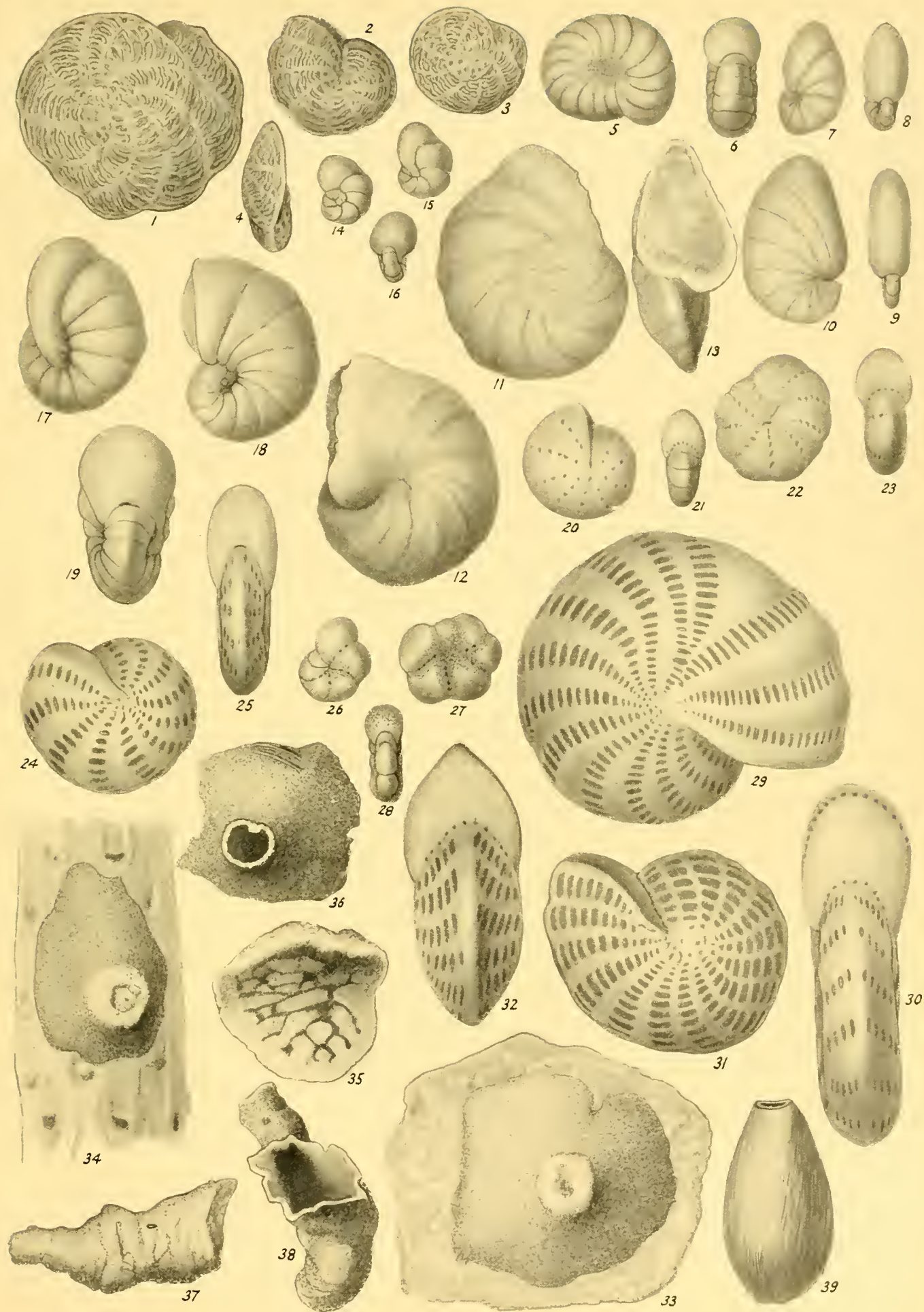


PLATE XVII

- Fig. 1. *Dendronina papillata* (Heron-Allen and Earland) (No. 59). Interior of small basal pad showing "astrorhizid" chamber: $\times 42$.
- Fig. 2. *Dendronina papillata* (Heron-Allen and Earland) (No. 59). First stage of growth, the basal pad: $\times 16$.
- Fig. 3. *Dendronina papillata* (Heron-Allen and Earland) (No. 59). Basal pad in advanced stage of growth: $\times 34$.
- Figs. 4-6. *Psammospaera fusca*, Schulze (No. 60). Sessile specimens of abnormal form due to the breaking away of large incorporated sand grains: $\times 20$.
- Fig. 7. *Tholosina vesicularis* (Brady) var. *erecta*, Heron-Allen and Earland (No. 68). $\times 20$.
- Fig. 8. *Tholosina vesicularis* (Brady) var. *erecta*, Heron-Allen and Earland (No. 68). Specimen showing branching tube: $\times 20$.
- Figs. 9, 10. *Protopotellina cylindrica*, Heron-Allen and Earland (No. 81). $\times 3$.
- Fig. 11. *Protopotellina cylindrica*, Heron-Allen and Earland (No. 81). Longitudinal section. $\times 3$.
- Fig. 12. *Protopotellina cylindrica*, Heron-Allen and Earland (No. 81). View of aperture: $\times 12$.
- Fig. 13. *Protopotellina cylindrica*, Heron-Allen and Earland (No. 81). Cross-section of tube: $\times 12$.
- Fig. 14. *Trochammia malovensensis*, Heron-Allen and Earland (No. 109). Edge view: $\times 80$.
- Fig. 15. *Trochammia malovensensis*, Heron-Allen and Earland (No. 109). Ventral view: $\times 80$.
- Fig. 16. *Trochammia malovensensis*, Heron-Allen and Earland (No. 109). Dorsal view: $\times 80$.
- Fig. 17. *Trochammia malovensensis*, Heron-Allen and Earland (No. 109). Edge view of specimen in balsam: $\times 80$.
- Fig. 18. *Trochammia malovensensis*, Heron-Allen and Earland (No. 109). Ventral view of specimen in balsam: $\times 80$.
- Fig. 19. *Trochammia malovensensis*, Heron-Allen and Earland (No. 109). Dorsal view of specimen in balsam: $\times 80$.
- Figs. 20-22. *Heronallenia (Discorbis) kempii*, Heron-Allen and Earland (No. 354). Dorsal view of early stages: $\times 80$.
- Fig. 23. *Heronallenia (Discorbis) kempii*, Heron-Allen and Earland (No. 354). Ventral view of early stage: $\times 80$.
- Figs. 24, 25. *Heronallenia (Discorbis) kempii*, Heron-Allen and Earland (No. 354). Dorsal views of immature shells: $\times 60$.
- Fig. 26. *Heronallenia (Discorbis) kempii*, Heron-Allen and Earland (No. 354). Dorsal view of adult shell: $\times 50$.
- Fig. 27. *Heronallenia (Discorbis) kempii*, Heron-Allen and Earland (No. 354). Ventral view of adult shell: $\times 50$.
- Fig. 28. *Heronallenia (Discorbis) kempii*, Heron-Allen and Earland (No. 354). Edge view of adult shell: $\times 50$.



