INVESTIGATIONS INTO THE VERTICAL DISTRIBUTION OF THE FAUNA OF THE BOTTOM DEPOSITS IN THE GULLMAR FJORD.

A PRELIMINARY STUDY CARRIED OUT BY MEANS OF A NOVEL BOTTOM-SAMPLING APPARATUS DESIGNED BY PROFESSOR O. PETTERSSON

BY ARVID R. MOLANDER.

WHILST engaged upon the work of bottom-sampling in the Gullmar fjord with Petersen's bottom sampler I soon found occasion to interest myself in the question as to how the fauna vertically distributes itself through the bottom deposits of the various areas. As is well known, Petersen's apparatus is effective of good results when it is a case of observing the quantitative development of the fauna over a given area. But it does not supply any definite information as to how the fauna is distributed vertically. Information on this point is naturally a matter of interest as enabling one, *inter alia*, to form an estimate as to what proportion of the bottom fauna is assimilative by fishes as food. In the bottom-sampling done by Petersen, it will be remembered that everything obtained — with certain exceptions — was looked upon as food for fishes (Petersen, 1918; Blegvad, 1914). But seeing that the bottom sampler, especially in soft ground, penetrates considerably below the surface layer proper, there would often by its means be brought up animals which cannot in any way be of importance as fish-food. Hence it would, theoretically as well as from a utilitarian point of view, prove of interest to make use of a bottom sampler capable of giving a more ample reply to the question of the vertical distribution of the fauna in the bottom deposits. Discussion of the conditions above referred to, with Professor Pettersson, resulted in his undertaking to design a kind of bottom sampler with which a profile cut might be made through the bottom deposit, at the same time securing a sharply defined column (with a basal area of 400 sq. cm.) of the bottom deposits, without disturbing the sequence of their stratification. How Professor Pettersson solved this problem will be clear from his description of the apparatus in question.

When the apparatus touches the bottom the weight is liberated automatically by the contrivance shown on p. 7. The impact of the weight upon the lid of the bottom sampler drives it vertically into the clay or gravel unto a certain depth which can be regulated by two iron screens outside the apparatus visible in the figures on p. 6 and 7. The shaft is also lowered by the impact when the line slackens and sinks so far that its hooks catch the end of a wire connected with the shutter which shuts the apparatus cutting off a column of bottomsediment when the line is tightened.

When the apparatus is brought on board its undermost part is placed in a quadrangular box of wood open at the top, a little wider than itself. It then contains a column of bottom sediment longer or shorter according to the position of the screens at the outside of the iron sampler. The shutter is then drawn aside by means of a hook and the column of bottom mud slides out into the box when the apparatus is lifted.

The sides of the wooden box, which can be left down, are made to be turned up according to the mud column sliding out of the apparatus down into the box, thus finally enclosing the bottom sample without any displacement having taken place of its different strata. On the inside of the four walls of the box there are horizontal, parallel, grooves 2½ cm. apart from each other. Then by letting down one of the sides of the box, and by pushing home into it a sharp-edged metal plate fitted into a suitable pair of grooves, the mud column can be divided into slices to be successively examined. In this way one gets as a rule slices 2½ cm. thick, except in the case when the mud column is of such small depth that it only measures 2½ cm. or slightly more. The intervals between these groves may of course be altered according to requirements. For many reasons I did not, however, find it suitable to work on slices thinner than 2½ cm.

With the abovementioned apparatus I have examined a number of stations of varying bottom conditions in the Gullmar fjord. Those that I have examined are nearly all identical with those that I previously had investigated by means of Petersen's bottom sampler, and whose animal communities I have described in another connection (Molander, 1928). For more detailed study of these stations (G. 13, G. 15, G. 17, G. 30, G. 33, G. 38, G. 42, G. 48, G. 41 and G. 59) I refer to the work mentioned. Besides the stations mentioned, examination has been made of a couple of localities off Alsbäck in Gullmar fjord (at 70—75 m.). In a couple of stations (G. 17, G. 30) two dips were made in each, so that the dips altogether amount to 14. It should be noted that, on account of the small number of stations, these investigations have no pretension to being an exhaustive analysis of the vertical distribution of the bottom fauna generally of the fjord. It is only to be accepted as a preliminary orientation in this matter, at the same time giving the new apparatus a trial for finding out its possibilities. I am looking forward to an opportunity of completing these investigations on some other occasion.

As regards the apparatus, even though it might be open to improvements in one or two details, it will doubtless prove of great use first and foremost in the kind of investigations here referred to. It has been found most efficacious on soft ground everywhere, and the more soft the bottom, the deeper it naturally penetrates. By its means I have brought up bottom strata up to 15 cm. in thickness. On harder bottoms it is of course less effective, but even in sand-mixed clay it penetrates down to a depth of from 5 to 7 cm.

If, then, the results obtained (Table 1) by means of this grab (the profile grab) be examined, it will be readily seen— what there in fact was every reason to expect — that the fauna to a very great extent concentrates in the upper strata of the bottom deposits. Certain animals, however, burrow down into these to a considerable depth, even as deep as from 12.5 to 15 cm. below the surface stratum. This is all the more the case when the bottom consists of soft, mud-like clay (ooze). Deeper down than 10 cm. below the ground surface the animals, however, occur very irregularly, and those that are found always are polychaetes. In Table 1 I have listed the animals recovered according to their distribution in all the bottom strata examined. With a view to a clearer survey I have further, in Table 2, scheduled the distribution of the animal groups within a somewhat wider scope. In so doing I have selected thicknesses of 0-5 cm., 5-10 cm., and 10-15 cm., as counted from the surface layer. As I naturally was unable to make all dips of equal depth or to obtain the limits of all strata at corresponding levels I have been obliged to include, in addition to those layers, a couple of transitional zones (8/8.5 to 11.5/12 cm., and 3/3.5 to 6.5/7 cm.). I beg, however, previously to remark, as regards the distribution of the animals shown through different layers in Table 2, that it is conceivable that certain animals (e.g. Polychaeta), after the dip is made, and whilst the mass is being raised to the surface of the water, manage to retire deeper down into the bottom deposit than is their normal level. The very uniform distribution of the animals captured does not, however, favour the supposition that this happens to any considerable extent.

From Table 2 will be seen that only a small number of individuals live in the lower strata. At depths from 5 to 15 cm. there are only found 47 individuals out of a total of 361, i.e., only 12.9%. The majority of these (40 indiv.) consists of polychaetes. Inclusion of the animals obtained from the intermediate zone, the one between 3 and 7 cm., makes up the number to 69, i. e. 19% as against 81% in the uppermost stratum. The lowest stratum of all contains only 0.8%, the next, 1.6%, the one after that holds 10.5%, and the next one again, 6.1%. It is probable that all animals below a depth of 5 cm. are inaccessible to fishes, as are also most of those living between 3 and 7 cm. This, of course, on the presumption that the animals of the deep-lying strata do not, habitually or at times, make excursions up towards the detritus stratum. So, for example, it is conceivable that the long tubes within which the species of Rhodine live, may serve them for moving, without much difficulty, towards the surface as well as in the opposite direction. Thus hardly onefifth of the sea-floor fauna of the area examined lives in the lower strata of the bottom sediments.

Further investigation of the surface layer to a depth of 5 cm. reveals that the majority of the animals are to be found at a depth of 0 - 3 cm. (Table 1).

Apart from the undivided vertical section from the surface down to 5 cm. shown in that table, elsewhere in the sections between the surface and 5 cm. down, sub-divided in different ways, there are 259 animals of various groups. Of these, there are no less than 118 in the section 0 - 2.5 cm., 47 in the section 0 - 1.5 cm., and 16 in the section 0 - 1 cm. This makes a total member of 181 individuals, or 69.9%. It will thus be seen that it is mainly the detrital layer that holds the majority of the animals.

From the point of view of distribution according to the rough weight of the animals within the respective sections, the disproportion between the uppermost and the lower sections is still more pronounced (Table 2). In the latter, against 97.4%, in the top section (0 - 5 cm.), there are only 2.4% in all the lower sections together. This is also in part due to the top section containing large-sized echinoderms (Brissopsis, Echinocardium) and mollusks (Mytilus). Whilst, e. g., the echinoderms only amount to 28.5% of the total number of animals, they constitute 65.8% of the rough weight. For the mollusks, the corresponding figures are 13.3% and 24%, respectively. These large echinoderms and mollusks are under no circumstances a suitable food for fishes. If they are eliminated, these groups will lose some of their preponderance in point of weight, and the relation between the fish food in the upper and in the lower strata will not be so disproportionate. As regards the polychætes, 31% of their total rough weight is contained in the lower strata.

The rough weight is not, however, directly representative of the actual biologically productive importance of the different areas. In order to approach this question more closely, I have tried, on the basis of my material, to compute the value of the fauna as fish-nourishment. In the same way as done by Boysen-Jensen (1911) I have thus calculated the quantity of dry organic matter in percentage of rough weight. From the percentage of dry matter I can then estimate the weight quantity of dry matter. The method I have followed is also entirely Boysen-Jensen's. As regards the figures obtained of the dry organic matter, they will have to be regarded as approximative although sufficiently exact, on the whole, for my purpose (Table 3). Therefore, taking for a basis these percentages and the figures therefrom derived (Table 2), it will be found that echinoderms and mollusks cease to be of such overwhelming predominance whilst the polychaetes gain a great deal in importance at the cost of the former, in that they represent 39% of the total organic matter. The great proportion of polychaetes in the lower zones also tends to render these not so entirely without importance in point of nutritive value as if only the rough weight is taken into account. A little more than 11%

of the nutritive value of all the animals obtained is what this deep-living fauna represents. But not even this percentage is so high as to justify any undue prominence being given to the deep-zone fauna. Under all circumstances it may be accepted that such localities in the fjord as are rich in worms are of value in the way of biological production. The same may also be said of localities with large quantities of Syndosmya, Mya, Philine, etc. (Table 3).

As regards the figures here given from my investigations it should however be pointed out that they are to a certain extent influenced by the localities from which the samples have been obtained. As already mentioned, in very soft ground the animals may penetrate deeper down, whilst in a hard bottom they are apt to be more restricted to the upper strata. If therefore a large number of samples are taken from soft bottom there is likelihood of obtaining higher figures as to the number of animals in the lower zones, and the opposite will be the case if samples from harder ground predominate. Of this, some examples are given in the table 4.

Then there arises the question as to what proportion of the animals obtainable by means of Petersen's bottom sampler may be set down as food within reach of fishes. In the frequent use I have made of this sampler I as a rule found that in soft ground I reached down as deep as 10 to 11 cm., which is the greatest depth the construction of the apparatus admits of. If this be taken for a basis, together with the investigations related above, it will then be seen that about 16 % of the animals (Table 2) brought up in this sampler would be living at depths inaccessible to fishes. This percentage naturally varies considerably in accordance with bottom conditions. In point of biological production this number of animals corresponds to 2.3 % of the total weight of the mass, or 9.7 % the amount of its organic matter. It is in the first place the polychaetes that should be included in the figures obtained of the number of animals in the deeper zones, and in the amount of their mass of nutritive matter. Even though these values be comparatively inconsiderable, they should, however, not altogether be left out of account. It is true that on hard and sand-mixed clay bottom the Petersen-sampler does not penetrate to any greater depth into the bottom sediments, but as in such a case the animals principally occur in the topmost zones it is probable that practically all of the fauna will be secured even by means of the Petersen-sampler, which thus will give an adequate idea of the food possibilities for fishes.

I have already said that the polychaetes are the principal members of the deeper-zone fauna. I found about 28 % of them living just below the top stratum. If the composition of the polychaetes fauna be closely studied, (Table 1), it will be seen that only a limited number of species occur in the lower zones. Of these, the most important are Rhodine lovéni, Lumbrinereis fragilis an Notomastus latericius. These three species alone form one-half of all the Polychaeta found in the deeper regions, the first mentioned species representing more than 28 %. It occurs, besides, more numerously in the lower strata. Among other species of the deeper zones may be noted Glycera alba, Maldane sarsi, and Goniada maculata, which, together with those mentioned above, appear to set their stamp on the worm fauna of the lower strata. All these species are consumers of detritus. (Blegvad, 1914). Such worms as inhabit harder ground are in their distribution considerably more restricted to the uppermost strata (Nephthys incisa, Rhodine gracilior, etc., this being also generally the case with those that are not tube-dwellers (e. g., Eumenia, Scalibregma).

The marked predominance of polychaetes in the deeper zones of the bottom strata does not however present any occasion for separating them into distinct communities according to these zones. If the localities here dealt with be compared with the animal communities I have elsewhere described (Molander, 1928) it will be seen that also the fauna of the deep-down strata on the whole represents the types pertaining to the communities found in the respective localities, from samples taken with Petersen's apparatus. And this is quite in the nature of things, seeing that this sampler also collects so many animals from the deeper strata.

Among the other animal groups it is only a couple of Nucula species, Nucula sulcata and N. tenuis, which, together with Amphiura filiformis and chiajei, occur in the lower strata. They do not, however, appear very numerously, neither do they occur in the very lowest strata. Nucula sulcata is found deepest down. Even though, perhaps, there should be taken into account the possibility of the three individuals in question (Table 1), as the mass of clay was being divided up, having happened to slip down into a lower stratum than the one to which they properly belonged, the distribution of the species in the top zone (Table 1) nevertheless leads one to suppose that this species normally lives at deeper levels than the rest of the mollusks obtained. It is, moreover, for the most part found in ground very soft so as to be almost mud-like.

The two Amphiura species seem to be more or less similarly distributed in the lower strata and are mostly living in the detritus layer or immediately below it. The same probably applies to Brissopsis lyrifera. As regards other species, mention needs only be made of Calocaris macandræ, the occurrence of which clearly enough appears restricted to the deeper zones of the upper stratum.

In conclusion I wish to express my thanks to Amanuensis G. Gustafsson, Upsala to whom I am indebted for his valuable assistance in the identification of the polychaetes.

Table 1.

Distribution of species through various zones of the sea bottom. Thickness of strata in cm. Figures to the left the lines denote depth (in cm.) below sea bottom surface of upper side of stratum, that of its lower side being given in figures to the right of the line.

Species	0 / 1	0 / 1.5–2	0 / 2.5–3	0 / 5	1–1.5 / 3.5–4	2–2.5 / 4.5–5	3–3.5 / 5.5–6	4–4.5 / 6.5–7	5–5.5 / 7.5–8	6–6.5 / 8.5–9	7–7.5 / 9.5–10	8–8.5 / 10.5–11	9–9.5 / 11.5–12	10–10.5 / 12.5–13	11–11.5 / 13.5–14	12–12.5 / 14.5–15
Spiophanes kröyeri	—	3	2	—	—	1	—	—	1	—	—	—	—	—	—	—
Prionospio cirrifera	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Laonice bahusiensis	—	—	3	—	—	—	—	1	—	—	—	—	—	—	—	—
Stylarioides glauca	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—
» plumosa	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—
Chaetozone setosa	—	1	—	1	1	—	—	—	—	—	—	—	—	—	—	—
Melinna eristata	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Sosane sulcata	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Sosanopsis wiréni	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Anobothrus gracilis	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Samytha sexcirrata	—	1	4	—	—	1	—	—	—	—	1	—	—	—	—	—
Capitella capitata	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Pectinaria koreni	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
» auricoma	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Terebellides strömi	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—
Proclea graffi	—	7	—	—	—	3	—	—	—	—	2	—	—	—	—	—
Lanassa venusta	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lysilla lovéni	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
Pista cristata	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Scoloplos armiger	—	—	—	11	—	2	—	—	1	—	—	—	—	—	—	—
Euchone papillosa	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—
Maldane sarsi	—	1	4	—	2	3	1	1	—	—	—	1	—	—	—	—
Rhodine lovéni	—	3	5	—	2	3	1	3	5	1	3	—	1	1	—	1
» gracilior	—	—	4	—	—	1	—	—	—	—	—	—	—	—	—	—
Polycirrus plumosus	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
» medusae	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
Castalia punctata	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Myriochele heeri	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Amaea trilobata	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Praxillella praeterm.	1	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—
» affinis	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Praxillura sp.	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	—
Eumenia crassa	—	—	4	—	—	1	—	—	—	—	—	—	—	—	—	—
Scalibregma inflatum	—	—	4	1	—	1	—	—	—	—	—	—	—	—	—	—
Lumbrinereis fragilis	—	5	2	—	3	1	—	4	1	1	—	—	1	—	—	—
Ophiodromus flexuosus	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
Harmothoë antilopis	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Hypereteone lactea	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Gattyana cirrosa	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nereis longissima	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Pholoë minuta	—	—	—	1	—	1	—	—	—	—	2	—	—	—	—	—
Nephthys incisa	—	1	2	1	—	3	—	—	—	—	—	—	—	—	—	—
Glycera alba	—	—	3	—	1	—	—	—	—	—	—	—	1	1	—	—
» goësi	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Goniada maculata	—	—	1	1	—	—	1	1	—	—	1	—	—	—	—	—
Notomastus latericius	—	—	4	—	—	2	1	—	1	—	1	1	1	—	—	—
Nucula tenuis	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—
» sulcata	—	—	3	—	1	1	—	—	—	—	3	—	—	—	—	—
» nitida	—	1	2	—	—	1	—	—	—	—	—	—	—	—	—	—
Syndosmya nitida	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
» alba	—	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—
Thyasira flexuosa	—	1	2	—	—	1	—	—	1	—	—	—	—	—	—	—
Neæra abbreviata	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cardium minimum	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
» fasciatum	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Lucina spinifera	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Corbula gibba	1	1	1	2	—	—	—	—	—	—	—	—	—	—	—	—
Limatula subauriculata	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Venus ovata	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Mytilus edulis	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Thracia convexa	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Turritella communis	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Philine aperta	—	—	—	4	—	1	—	—	—	—	—	—	—	—	—	—
Dentalium entalis	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lepidopleurus asellus	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Eriopisa elongata	—	1	1	—	1	—	—	—	—	—	—	—	—	—	—	—
Microdeutopus anomalus	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—
Erichthonius difformis	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Diastylis cornuta	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Calocaris macandræe	—	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—
Brissopsis lyrifera	—	—	2	—	1	—	—	—	—	—	—	—	—	—	—	—
Echinocardium cordatum	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Amphiura filiformis	10	3	35	—	21	5	2	1	1	—	—	—	—	—	—	—
» chiajei	—	3	9	—	4	—	3	—	1	—	—	—	—	—	—	—
Ophiura albida	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	16	47	118	31	40	38	17	13	17	2	16	2	4	2	—	1

Table 2. Distribution of various animal groups through the strata of the sea bottom (compare table 1).

Boundaries of the strata	Polychaeta			Echinoderma			Mollusca			Crustacea			Individuals		Rough weight		Dry organic matter weight	
	Individuals no.	Rough weight gr.	Dry organic matter weight gr.	Individuals no.	Rough weight gr.	Dry organic matter weight gr.	Individuals no.	Rough weight gr.	Dry organic matter weight gr.	Individuals no.	Rough weight gr.	Dry organic matter weight gr.	no.	%	gr.	%	gr.	%
10—10.5 / 14.5—15 cm.	3	0.28	0.02	—	—	—	—	—	—	—	—	—	3	0.8	0.28	0.2	0.02	0.9
8—8.5 / 11.5—12 cm.	6	0.11	0.012	—	—	—	—	—	—	—	—	—	6	1.6	0.11	0.1	0.012	0.5
5—5.5 / 9.5—10 cm.	31	1.11	0.122	2	0.30	0.012	5	0.08	0.003	—	—	—	38	10.5	1.49	1.3	0.137	6.1
3—3.5 / 6.5—7 cm.	16	0.51	0.056	6	0.65	0.025	—	—	—	—	—	—	22	6.1	1.16	1.0	0.081	3.6
0 / 4.5—5 cm.	142	5.55	0.655	95	66.28	0.920	43	24.45	0.334	12	2.78	0.058	292	81.0	99.06	97.4	1.967	88.9
Total	198	8.06	0.865	103	67.23	0.957	48	24.53	0.337	12	2.78	0.058	361	100	102.10	100	2.217	100
%	54.8	7.8	39.0	28.5	65.8	43.1	13.3	24.0	15.1	3.4	2.4	2.8						

Table 3. Quantity of dry organic matter in percentage of rough weight in certain animal groups, as determined by Boysen-Jensen and Molander respectively.

Species	Percentage according to Boysen-Jensen (1911)	Percentage according to Molander
Polychaeta:		
Maldanidae	10.9	11.8
Pectinaria	15.0	13.7
Eumenia	—	16.6
Melinna	—	13.0
Nephthys	—	14.1
Nereis	—	14.3
Lumbrinereis	—	11.6
Mollusca:		
Nucula nitida	3.0	—
» sulcata	—	2.8
» tenuis	—	3.2
Thyasira flexuosa	—	7.9
Syndosmya nitida	—	7.5
» alba	7.0	—
Cardium minimum	—	6.2
» fasciatum	7.7	7.9
» edule	2.4	—
Mya truncata	8.2	—
» arenaria	5.1	—
Macoma baltica	5.7	5.1
» calcarea	7.6	—
Mytilus edulis	2.8	3.1
Modiolaria	6.8	—
Cultellus pellucidus	6.2	—
Limatula subauriculata	—	8.0
Spisula subtruncata	4.0	—

Species	Percentage according to Boysen-Jensen (1911)	Percentage according to Molander
Mollusca:		
Cyprina islandica	3.1	—
Pecten septemradiatus	—	4.7
Apporhais pes pelecani	6.0	—
Corbula gibba	2.4	2.1
Venus gallina	5.1	6.0
Astarte borealis	2.2	—
Lucina spinifera	—	5.6
Turritella communis	—	4.0
Leda pernula	5.1	—
Littorina	5.1	—
Buccinum undatum	11.1	—
Naera abbreviata	—	7.1
Acera bullata	13.4	—
Philine aperta	14.0	13.5
Crustacea:		
Ampelisca, Pontoporeia	—	2.5
Diastylis, Eudorella	1.3	2.0
Calocaris mac'andrae	—	8.3
Echinoderma:		
Echinocardium cordatum	1.02	1.2
Brissopsis lyrifera	—	1.3
Echinus	2.04	—
Asterias	5.4	—
Amphiura	—	4.1
Ophiura albida	3.8	—
» texturata	—	2.1

Table 4. Distribution of the bottom fauna on various bottom deposits.

Depth of the various strata in cm.	Soft clay. 3 dips		Hard clay. 2 dips		Sand-mixed clay, shell, pebbles. 2 dips	
	no.	%	no.	%	no.	%
0—2.5	57	53.3	17	54.8	32	65.5
2—2.5	19	17.7	5	16.2	15	30.6
5—7.5	16	14.9	5	16.2	0	0
7.5—10	11	10.4	3	9.6	2	4.1
10—12.5	3	2.8	1	3.2	0	0
12.5—15	1	0.9	—	—	—	—

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