

COLONIZATION OF GRADED SAND BY AN INTERSTITIAL FAUNA.

by

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Résumé

Ce travail concerne la colonisation du sable par une faune interstitielle. Divers échantillons de sable furent enfouis dans une plage de la Galles du Nord et relevés vingt jours plus tard. La faune a repeuplé le sable normal de la plage bien plus que le sable tamisé. L'Archiannélide *Protodrilus chaetifer* peut coloniser des sables plus fins que l'espèce *Protodrilus adhaerens*.

INTRODUCTION

An experiment on the colonization of sand samples of varying particle size was conducted at Traeth Bychan, a beach on the east coast of Anglesey, North Wales, in early March 1961. The importance of grain size as a factor affecting the distribution of interstitial animals has been recognised by most mesopsammologists. In America, Wieser (1959) demonstrated the absence of many interstitial species from sands with a mean particle diameter less than 200 μ . Delamare Deboutteville (1953) has shown that the occurrence of the mystacocarid *Derocheilocaris remanei* Delamare et Chappuis in the Mediterranean is dependant on sand with a medium diameter of about 200 μ . Renaud-Debyser (1958) demonstrated the recolonization of depopulated beach sand at Arcachon. No work concerning the actual colonization of sand graded according to particle size has been published.

METHOD

A fairly large quantity of sand was taken from the top 10 cm. of the beach at L.W.N. This sand was dialysed to remove the salt,

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dried at about 60°C for a week and then sorted into fractions retained by sieves of 2057, 1405, 1003, 500, 211 and 152 μ mesh. A smaller quantity of sand was similarly treated to determine the granulometric composition and another portion dialysed and dried but not sieved.

Some "Pyrex" glass tubing of 5 cm diameter was cut into lengths of approximately 250 cm³ capacity. Seven tubes, that is one for each of the six grades of sand and one for the washed but unsieved sand, were filled with treated sand and buried 3 cm below the sand surface at the original locality. An eighth tube filled with sand straight from the beach (sample B) was also buried. The tubes open at both ends were buried lying horizontally in the sand, directly alongside each other so that each would be subject to the same external conditions.

A ninth tube was filled directly from the beach and taken back to the laboratory. The animals in 220 cm³ of this sample (sample A) were counted very carefully and laborious sorting of the sand under low magnification ($\times 25$). Specimens were identified under higher magnification when necessary.

After a period of twenty days the eight buried tubes were recovered and taken to the laboratory. A small portion of sand from each of the experimental tubes was rejected because of slight mixing with the beach sand. The animals in 220 cm³ of sand from each of the sample were identified and counted. Since they were very difficult to catch and count Protozoa shorter than 300 μ were omitted.

RESULTS

The population recovered from the various samples is shown in Table 1. Definite conclusions concerning all the individual species cannot be drawn from this experiment but general conclusions are certainly valid for the commoner forms.

The population of the buried tube of normal beach sand (sample B) corresponded closely to the control (sample A); thus the presence of the tubes around the actual sand samples had little or no adverse effect on the main constituents of the fauna. The sample of dialysed and dried beach sand was repopulated almost completely within the twenty day period, the species occurring approximately in the same percentages as in the normal beach fauna.

The samples of graded sand were populated by a fauna reduced both in the number of species and the total number of specimens. The sample most closely corresponding to the normal beach fauna was that with the 1000 - 500 μ diameter particles. This correlates with the medium grain diameter of the normal beach sand (Table 2).

It is interesting that though four interstitial predatory genera *Paracicerina*, *Rhinepera*, *Schizochilus* and *Schizorhynchoides* were found in normal sand, only one, a single specimen of *Schizochilus choriurus*, was found in the graded sand. The finest grades of sand had been colonized by large numbers of Nematoda. The archiannelid

TABLE 1.
Colonization of various sand samples by an interstitial fauna.

	Collected 3-3-1961	Collected on 23-3-1961 Samples buried 20 days							
	Normal beach sand A	Normal beach sand B	Dried beach sand	Sieved sand					
				> 2057 μ	2057-1405 μ	1405-1003 μ	1003-500 μ	500-211 μ	211-152 μ
PROTOZOA									
Ciliata (larger than 300 μ)	9	11	6			1		1	
CNIDARIA									
<i>Halammohydra vermiformis</i> Swed. et Teiss.	1								
TURBELLARIA									
Acoela	2	1	1	1	1				
<i>Archicoela</i> sp.	1								
<i>Coelogygnopora</i> sp.	17	14	16	2	5	5	8	10	3
<i>Diopisthoropus longituba</i> Westblad.	1								
Macrostomid		5	3			5	15		
Microstomid	2								
<i>Monocelis lineata</i> (Müller)	1								
Otoplanid				1			1		
<i>Paracicerina laboeica</i> Meixner	4	2							
<i>Proxenetes simplex</i> Luther									
<i>Rhinepera</i> sp.	3	3	2			2	7		
<i>Schizochilus choriurus</i> Boaden	3	1	1						
<i>Schizorhynchoides coronostylus</i> Boaden		1				1			
<i>Tvaerminnea karlingi</i> Luther	1	3		1					
Typhloplanoid	1	2							
NEMATODA	74	86	83	21	15	24	48	95	135
GASTROTRICHA									
<i>Acanthodasys aculeatus</i> Remane	1								
<i>Macrodasys remanei</i> Boaden		1							
<i>Paradasys turbanelloides</i> Boaden	2	7	3						
<i>Pleurodasys megasoma</i> Boaden	1		2						
<i>Tetranchyroderma polyacanthus</i> (Remane)	8	9	5			1	3		
<i>Turbanella hyalina</i> Schultze	3	1	1						
ANNELIDA									
<i>Microphthalmus</i> sp.	21	18	18	77	12	7	35	7	6
<i>Protodrilus adhaerens</i> Jägersten	66	58	54	2	2	20	17		
<i>Protodrilus chaetifer</i> Remane	15	13	17			4	5	3	12
ARTHROPODA									
Burrowing Copepoda	10	6	10	1	2	2	5	5	5
Interstitial Copepoda	8	9	7			1	2	1	
Ostracoda	1	2	2		1		1	1	
Hydracarid	1	1	1	1		1		3	4
Pycnogonid							1		
TOTAL	257	254	232	107	38	74	148	126	166

Protodrilus adhaerens did not occur in the samples with grain diameter less than 500 μ , whereas *Protodrilus chaetifer* was commonest in the 210-150 μ sample. This indicates that *P. chaetifer* most readily colonizes substrates with a fine grain or pore size and is in agreement with the known distribution of the species which is most common throughout Anglesey in beaches with this type of sand (Boaden, in press). The experiment shows how some interstitial species may be limited in distribution due to their inability to colonize various grades of sand.

TABLE 2.
Composition by weight of the normal beach sand.

Grain diameter	Grain diameter
> - 2057 μ 1.1 %	500 - 211 μ 52.4 %
2057 - 1405 μ 2.4 %	211 - 152 μ 16.9 %
1405 - 1003 μ 7.1 %	< - 152 μ 0.9 %
1003 - 500 μ 19.2 %	Mean diameter c. 500 μ

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