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THE ANNELIDS OF A MARINE SERE

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During the summer of 1929 a general survey was made of the bottom fauna of East Sound and adjacent interior waters of the San Juan island group. A preliminary paper based on the data obtained was published in Volume 10 of the proceedings of the Oklahoma Academy of Science. Since that time, through the kindness of Dr. C. Berkley of the Pacific Biological Station, Nanaimo, B. C., all annelids collected have been identified. The results of this work are therefore presented herewith.

East Sound is a long, narrow, body of water extending into the south side of Orcas Island which surrounds it somewhat in the shape of a horseshoe. The length is about 12 kilometers and the average width 1.8 kilometers. The shore line is rugged except at two points, where the villages of Rosario and East Sound are located. The latter is at the head of the

sound, which is here divided by a low, rocky headland into two shallow bays, Fishing Bay and Ship Bay. Of these the second is bounded by a sandy beach from which the landward slope is gradual to an altitude of perhaps 15 meters, followed by a similar downward slope to sea level on the north side of the island, at a distance of approximately 2 kilometers. This is the lowest portion of the island and may represent a former strait. The depth of the sound, off shore, varies from 20 to 35 meters but the greater part has a relatively uniform depth of about 30 meters. The bottom material ranges from a very heavy organic mud in Fishing Bay to a mud having a considerable admixture of sand and shell at the mouth.

The principal method of collection was the use of the Peterson bottom sampler, which brings up the surface mud of the sea-bottom with the contained animals from an area of 0.1 square meter. The larger, less frequent are not accurately represented in the catch nor are motile forms collected with any degree of quantative accuracy. The census of the smaller sessile and inactive forms may be considered, however, as reasonably accurate. In addition a study of the beach fauna at the head of Ship Bay was made, measured areas being dug up to a depth of 20 cm. The stations* from which the principal collections were made were located as follows:

STATIONS M, N, and O, respectively 1.85 m. 2.5 m. and 2.9 m below mean high tide on the west side of Ship Bay; muddy sand.

STATION A, in Fishing Bay, 20-25 m. The mud at this station was very dense, giving off a strong odor of hydrogen sulfide. In spite of this, Gran and Thompson (1930)** obtained 5.93 mg. per liter of oxygen at a depth of 20 meters at this station. This was 64 per cent saturation. Larger particles in the mud here were mostly diatom *(Coscinodiscus* spo.) and foraminiferan shells. There were no sand particles and practically no shell fragments.

STATION B, in Ship Bay 10 m., sandy mud. Sand particles made up about 2 per cent of the bulk of bottom material. Diatom shells were present here also but not in great abundance.

STATION C, mid-channel, off Rosario, approximately half-way from the mouth to the head of the sound, 30 m. Dense mud, with some small shell fragments. Microscopic examination was not made.

STATION D, south of Rosario (Cascade Bay), 26 m. Dense mud with about 8 per cent *Coscinodiscus* shells. Gran and Thompson (l. c.) found 5.51 mg, per liter of oxygen near bottom between stations C and D.

STATION E, mouth of East Sound, off Olga, 24-26 m. Mud containing some small shell fragments with diatom and foraminiferan shells.

STATION F, south of Olga, 28-30 m. Mud with more and larger shell fragments and numerous diatom *(Coscinodiscus, Arachnoidiscus* and *Biddulphia)* and fomaminiferan shells.

STATIONS G, H and K were located, with Station F, on a line between Obstruction Pass and Upright Channel, 24-50 m. Bottom samples at Station H, 36m., gave 32 per cent larger particles, mostly sand and shell fragments with the three diatoms mentioned above also present. At G and K a considerable amount of gravel was also present.

The predominant physiographic processes seem to tend toward land formation at the head of the sound, so that stages of a landward sere may be observed northward from the mouth. Within the sound, deposition of

*A map of this area is given in Proc. Okla. Acad. Sci. 10:26.

**Gran. H. H. and Thomas G. Thompson. The diatoms and the physical and chemical conditions of the sea water of the San Juan Archipelago. Pub. Puget Sound Biol. Sta. 7:169-204. 1930.

silt is taking place at a rapid rate. Quartz sand makes up a considerable portion of this deposit near the mouth of the sound and also, locally (Ship Bay) at the head; molluscan shells also play an appreciable role especially in the lower part, but everywhere organic debris is the most important constituent of the bottom material. Intact shells of larger diatoms may make up as much as 10 per cent of the upper layer.

Table I gives the population per square meter at each station of all annelids of which ten or more per square meter were present at some locality and Table II lists all annelids taken.

TABLE I

Stations	M	N	O	A	B	C	D	E	F	GHK
Nephthys caeca Fab.	8	22	2					2		1
Nephthys Hombergii Aud. & M.-E.									3	1
Ammochares fusiformis (Delle Chiaje)	6				1692					
Notomastus sp?	5000	4								
Nephthys sp?				8						
Paraprionospio tribranchiata Berk.				1	8	4				x
Scalibregma inflatum Rathke				2	16	1565	1278	15		3
Spionides japonicus Moore						27				2
Heteromastus filibranchus Berk.						12	4			
Eucylmene (reticulata Moore?)					34					
Sternaspis fossor Stimp.						3	4	26	21	20
Scoloplos elongata Johns					18					1
Glycinde armigera Moore					39	6	2			2
Pista cristata Muller					100					1
Lumbrinereis Latreilli Aud. & M.-E.					62					
Lumbrinereis impatiens Clap.						1				x
Nereis Agassizi (Ehlers)					36					2
Amphicteis glabra Moore					2	10			1	
Cistenides brevicoma (Johns.)					24					
Lumbrinereis bifurcata McInt.						18			2	2

TABLE II

ERRANTIA

Family	Species	Stations
Polynoidae	Harmathoe imbricata Malmgren	K
	Polynoid sp.?	FGH
Sigalionidae	Sthenelais verruculosa Johnson	H
	Sthenelais fusca Johnson	K
	Sthenelais sp.?	K
Phyllodocidae	Anaitides (Phyllodoce) mucosa Oersted	BK
	Anaitides (Phyllodoce) groenlandica (Oersted)	C
	Phyllodoce sp.?	B
Hesionidae	Pilargis sp.?	C
Syllidae	Syllis sp.?	K
Nereidae	Nereis notomacula Treadwell	BK
	Nereis Agassiz (Ehlers)	BHK
	Nereis procera Ehlers	B
	Nereis virens Sars	MNO
Nephthydidae	Nephthys caeca Fabricius	MNEK
	Nephthys ciliata (Muller)	CGK
	Nephthys Hombergii Audouin & Milne-Edwards	MNOFH
	Nephthys cirrosa Ehlers	F
	Nephthys sp.?	AFH
Glyceridae	Glycera nana Johnson	C
	Glycera capitata Oersted	CF
	Glycera rugosa Johnson	BCDEGK
	Glycera tesselata Grube	B
	Glycinde Armigera Moore	BCDEH
	Glycinde sp.?	CH
	Goniada brunnea Treadwell	C
	Glycerid sp.?	C

Family	Species	Stations
Leodicidae	Lumbrinereis bifurcata McIntosh	CEFGHJ
	Lumbrinereis impatiens Clap. (small var.)	BCEH
	Lumbrinereis Latreilli Audouin & Edwards (small var.)	B
	Lumbrinereis sp.?	CH
	Diopatra californica Moore	H
	Diopatra ornata Moore	HR
	Onuphis elegans Johnson	GH
	Leodicid sp.?	CH
Arictidae	Scoloplos elongata Johnson	BEK
	Scoloplos sp.?	NO
Spionidae	Spiophanes cirrata Sars	BC
	Spiophanes sp.?	DH
	Paraprionospio tribranchiata Berkeley	ABCH
	Spionides japonicus Moore	BCK
	Magelona longicornis Johnson	H
	Pygospio sp.?	B
	Spionid sp.?	BCH
SEDENTARIA		
Chaetopteridae	Leptochaetopterus Pottsi Berkeley	BCEFGK
	Phyllochaetopterus prolifica Potts	GH
	Mesochaetopterus Taylori Potts	G
Cirratulidae	Chaetozone setosa Malmgren	H
	Tharyx sp.?	H
Chlorhaemidae	Styllaroides plumosa Muller	E
	Styllaroides papillata Johnson	K
Scalibregmidae	Scalibregma inflatum Rathke	ABCDEHK
	Sclerocheilus pacificus Moore (?)	K
Opheliidae	Ammotrypane aulogaster Rathke	K
	Ammotrypane sp.?	B
Capitellidae	Heteromastus filobranchus Berkeley	BCDE
	Notomastus sp?	MN
	Capitellid sp.?	E
Maldanidae	Euclymene (reticulata Moore?)	B
	Maldane Sarsi Malmgren (smal var.)	H
	Nicomache carinata Moore	K
	Praxillella gracilis Sars	K
	Rhodine sp.?	K
	Maldanid sp.?	BDFK
Ammocharidae	Ammochares fusiformis (Delle Chiaje)	MB
	Myriochele Heeri Malmgren	GH
Sternaspidae	Sternaspis fossor Stimpson	BCDEFGHK
Amphictenidae	Pectinaria auricoma (Muller)	B
Ampharetidae	Ampharete gracilis Malmgren	C
	Ampharete arctica Malmgren	CG
	Amphicteis glabra Moore	BCEF
	Amphicteis mucronata Moore	HK
Terebellidae	Streblosoma Bairdi (Malmgren)	B
	Pista cristate Muller	BK
	Artacama conifera Moore	HK
	Terebellides Stroemi Sars	HK
	Scionella japonica Moore	K
	Polycirrus perplexus Moore	K
	Polycirrus sp.?	HK
	Terebellid sp.?	K
Sabellidae	Sabellid sp.?	F