Invertebrates of The Great Bras D'Or

On the following pages are found the raw data recording the invertebrates in the different collections and also notations made of invertebrates in drags and tows but not collected.

The general description for the collection covering phylum or class can be considered valid both with respect to accuracy of identification and to complete coverage of the animals involved, with the exception of polychaetous tubeworm whose identity was at first in doubt and which it is believed is not always mentioned in the records. With respect to some of the smaller animals or more obscure groups where identification is doubtful these notations are always indicated as being questionable. Also for these smaller animals it is quite likely that they were not always picked off the screens used for sorting the bottom plankton hauls and also that they may not have as yet been discovered and/or described in the respective collections.

Specific identification of the mysids, isopods, decapods, and gammarids in part has been effected and is considered to be of satisfactory accuracy.

The identification of the molluscs is open to question since this was done in a preliminary fashion using only one key plus picture books. In cases where there is doubt of identification this is always indicated, those species which are indicated as definite being generally common and readily identifiable.

The polychaets collected in 1951 have been sorted with respect to families and it is felt that while further work is necessary here, the familial designations are as accurate as possible at this stage. Changes in these identifications would no doubt result after more specific taxonomic work breeds a better understanding of the group. It should be pointed out that while Fauvel was consulted at times during this sorting the basic work was done using Treadwell which is certainly inadequate in every respect. The specific names of the polychaets are present for the author's guidance alone and will be stricken from these pages and replaced with the familial names.

In the following outlines of drags and plankton tows, where no collection was made only a general statement of the invertebrate groups can be given. Where collections have been made a general statement indicating the groups present is given. This statement was usually recorded at the time of collecting and therefore in the case of bottom plankton tows is usually not all inclusive. The general statement is followed by the more specific description and identification of those forms for which that is at present available.

Some of the abbreviations and terms used here are vague and will be described below.

Dr. - denotes drag

dr., dre. etc. - denotes dredge drop.
S.Pl. - surface plankton tow.
M.Pl. - middle plankton tow; depth unknown somewhere between top and bottom.
B.Pl. - bottom plankton tow; in most cases behind drag, so that it is known to have been on the bottom.
l. or L. - length
h. or H. - height.
br. - breadth.
w. or W. - width.

Measurements are in millimetres:
Pelecypoda - greatest length and greatest height;
Gastropoda - greatest breadth (definition obscure), greatest height;
mysids - tip of "rostrum" to tip of telson; extended position;
gammarids - similar to mysids, but some measured in "relaxed" condition others in extended position; this is noted or else understood to be an extended measurement;
isopods - as above; since isopods usually preserve flat there is no difficulty about relaxed or extended position;
shrimp - rostrum - telson; shrimp extended for measuring;
lobster - similar to above; telson setae also included in one measurement;
crab - greatest width;
hermit crab- length from tip of "rostrum" to posterior margin of carapace (hardened area);

M. - male; sometimes - m.
F. - female; sometimes - f.

i. - immature.
m. - mature.

B.B., K.H., W.B. - main areas of investigation.
G.B.D. - Great Bras D'Or Channel.
St.P.Ch. - St. Patrick's Channel.

shrimp -
r. - rostrum length; tip to line at right angle to orbital posterior limit concavity.
r/c - rostrum plus carapace.
spines - 6/3/3 - 9 dorsal spines, 3 on carapace; 3 ventral spines.

isopod - plate - penes of male;
shrimp - (Pandalus) - annulations on carpus of 2nd. pereipod;
pelecypods - (Yoldia) - teeth - hinge teeth; ant, - anterior to umbo; similarly for posterior;
measurements - L.-13.5(6)10-17 - mean length 13.5, 6 individuals range in length of 10-17 millimetres.

Invertebrate Collections

Bras D'Or Lake 1951, 1952.

Baddeck Bay - lobster traps. No dates

Homarus americanus sex	carapace	c/r	l	l'
M.	73	97	8.13	8.31
F.ovig.	79	106	9.13	9.31
M.*	94	122	10.44	10.69

* about 25 young M. edulis (all less than 10 mm.), attached to bases of appendages.
l' - includes setae at tip of telson.

Baddeck Bay - lobster trap? No date.

Cancer irroratus - 2 M - w.-98, 112.

Little Narrows - by hand. No date.

Oestrea virginica - 3 -	l.	h.
	78	120
	78	123
	70	109

Little Narrows - by hand. No date.

Mya arenaria - 3 -	l.	h.
	84	48
	86	51
	99	57

#1 B.B. Dredge 24-V-51

Nephthys - 4 -
Sabellidae - 2 -

nemertean - 1 -

Nucula delphinodonta - 1 - l.2.5;h.2.0.;
Cardium pinnulatum - 1 - shell only
nudibranch - 1 -

#2 B.B. S.Pl. 24-V-51

#3 B.B. Dr. 24-V-51

kelp; large numbers of starfish, small, probably Asterias;

B.B. Dr.#1 24-V-51
a few starfish;

B.B. Dr.#3 24-V-51
kelp and starfish;

#4 B.B. Dr. 24-V-51
many starfish; a few crabs, worms;

Mytilus edulis - 1 - 1.-50;

Cancer irroratus - 2 - 1 M. w.-30
1 F. w.-19

#5 B.B. Dr. 24-V-51
starfish, etc.;

#6 B.B. Dr. 25-V-51
many small starfish, 2-3" in diameter; sponge; brittle stars (2);
sea urchins; crabs (2); skate egg case;
poorly preserved, most discarded;

Cancer irroratus - 1 F.-w.-20

B.B. Lobster Trap 25-V-51

Cancer irroratus - 1 M. - w.-97

B. B. Dr. #7 25-V-51
a few invertebrates; some kelp;

#7 B.B. Dr. 25-V-51
large numbers of starfish; many worms; some amphipods;
sea urchins; molluscs; 1 skate egg case; much kelp;

Polinices heros?? -1-
Cardium pinnulatum -4- shells only

l.	h.
6.5	5.5
8.0	7.0
7.0	6.5
5.0	4.5

Yoldia limatula - 11 - including 4 empty;

l.	h.	ant	post.
35	15	31	25
33	14		
30	13		
20.5	11		
19	10	22	20
18	9.5		

Citharia convexa - 1 - 1.-32; h.-26; N.B. 4 teeth left valve;
P. heros (Natica heros of Apgar) - 3 -

h.	br.
34	28
30	25.5
22	19

#8 B.B. Dredge 29-V-51
dredge not operating or being operated successfully; few animals; worms; bivalves;

Terebellidae - 2 -
Ninoe nigripes?? -12 -
Nephthys - 5 -
Polynoidae - 1 -

nemertean - 1 -

Astarte sp. undata? - 2 -

l.	h.
9.0	8.0
4.0	3.5

Nucula delphinodonta - 2 -

l.	h.
2.5	1.5
2.0	2.0

Yoldia limatula - 3 - one of these empty;

l.	h.	ant. teeth	post. teeth
19	10		
21	10		

Edotea - 2 -

	l	w	
	8.0	3.5	plate
4 prs oostegites	5.0	2.5	no plate covering pleopods

(plate - penes, attached to sternum of last thoracic somite)

#9 B.B. S.Pl. 29-V-51

#10 B.B. M.Pl. 29-V-51

B.B. Dr. #11 31-V-51
a few 6-10 starfish;

B.B. Dr. #12 31-V-51
6-10 starfish;

B.B. Lobster Trap 31-V-51

Cancer irroratus - 1 M. - w. - 109;

#11 B.B. Dr. 1-VI-51
dozen starfish; 1 sea urchin; 2 anemones; sponge;
1 hermit crab; 1 lobster;

Homarus americanus - 1 M. - c.-82; c/r - 109; 1-9.13" or length- from tip of rostrum to tip of telson; second value includes setae on telson;
Pagurus acadianus - 1 F. - 1.-6.0;
length is the length of the carapace, armored area;

Modiolus modiolus - 1 - 1.-82

#12 B.B. Dr. 1-VI-51
starfish; 1 hermit crab; 1 skate egg case;

Pagurus acadianus - 1 M. - note animals?, on gastropod shell; see 12, 13 for further data;

#13 B.B. Dr. 1-VI-51
many starfish; sea urchins; sponges; 2 hermit crabs; 2 sand dollars; brittle stars; worms; bivalves;

Cancer irroratus - 1 F. - w.-23.5
Pagurus acadianus - 2 M. - N.B. limpets from inside one gastropod shell; see 12, 13 for further data;

Venus mercenaria ?? - 1 - l.-75; h.-73;
M. modiolus - 1 - l.-95; empty, one valve discarded;
Saxicava arctica - 3 - l.-12;8;3.5;
M. edulis - 2 - l.-5;10;

#12, 13 B.B. 1-VI-51
P. acadianus - 3 M. - l.-5.5(2);8.5;

#14 B.B. Dr. 1-VI-51
starfish; sea urchins; sponge; 1 lobster;

H. americanus - 1 M. - c/r - 63; r - 18; 1-135; 1'-140;

#15 B.B. Dr. 1-VI-51
a few sea urchins; starfish; 1 hermit crab;

Pagurus pubescens - 1 F. - l.-4.0; (length of carapace)

#16 B.B. Dr. 24-31-V-51

#17 B.B. Dr. 5-VI-51
net loaded with kelp; a few starfish; sea urchins; 2 anemones;

B.B. Dr. #18 5-VI-51
some starfish;

B.B. Dr. #19 5-VI-51
a few starfish; much kelp;

B.B. Lobster Traps 5-VI-51
Cancer irroratus - 1 M. - w.-111;
also recovered from one trap same day - 1 lobster, 1 eelpout, both discarded;

#18 B.B. Dr. 6-VI-51
kelp; a few starfish; a few anemones;

B.B. Dr. #21 6-VI-51
kelp and a few starfish;

#19 B.B. Dredge 6-VI-51
dredge working but few animals; polychaets; a few bivalves; 1 amphipod;

Nephthys - 1 -
??? Ninoe nigripes - 8 -

Leodicidae - 1 - (2 small pieces)

		l.	h.	ant.	post.
Nucula delphinodonta	- 2 -	2.5	2.0		
		3.0	2.5		
Y. limatula	- 2 -	27	12.5		
	loaded with eggs?	21	10.5	21	18

Edotea sp. - 1 - 1.-4.5; 2.-2.0; plate (i.e. male);

Monoculodes sp. - 2 F. - ext. l. - 6.5;7.5;
oostegites proximal (iemesad?) to branchiae;
larger and narrower than branchiae (at this size);
fringed with long setae;

#20 B.B. M.Pl. 6-VI-51

#21 K.H. Dr. 6-VI-51
some starfish; a few relatively large shrimp;

Pandalus montagui - 18 -
leftV usually 64 annulations occasionally less, seldom more;
right V circa 20 annulations usually less;

Sex	Left*	Right*	R.	R./C.	L.	Spines
m/f	65	22	25	41.5	90	5/4/5
m/f	62		22	36.5	77	8/3/6
m/f	62					6/4/6
m/f**	57	19	24	38.0	84	6/4/6
m/f	64		23	38.5	81	6/4/6

*annulations on wrist (carpus, carpopodite) of second periopod.
**both male and female aperatures discernable except in this one case, the female aperature not being definitely located;

#22 B.B. H.N. 7-VI-51
starfish, molluscs, polychaets, mysids, gammarids, caprellids, ascidian;

mysid species - 22 - dired up unidentified;

Mysis stenolepis - 2 imm. F. - 1.-9.0 - 20 spines
11.5 - 20 spines
The spines referred to here are the spines along the lateral border of the telson.

#22 B.B. Nephthys - 7 -
?? Ninoe nigripes - 2 -
Polynoidae - 2 -
Phyllodocidae - 2 -

unidentified bivalve - 15 -
P. heros - 1 - h.-29; br.-23;

Orchomnella pinguis (Boeck) - 151 -
measured in relaxed (normal) position;
1 M. l.-6.0;
37 F. nonovigerous
34 F. ovigerous
5.0 - 12 eggs
5.0 - 14 eggs
5.5 - 18 eggs
6.0 - 14 eggs
4.5 - 11 embryos

79 immature, unsexable l.-2,0(3);2.5
151

#23 B.B. H.N. 8-VI-51
amphipods, a few mysids; 1 shrimp; starfish, latter not collected;
unidentified mysids - parts of 2 or three - discarded;
nematode (1) lying free in collection discarded;

Crago septemspinosus - 1 F. - l.-30.5 no spine; young recently shed; egg still attached, shells still attached;

O. pinguis - 15 -
2 imm. unsexable l.-2.0 (ext.l. - 2.5)
9 F.M. nonovigerous
4 F.M. ovigerous
5.5 - 18 eggs
5.5 - 17 eggs
Aeginina longicornis (Krøyer) - 1 F. - l.-6.5

B.B. Dr. #24 8-VI-51
kelp; a few starfish;

B.B. Dr. #25 8-VI-51
kelp; starfish; anemone; small crab;

#24 W.B. Dr. 11-VI-51
much alga, many pelecypods of a new variety; many medusae not collected;

Saxicava arctica - 69 -

l.	h.	l.	h.	l.	h.	l.	h.
29	13	26	15	23	12	15	8
27	14	26	11	24	12	15	8
25	12	24	14	24	12	18	9
30	16	25	14	22	11	14	7.5
28	15	11	5.5	19	9	13.5	6.5

#24 W.B. cont.

S. arctica cont.

l.	h.	l.	h.	l.	h.
11.5	5.5	21	10	18	9
12	6	23	13	8.5	4
10.5	5	22	10	8	4
9	4	20	10	7	3.5

M. edulis - 2 -

l.	h.
32	17
23	13

#25 W.B. Dr. 12-VI-51
tubeworm in great abundance in which were entangled bivalves, worms; also bivalves, sponges attached to trees which were raised; a few starfish;

Mytilus edulis - 40 -

l.	h.	l.	h.	l.	h.
55	30	8	4.5	38	20
47	24	7	4.0	25	14
47	24	4.5	2.5	49	26
50	25	51	26	17	10
72	36	31	17	44	22
48	26	28	16	36	20
60	30	48	24	27	17
34	21	21	11	55	26
13	7	50	25	28	15
11.5	6	27	13	47	26
10	5.5	32	19	70	36
9.5	5	23	13	21	11
8	4.5	35	20	13	7
				13	7

Saxicava arctica - 349 -

less than 5 mm. in length	- 45
5.5 - 10	- 46
10.5 - 15	- 75
15.5 - 20	- 75
20.5 - 25	- 67
25.5 - 30	- 33
30.5 - 35	- 7
35.5 - 40	- 1
	349

#26 W.B. Dr. 12-VI-51
much tubeworm tube with clams and worms; a few anemones; 1 tree covered with anemones and bivalves;

M. edulis - 39 - most of a relatively large size, many bearing anemones; those measured are larger specimens;

l.	h.
62	28
76	38
82	40

S. arctica - 73 - several of the larger specimens bearing anemones; largest specimens only, measured;

l.	h.
30	17
34	18
34	16
36	17

#27 W.B. Dr. 12-VI-51
a little Laminaria; N.B. bodies on thallus - bryozoan?

#28 W.B. S.Pl. 12-VI-51
put down as a result of noting objects at surface which proved to be medusae of the type locally known as blood suckers;

#29 W.B. Dr. 13-VI-51
1 large medusa, this proved too large and fragile to handle properly so that it was later discarded;

W.B. Dr. #35 13-VI-51
2 sand dollars; sponge; a few starfish; a few bivalves;

W.B. Dr. #36 13-VI-51
bivalves; sponges; a few starfish; a few sand dollars;

W.B. Dr. #38 14-VI-51
some kelp; sand dollars; bivalves; a few starfish;

W.B. Dr. #39 14-VI-51
kelp; sponges; sand dollars; bivalves; a few starfish;

#30 W.B. Dredge 14-VI-51
relatively few animals; polychaets bivalves;

Nepthys lawrencii	- 1 -	
Nepthys sp. caeca?	- 14 -	
Lagisca	- 4 -	
Cistenides	- 1 -	
Terebellidae	- 3 -	
nemerteans	- 2 -	
S. arctica	- 7 -	L.-10.5; 10; 14; 9(2); 6; 5.5; latter specimen covered with ? placed with miscellaneous items;
C. pinnulatum	- 2 -	L.-5.5; H.-5.0;

#31 W.B. S.Pl. 14-VI-51

#32 W.B. M.Pl. 14-VI-51

#33 W.B. S.Pl. 14-VI-51

#34 W.B. M.Pl. 14-VI-51

#35 W.B. H.N. 14-VI-51
starfish; polychaets; 1 gastropod; gammarids; cumaceans; mysid; 1 medusa;

unidentified mysid rear end - discarded;

Nephthys - 9 -
Lagisca - 2 -
Cistenides tubes - 5 -

nemerteans - 3 -

P. heros ? - 1 - H.-19; Br.-17;

W.B. Dr. #40 15-VI-51
bivalves; worms, grass, sponge; trees, anemones; 1 sea urchin;

#36 W.B. H.N. 15-VI-51
starfish; bivalves; polychaets; gammarids;

Nephthys - 1 -
tubes - 2 - of what?

Y. limatula - 1 - L.-12; H.-6; ant teeth - 18; post. teeth - 15;
C. pinnulatum - 2 -

L.	H.
5.5	5.0
7.0	6.5

#37 W.B. Dr. 11-15-VI-51
miscellaneous items;

M. edulis - 1 - L.-59; H.-40
covered with bryozoan; part of shell covered with bryozoan retained, rest discarded;
S. arctica - 1 - L.-28; H.-18; discarded;
Y. limantula - 1 - empty; discarded;
L.-42; H.-19; ant. teeth - 31; post. teeth - 27;
C. pinnulatum - 1 - L.-9; H.-8.5; shell only;
Astarte sp striata ? - 1 - L.-14; H.-12;

B.B. Dr. #42 19-VI-51
Laminaria; Pelvetia?? many starfish; a few sea urchins; a number of medusae;

B.B. Dr. #43 19-VI-51
kelp; some starfish;

B.B. H.N. 20-VI-51
hoop nets set 19-VI-51, only a few starfish, 3 or 4 worms, not collected;

#38 B.B. Dr. 22-VI-51
kelp; many starfish, anemones; a few sea urchins;

M. edulis - 1 - L.-90; H.-50;
covered with bryozoan and other animals - check;

#39 B.B. H.N. 22-VI-51
a few mysids, gammarids; many starfish;

unidentified mysid - 1 - discarded;
Mysis stenolepis -2F.- small; one has only 21 spines lateral border of telson; telsons removed but in vial;

Amphithoe ? - 1 - parts missing; identification not possible;
O. pinguis -2F.- L.-5.5; extL.-6.0; lat. spines-3,3;3,2; (for O. pinguis - 2,2; #1)

#40 B.B. S.Pl. 23-VI-51

#41 B.B. M.Pl. 23-VI-51

#42 B.B. Dr. 26-VI-51
Laminaria; Pelvetia? a few sea urchins; many starfish; a few anemones; 2 crabs;
6 medusae discarded;

B.B. Dr. #47 26-VI-51
kelp; starfish; 1 hermit crab;

#43 K.H. Dr. 26-VI-51
starfish; shrimp, etc.;

Pandalus montagui - 6 - second pereiopod annulations, L.-57-74; R.-17-23; definition may have been better for these specimens;

#44 G.B.D. Dr. 27-VI-51
a large amount of kelp; many sand dollars; jellyfish; a few small sea urchins; starfish; brittle stars; crabs;

Cancer irroratus - 2 F. - W.-12; 74; the latter ovigerous

Pecten magellicanus - 1 - L.-46; H.-45;
gastropod egg collar, Polinices?, loaded with eggs;
also eggs of some other animal attached to collar;

#45 G.B.D. Dr. 27-VI-51
large amount of kelp; a few starfish; scallops; crabs (5 large discarded); sea urchings; 1 lobster - discarded; many medusae; a few shrimp; 7 medusae discarded;

Cancer irroratus - 6 -
2M.-".-9.0;11.5;
4F.-W.-11;22;30;69; latter ovigerous;
tips dact., prop., purple (preserved color):
larger crabs (here), discarded;
Spirontocaris fabricii - 1 M. - L.-31.5; r.-6.0;
r.&c.-11.0;
5 prs dorsal spinules on telson;
Pecten magellicanus - 1 - L.-46; H.-45;

#46 out G.B.D. Dr. 27-VI-51
large numbers of sea urchins, sand dollars; some sponge; a few starfish, gastropods, hermit crabs, worms;

Cancer irroratus - 1 M. - W.-41;
Pagurus acadianus - 2 -
note encrustaceans on shells, and limpet;
see 46,47,49 for further data;

Polinices heros ? - 2 -

H.	Br.
47	40
33	30

gastropod egg collar - Polinices???

#47 G.B.D. Dr. 28-VI-51
a few scallops, other bivalves; starfish; sponge; 1 hermit crab;

Pagurus acadianus - 1 -
three abdominal limbs (unpaired) other than uropods; for further data see 46, 47, 49;

#48 G.B.D. Dr. 28-VI-51
sponge; scallop; brittle stars; medusa; alga covered with animals, bryozoan?
1 medusa discarded;
piece of alga with attached bryozoan discarded;

P. magellicanus - 1 - L.-29; H.-31;

#49 G.B.D. Dr. 28-VI-51
sponge, bivalve; starfish; polychaets; hermit crabs;

P. acadianus - 2 - for further data see 46, 47, 49;

M. modiolus - 1 - L.-75; H.-40; covered with animals, check;

#46,47,49,G.B.D. 27, 28-VI-51

P. acadianus - 4M. - L.-7(2);8.5;9.5;
1F. - L.-9.5;

#50 K.H. Dr. 3-VII-51
a few starfish; shrimp; worms; 1 holothurian;

P. montagui - 8 -
7 identified on basis of annulations on carpus of one or both pereiopod 2, other no pereiopod; left 60-65 annulations; see summary - 50,53,54,56;

Lepidonotus squamatus - 1 - ???
tubeworm - 2 -
both broken; 2 additional tubeworms even more severely battered discarded; most of tubeworm tube in collection discarded;

B.B. B.Pl. 4-VII-51
ski not getting to bottom, actually getting only surface plankton; medusae plugging up net; not collected;
7- 6" diameter
11- 2" diameter

K.H. Dr. #58 7-VII-51
a few starfish, shrimp;

#51 K.H. B.Pl.? 7-VII-51
ski not running along bottom, picked up only plankters;

#52 K.H. B.Pl.? 7-VII-51
same situation as in #51;

#53 K.H. Dr. 10-VII-51
a few starfish; shrimpl putrefied, some starfish discarded;

P. montagui - 3 - 60-65 annulations left pereiopod 2; see summary 50,53,54,56;

#54 K.H. Dr. 10-VII-51
shrimps, 2 types; starfish; worms; 1 hermit crab; 1 sea cucumber;

P. montagui - 7 - see summary - 50,53,54,56;
Sabinea septemcarinata - 1 F. - ovigerous; L.-54; no obvious development of eggs; agrees with description but 2nd. pereiopod very short reach only as far as middle of merus; cf. fig. 29;
Argis dentata - 1 F. - ovigerous; L.-82; no obvious development of eggs;
P. pubescens - 1 M. - L.-7.5;

#55 K.H. B.Pl. 10-VII-51
mysids; platyhelminthes; polychaets; pycnogonids; chaetognaths; gammarids; bivalves; hirudinenas?; louse; copepods; minute eggs; larvae of isopod?, these are possibly male or young Dajus mysids;

Mysis mixta 1 M. immature
39 F. (3 immature) L.-9.5
(36 mature) L.-21(5); 22(2); 23(3);
nonovigerous; measurements retaken
with more accurate instruments;
see 55, 56;
16 eggsacs unnattached probably
from these females, in separate
vial; (these are female isopod
parasites);

40

Erythrops erythrophthalma - 2 M. L.-9(2); both mature;

Polynoidae - 6 -
Potamilla torella - 1 -
unident. polych.(x)-2 -

rhynchobdellids ? - 4 -

S. arctica - 2 - L.-3.5(2)

unidentified isopod - 1 -

#56 K.H. B.Pl. 10-VII-51
polychaets gammarids; chaetognaths; bivalves; bryozoan?;
copepods; clusters of small eggs; white feather-like
objects;

Polynoidae - 2 -
tubeworm - 1 - in 2 pieces;

P. montagui - 5 - preserved color, macroscopically -
pure white; microscopically - bands
of red stellate bodies; difficult to
count annulations; all somewhat small
than those caught in the trawl;
see summary 50,53,54,56;

M. mixta - 2 imm M. - 4th pleopods not elongated (ie
over 2X5th);
1 imm F. - L.-13;
8 m.F. - mature (oostegites large) or
nearly mature; nonovigerous;
2 imm M. - rear ends
13 F. - rear ends
1 unsexable rear end
6 unattached heads included here,
antennal scale ratio not taken;

27

mysid species - 2 unidentified rear ends - discarded;
Neomysis americana - 1- mature male rear end;
E. erythrophthalma - 6 m. M. - includes 2 rear ends;

1 i. F. -
2 m. F. - includes 1 rear end; nonovigerous; spent?

9

S. arctica - 2 - L.-4;5;

#55,56 K.H. 10-VII-51
M. mixta - dissection for nematodes - 16 m.F.
11 F. rear ends
27 no nematodes
0% infection
these animals were removed from the above collections and are not additional to the numbers recorded there;

spines on lateral border of telson;

mature females		immature females	
L.	spines	L.	spines
20	28	13	23
22	29	12	27
21.5	32		
22.5	30		
22	31		
21	32		
21	31		

Dajus mysidis - 21 - ex M. mixta
4 M.
14 i.F.
3m. F. (ie. ovigerous)
2 of the males were found free; of immature females eggs are obviously being formed in about 9 cases; 2 immature females have sac-like structure protruding- significance?

#50,53,54,56 K.H. 3-10-VII-51
Pandalus montagui

sex	left	right	spines	r.	r≠c.	L.
m/f	53	18	5≠4/6	15	25.5	54
m/f	60	18	6≠4/5	19	31.5	65
m/f		18	6≠4/6	22.5	38	81
m/f	63	18	6≠4/5	26	43	88
m/f		20	6≠4/5	23.5	38	80
m/f	59	20	6≠3/6	18.5	30.5	66
	63	21	6≠4/6	16.5	28	58

K.H. Dr. #61 12-VII-51
shrimp, starfish; 1 sea urchin;

B.B. Dr. #62 14-VII-51
let out too much cable, net loaded with jellyfish and

mud, all dumped; 35 fathoms cable;
large school of medusae noted at head of bay in morning;

#57 B.B. B.Pl. 14-VII-51
starfish; polychaets; 1 shrimp; gammarids; isopods; gastropod; fish; cumacean; echinoid; mysid; eggs; queer things;

Crago septemspinosus - 1 - unsexable L.-16; with spine;

Neomysis americana - 1 i.F. - rear end; loose head probably belongs to this animal;

Nephthys - 14 -
Ninoe nigripes 1 -
Polynoidae - 1 -

Gastropod - 1 - no shell;

Edotea - 4 - L.
5 - no plate (sternal plate, penes)=
3.5- no plate female
6.5- plate = male
6 - no plate - 67 embryos, well formed, 6 prs legs lengths of embryos - 0.8-1.1 mm. some variation in development;

Orchomnella minuta - 1F. - ext. L-4.5; telson spines 1,2(✓ terminals)
Pontogeneia inermis -1M. - ext. L-6.0;

P. abdominalis -1M.- what is this? Phryxus???

#58 B.B. B.Pl. 14-VII-51
gastropod egg case; polychaets; queer tree with egg cases; cumaceans; small eggs; nematodesetc.; 1 mysid;

Nephthys - 1 -
unident. polych. - 1 -

Pelecypod innards - 1 - looks like Cardium - discarded;
egg collar, loaded - Polinices??

#59 B.B. B.Pl. 14-VII-51
polychaets; "large" queer things; one a worm; mysids;

Mysis stenolepis - 2 i.F. - L.-12;14;
21-23 spines along lateral border of telson; pigmentation ok.; antennal scale approximately 10 times as long as wide;

Nephthys - 1 -
Polynoidae - 1 -
nydibranch - 2 - more flattened, artifact?, than most specimens;

W.B. Dr. #65 17-VII-51
some plant; bivalves; sponge; (is this plant not tubeworm tube??)

W.B. Dr. #66 17-VII-51
some plant; bivalves; sponge; etc.;

W.B. Dr. #67 17-VII-51
a little plant; invertebrates;

W.B. Dr. #68 17-VII-51
large number medusae; some plant; bivalves; sponge;

#60 W.B. B.Pl. 17-VII-51
mysids; polychaets gammarids; copepods; fish scales?;

M. stenolepis - 6 i.M. - L.-13; 14.5;
3 i.F. - L.-13;14;
9
spines along lateral border of telson- 21;23(2);24; sexing of this species, #60-67, indefinite; development not progressed to point where sex obvious; (checked);

S. arctica - 1 -
nudibranch - 1 -

Polynoidae - 9 -

#61 W.B. B.Pl. 17-VII-51
mysids; polychaets; gammarids; bivalves; cumacean; chaetognaths; queer thing;

M. stenolepis - 5 i.M. -
2 i.F. -
7

Polynoidae - 4 -
Nephthys - 1 -
unident. polych- 1 - (z)

#62 W.B. B.Pl. 17-VII-51
bottle spilled in lab., some items particularly of a small size may have been lost; polychaets; cumacean(1); 1 caprellid; gammarids; 1 bivalve; flatworm; mysids; queer thing;

M. stenolepis - 10 i.M. -
5 i.F. -
15

Terebellidae - 2 -
Polynoidae - 6 -
Nephthys - 1 -
Hesionidae - 3 -

S. arctica - 1 -
nudibranch - 1 -

#63 W.B. B.Pl. 17-VII-51
part of contents lost; 2 mysids; 1 cumacean; 1 worm tube (sand tube)

M. stenolepis - 1 i.M.
1 i.F.
2

#64 W.B. B.Pl. 17-VII-51
mysids; polychaets; chaetognaths;

Mysis stenolepis - 3 i.M. - L.-13; 13.5;
7 i.F. -
10

Nephthys - 2 -
Polynoidae - 3 -
Terebellidae - 1 -

#65 W.B. B.Pl. 18-VII-51
1 mysid; 1 cumacean; chaetognaths;

M. stenolepis - 1 i.M. -
N. americana - 1 i. - unsexable;

#66 W.B. B.Pl. 18-VII-51
2 mysids; polychaets; 1 chaetognath; copepods; queer things;

M. stenolepis - 2 i.F. -

Polynoidae - 3 -
unident. polych. - 1 - (n)

nudibranch - 1 -

#67 W.B. B.Pl. 18-VII-51
1 caprellid; 1 bivalve; flatworm; small items; many mysids; polychaets; chaetognaths; cumaceans;

M. stenolepis - 19 i.M. - L.-11;11.5(3);12(3);14.5;
65 i.F. - L.-12;13(2);13.5(2);14(5); 14.5;15;15.5; all very young animals; sexing very difficult;

Polynoidae - 14 -
Nephthys - 1 -
Cistenidae - 1 - also 2 empty tubes, very small;

S. arctica - 1 -

S.P.C. Dr. #74 19-VII-51
net loaded with red medusae

S.P.C. Dr. #75 19-VII-51
net loaded with red medusae

S.P.C. Dr. #76 19-VII-51
numbers of red medusae

S.P.C. Dr. #77 19-VII-51
medusae

S.P.C. Dr. #79 19-VII-51
many medusae

B.B. Dr. #83 30-VII-51
1 lobster; a few anemones;

B.B. Dr. #84 30-VII-51
2 lobsters;

#68 B.B. B.Pl. 30-VII-51
sponge; 1 starfish; mysids; polychaets; cumaceans; gammarid; bivalves; chaetognaths; queer things;

Nephthys - 2 -
Polynoidae - 2 -
Terebellidae - 1 -

Nucula delphinodonta - 1 -
nudibranch - 1 - as in 59;

Crago septemspinosus - 1 m.F. - ovigerous; L.-26; tip antennal scale - tip of telson;

Mysis stenolepis - 1 i.M. - L-16;
1 i.F. -
2

Neomysis americana - 7 m.M.- L.-7;8(2);
2 i.F.
4 m.F.- L.-9;
1 M.- rear end;
14

Argissa hamatipes - 1 F. - ext. L.-4.5;

#69 B.B. B.Pl. 30-VII-51
1 yellowtail; mysids; polychaets; cumaceans; 1 gammarid;

Terebellidae - 1 -
Nereis pelagica - 1 -

Phyllodocidae - 1 -
unident. polych. - 1 -

M. stenolepis - 2 i.M. - including 1 rear end;

Orchomnella minuta - 1 F. - L.-3; ext.L.-3;

#70 B.B. B.Pl. 30 VII-51
mysids, polychaets; cumaceans; chaetignaths; gammarids; copepods; small nematodes;

Sabellidae - 1 -

Monoculodes sp. 1 M. - M. edwardsii?? M.pallidus??
r.-7;eye-5; r. in front of eye -5; (micrometer divisions); per.2-6th - 3Xw- L.
1 unidentified gammarid rear end;

C. septemspinosus - 2 m.F. - ovigerous; L.-22.5;23.5;

M. stenolepis - 4 i.M. - L.-15;
17 i.F. - L.-12;13;14.5;15;15.5;17;
21 spines along lateral border of telson - 21(2);22(2); 23;24;25;

N. americana - 7 i.M. - L.-7.5(2);8.5;
15 m.M. - L.-7(2);8;8.5;11(2);
3 i.F. - L- 8;
9 m.F. - L.-7.5;8.5;13; includes 1 rear end;
34

#68, 70 B.B. 30-VII-51

N. americana - 17 F.
6 i.F.
9 m.F. nonovigerous; most appear to have shed embryos, ie. large oostegites; 1 has probably not yet carried eggs;
2 m.F. ovigerous; 1 with 2 or 3 disintegrating eggs; other with 9 apparently undeveloped eggs;

K.H. Dr. #86 31-VII-51
a few starfish; shrimp;

#71 K.H. B.Pl. 31-VII-51
mysids; nudibranchs; polychaets; bivalves; nemerteans; chaetognaths; gammarids; annelids; pycnogonids; caprellid; copepods; mysid egg cases (detached); placed in with mysids (these are probably D. mysidis)
small items - eggs; unknown;

Mysis stenolepis - 4 i.M. - L.-16;
9 i.F. - L.-15;17;
13
spines lateral border of telson - 22;24;25;

M. mixta - 30 i.M. - L.-10.5;12(2);13(3);15.5;
spines - 26(2);27;28(2);30;32;
37 i.F. - L.-11;12;13(3);13.5(3);15.5;
spines - 24;26(3);28(4);30;
40 m.F. - L.-22(3);22.5(2);23.5;26.5;
spines - 29;30(2);31;32(2);34;
4 M. - rear ends
11 F. - rear ends 7 unattached heads placed here;
122 1 head may be N. americana;
1 tail - M. oculata;

M. oculata - 2 m.M. - 17.5;20.5;
2 m.F. - 20.5;24;
4
spines - 24(2);28;32;
1 unattached head of this species also recovered;

N. americana - 2 m.M. - L.-12;
2 m.F. - L.-12;
1 F. - rear end
5

E. erythrophthalma - 2 i.M. -
20 m.M. - L.-8(2);8.5(2);9;
3 i.F. -
6 m.F. - L.-9;9.5;
1 M. rear ends;
5 F. rear ends;
2 unsexable rear ends;
39 7 unattached heads placed here;

13 isopod parasites probably from M. mixta, in separate vial, with those from #72; these were originally thought to be egg cases of the mysids;

Spirontocaris macilenta - 1M.-rostrum not typical in shape; L.-25;r.-3;r./c.-8;spines-9/2/1;

Pandalus montagui - 2 -

sex	left	right	r	r/c	L.	spines
m/f	-	19	17.5	29	59	7/4/6
m/f	-	21	17.5	28	58	6/4/5

Polynoidae - 5 -
tubeworms - 7 -
rhynchobdellids - 1 - ??

S. arctica - 14 - L.-2(2);2.5(3);3;4(2);5(2);
nudibranchs - 2 -

#72 K.H. 31-VII-51 B.Pl.
bryozoan colony(Ectoprocta); mysids; alligatorfish - 10 cms; polychaets; nemerteans; bivalves; chaetognaths; nudibranch; gammarids; copepods; hymenopteran; small items - unidentified;

Spirontocaris macilenta - 1 M. - rostrum typical in shape; L.-31.5;r.-3.5; r./c.-9.5;spines-11/2/2

M. mixta - 52 i.M. - L.-12;13;13.5(4);14; 14.5;15.5;16(2);17.5; 18.5;
106 F. - L.-13(3);13.5;14;15; 22(2);22.5(2);23(3); 24(2); less than 15 mm. - immature; over 22 mm. - mature;
sample 41 F. -15 m., 26i.;
13 M. - rear ends
23 F. - rear ends
194 25 unattached heads, placed with these specimens; one or two heads may be of N. americana; one or two rear ends may be M. oculata; spines along the lateral border of the telson - 25;26(2);27(5);28(5);29(2); 30(6);31(3);32;

M. stenolepis - 2 i.M. - L.-15;
3 i.F. - L.-13;
5

M. oculata - 3 F. - L.-13.5i.; 23m.;
1 head
4 spines along lateral border of telson - 23;26;30; pigmentation as for M. mixta; check for M. oculata in all M. mixta collections 73 et seq.; obvious difference - length antennal scale; rounded tip;

N. americana - 1 m.M. - L.-12.5;
1 F.
1 M. rear end
2 F. rear ends
5

E. erythrophthalma - 10 M. - L.-8.5;9(3);
4 i.F. including 2 rear ends;
9 m.F. including 2 rear ends; L.-8.5;9.5;
3 M. rear ends
2 unsexable rear ends
28

1 nematode lying free placed in separate vial;
1 F. M. mixta with contained nematode preserved separately;

11 isopod parasites placed with those of #71 in separate vial; all are most probably from M. mixta;

Polynoidae - 9 -
Potamilla sp. neglecta?? - 4 -
Terebellidae - 6 -
Amphiglena -13 -
unident. polychaet(x) - 1½-
quantities of tubeworm tube, most empty;

rhynchobdellids ?? - 1 -

S. arctica - 24 - L.-1.5;2;2.5;3.5;4;5;
P. magellicanus? - 1 - L.-9; H.-10; only one valve - right;

#72,72 K.H. 31-VII-51

Mysis mixta

6 m.M. may actually be immature; 4th pleopods not fully developed;
90 i.M. including rear ends;
57 m.F. including rear ends; all nonovigerous; appear to have shed;
98 i.F. including rear ends; some close to maturity;
9 F. rear ends; (30 heads, including 2m.F., 1i.F.)
1 intersex, in separate vial;
5 i.M. dissected;
4 i.F. dissected;
43 m.F. including one with parasite;
3 rear ends;
316

nematode infection - 1/55 - 1.8%

7 more isopod parasites placed in vial along with others making a total of 31; parasite like structure attached to pleopod also placed with isopod parasites; these parasites mentioned above are definitely from M. mixta, whereas those mentioned under #71 and #72 could possibly be from other species of mysid;

M. oculata 2 m.M.
4 m.F. one containing 2 well developed embryos; also isopod parasite in brood pouch; also parasite attached to pleopods; parasites placed in separate vial;
1 i.F.
7

Erythrops erythrophthalma - 32 m.M. including 4 rear ends; some may actually be immature;
1 i.M.
16 m.F. including 4 rear ends; 2 ovigerous, one with 7 undeveloped eggs; 1 rear end with 14 embryos; embryos with at least 3 prs appendages, eyes; placed in separate vial, some embryos may have fallen out of brood pouch;
10 i.F. including 2 rear ends;
5 F. rear ends; also 10 unsexable heads
64

N. americana - 4 m.M. L.-12;12.5; including one rear end;
1 i.F. rear end
5 m.F. L.-12; 2 may be immature; includes 1 rear end; none ovigerous;
10

Dajus mysidis - 1 i.F. - ex. M. oculata
1 M. - ex. M. oculata recovered from same animal as female according to #71,72 but not noted in re-examination for isopods;

D. mysidis - 35 - ex M. mixta(?)
4 M. - L.-1.0(2);1.5; 2 of these attached to female
8 i.F. - "L."-1.5;2.0(2);2.5(3);nonovigerous;
23 m.F. - "L."-2.5(4);3.0(7);3.5(3);4.0;

L.	No.Eggs	Size Eggs	Remarks
3.0	1216	diam.0.2X.25	no dev.
3.0	1015	0.2X.25	no dev.
3.0	1055	0.2X.25	no dev.
3.5	1010	1..25Xw..20	some dev.

B.B. Dr. #90 2-VIII-51
1 lobster;

#73 B.B. B.Pl. 8-VIII-51
mysids; bivalves; tubeworm; cumaceans; small nematodes; hyperiid?? queer white thing - egg case?;

M. stenolepis - 2 i.M. L.-18;
2 i.F. L.-16.5;
4 all very immature; sexing very difficult;

Sabellidae - 2 -
Polynoidae - 1 -

S. arctica - 2 - L. 25 H. 12.5
8 4.5 both discarded;

W.B. Dr. #92 9-VIII-51
sponge; bivalves; tubeworms;

#74 B.B. 10-VIII-51
nematodes from fish #771-788;

B.B. Dr. #96 14-VIII-51
many sea urchins;

B.B. Dr. #97 14-VIII-51
2 lobsters; 2 scallops;

B.B. Dr. #98 16-VIII-51
many medusae

B.B. Dr. #99 16-VIII-51
many medusae; many small starfish; a few anemones; a few sea urchins; 1 sand dollar; 1 gastropod; 2 lobsters;

B.B. Dr. #101 24 VIII-51
2 sea urchins; a few starfish;

#75 B.B. 24-VIII-51
nematodes from fish #819-820

K.H. Dr. #102 25-VIII-51
2 shrimp; a few starfish;

K.H. Dr. #103 25-VIII-51
shrimp; a few starfish; 1 sea urchin;

#76 West Bay Dr. 29-VIII-51
#104 - many sea urchins, medusae, tubeworm; a few starfish, bivalves, sponge polychaets;
#105 - many sea urchins, tubeworm tubes; medusae; a few starfish;

S. arctica - 1 - L.-29; H.-17;

B.B. Dr. #107 10-IX-51
many medusae; 1 sea urchin; a few starfish; 1 crab; 1 lobster;

#76 K.H. B.Pl. 11-IX-51
copepods; small items (including decapod larvae?); nemerteans; pycnogonid with eggs; at least o gammarid bearing eggs N.B.; alga; chaetognath; bivalves; gammarids; tube of Cistenides; shrimp; 1 caprellid; mysids, detached brood pouches included ((D.mysidis)); polychaets; polyclad turbellarian; Aphrodite;

Crago septemspinosus - 1 - unsexable L.-13.5; with spine;
Pandalus montagui - 1 -

sex	left	right	r.	r./c.	l.	spines
m/f	60	22	18	29	62	6/4/6

Mysis stenolepis - 3 i.M. L.-18;
7 i.F. L.-18;18.5;
10 spines along lateral border of telson - 22;24;25;
all females definitely immature;

Mysis mixta - 20 i.M. - L.-16;17;17.5(2);18;19.5;21;
3 m.M. - L.-18;
14 i.F. - L.-12;13;14.5;15.5;
43 m.F. - L.-22;23;23.5;24(3);24.5(3);25(2);
80 spines - 26;27;28(3);30;31(3);32(4);33;
males - many approaching maturity;
none may actually be mature;
females - oostegites not fully developed for most "mature" females;
those with fully expanded oostegites may not have carried eggs;

Erythrops erythrophthalma - 3 i.M.
9 m.M. - L.-8(2);8.5;9.5;
5 i.F. - L.-6;9.5;
10 m.F. - L.-8(4);
6 - ovigerous
1 - 1 embryo
1 - 2 embryos
1 - 6 embryos
1 - 3 eggs, undeveloped
1 - 4 eggs, undeveloped
1 - 1 egg plus 2 or 3 disintegrating;
4 nonovigerous

some of the eggs and embryos may have fallen out of brood pouches;

27

Aphrodite aculeata - 1 -
Paraxiothea catenata - 3 -
Polynoidae - 2 -
Nephthydae - 1 -
unident. polychaet - 1 - (x)
cistenid-like tube?

gephyreans ??? - 3 -

Saxicava arctica - 6 - all less than 5 mm.;

Dajus mysidis - 37 - ex M. mixta ?? 2 of the mature females were removed from the brood pouches of this species;
11 M.
13 i.F.
13 m.F.

4 males were in mature females
5 males, including 1 larva? were in (attached to) immature female Dajus;
1 m.M., 11.M. found free;
development of eggs variable - recently formed eggs in some females, embryos with appendages in other females;

K.H. Dr. #109 14-IX-51
a few starfish; 1 sea urchin; 1 shrimp;

B.B. Dr. #110 15-IX-51
a few starfish, medusae, sponges; 1 sea urchin; 1 lobster;

B.B. Dr. #112 17-IX-51
a few medusae, starfish; some sponge; 1 sea urchin; 1 small lobster;

B.B. Dr. #113 17-IX-51
a number of starfish; 1 large; a few sea urchins; 4 anemones; sponge; a few bivalves; 1 lobster;

#77 B.B. B.Pl. 17-IX-51
sponge?; 1 isopod, 1 cumacean; 1 mysid; bivalves; ecrusting bryozoan; coelenterate;

Neomysis americana - 1 m.F. -

Edotea - 1 - L.-3.5 no plate (ie. - female);

Cardium pinnulatum ✓ ? - 3 - shells eaten away;

#78 B.B. B.Pl. 17-IX-51
1 shrimp; bryozoan - upright, ecrusting; sponge; 1 starfish; mysids; polychaet; Yoldia; brittle star; isopod;

Polynoidae - 1 -
Chlorhaemidae - 1 - ???

Y. limatula - 2 -

L.	H.	Ant.	Post.
8.5	4.5	15	12
4.5	2.5		

Crago septemspinosus - 1 - immature; L.-4.5;

Edotea - 1 - L.-4; female, (no plate);

Neomysis americana - 10 M. - imm.-5.5;
mat.-7;7.5(2);8(2);
12 F. - imm.-5.5;
mat.-7.5(3);8.5(2);9;9.5;10;
one of the above females carrying what look like full term young; compare sizes with immatures;

#77,78 B.B. 17-IX-51

N. americana - 2 i.M. - L.-5.5;
8 m.M. - L.-7;7.5(2);8(2);
1 i.F. - L.-5.5;
12 m.F. - L.-7.5(3);8.5(2);9;9.5;10;
3 of these females ovigerous;
1 - 1 egg disintegrating?
1 - 6 eggs;
1 - 12 well developed embryos;

23 animals dried up, discarded;

W.B. Dr. #114 18-IX-51
many medusae; a few sand dollars;

#79 W.B. B.Pl. 18-IX-51

M. stenolepis - 1 i.F. - L.-15; lat. spines - 25;
Polynoidae - 1 -
S. arctica - 2 - one with coelenterate attached placed with miscellanous material, other discarded;

nudibranch - 1 -

#80 K.H. Dr. 22-X-51
2 shrimp; a few starfish; 1 bivalve;

P. montagui ??? - 1 - looks like this species, but too mutilated for positive identification, discarded;
Argis dentata - 1 F. - L.-69; ovigerous; eyes visible, legs also appear to be developed;

Citharia limatula ??? - 1 - L.-33; H.-29; 4 teeth on right; name doesn't sound right;

#81 B.B. Dr. piece of wood 23-X-51

polychaets; bivalves;

Polynoidae - 3 -
Nereis pelagica- 1 -

Zirphaea crispata - 1 L.-23; queer iternal supports;

B.B. Dr. #116 23-X-51
4 or 5 starfish; a little kelp; piece of rotted wood (see #81)

#82 B.B. B.Pl. 23-X-51
copepods; young smelt - 7.5 cms; starfish, Yoldia; mysids, many very small; caprellid; polychaets; cumacean; shrimp; isopod; small items;

Nephthys - 2 -
Sabellidae - 1 -

Y. limatula - 1 - ant. teeth - 15; posterior teeth - 12; discarded;

M. stenolepis - 1 i.M. L.-21; 24 spines;
N. americana - 10 i.M. - L.-4.5;5.0;5.5(3);6.0;6.5;7(2); 7.5;
3 i.F. - L.-5.5;6(2);
4 m.F. - L.-7.5(2);9;10;
12 unsexable - L.-3.5(3);4.0(5);4.5(3);5.0;
30 identified only
59 males were not considered to be mature as 4th pleopods did not nearly reach to tip of 5th;

Crago septemspinosus - 4 - immature; L.-4.5;5.5;6;11;

Edotea - 5 - L.-3.5(3);4(2);none have plates (all females;)

Aeginina longicornis - 1 M. -

#83 B.B. B.Pl. 23-X-51
these items are from the same tow as #82, being the smaller items which passed through the large screen;

N. americana - 52 - only one mature individual, a female; many of "unsexable size";

C. septemspinosus - 4 - L.-3.5(2);4.0;4.5; all immature; smallest individual a larva, but still identifiable as this species;

Nephthys - 10 -
Sphaerodoridae - 2 -
Phyllodocidae - 1 -

Edotea - 5 - L.3-4; none with plates (all females);

Orchomnella minuta - 2 F.

L.	ext. L.
2.5	3.0
2.0	2.5

Argissa hamatipes - 1 F. -

#82,83 B.B. 23-X-51
Neomysis americana - 10 i.M. - L.-4.5-5.0;5.5(3);6;6.5; 7(2);7.5;
3 i.F. - L.-5.5;6(2);
6 m.F. - L.-7.5(2);9;10;
2 ovigerous;
1 - 2 well developed embryos;
1 - 8 well developed embryos; circa 1.5 mm.;

1 - 19 less well developed embryos;
7 embryos circa 1 mm. free in vial;
12 unsexable - L.-3.5(3);4(5);4.5(3);5;
80 identified only; none mature, most probably unsexable;

111

#84 W.B. B.Pl. 25-X-51
mysids; mainly small; polychaets; isopods; starfish; bivalves; gammarid; shrimp; chaetognath; bryozoan; cumaceans; copepods;

Polynoidae - 3 -
unident. polychaet(x) - 16 -
cistenid-like tube - discarded;

N. americana - 37 - including 2 mature, 1M.,1F.;
21.M. - L.-5;7;
21.F. - L.-6;6.5;
2 unsexable - L.-3.5;5;
43 the latter six, formed a sample for sexing and degree of maturity;

Crago septemspinosus - 1 - immature L.-7.5;
11 - larvae, probably late schizopod, undoubtedly this species - subschelate 1st. pereiopod; L.-4;

S. arctica - 2 - discarded;
M. edulis - 1 - L.-915; H.-6;
C. pinnulatum - 1 -
nudibranch - 1 -

Edotea - 2 - L.-8; with plate (male); L.-5, no plate (female);

#85 W.B. B.Pl. 25-X-51
screenings of the same tow as #84; note to the effect that considerable was lost;

N. americana - 2 - both immature;

C. septemspinosus - 1 - schizopod larva, specific characters not actually discernable;

unidentified polychaet - 3 - (x);

#84,85 W.B. 25-X-51
N. americana - 1 m.M.
14 i.M. - L.-5;6;7;7.5;
1 m.F. - nonovigerous;
10 i.F. - L.-5;6;6.5;
6 - unsexable; L.-3.5;4;5;
11 - rear ends; 5 heads;
43

#86 W.B. S.Pl. 25-X-51
almost no animals;

#87 B.B. 29-X-51
laths from fish tank collected about October 20; riddled by worms, ecrusted with bivalves, probably coelenterates, others;

#88 B.B. Dr. 30-X-51
many small starfish;

#89 B.B. Dr. 30-X-51
a few sea urchins; many small starfish; a few Mytilus attached to clam shells; 2 lobsters - discarded;

M. modiolus - 3 -

L.	H.
63	34
45	23
40	22

#90 B.B. B.Pl. 30-X-51
mysids - thousands, small; hundreds, large; starfish; shrimp; isopods; bivalves; bryozoan; polychaets; cumaceans; gammarids; argulids; other items;

Nephthys	- 1 -
Polynoidae	- 2 -
Sabellidae	- 5 -
Phyllodocidae	- 2 -
Ninoe nigripes	- 1 -
unident. polychaet	- 3 -
Phynchobdellids??	- 1 -

Nucula delphinodonta - 1 - shell only discarded;
Y. limantula - 3 - all discarded;

L.	H.	ant.	post.
3			
6			
9.5		15	13

Edotea - 29 - L.-3.5(8);4.0(7);4.5(4);5.0(4);5.5(2); 6;6.5;females;
L.-6.0;male (with plate);
l.-w. ratios - 3.5 - 2.0
3.5 - 1.5

Crago septemspinosus - 2 M. - L.-24.5;27.5;
16 - unsexable L.-4.5(2);5; 5.5;8.5;10;14.5(2);
4 - larvae, undoubtedly of this species;
22

Idothea phosphorea - 1 M. - L.-13; W.-4; L.abd. - 4.5;

Argissa hamatipes - 1 F. -
Monoculodes sp. - 10 - about as #70 ie. sideplate-1, expanded below; eye position etc., the same; per. 1,2 ok.; telson ok.;
Aceroides latipes - 1 - N.B. appendages detached; antennae chopped but don't quite agree;
Mysis mixta - 1 m.F. - nonovigerous;
Mysis stenolepis - 87 i.M. - L.-19(2);19.5(2);20(2); 21.5(2);22(3);22.5(2); two of these may be mature;
82 i.F. - L.-19.5;20;21;21.5(5); 22(2);22.5(3);23(2);23.5; 1 female with deformed telson, placed in separate vial; 9 females may be mature, close to it; all females approaching maturity;
1 M. - rear end; 2 heads; 12 of these specimens given to McGill;
spines lateral border of telson - 23(7);24(8);25(9); 26(3);28;
all females immature (oostegites small); immature male - 4th pleopod less than or at most 2XL. -5th. by definition used here, mature male - 4th. pleopods obviously over 2XL. 5th. pleopods;
Neomysis americana - 543 - unsexed
1009 - unsexed rear ends; 545 heads;
1 m.M. - L.-8;
23 i.M. - L.4.5(2);5(4);5.5(2); 6;6.5;7(3);7.5(2);8; one of these contained a nematode, now lying free in vial;
4 m.F. - L.-8.5;10; one of these ovigerous; with embryos;
23 i.F. - L.-4.5;5;5.5(3);6.5(3); 7(3);7.5; one of these contains a nematode;
6 unsexable - L.-3;4(2);4.5;
1609 only a sample sexed; several nematodes lying free not retained because animals other than mysids present;

#91 B.B. B.Pl. 30-X-51
screenings from same tow as #90;

N. americana - 23 - unsexed
1 m.M.
1 i.M. - L.-4.0;
2 i.F. - L.-5.5(2);

2 unsexable - L.-4.0;3.5;
29 only a sample sexed;

Nephthys - 11 -
Phyllodocidae - 2 - (1 rear end may not belong here);
Chlorhaemidae - 1 -

P. magellicanus ?? - 1 - L.-9.5;H.-9.5; only one valve - left; has some 20 rib-like rays;

Edotea - 2 - L.-3.5;4.5; noplates, females;

O. minuta - 6 - (F?)

L.	ext. L.
2.5	3.0
2.5	3.0

Monoculodes - 2 - p.1-6 about same length or little longer than p.2-6; about same as #90;
A. hamatipes - 3 F. - ext. L.-3.0;

#90,91 B.B. 30-X-51

N. americana - of 13 females picked out of collection after a more or less cursory examination -
10 - nonovigerous
3 - ovigerous
1 - 1 embryo
1 - 3 embryos
1 - 5 embryos (heads facing posteriorly)
these embryos fully developed;
low numbers may be accounted for by prior release;

#82,83,90,91 B.B. 23, 30-X-51

Edotea - 1/41 ovigerous
L.-4 - 14 eggs, no development;

#92 B.B. S.Pl. 30-X-51

W.B. Dr. #120 2-XI-51
some tubeworm; 1 sand dollar; a few pieces of sponge; a few starfish; bivalves;

#93 W.B. Dr. 2-XI-51
large amounts of tubeworm tube, sponge, bivalve; some of this material in collection;

M. edulis - 2 -

L.	H.
41	22
27	15

Saxicava arctica - 34 -

L.	H.	L.	H.	L.	H.	L.	H.
28	15	24	12	21	12	16.5	8.5
29	14	24	12	22	10	15	7
27	14	25	11	22	11	13.5	7
30	14	24	13	22	11	13	7
28	14	23	11	17	9	8.5	5

#94 W.B. B.Pl. 2-XI-51
chaetognaths; gammarids; polychaets; cumaceans; 1 caprellid; mysids, many large, few small;

Polynoidae - 7 -

Crago septemspinosus - 1 F. - L.-19.5; with spine;

M. stenolepis - 33 i.M. L.-19.5;20;20.5;21(6);21.5;
26 i.F. L.-20;20.5;21.5;22(3);22.5;23(2); none mature, but all close to maturity; spines along lateral border of telson - 22(2);23(3); 24(2);25(4);26(3);27(3);28;

N. americana - 1 i.M. - L.-7.5;
1 i.F. - L.-7;
1 m.F. -L.-8; nonovig.; shed?;
1 unsexable - L.-4.0; (covered with growth, check);
4

#95 W.B. B.Pl. 2-XI-51
screenings from same tow as #94;

N. americana - 9 - none mature; includes 2 rear ends;

Polynoidae - 6 -
unident. polychaet - 10 - (x);
1 tubeworm, probably terebellid, beat up discarded;

#94,95 W.B. 2-XI-51

Neomysis americana - 3 i.M. - L.-7.5;
2 i.F. - L.-7;
1 m.F. - L.-8; shed nonovigerous;
4 unsexable L.-4.0;
3 rear ends, 2 heads
13

#96 W.B. S.Pl. 2-XI-51

K.H. Dr. #122 7-XI-51
a few sea urchins, starfish;

#97 K.H. B.Pl. 7-XI-51
polychaets; caprellids; chaetognaths; gammarids; cumaceans; 1 shrimp; small items; mysids;

Chlorhaemidae ? - 1 -

Polynoidae - 1 -

C. septemspinosus - 10 - small - large; includes 1 schizopod larva;
450 large mysids fed to cod;
M. mixta - 26 M. - L.-17(3);18(3);19(2);
24 F. - L.-17;17.5;18(2);19.5(2);23;
50 spines along lateral border of telson - 26;27;28(4);29(4);30(2); 31;33;35;
M. stenolepis - 32 M. - L.-19(2);20;20.5;21;21.5;22(2);
24 F. - L.-20.5;21;21.5;22;22.5(2);23(3); spines along lateral border of telson - 22;23(2);24(2);25(7);26(4); 27; none of female stenolepis mature in sense used here, ie. expansion of oostegites; however this development may coincide with development of embryos as in several cases it looked as if embryos were present, check; immature male - 4th. abdominal appendages not stringly developed ie. not obviously 2XL.5th. appendages;
N. americana - 529 - immature (not sexed);
12 m.M.
29 m.F.
8 i.M. - 1.-4.5;5;6;7(4);9;
1 m.M. - L.-9;
12 i.F. - L.-5.5;6(2);6.5;7;7.5;8(3); 8.5;9(2);
5 m.F. - L.-8;8.5(2);9;9.5; sample taken for sex and degree of maturity; mature individuals noted in remainder; sample of mature males and females with young in separate vial along with apparently diseased animals;
E. erythrophthalma - 2 m.M. - L.-6.5(2);
1 i.M. - L.6.5;
5 m.F. - L.-5.5;6.5;7;
13 unsexable - L.-7;7.5;
21 sexing for this species seems to be difficult, something may be missed;

#98 K.H. B.Pl. 7-XI-51
screenings from same tow as #97

M. stenolepis - 6 M. -
7 F. - mature, expanded oostegites;
13

M. mixta - 4 - 2 M., 2 F.; females mature, oostegites; one male with 4th. pleopods to tip of uropods; mature;

Erythrops erythrophthalma - 4 -

Crago septemspinosus - 1 - very immature but not a larva;

Modiolus sp. - 2 - both less than 1.5 mm.;

Neomysis americana - 94 - not sexed;
1 i.M. - L.-5;
3 i.F. - L.-5(2);5.5;
7 unsexable - L.-2.5;3;4(4);4.5;
105 so-called unsexable specimens could possibly be differentiated using more powerful optics;

Polynoidae - 1 -

#97,98 K.H. 7-XI-51

M. mixta - 1 i.M. -
26 m.M. - L.-17(3);18(3);19(2);
5 i.F. - L.-17;17.5;18;
20 m.F. - L.-18;19.5(2);23;
52
mature male endopod of 4th pleopod almost to tip of telson; setae to tip of uropods; for our purposes, mature male - endopod to extremity of 6th abdominal segment; therefore many classified as mature male are probably actually advanced immature males;
no obiverous females; a few may have shed; most do not appear to have carried eggs yet;

M. stenolepis - 38 i.M. - lengths of males - 19(2);20; 20.5;21;
2 m.M. - 21.5;22(2);
2 i.F. - lengths of females - 20.5;21; 21.5;22;
27 m.F. - 22.5(2);23(3);
69
all males actually immature, those classified as mature do not have 4th. pleopods fully developed; females all close to maturity; oostegites partially expanded; none ovigerous; none shed;

N. americana - 529 - imm. not sexed
12 m.M.
29 m.F.
9 i.M. - L.-4.5;5(2);6;7(4);9;
1 m.M. - L.-9;
15 i.F. - L.-5(2);5.5(2);6(2);6.5;7;7.5; 8(3);8.5;9(2);

5 m.F. - L.-8;8.5(2);9;9.5;
7 unsexable - L.-2.5;3;4(4);4.5;
94 not sexed, maturity not determined;
701

% mature - 47/596 - 7.9%
of 8 mature females examined -
6 nonovigerous, presumably shed;
1 - 3 fully developed embryos;
1 - 4 fully developed embryos;

E. erythrophthalma - 1 i.M. - L.6.5;
2 m.M. - L.-6.5(2);
17 i.F. - L.-6;7;7.5; some smaller, no indication of biramous pleopods;
5 m.F. - L.-5.5;6.5;7;
1 ovigerous - 6 embryos, rest nonovigerous;

25

#99 K.H. B.Pl. 9-XI-51
ski alone; probably not on bottom as indicated by collected animals mainly copepods, Sagitta; should be considered a "middle" tow;

B.B. Dr. #123 13-XI-51
a few starfish;

B.B. Dr. #124 13-XI-51
15-20 starfish; 1 C. irroratus;

B.B. Dr. #125 13-XI-51
1 sea urchin; 1 anemone; 4 or 5 starfish; some kelp;

K.H. Dr. #126 17-XI-51
2 sea urchins; 2 starfish; 2 shrimp; 1 small crab;

#100 K.H. B.Pl. 17-XI-51
chaetognaths; gammarids; pectens; nematodes; shrimp limbs - discarded; mysids; others;

Pandalus montagui - 2 - see 100, 102, 103 for data;
C. septemspinosus - 3 - see 97, 98, 100 for data;
Sabinea septemcarinata - 1 M. - L.-22; male by stae of telson, also male pore observed;

75 large, 380 small mysids used in experiment;
M. mixta - 14 M. - L.-17.5; 18; includes 10 rear ends;
7 F. - all mature?? - L.-19;18.5;19.5; those measured are considered to be mature; 1 female not measured with eggs;
8 F. - rear ends; also in collection - 17 unattached heads;

29 spines along lateral border of telson - 29;30(3);31;

M. stenolepis - 8 M. - L.-21.5; includes 5 rear ends;
11 F. - L.-22;24.5; includes 3 rear ends; oostegites not fully developed on any of these animals;
19 8 unattached heads
spines - 23(2);24;25;

N. americana - 26 i.M. - L.-5.5(2);7(3);8.5;9.5;
2 m.M. - L.-10;
25 i.F. - L.-7;7.5;8;10;
5 m.F. - L.-9(2);9.5;
11 male rear ends
10 female rear ends, 1 of these mature;
42 unattached heads;
28 unsexable
107

E. erythrophthalma - 2 M. - L.-8.5;
2 F. - L.-8.5; includes 1 in pieces;
12 immatures; includes pieces; all look like males;

M. oculata - 1 i.M. - antennal scale - L.5-6X w. telson - 21 lateral spines; pigmentation - not apparent;

P. magellicanus - 2 - L.-8.5; h.-9; smaller broken up; larger resembles P. irradians to a degree in having riblike structures but too many of these and also valves unequal;

#101 K.H. B.Pl. 17-XI-51
screenings from same tow as #100

M. mixta - 1 F. rear end;
N. americana - 9 - rear ends - discarded;

Polynoidae - 1 -
unident. polychaet(x) - 1 -

#97,98,100 K.H. 7-20-XI-51

Crago septemspinosus - 7 M. - all with spine - L.-16;17.5;20;21.5;25;25.5;
5 F. - none with spines - nonovigerous; L.-20;24.5;26;27;29.5;
6 unsexable - L.-5;6.5;7.5;15; 15.5;18.5;
1 schizopod larva probably of this species;
19

K.H. Dr. #127 20-XI-51
1 sea urchin; 2 shrimp;

#102 K.H. Dr. 20-XI-51
shrimp; a few starfish; 3 sea urchins; 1 hermit crab;
1 sea cucumber;

P. montagui - 13 - including 3 ovigerous;
see 100, 102, 103 for data;
P. pubescens - 1 M. - L.-8; (length of carapace or hard area);

#103 K.H. B.Pl. 20-XI-51
includes specimens from two tows;
mysids; alligatorfish - 6.5 cms; gammarids; polychaets;
pycnogonids; tunicates; small items; pteropod?
(probably meant nudibranch);

P. montagui - 8 - see 100, 102, 103 for data;
C. septemspinosus - 5 -

Mysis mixta - 14 M. - L.-17;18; includes 3 rear ends;
10 F. - L.-18;19;20; includes 1 rear end;
most mature; 2 bearing embryo sacs-((Dajus?));
24 4 unattached heads assumed to be of this species;
spines along lateral border of telson - 30(2);31(2);32;

M. stenolepis - 4 M. - L.-21;22;
3 F. - all with large oostegites;
spines - 24;25;26;27;

E. erythrophthalma - 3 M. - L.-7;8;
5 F. - L.-6;7;8; latter bearing brood sac - ((Dajus, or actually ovigerous))
8

N. americana - 2 M. - L.-9;
3 F. - L.-7;
5 all relatively undeveloped, sexing may be off;
400 large mysids fed to cod;

Amphiglena - 1 - ???
Terebellidae - 1 -
Polynoidae - 2 -
unident. poly.- 1 - (y)

Saxicava arctica - 1 - L.-4; discarded;
nudibranch - 1 - digestive tract enters gills;

#100,102,103 K.H. 17-20-XI-51

Pandalus montagui data

sex	left	right	r.	r/c	L.	spines
m/f	58	20	20.5	33	66	6/4/6
m/f	65	20	19	32	68	6/4/6
m/f	63	22	24	39.5	83	6/4/5
m/f	60	18	18	29	58	6/4/5
m/f	64	-	18	30	62	6/4/5
m/f	65	21	14.5	24.5	54	5/3/5
m/f	63	21	16	26.5	53	6/4/6
m/f	53	20	12	19.5	41	6/4/5
m/f*		18	22.5	41	84	6/4/6

*ovigerous; eyes appendages obvious;
4 other specimens in this collection ovigerous (rostra broken so couldn't be measured), all about 80 mm.
2 - no obvious development of eggs;
2 - eyes appendages visible;
5/23 ovigerous;

#104 K.H. B.Pl. 23-XI-51
large animals plus some of the small mysids; mysids; shrimp; 1 argulid;

P. montagui - 3 - see 104, 107 for data;
C. septemspinosu - 3 M. - L.-18;23;30.5;
2 F. - L.-23;25.5;
2 unsexable - L.-15;16.5;
7

245 large mysids used in experiment;
Mysis stenolepis - 26 M. - 21;22(2);23(2);
13 F. - 22(2);25;
39 spines lateral border of telson - 22;23;24(3);25;26;27(2);

Mysis mixta - 2 M. -
4 F. -
6

Erythrops erythrophthalma - 2 M. -
10 F.
1 unattached head
13 sexing may be off for small animals - young male relatively undeveloped ? (4th. pleopod);

Neomysis americana - 4 M. - L.-9;10;11;
27 F. - L.-8;9(4);10(4);
17 rear ends - 1 M., 14 F., 2 unsexable, also 17 unattached heads;
unsexables probably immature males;
4th. pleopods longer than others;
48

B.B. Dr. #130 26-XI-51
much kelp; 1 sea urchin; 30-40 starfish;

B.B. Dr. #131 26-XI-51
many small starfish; 1 sea anemone; 1 medusa;

B.B. Dr. #132 26-XI-51
a few starfish; 2 sea urchins; 1 sea anemone;

#105 B.B. B.Pl. 26-XI-51
screened items from two tows;
mysids; small fish; 1 starfish; polychaet; isopod;
copepod;

unidentified polychaet - 1 -

Edotea - 2 - L.-3.5;8; no plates (females);

Mysis stenolepis - 11 M. - L.-21(3);22(2);23(2);
21 F. - L.-20;23(2);24(3);
32 spines along lateral border of telson - 22-26;
2 or 3 of these identified by pigment pattern alone, telson and/or antennal scale broken;

Neomysis americana - 64 unsexed
26 rear ends; also 32 unattached heads, these could be Mysis;
10 i.M. - L.-6;6.5(2);
15 i.F. - L.-5.5;6(3);7;9;
2 immature unsexable;
117 not as much difficulty defining maturity here as in #121; 1 female here classed as immature might possibly have been classed as mature by #121 standards;
a few of the animals have parasitic growth;

#106 B.B. B.Pl. 26-XI-51
screenings form same tows as #105;

Neomysis americana - 18 -

Nephthys - 18 -
Sabellidae - 1 -

Edotea - 3 - L.-3;3.5;4;

#107 K.H. Dr. 30-XI-51
specimens from two drags;
#134 - 4 shrimp; 1 hermit crab;
#135 - 4 starfish; 3 shrimp; 2 sea urchins;
only shrimp; hermit crab; included in collection;

Pandalus montagui - 3 - probably female ie. ovigerous; see 104, 107 for data;
Sabinea septemcarinata - 1 F. - ovigerous; L.-66; eyes, of embryos visible;
Argis dentata - 1 F. - L.-79; nonovigerous;
Pagurus pubescens - 1 M. - L.-6.5

K.H. B.Pl. #60 30-XI-51
100 large mysids from tow fed to experimental fish, other items not retained;

K.H. B.Pl. #61 30-XI-51
70 large mysids fed to experimental fish, other items not retained;

#104,107 K.H. 23, 30-XI-51

Pandalus montagui data

sex	left	right	r.	r/c	L.	spines
m/f	57	18	20.5	33	65	6/4/5
m/f	62	20	19.5	32	65	6/4/6
m/f	64	21	24	39	81	6/3/6
m/f	59	19	13	20	55	7/4/5
m/f*	60	20	26.5	43.5	90	5/4/5
m/f*	57	17	24.5	40	80	6/4/6

*ovigerous; eyes developed in both cases; appendages also apparent in embryos of one of these "females"; one other specimen in group is ovigerous, total - 3/7;

K.H. Dr. #136 4-XII-51
mysids; alligatorfish - 7 cms.; gammarids; pycnogonids; polychaets; other small items;

200 large mysids fed to cod;
Mysis mixta - 11 M. - L.-17(3);17.5(2);
36 F. - L.-18(2);18.5;19(3);20;
1 female carrying eggs;
47 spines lateral border of telson - 26;28(2);29;30(3);31(4);
Mysis stenolepis - 33 M. - L.-18.5;21;22;22.5(5);
12 F. - L.-23(3);23.5;25;
45 spines - 22;23;24(2);25(5);26(3);28;
oostegites of M. mixta more fully developed than those of M. stenolepis; actually none of stenolepis fully developed; 4 egg masses probably from M. mixta, discarded - these must have been female Dajus mysidis;

Neomysis americana - 25 i.M. - L.-6.5;8(3);8.5(2);9(2);
1 m.M. - L.-10.5; (4th. abdominal appendage obviously 2XL.-5th);
24 i.F. - L.-6.5(2);7.5;8;9(2);

4 m.F. - L.-9.5;10.5(2);11;
one of these ovigerous;
mature female - oostegites
expanded forward;
4 M. - rear ends;
5 F. - rear ends; 6 unattached heads;
2 - unsexable;
65

Erythrops erythrophthalma - 4 F. - includes 1 rear end;
5 unsexable, includes 1
rear end; immature males??;
9

dissection for nematodes;
M. mixta - 4 m.M., 11.F., 5 m.F. - 0 nematodes 0/10 - 0%
M. stenolepis - 7 m.M., 3 m.F., - 0 nematodes 0/10 - 0%
these are presumably included in the above tally and
are not additional to it;

Nephthys - 1 -

#109 K.H. reference date 6-XII-51
sponge, not known when or how brought up;

#110 K.H. Dr. 20-XII-51
2 starfish; 2 sea urchins; 1 shrimp; 1 aphrodite;

Argis dentata - 1 F. - L.-79; ovigerous; eyes and
appendages of embryos quite obvious;

#111 K.H. B.Pl. 20-XII-51
mysids and other large items ie. gammarids, chaetognaths;
polychaets; isopods; nemerteans; small items; screenings
(very small animals) not retained;

Mysis stenolepis - 9 F. - L.-22;24;24.5;25;25.5;26;
spines - 24-26;

Mysis mixta - 1 M. - rear end;
13 F. - including 4 rear ends; L.-18;
19(2);20;
1 unsexable
6 heads, ant. scale - L.8-10Xw.
15 spines - 31-32;
sexing may have been faulty as penes
may have been mistaken for undeveloped
oostegites, however, 4th. pleopods
unlikely to have been wrongly observed;

Erythrops erythrophthalma - 8 M. - L.-8;10;
20 F. - L.-7;8;8.5;
23 unsexable, includes rear ends;
51 6 unattached heads of this
species;

Neomysis americana - 4 m.M.
11 m.F.
135 immatures, not sexed;
87 immature rear ends;
2 M. rear ends
13 F. rear ends; 100 unattached heads;
6 i.M. - L.-7;8;8.5;9(3);
1 m.M. - L.-9;
4 i.F. - L.-7.5;8(2);9;
4 m.F. - L.-9.5(2);10.5;11;
267 the latter series constituted a sample; mature individuals noted in remainder;

Crago septemspinosus - 3 - see summary 111, 112;
Spirontocaris macilenta - 1 M. - L.-29 plus, tip of telson broken; r.-3; r/c-9.5; spines -10/2/1

Polynoidae - 6 -

#112 K.H. B.Pl. 20-XII-51
"everything" retained;

Mysis stenolepis - 4 m.F.
Mysis mixta - 1 m.M.
4 m.F.
5

Neomysis americana - 1 m.F. -
8 immature
9

Erythrops erythrophthalma - 3 m.M. -
8 m.F. -
16 unsexable, presumably immature;
3 rear ends including 1 m.F.;
30

Crago septemspinosus - 6 - L.-14.5;16.5;18.5;21;24.5;26; the latter a mature female - ovigerous; see summary #111, 112;

Lumbrinereis fragilis - 1 -
terebellid - 1 - mutilated, discarded;
Amphiglena - 1 -
Polynoidae - 3 -
unident. polychaet (x)- 1 -

Saxicava arctica - 3 - L.-5;6.5;

Pecten magellicanus - 2 -

L.	h.
5	5.5
5.5	6

again these resumble P. irradians to a degree in having riblike structures on right valve;

#111,112 K.H. 20-XII-51

Crago septemspinosus - 3 M. - with spine; L.-17;21.5;27.5;
3 F. - with spine; L.-20.5;23;25;
1 F. - no spine; ovigerous; L.-27; eggs not developed;
2 unsexable - L.-14.5;18;
9

#113 K.H. Dr. 22-XII-51
many starfish; piece of sponge; 2 sea urchins; 1 gastropod; much plant (what kind of plant??);

Polinices heros ?? - 1 - H.-55; Br. - 50;

K.H. Pl. #67 22-XII-51
"no" mysids, all discarded;

K.H. Pl. #68 22-XII-51
"no" mysids, all discarded;

#114 K.H. Dr. 22-XII-51
many starfish; 2 sea urchins; 1 anemone; sponge; 1 gastropod; several hermit crabs;

Pagurus acadianus - 1 M. - L.-4.5;
Pagurus pubescens - 4 M. - L.-6.5(3);8;

Polinices heros ??- 1 - H.-54;Br.-50;

#115 K.H. S.Pl. 22-XII-51

#116 W.B. Dr. 27-XII-51
items from two drags;
#114 - a few bivalves; 1 sand dollar;
#145 - sponge; bivalves;

Mytilus edulis - 5 -

L.	H.
83	38
60	32
42	21
32	19

note to the effect that one or all are covered with medusae, this should probably read polyps - check;

Saxicava arctica - 25 -

L.	H.
32	17
26	13
24	12
22	13
22	11
18	10

#117 W.B. S.Pl. 27-XII-51

#118 W.B. B.Pl. 27-XII-51
bottle broken in transit, possibly some lost;
"everything" retained;

Mysis stenolepis - 1 i.M. -
Neomysis americana - 1 i.M. -

Polynoidae - 5 -
Phyllodocidae - 1 - in tube with orange terebellid;
Sabellidae - 1 -
unident. polychaet(x) - 11 -
Terebellidae - 4 - orange ex smooth tube; white with branched gill (tentacles broken off), ex rough tube; white tentacles broken - no tube; white, badly mutilated (one body part, gills, tentacles separate in vial) from rough tube which was discarded;

Amphictenidae - 1 -

S. arctica - 1 - discarded;

#119 W.B. B.Pl. 27-XII-51
"all" retained;

Polynoidae - 15 -
Hesionidae - 10 -
Terebellidae - 2 -
Phyllodocidae - 2 -
unident. polychaet(x) - 15 -
unident. polychaet(g) - 1 -

Saxicava arctica - 29 -

L.	H.
20	12
24	13
21	11.5
16	9
23	13
19	11
15	8
17	9
13.5	6.5

W.B. Dr. #146 27-XII-51
1 sea urchin; many pieces of sponge;

#120 B.B. B.Pl. 28-XII-51
"everything" retained;

Neomysis americana - 10 i.m. -
7 i.F. -
1 m.F. -
3 unsexable
6 rear ends, including 2 which were immature males
27

Nephthys - 32 -
Phyllodocidae - 2 -
Nereis pelagica - 1 -
Terebellidae - 3 - 1 in rough tube, many pieces; tentacles and gills still in tube; 1 in smooth tube, 2 pieces; tentacles and gills broken off before preservation; 1 complete, not found in tube;

nudibranch - 1 - (Aeolis???)
Nucula delphinodonta - 7 - L. H.
2.5 2
1.5 1
Cardium pinnulatum ??- 1 - inside only - discarded
gastropod - 2 - insides only;

Edotea - 15 - L.-3;3.5;4(3);4.5(2);5(3);5.5(2);6; no plates - females;
L.-5.5;7; plates - males;
Monoculodes - 19 -
Orchomnella pinguis - 1 M. - L.4.5;ext.L.-5.0;

#121 B.B. B.Pl. 28-XII-51
"everything" retained;

Neomysis americana - 10 m.M.
15 m.F.
208 immatures
6 i.M. - L.-6;6.5(2);7(2);8;
1 m.M. - L.-9.5;
13 i.F. -L.-5;5.5(3);6.5;7;8(4); 8.5(3);
1 m.F. -L.-11;
254 last group constitutes a sample for sex and maturity determination, mature individuals in remainder noted; difficult to determine maturity, most animals half-way; no females with embryos in brood pouches, only two of the so-called mature females with well expanded oostegites;

Erythrops erythrophthalma - 1 m.F. - L.-7.5; embryo in brood pouch;
1 immature;
2

Crago septemspinosus - 2 - unsexable; L.-13.5(2);

Nephthys - 2-
Phyllodocidae - 1 -

Edotea - 5 - L.-2;3.5(3);4; none with plates, ie. all females; one of those L.-3.5 has 1st. antennae not same length; rel. lengths of segments different; both short; left 2nd. subequal to left 1st.; rt 1st. longer;

Monoculodes sp - 37 -
Argissa hamatipes - 5 F. -

B.B. Dr. #137 28-XII-51
30-40 starfish; much plant - Laminaria; Pelvetia??; grass, others;

B.B. Dr. #148 28-XII-51
4-5 starfish; kelp;

B.B. Dr. #149 28-XII-51
a few starfish; anemones; kelp;

#122 B.B. S.Pl. 28-XII-51

#1 B.B. B.Pl. 12-V-52
mysids; shrimp; gammarids; cumaceans; isopods;

Cardium pinnulatum	- 18 -	
nudibranch	- 1 -	
Bela(Lora), or Pleurotomella??	- 4 -	
Nucula delphinodonta	- 1 -	
Yoldia limatula	- 2 -	L.-6;ant.-15;post.-12; both discarded;
Crepidula sp. ??	- 1 -	

Neomysis americana - 5 i.M. - L.-7.5;8.5;10.5(2);
4 m.M. - L.-9(2);10.5(2);
10 i.F. - L.-6.5;7;7.5;8(2);8.5; 9;9.5;10;11;
5 m.F. - L.-9.5(2);10;11;11.5; none ovigerous;
2 containing nematodes;
9 i.M. - dissected for nematodes;
6 m.M. - do.
16 i.F. - do.
6 i.F. - do.
1 unsexable - do.
22 dried up - discarded;
51 rear ends, 14 heads - discarded;
137

nematode infection - 66 examined while alive
- 1 - nematode infested;
same group examined after
preservation - 1 - nematode
infested, 2 free nematodes
(no possible contamination)
total nematodes - 4 - 4/66 - 6.1%
38 of the above specimens,
dissected at a later date
after preservation, 1 m.M. -
nematode infested; 1/38 - 2.6%
5/66 - 7.6%

note the marked difference in the % infection obtained by the two methods; actually, the mysids which were dissected would probably have yielded more nematodes had they not earlier been examined while alive and after preservation; similarly, since 1 nematode infested mysid of 38 was missed in this aforementioned examination, it is probable that the overall % infection would be slightly higher in actuality allowing for those mysids which were not dissected; this discourse merely points out the need for both techniques in estimating the nematode infestation in mysids;

16 animals from this tow kept alive overnight placed with animals in #2;
mature male - end of 4th. pleopod to posterior limit, or beyond, of 5th. abdominal segment;

Mysis sp. - 3 - small; probably M. mixta, but check for M. oculata;
E. erythrophthalma - 1 m.F. -

Crago septemspinosus - 1 F. - L.-22; spine; nonovigerous;
10 unsexable; with spine; L.-9;9.5(2);
10(2);13.5;14;16.5;

Edotea - 360 - 86 with plates (males) - L.-5(2);5.5(2);
6;6.5;7(3);7.5;
241 no plates (females) - L.-3;3.5;4.0(7);
4.5(6);5(4);
5.5(2);6(2);

Monoculodes sp. - 41 - also 1 rear end; 1 female ovigerous,
lost some of her eggs;
O. pinguis - 4 M. - ext. L.-6.5;7.0;
2 F. - ext. L.-7.0;
6 spines - 3, 4;3,3;4,4;
O. minuta - 2 M. - ext. L.-5;
6 F. - ext. L.-4.5(2);5.0;
all ovigerous;
4.5 - 4 eggs
4.5 - 4 embryos
5.0 - 14 eggs
8 spines - 1,1;1,1;2,2;1,1;1,1;

A. hamatipes - 2 - 1 M.-ext. L.-5.5;
1 F.
Aceroides latipes - 1 F. -
Dulichia monocantha - 1 M. - no tubercle on finger; not produced as much as Sars PL230-1

#2 B.B. B.Pl. 13-V-52
only some of screened animals collected;
mysids, shrimp; gammarids; cumaceans; isopods;

Neomysis americana - 3 i.M. - L.-6.5;7;7.5;
2 m.M. - L.-9;9.5;
6 i.F. - L.-7.5;9;9.5(3);10;
5 m.F. - L.-9;9.5;10(2);11; none ovigerous; shed or lost?;
2 dried up - discarded;
8 i.M. - dissected for nematodes;
5 m.M. - do.;
5 i.F. - do.;
10 m.F. - do.;
46
the total includes 17 from the tow of 12-V-52, kept alive overnight;
N.B. white bodies on antennular setae;
nematode infection -
29 - originals of this collection,- 3 nematode infested individuals, noted during live examination, 1 with nematode still inside, nematodes seen crawling out of other two; 3/29 - 10.3%
28 - dissected at some time after preservation; none nematode infested; 0/28 - 0%
there is undoubtedly duplication here, hence, infection - 3/46 - 6.5%

Mysis stenolepis - 1 m.F. - L.-25.5; oostegites fully expanded, empty;

E. erythrophthalma - 3 m.M. -
12 m.F. - none ovigerous; varying degrees development of oostegites;
4 i.F. -
2 i.M. - dissected for nematodes;
3 m.M. - do.;
5 i.F. - do.;
17 m.F. - do.;
2 dried up - discarded;
48 males - biramous pleopods;
% nematode infection - 0/27 - o%

specimens do not quite agree in eye ratio or in telson characters with E. erythrophthalma, of Nouvel but are closer to that than other species; specimens generally not in good shape for measuring;

Crago septemspinosus - 62 - five of these ovigerous;
26 M. - with spine; L.-13.5; 14.5(2);15.5(3);16(2); 16.5(3);17;17.5;18; 18.5;19.5;20;20.5; 21;21.5;22(2);25.5; 28;
8 F. - nonovigerous; with spine; L.-15.5;17.5; 18;20;22.5;23;24;
5 F. - ovigerous; no spine; L.-24.5;25.5;29;29.5; 30.5;little obvious development of eggs;
23 unsexable; with spine; L.-9;9.5(2);10;11; 12;12.5;13(4);15(2); 15.5;16.5;21.5;
62

male aperature more readily discernable than that of female; for unsexables - many or most too small to be sexed with equipment used; larger of these unsexables probably female (over 15 mm.) for which equipment not powerful enough to show female aperature;

Pagurus sp. - 1 - L.-5-6; no chelipeds attached; loose cheliped placed here; length given above is total length, no carapace length;

Cardium pinnulatum - 4 -
Yoldia limatula -11 -

L.	H.	ant.	post.
16	8.5	21	19
16.5	9	21	17
14.5	8	20	18
11.5	6	18	17
3.5	2	10	8

Astarte sp. undata? - 3 - all empty;
Polinices heros ??? - 1 -
Bela(Lora) or Pleurotomella - 1 - empty;

Edotea - 10 -
Cirolana impressa - 1 - L.-19;w.-6;
flag-1 segs - 9-11 Rich. - 12
2 segs - 20 Rich. - 20

Gammarid sp. - 3 - (x); one with nematode in side plate;

Gammarid sp. - 3 - (y)

Monoculodes sp. - 53 -
Monoculodes tuberculatus - 5 - ext. L.-7.5;
Monoculodes packardi - 4 - ext. L.-6.0;6.5(3);
O. minuta - 1 M. -
O. pinguis - 2 - 1 M., 1F.; female ovigerous;
Aeginina longicornis - 1 M. -

#1,2 B.B. 12, 13-V-52

Edotea - 90/370 ovigerous; eggs forming or newly formed; can't count - disintegrate too readily; these animals are 4.0-5.5 mm. in length; there are in addition to the above mentioned 90, 9 additional specimens in which the sternal plates are readily separated - significance?

B.B. B.Pl. 16-V-52
bottom plankton tows only mysids retained; used for experimental feeding;
afternoon tows;
Tow 1 - 225
2 - 275
500 these are purportedly Neomysis;-Mysis discarded;

B.B. B.Pl. 17-V-52
bottom plankton tows, only "Neomysis" retained; A.M.
Tow 1 - 10
2 -150
3,4 -150
310

#3 B.B. B.Pl. 19-V-52
bottom plankton tows for mysids, 4 tows, almost no Neomysis, contrast with 16-V-52; some of the animals from these tows collected;
sponge; caprellid(1); polychaets(4); mysids; bivalve;

bivalve - 1 -
nudibranch -13 -

Neomysis americana - 1 m.M. - L.-11.5;
Mysis mixta - 3 m.F. - L.-19.5; according to 1951 criteria, 2 would probably have been classed as immatures; none were ovigerous;
M. stenolepis - 32 m.F. - L.-25;25.5;26(3);26.5(3);27.5; 28; spines - 23;24(2);25;26(3); only 1 ovigerous, all with greatly expanded oostegites - shed?; 15 of these dissected for nematodes - 1 very small nematode found free in dissecting dish, placed in separate vial - 1/15 - 6.7%

mysid embryos?larvae? found free placed in separate vial;

nematodes found free in collection (about 30), placed in separate vial; these are not necessarily from mysids or from any other of the invertebrates of the collection but may be free living forms;

Crago septemspinosus - 25 - 3 of these ovigerous;
14 M. - spined - L.-19;21(3); 22;22.5(4); 23(2);26;26.5;
7 F. - spined - nonovigerous; L.-20;20.5;22(2);23; 26;30;
4 F. - no spine - ovigerous; L.-25;25.5;26;27; no obvious development of eggs;

Aeginina longicornis - 1 M. - L.-24; N.B. with nematode, ventrally in 1st. thoracic segment;

B.B. Dr. #3 21-V-52
much kelp; "thousands" of small starfish; "hundreds" of Yoldia; a few sea urchins;

B.B. Dr. #4 21-V-52
some starfish; a few sea urchins;

#4 B.B. B.Pl. 21-V-52
bottom plankton tows (3) for mysids; about 50 Mysis, 50 Neomysis; this compares favorably with 19-V-52;

N. americana - 4 i.M. - L.-9.5(2);11;11.5;
8 m.M. - L.9.5;10.5(2);11;
2 i.F. - L.-6.5;
5 m.F. - L.-8.5;10.5;12;
4 i.M. - dissected for nematodes;
7 m.M. - do.; (4th pleopods; as long or longer than 5th.;
6 i.F. - dissected for nematodes;
3 m.F. - do.;
39
N.B. black condition, believed to be an alga;
nematode infection - of the dissected individuals - 1 m.M. found with a nematode under carapace - 1/39 - 2.6%
no nematode infested individuals were noted during "live" examination;

M.mixta - 2 i.M. - 1-large, 1-small; latter L.-8.5;
spines - 21;
1 i.F.
3 m.F. - 1 with embryo;
6
examined for nematodes while still alive - none noted - 0/6 - 0% infection

Mysis sp. - 3 - immature, probably mixta, but antennal scale not quite characteristic or broken; telson spines - 12-15;

M. stenolepis - 1 i.M. -
1 i.F. - immature, but large;
18 m.F. - L.-24.5;25(2);25.5(2);26(3);
26.5(2);27(5);27.5(2);28;
none ovigerous - lost or shed?;
25 m.F. - dissected for nematodes;
1 nematode infested, removed during live examination;
46
nematode infection - as noted above, animals were examined while alive and 1 nematode infested individual was recovered; 3 very small nematodes were found in the thoracic region of three of the dissected specimens; 4/46 - 8.7%

Crago septemspinosus - 2 F. - L.-20;22;spined;
nonovigerous;

Y. limatula - 2 -
Bela(Lora) or Pleurotomella - 1 -

K.H. Dr. #5 23-V-52
a few starfish; hermit crab;

#5 K.H. B.Pl. 23-V-52
mysids; holothurian; polychaets; chaetognaths;

M. mixta - 38 m.F. - 21 of these ovigerous;
N.B. - these ovigerous females had smaller oostegites on the whole than nonovigerous; latter lost or shed?; (or are these so-called ovigerous females actually only Dajus infested?)
L.-ovigerous - 19;19.5;20(6);23;
L.-nonovigerous -17.5;18.5(2);
19(3);20(2);23;
spines - ovigerous - 30(4);31(4);
nonovigerous - 28;29;30(3);
3"intersexes" 17-20 mm.; 4th. pleopod biramous, about same length as 5th.; structures on last thoracic segment not characteristic of male or female; carrying (brood pouches)

egg sacs which appear to be stuck on, not held, due to absence of oostegites; (this clearly looks like Dajus, which has possibly caused some degree of male castration);

41 animals examined while alive, no nematodes observed, infection - 0/41 - 0%

M. stenolepis - 1 i.M. - L.-25.5; spines - 23; seems rather large for an immature?;
7 m.F. - L.-23;27;28;29; spines-24(3); 28; 5/7 ovigerous; (not Dajus?); females with largest oostegites - nonovigerous lost or shed?; embryos in only one ovigerous female;
1 nematode infested;
9 examined for nematodes while still alive, one nematode infested individual noted as above; 1/9 - 11.1%
above mentioned nematode vacated mysid rapidly after the mysid was placed in 70% alcohol;

1-nematode infested chaetognath in this collection;

K.H. B.Pl. 27-V-52
5 bottom plankton tows for mysids, other animals discarded; tows 1-3 A.M.;4,5 - P.M.;

Tow 1 - 235
2 - 75
3 - 50
4 - 195
5 - 195
750 these animals were designated as Mysis sp. and were used in experimental feeding;

#6 K.H. Dr., B.Pl. 27-V-52
sample from 5 drags and tows;
scallop; hermit crabs; bivalve; shrimp; nemerteans; polychaet; gammarids; pycnogonid; chaetognath;

Drag #6 - many hermit crabs; a few bivalves including large scallop; some of these items are presumably included in collection #6 as it is outlined above; for mysids from these tows see above;

L.-total length for shrimp and mysids - tip of "rostrum" - to tip of telson;

Crago septemspinosus - 4 M. - spined; L.-22;23.5;27.5;30;
2 F. - nonovigerous; L.-24.5
no spine; one not
measured - spined;
6

Pandalus montagui - 1- m/f; right-20;left-64;r.-20;
r/c-33.5; L.-70; spines-5/4/5
Pagurus pubescens - 6 M.-L.-3.5;4;5(3);5.5;
2 F.-L.-3;5; nonovigerous;
6 F.-L.-5(5);5.5; ovigerous;
14 L.-length of carapace (hard part);
Argis dentata - 1 M. - L.-37.5; sternal spines - one on
last five thoracic(may be anteriorly
also), and on each of first four
abdominals;
1 unsexable - L.-77; only 2 thoracic
sternal spines; no
abdominal sternal spines;
2
Spirontocaris fabricii - 2 M. -
1 F. - 2/2/3; r.-11.5;r/c-19;
L.(55); telson broken;
S. gaimardii - 1 F. - 3/2/5;r.-6.5;r/c-12;L.-41;
1 F. - probably of this species;
S. macilenta - 1 M. - 10/2/1;r.-3;r/c-8.5;L.-27.5;
1 F. - 9/2/1;r.-2.5;r/c-7;L.-22.5;
2 - probably of this species,
rostrum broken;
Crepidula plana ?? - 1 - from one of the pagurid shells;
- 2 - L. H.
82 43
74 37

K.H. B.Pl. 29-V-52
5 plankton tows for mysids; some of the invertebrates
from these tows retained as collection #7;
tows 1-3 - A.M.; 4,5 - P.M.;
Tow - 1 - 105
2 - 102
3 - 45
4 - 54
5 - 105
411 fed to experimental cod;
these were designated as Mysis sp.
cf. 27-V-52;

K.H. Dr. #7 29-V-52
1 sea urchin; 1 brittle star;

#7 K.H. B.Pl. 29-V-52
some of the animals from several tows; mysids not
collected, see note above;

Crago septemspinosus - 11 M. - L.-16;17;19;21(2);21.5;22;
22.5(3);24;
all with thoracic sternal
spine;
7 F. - nonovigerous;
spined L.-17.5;21.5;
22(2);23;
no spine - L.-25.5;29.5;
3 F. - ovigerous; not spined;
L.-25.5;26;29.5;
no obvious development
of eggs;
3 unsexable - spined; L.-14;14.5;
1 circa 12 mm.;
24

Pandalus montagui - 14 -

sex	left	right	spines	r.	r/c	L.
m/f	72	21	-	-	-	-
m/f	-	-	7/4/6	17	29	62
m/f	60	-	-	-	-	-
m/f	62	19	7/4/6	20.5	34	70
m/f	71	22	5/4/6	24	39.5	83
m/f	60	18	6/4/6	23	38	78
-	63	20	7/4/5?	-	-	-
m/f	62	21	7/4/6	17.5	29	64
m/f	59	17	6/4/5	26	41.5	85
m/f	64	20	6/3/5?	-	-	-
m/f	68	22	6/4/6	24	38	77
m/f	60	20	6/4/5	18.5	30.5	65
m/f	66	22	-	-	-	-
m/f	67	20	7/4/6?	-	-	-

Spirontocaris macilenta - 6 -

sex	spines	r.	r/c	L.-
M.	10/1/1	2.5	8	26.5
M.	9/2/1	2.5	7	23
M.	10/2/1	3.5	11	36.5
F.	10/1/2	3.5	9.5	30
F.	9/2/1	2.5	7.5	25
F.	10/2/3	2.5	7	22

Spirontocaris sp. - 1 - probably of this genus, species
not determinable;
Sabinea septemcarinata - 2 F. - L.-52;68;

W.B. Dr. #8 30-V-52
a few bivalves; some tubeworm;

#8 W.B. B.Pl. 30-V-52
very few animals

nudibranch - 5 - all blackened with what is reported
to be alga;

#9 W.B. B.Pl. 30-V-52
many ctenophores broken up, not in collection, otherwise very little;
1 chaetognath noted containing living nematode;

nudibranch - 6 -

#10 K.H. 29-V-52
nematodes found just under skin of belly of Sea Raven picked up today;

K.H. B.Pl. 2-VI-52
6 bottom plankton tows for mysids; animals designated as Mysis sp no note as to their size, these were used in experimental feeding;

Tow - 1 - 453
2 - 500
3 - 175
4 - 185
5 - 410
6 - 315
2038 approximately 2000 fed to fish;
tows 1-3 - A.M. 4-6 - P.M.;

#11 K.H. B.Pl. 2-VI-52
miscellaneous items from 6 tows;
the bulk of the mysids collected were used as cod feed, see above;

Mysis mixta - 2 m.F. - 1 with egg sac (this is probably Dajus);
Erythrops erythrophthalma - 2 m.F. - L.-8.5(2); nonovigerous; oostegites well expanded;
Argis dentata - 1 M. - L.-27.5;c.-6.5;(does this actually mean carapace or does it include the "rostrum"?)
Crago septemspinosus - 53 M. - all with spine; L.-16.5; 17.5;18(2);18.5;19(3); 19.5(3);20(2);21(3); 21.5(2);22;22.5(3);23(6); 23.5(2);24(6);24.5(4); 25(3);25.5(2);26;34.5;
24 F. - nonovigerous; no spine; L.-16.5(2); 17;19.5(2);20(2);20.5; 23(2);23.5;24(2);25(3); 25.5(4); with spine - L.-22;26; 26.5;27.5;
24 F. - ovigerous; no spine - L.-22.5;25(2); 25.5;26(2);26.5;27(2); 27.5;28;28.5;29;31.5*; 32;33.5;

with spine; L.-34.5;36;
no development - dev. to point where eyes, appendages visible;
9 unsexable - with spine; L.-20; 22;23.5;25;
110 *lousy with nematodes, placed in separate vial; males, females, unsexables, in separate vials;

Pandalus montagui - 7 -

right	left	spines
20	60	5♂3/6
18	58	6♂4/4?
19	-	6♂4/6
19	60	7♂4/5? *
19	62	7♂4/6
19	57	-
20	57	-

* parasite? between pleopods; contains eggs whatever it is; (see summary - 11,15,16;)

Spirontocaris gaimardii - 1 F.? - 5♂3/6; r.-8;c♂r-8; L.-35.5; presumably female from shape of rostrum; agrees with S.g.belcheri, in having rostrum exceed in length antennal scale; (note- one of the above lengths was not recorded properly or was copied wrongly;)

Spirontocaris macilenta - 3 F. -

sex	spines	r.	r♂c	L.
F.	9♂2/2	3.5	8.5	27
F.	8♂2/2	2.5	7.5	25
F.	8♂2/1	2.5	7	21.5

paired sternal spines (?) thoracic 5, 6, 7, 8;

Spirontocaris fabricii - 1 M. - 2♂2/3; r.-6;r♂c-11;L.-30; appear to be 6 only carpal segments; antennular flagellum (inner), exceeds rostrum;

Nudibranch - 13 - Galvina???

Astarte undata ? - 1 - L.-12.5;H.-11; crenulated margin; teeth - 1 right, 2 left; red-brown; prominent ridges tending to disappear at either end;

Citharia convexa - 1 - L.-53; H.-48; empty;

Idothea baltica - 1 M. - L.-17;w.-6.5;L.abd.-7;16 segs - 2nd. ant. flagellum;

B.B. Dr. #11 4-VI-52
a few sea urchins; a few mussels;

#12 B.B. B.Pl. 4-VI-52
animals from two tows;

Mysis stenolepis - 11 m.F. - L.-23.5;25(4); all but one with fully expanded oostegites; all empty; N.B. white growth - coelenterate or bryozoan; spines - 21(2);22;

Mysis mixta - 24 m.F. - all with well developed oostegites; only 2 ovigerous, one of which carried embryos; spines - 23;24;26; 14 of these dissected for nematodes - 1 small nematode found in head region of 1 individual; 1/14 - 7.1%

Neomysis americana - 6 m.M. - L.-9;9.5;12; one of these specimens contained a nematode, placed in separate vial, infection - 1/6 - 16.7%

Mysis sp. - 5 - all young individuals, probably M. mixta, but check for M. oculata; spines - 16; 17(2); spines at least halfway from the apex of the notch to the tip;

Cancer irroratus - 2 M. - w.-10;21;
2 F. - w.-7.5;22;
4

nudibranch - 4 - Galvina???; one of these looks different;

Edotea - 3 -

#13 K.H. B.Pl. 4-VI-52
miscellaneous items from 4 tows;

Neomysis americana - 1 m.M. - L.-10.5;
Erythrops erythrophthalma - 5 i.F. - L.-8.5;9(2);

K.H. B.Pl. 4-VI-52
4 bottom plankton tows for mysids;

Tow - 1 - 770
2 - 675
3 - 780
4 - 680
2905 these are Mysis, size not indicated but, assumedly they are large; tow 1 - A.M.; 2-4 - P.M.; cf. 2-VI-52;

#14 6-VI-52
worms from short-horned sculpin caught at wharf; worms in flesh; 40 cm.; female spawn; 16 nematodes;

K.H. B.Pl. 6-VI-52
6 bottom plankton tows for mysids; Mysis sp;

Tow - 1 - 578
2 - 524
3 - 327
4 - 587
5 - 690
6 - 85
2791 these animals were fed to the experimental fish; tows 1-3 - A.M.?;

#15 K.H. B.Pl. 6-VI-52
some of the animals other than mysids, from several tows; for mysid numbers, see above;

Pandalus montagui - 4 -

sex	right	left	r.	r/c	L.	spines	
m/f	19	60	-	-	-	-	c - 13;
m/f	21	68	21.5	38	-	7/4/7	
m/f	19	64	-	-	-(80)	-	c - 17;
-	20	68	24.5	42	93	6/4/6	

Spirontocaris macilenta - 1 F. - nonovigerous; 17/2/2; r/c - 17.5; L.-56;

K.H. B.Pl. 10-VI-52
6 bottom plankton tows for mysids; Mysis sp.;
Tow - 1 - 241
2 - 280
3 - 340
4 - 378
5 - 771
6 - 600
2610 2192 fed to cod; tows 1-3 - A.M. ?;

#16 K.H. B.Pl. 10-VI-52
all items from Pl. #5 except for hundreds of chaetognaths, a few nemerteans, 241 mysids fed to fish;
also included in collection - 1 eel from a later tow;
1 gastropod of a new type;
don't know if there are any or many euphausids in collection but as many as 6 were noted in screened material of other tows;

Mysis mixta - 1 m.F. - bearing egg sac (Dajus?);

Crago septemspinosus - 1 F. - no spine; ovigerous; no development of eggs; L.-24.5;

Spirontocaris macilenta - 1 - unsexable; 10/2/1; r.-3; c/r - 9; L.-26;

Pandalus montagui - 4 -

sex	right	left	r.	r/c	L.	spines	
*	22	64	20.5	34	73	6/4/6	
m/f	21	69	-	-	-	-	c-16;L.-r-65;
-	22	66	18.5	32	69	6/4/6	
**	-	56	12	19.5	44	6/4/6	

*can't see bases of 3rd. pereipods well; male openings plugged with red substance (sperm?);
**brood pouch? or parasite with eggs? between pleopods; came loose readily, now free in bottle;

nudibranch - 8 -
P. magellicanus - 1 - L.-7.5;h.-8.5;
Haminia solitaria? - 1 - h.-6.5;

#11,15,16 K.H. 2,6,10-VI-52

Phrynux abdominalis - 5 - ex P. montagui
total lengths including overlap of brood pouch;

male	female	
2.5-attached to	5.5	loaded with eggs;
	8.5	empty but for a few undeveloped eggs; eggs fell out??;

1 male, 1 female left attached to shrimp;

#17 K.H. B.Pl. 10-VI-52
mysids from one tow, most dissected;
originally 446, one bottle lost?;

Mysis stenolepis - 2 F. - mature; L.-27;28;spines - 24;25;
2/4 - dissected; 2 of these were examined for nematodes while alive, latter two dissected, but not examined before or after preservation; no nematodes - 0/4 - 0%

Mysis mixta - 206 - examined for nematodes before preservation, no nematode infested individuals noted, this collection appears to have been lost;
236 - dissected, not examined before preservation; 6 nematode infested animals; 1 free nematode - 7/236 - 3.0%
446 nematode infection - 7/442 - 1.6%

nematode infested individuals - 5 F. -

L.	spines
20.5	27
21	28

all mature, nonovigerous;

N.B. 1 carrying parasite? between oostegites; (Dajus?);

K.H. B.Pl. 13-VI-52
1 bottom plankton tow for mysids
Mysis sp. - 287 - fed to cod;

#18 K.H. B.Pl. 13-VI-52
some of the animals from 1 tow, mysids noted above;

Spirontocaris macilenta - 3 - unsexable;

spines	r.	r/c	L.
9/2/2	3	9	30
11/1/1	2.5	7	24
9/2/1	2	6.5	22

#19 13-VI-52
pieces of cod meat containing Porrocaecum preserved in formalin, for histological study;

K.H. B.Pl. 16-VI-52
4 bottom plankton tows for mysids; net ripped after first tow;
Mysis sp.

Tow - 1 -	340	
2 -	65	
3 -	3	
4 -	32	preserved for later dissection;
	440	apparently lost; 408 fed to cod;

#20 K.H. B.Pl. 16-VI-52
sample from 4 tows;
for the first time in several weeks small mysids were picked up in plankton tows, some of these were retained; note - while only small mysids were collected, those fed to cod, see above, were probably large Mysis since there is note to the contrary;

Mysis stenolepis - 2 i.M. -
2 i.F. -
7 unsexable
1
4 i.F. - L.-8;9.5; spines - 21;
16 all were examined before and after preservation, for nematodes and 12 were later dissected; 1 nematode infested animal recovered; 1/16 - 6.7%
this in itself is a rather disturbing find, since according to our basis of reasoning, assuming we have here the immature Porrocaecum, none of these newly released individuals should be infested and should not become so until the reappearance of the seals in the fall;

Mysis mixta - 5 i.M. - L.-8;10;11; spines - 18;22;24;
4 i.F. - L.-
4 unsexable
14 i.M. - L.-
6 i.F.
5 unsexable
38 all were examined before and after preservation; the latter 25 were dissected; no nematodes, or nematode infested animals; 0/38 - 0%

Neomysis americana - 1 m.M. - rear end;
4 i.M.
1 m.F. - rear end;
1 i.F. - rear end;
6 m.M.
1 i.M.
6 m.F.
1 i.F.
1 unsexable
3 nematode infested
25 all examined before and after preservation; 3 nematode infested animals; 15 later dissected, 1 - with small nematode in head; 1 - nematode in thorax; 5/25 - 20% dissected animals - all pieces, none entire;

1 m.F.

Erythrops erythrophthalma - 4 m.M. - L.7.5(2);
1 i.M.
2 i.F. - L.-9.5(2);
1 m.M.
1 i.M.
1 m.F. - oostegites expanded, no eggs or embryos;
6 i.F.
2 unsexable
19 examination before and after preservation, for nematodes; 11 dissected after preservation, 1 nematode infested animal, nematode in thoracic region - 1/19 - 5.3%;

#21 K.H. Pl. 16-VI-52
medusae from plankton tows;

B.B. B.Pl. 20-VI-52
3 bottom plankton tows for mysids, exact numbers not noted, almost all fed to cod;

#22 B.B. B.Pl. 20-VI-52
this may actually be #23
medusa - discarded;
most mysids not collected, see above;

Mysis stenolepis - 1 m.F. - L.25.5; spines - 26;
oostegites fully expanded -
empty; probably shed;
Mysis mixta - 2 m.F. - 2 free egg sacs tentatively placed
here; (these are likely Dajus)
1 i.M. - L.-9;
3
Neomysis americana - 2 m.M. - both rear ends, 1 discarded;
2 m.F. - 1 may be immature, both
empty, both with small
oostegites;
1 unsexable rear end, 2 heads -
discarded;
5

Crago septemspinosus - 2 M. - L.-20;21.5;
1 F. - L.-24.5;
3
Yoldia limatula - 2 -
Cardium pinnulatum - 3 -
nudibranch - 4 -
Bela (Lora)? Pleurotomella? - 9 -

Edotea - 12 - no plates, (females) - L.-4(2);4.5(4);5(2);
5 of these ovigerous - 4;4.5(2);5(2);
plates (males) - L.-4.5;5;7.5;8;

#23 B.B. B.Pl. 20-VI-52
this may actually be #22 (for all it matters);
3 medusae discarded;
only a few mysids - retained, most used experimentally,
see above;

Mysis stenolepis - 1 i.M.
1 unsexable, possibly mixta but
telson characteristic of stenolepis;
2
Neomysis americana - 6 m.M. - L.-9.5;10.5;11.5; 3 of these
rear ends - discarded;
8 m.F. - L.-10;10.5;12.5(2); 2
of these rear ends -
discarded; 1, a rear end -
ovigerous, embryos;
4 i.F. - L.-10; 1 rear end, discarded;
18 4 heads probably of this
species discarded;
Cancer irroratus - 1 F. - w.-22;
Crago septemspinosus - 1 M. - L.-17.5;

Yoldia limatula - 2 -
C. pinnulatum - 2 -
Bela ??? - 1 -
nudibranch - 3 -

Edotea - 4 -

#24 B.B. B.Pl. 20-VI-52
most of the mysids, not collected, see above;
22 smelt - discarded;

Neomysis americana - 9 m.M. - L.-9.5;10(2);10.5(2);11;11.5;
21 m.F. - L.-9.5;10;10.5(5);11(2);12;
5 empty, rest with eggs or embryos;
5 i.F. - L.-10(2);10.5;11;
2 of these may be mature;
5 nematode infested animals, dried up, discarded;
10 m.M.
4 m.F. - 1 ovigerous, 2 others with large oostegites;
54 examined for nematodes before preservation, 14 also later dissected; 6 individuals - nematode infested (1 from dissection) - 6/54 - 11.1%

Mysis stenolepis - 6 i.F. - L.-9.5;10;10.5;
spines - 18;20;21;
examined before preservation, for nematodes - 0/6 - 0%

Crago septemspinosus - 2 M. - L.-21.5;31.5;
Spirontocaris pusiola - 1 F. - ovigerous;

nudibranch - 5 - Galvina ???

Edotea - 8 - no plates (females) L.-5;5.5;6(2);
plates (males) L.-5.5;6(2);7;

K.H. B.Pl. 21-VI-52
2 bottom plankton tows for mysids;
Tow - 1 - 600 (#25)
2 - 600 (#26)
1200 fed to cod; no note as to species or degree of maturity;

#25 K.H. B.Pl. 21-VI-52
animals not collected - 4 medusae, chaetognaths, mysids - 600, see above;

Mysis mixta - 2 m.F. - 1 egg sac floating free included (Dajus);

Pandalus montagui - 2 -

sex	left	right	r.	r/c	L.	spines
*	-	20	13	22.5	50	5/4/5
m/f	64	18	-	-	-	-

c-13;L.-r-52;
*can't see female opening but probably there;
male pore blocked by red substance - sperm?;

Spirontocaris macilenta - 3 -

sex	r.	r/c	L.	spines
M.	3	9	29	10/2/1
M.	2.5	7	23.5	7/2/2
F.	5	13.5	43.5	12/2/3 *

*"typical" rostrum; unless otherwise indicated, S. macilenta, do not show typical shape of rostrum as indicated by Rathbun;

nudibranch - 2 -

#26 K.H. B.Pl. 21-VI-52
not included in collection - chaetognaths, mysids - 600, see above; also 200 mysids preserved, no further record;

Mysis mixta - 1 i.M.
2 i.F. - L.-10.5; spines - 25;
3 2 egg sacs undoubtedly not belonging to these specimens but probably ex M. mixta placed with these specimens; (probably Dajus);
Erythrops erythropthalma - 1 i.F. -

Pagurus pubescens - 1 F. - ovigerous; no development; L.-6.5; (length of carapace;)
Crago septemspinosus - 1 F. - ovigerous; no spine; eggs not obviously developed; L.-26.5;
Pandalus montagui - 1 - m/f; left - 58; right - 19; r.-14; r/c - 23.5; L.-54; spines-7/4/6; red matter attached to male pore;

Spirontocaris macilenta - 3 -

sex	r.	r/c	L.	spines	
?	2	6	21	8/2/2	
?	2.5	7	23.5	9/2/2	
M.	5	14.5	45	13/1/2	"typical" rostrum

B.B. B.Pl. 24-VI-52
2 bottom plankton tows for mysids; designated- small mysids;
Tow - 1 - (1000)
2 - (1500)
(2500) numbers estimated; these animals were fed to experimental cod;

#27 W.B. B.Pl. 25-VI-52
medusae not collected; tow of 14 minutes duration;

Neomysis americana - 3 m.F. - L.-12.5

Mytilus edulis - 2 -

L.	H.
35	18.5
32	16

Saxicava arctica - 15 -
L. - 22 25 25.5 15.5 15
H. - 12 13 12.5 9 8
nudibranch - 1 -

B.B. B.Pl. 26-VI-52
2 bottom plankton tows for mysids;
Tow - 1 - 601 A.M.
2 - 137 P.M.
738 fed to fish; no note as to size or species;

K.H. B.Pl. 26-VI-52
1 bottom plankton tow for mysids;
420 mysids fed to cod, no note as to size or species;

B.B. B.Pl. 27-VI-52
2 bottom plankton tows for mysids;
Tow - 1 - 480
2 - (1600)
(2080) these animals fed to experimental cod; numbers in second tow estimated; both tows - A.M.;no note as to size or species, but undoubtedly of small size;

B.B. B.Pl. 2-VII-52
2 bottom plankton tows for mysids;
small mysids;
Tow - 1 - (300) numbers estimated; A.M.
2 - 257 P.M.
557 fed to experimental fish;

B.B. B.Pl. 3-VII-52
3 bottom plankton tows for mysids; small mysids;
Tow - 1 - 625 A.M.
2 - (800) A.M.
3 - (4500) P.M.
(5925) these animals fed to cod; numbers from tows 2,3 - estimated;

B.B. B.Pl. 4-VII-52
2 bottom plankton tows for mysids; small mysids;
Tow - 1 - 527
2 - few - preserved - #28, also some examined for nematodes(?);
527 fed to experimental fish;

B.B. 4-VII-52
sample of 112 mysids examined for nematodes; (from second tow 4-VII-52?) not recorded whether these animals later preserved but no collection found;
100 Neomysis americana - 9 nematode infested - 9/100 - 9.0%
12 Mysis stenolepis - 0 nematode infested - 0/12 - 0%
cf. later dissections of preserved mysids - 4-VII-52
(this is expected nematode occurence according to theory of life cycle of nematode and of mysids)

#28 B.B. B.Pl. 4-VII-52

Neomysis americana - 7 m.M. - L.-10;10.5;11;11.5;12(3);
6 m.F. - L.-ovigerous - 11(2);11.5;
nonovigerous L.-10.5(2);11;
3 i.F. - L.-9;9.5;10.5; may be mature;
7 m.M.
6 m.F. - varying degrees development of oostegites, all empty;
29 13 of these animals dissected for nematodes - 0/13 - 0% nematode infested, cf. above;

Mysis stenolepis - 5 i.M. - L.-10.5;11;11.5;12;12.5; spines - 20;21(2);25;
6 i.F. - L.-10;10.5(2);11;11.5;12; spines - 18;21;23;
3 unsexable - L.-8;9;9.5;spines - 18;21;
3 i.M.
3 i.F.
9 unsexable
29 15 of these dissected, no nematode infested animals - 0/15 - 0% this is expected pattern;

B.B. B.Pl. 7-VII-52
3 bottom plankton tows for mysids; small mysids;
Tow - 1 - 82 A.M.
2 - 134 P.M.
3 - 153 P.M.
369 fed to experimental fish;

B.B. B.Pl. 9-VII-52
2 bottom plankton tows for mysids; small mysids;
Tow - 1 - 204 A.M.
2 - 228 P.M.
432 fed to experimental fish;

B.B. B.Pl. 9-VII-52
sample of 58 mysids examined for nematodes; presumably from one of the above tows, but all animals from those tows supposedly fed to fish;
51 Neomysis americana - 4 nematode infested - 5/51 - 7.8%
7 Mysis stenolepis - 0 nematode infested - 0/7 - 0%
Note - the term examined as used here is rather vague; probably where the term is used, the animals were examined while alive, they may also have been dissected although this term is not used so that we assume that they were not dissected;

B.B. B.Pl. 10-VII-52
1 bottom plankton tow for mysids; - 246 - fed to cod; also mysids preserved for dissection etc., but no collection number; have never found them or any further record;

B.B. Dr. #48 10-VII-52
1 female lobster weight - 7.25 pounds;

Invertebrate Data from Stomach Examination

As noted in the data on stomach contents, detailed examination and often dissection of mysids and other animals was made in the cases of some stomachs. Included below are data from these examinations, concerning the sex and maturity of the respective species. Note, only such information as is pertinent is included here; no attempt is made to account for all animals of this species in the stomach, only those for which data are available.

Neomysis americana

Date	Stomach No.	i.M.	M.M.	M.	i.F.	M.F.	F.	unsexable
31-V-52 B.B.	36	3	24		4	14		
	37			1			1	
	38			13			9	
	41	14	29		3	16		
	42			89		40		6?
	43			8		9		8?
	44			34		17		
	47(or 51)			66		29		
		17	53	211	7	30	105	14?
5-VI-51 B.B.	120		7			13		
	123			7			11	
	126	several females with well advanced young;						
			7	7		13	11	
7-VI-51 K.H.	157	1	2					
	158		1			4		
		1	3			4		
12-VI-51 W.B.	211			1		1		
2-VII-51 B.B.	706				1	3		
20-XI-51 K.H.	1087	11	2		10	3		5?
	1088					2		
		11	2		10	5		5?

31-V-52 - *N. americana* - embryos; in brood pouches; larval mysids removed from brood pouch;
5-VI-51 - several females with well advanced young;

Total *N. americana*, from stomachs, identified - 827;
males - 313
females - 190

Crago septemspinosus - B.B., K.H. - 29 identified;

Mysis mixta -
7-VI-51 #158 K.H. - 1 m.F.

Mysis stenolepis -

13-VI-51	#252	W.B. - 1 entire, parts of six others;
2-VIII-51	#706	B.B. - 7 all immature;
20-XI-51	#1087	K.H. - 1 m.M., 1 m.F.

Erythrops erythrophthalma

20-XI-51	#1087	K.H. - 1 m.F. also 1 head;
	#1088	K.H. - 1, also 4 heads;

Hyperiids

22-XII-51 - K.H. - #1193,1196,1198

Mysids in Cod Stomachs

The numbers of mysids in the cod stomachs collected in 1951 were estimated and in some cases actually counted, also the species found in each stomach were noted.

Baddeck Bay

31-V-51 - 29 -

#36 - 56 - N. americana, mainly mature, a few immatures;
#37 - 2 - N. americana, mature;
#38 - 22 - N. americana;
#39 -(20)
#41 - 91 - N. americana, mainly mature, 65%;
#42 -135 - N. americana;
#43 - 25 - N. americana;
#44 - 51 - N. americana;
#45 - (3)
#47 - 92 - N. americana;
#48 - 65 - N. americana;
#49 -(15)
#50 - 76 - N. americana;
#51 - 28 - N. americana;
#52 -(30)
#53 -(50)
#54 -(40)
#55 -(100)
#56 -(175)
#57 -(50)
#58 -(40)
#61 -(25)
#62 -(3)
#63 -(10)
#64 -(3?)

5-VI-51 - 11 -

#116 - (1)
#118 - (2)
#119 -(20)
#120 - 20/(25) - N. americana, all mature;

#121 -(30)
#122 -(10)
#123 - 18 - N. americana;
#126 - 20 ♂ (50) - N. americana;

30-VII-51 - 4 -

#665 - (15) - N. americana, most very small, but at least 1 m.M.;
#667 - (1)?

2-VII-51 - 14 -

#704 - (1) - N. americana;
705 - (1)
706 - 16 - 9 N. americana, 4/4F-mature; 7 M. stenolepis;
709 - (3)

10-VIII-51 - 4 -

#768 - (1)
769 -(20) - N. americana;

15-IX-51 - 10 -

#941 - (50) - Neomysis, including many small;

17-IX-51 - 1 -

23-X-51 - 3 -

30-X-51 - 9 -

#1008 - 1 - Neomysis;
1009 - 2 - M. stenolepis;
1010 - 1 - Mysis;
1011 - 1 -
1014 - 1 - M. stenolepis;

13-XI-51 - 4 -

26-XI-51 - 7 -

#1122 - 1 - M. stenolepis;
1123 - 1 - M. stenolepis;

28-XII-51 - 8 -

#1251 - (5) -
1252 -(40) - (35♂) Neomysis; no young Mysis in sample examined;
1 Mysis;
1253 - (50) - (40♂) Neomysis; 11 M. stenolepis;
1254 - (5)
1256 - (1) - M. stenolepis;
1258 - (3)

Whycocomagh Bay

12-V-51 - 12 -

#211 - 1 - N. americana;
217 -(1)
218 -(5)

13-V-51 - 22 -

#240 -(1)
252 - 4 - M. stenolepis;

17-VII-51 - 22 -

#551 - (1) -
562 - (1)
588 - (1)

18-VII-51 - 5 -

8-IX-51 - 19 -

#724 - (1)

13-IX-51 - 11 -

#872 - (3) - 1 M. stenolepis, others probably same species;
876 - (1) - N. americana, mature female;
879 - (1) - M. stenolepis, immature female;

18-IX-51 - 17 -

25-X-51 - 7 -

#1001 - 15 - Neomysis, M. stenolepis;

2-XI-51 - 11 -

#1019 - 1 -
1021 - 1 - Neomysis
1029 - 1

28-XI-51 - 5 -

#1141 - (3) - M. stenolepis;
1143 - (1) - M. stenolepis;

27-XII-51 - 11 -

#1230 - (2) - 1 M. stenolepis, other Mysis;
1231 - (1)
1233 - (1) - Mysis;
1236 - (1) - M. stenolepis;

Kempt Head

7-VI-51 - 8 -

#156 - (20) - Erythrops;
157 - 5 - Neomysis, 2 m., Li.;
158 - 19 - 18 Neomysis, 5/5 m.; 1 M.mixta -m.;

10-VII-51 - 10 -

#459 - 1 - Neomysis;
464 - (3)- 1 m.F. M. mixta; 2 Erythrops (probably others in vial);

31-VII-51 - 12 -

#668 - (1)
669 - (1)
673 - (2)
674 - (1) - m.F. M.mixta;
676 - (2)

11-IX-51 - 9 -

#861 - (1) - Erythrops;
862 - (5) - Erythrops;
864 - (4) - M. mixta, 3 m.F.; 1 m.M.;
866 - (1)
868 - (1) - Neomysis;
869 - (1) - Mysis;

14-IX-51 - 13 -

#881 - (5) - 1 Mysis, 1 Neomysis; other 3 small probably Neomysis;
883 - (4) - 2 m.F. M. stenolepis;
884 - (10) - Erythrops;
885 - (4) - Erythrops;
887 - (1) - M. mixta;
888 - (4) - 3 Erythrops; 1 Neomysis;
889 - (1) - M. mixta;
890 - (2) - 1 Erythrops; 1 Mysis;
891 - (1) - Erythrops;
895 - (1) - Erythrops;

22-X-51 - 13 -

#978 - (1) - Erythrops;
980 - (20)- Erythrops;
981 - (2) - Erythrops;
982 - (3) - 2 Neomysis, 1 Mysis;
983 - (1) - Erythrops;
985 - (5) - Erythrops;
986 - (45)- (43) Neomysis?, 2 Erythrops;
987 - (10) - Neomysis; 1 Mysis;
988 - (5) - 3 M. stenolepis; 1 probably M. stenolepis; 1 Neomysis;
989 - (25) - Neomysis, some young; 1 Erythrops?
990 - (75) - Neomysis, m/imm. - 10:1;

7-XI-51 - 4 -

#1039 - (25) - Erythrops;
1040 - (1) - Mysis;
1041 - (10)- Erythrops;
1042 - (6) - 3 Erythrops; 3 M. stenolepis;

20-XI-51 - 9 -

1083 - (10) - 8 Erythrops; 2 M. stenolepis:
1084 - (2) - Erythrops; M. stenolepis;
1085 - (4) - Erythrops;
1086 - (1) ≠ ? - M. stenolepis;
1087 - (50) - 45 Neomysis, including 14 extra heads; 2 M. stenolepis;
2 Erythrops;
1088 - (35) - 30 Neomysis, including 23 heads, 5 rear ends;
5 Erythrops;
1090 - 1 - Erythrops;

29-XI-51 - 12 -

1144 - (7) - 3 M. stenolepis; others same species ?
1145 - (2)
1146 - (1) - Erythrops;
1147 - (20) - Neomysis; at least 1 Mysis;
1148 - (1) - Neomysis;
1149 - (3) - Erythrops;
1150 - (10) - 5 Erythrops; 1 Mysis; others - ?
1151 - (25) - 13 Erythrops; 1 Neomysis;
1154 - (2)

20-XII-51 - 11 -

1196 - (5)
1197 - (1)≠? - M. stenolepis;
1198 - (3)
1199 - (3)
1193 - (3) - Erythrops;
1194 - (2) ≠?
1195 - (15)- 9 Neomysis; 2 M. stenolepis; 2 Mysis, probably
stenolepis;

Baddeck Bay

Date	No. Cod	Mysid Incidence		Mysids/stomach	Species
31-V-51	29(25)	86%		58(11) (48)(25)	N. americana
5-VI-51	11(8)	73%		(25)	N. americana
30-VII-51	4(2)	50%		(8)	N. americana
2-VII-51	14(4)	29%		(5)	N. americana M. stenolepis
10-VIII-51	4(2)	50%		(11)	N. americana
15-IX-51	10(1)	10%		(50)	small Neomysis
17-IX-51	1(0)	0%		0	
23-X-51	3(0)	0%		0	
30-X-51	9(5)	56%		1	Neomysis, M. stenolepis;
13-XI-51	4(0)	0%		0	
26-XI-51	7(2)	29%		1	M. stenolepis
28-XII-51	8(6)	75%		(17)	Neomysis, M. stenolepis;

Whycocomagh Bay

12-VI-51	12(3)	25%	14%	(2)	N. americana
13-VI-51	22(2)	9%		3	M. stenolepis
17-VII-51	22(3)	14%	11%	(1)	
18-VII-51	5(0)	9%		0	
8-VIII-51	19(1)	5%		(1)	
13-IX-51	11(3)	27%	11%	(2)	Neomysis, M. stenolepis;
18-IX-51	16(0)	0%		0	
25-X-51	7(1)	15%		15	Neomysis, M. stenolepis;
2-XI-51	11(3)	27%		1	Neomysis;
28-XI-51	5(2)	40%		(2)	M. stenolepis;
27-XII-51	11(4)	36%		(1)	M. stenolepis;

Kempt Head

7-VI-51	8(3)	38%		12(2)-(15)(3)	Erythrops, M. mixta, Neomysis;
10-VII-51	10(2)	20%		(2)	Erythrops, M. mixta;
31-VII-51	12(5)	43%		(1)	M. mixta;
11-IX-51	9(6)	67%		(2)	Erythrops, M. mixta; Neomysis;
14-IX-51	13(10)	77%		(3)	Erythrops, M. mixta; Neomysis;
22-X-51	13(11)	85%		(17)	Neomysis, Erythrops, M. stenolepis;
7-XI-51	4(4)	100%		(10)	Erythrops, M. stenolepis;
20-XI-51	9(7)	78%		(15)	Neomysis, Erythrops; M. stenolepis;
29-XI-51	12(9)	75%		(8)	Erythrops, Neomysis, M. stenolepis;
20-XII-51	11(7)	64%		(5)	Neomysis, M. stenolepis, Erythrops;

The information obtained from stomach examination with respect to mysids is in agreement with the data obtained from the invertebrate collections. Notes on maturity of Neomysis americana, indicate that in May and June the proportion of mature and immature individuals is approximately the same as that of late July as determined from specimens obtained by bottom towing. The ratios of mature to immature individuals is similar for the period for which there are overlapping data - November, 1951.

The presence of females (N. americana) with well developed young in late May and early June, bears out the supposition that a winter breeding period occurs with release of young in late spring and early summer.

The appearance of M. stenolepis at Kempt Head in relatively great numbers in early November, as see from collection data is borne out by stomach data. The estimated numbers of M. stenolepis in stomachs are not high but this species is of regular occurrence. It is interesting to note that between the stomach collections of 14-IX-51 and 22-X-51, this influx of M. stenolepis has occurred and that at the latter period and thereafter to the end of 1951 so far as our data indicate M. stenolepis, replaces M. mixta, the latter not being recorded after 14-IX-51 in a total of 49 stomachs taken upon 5 separate occasions. Our data from invertebrate collections do not indicate any very drastic decline in the population of M. mixta, so that the influx of M. stenolepis, presents a choice to the cod and that of the two species the "preferred" one is M. stenolepis. It should be noted that the numbers of mysids in the respective stomachs is only estimated in most cases and that identification was not very thorough, it seems unlikely however that M. mixta, had it been present more than once or twice would have been missed or that misidentification of the two species is likely.

With respect to the bloom of Neomysis occurring in the late fall, there is a gap in the data obtained from Kempt Head collections, so that dating this event is somewhat difficult. The earliest record is found in collection #97 - 7-XI-51, and this date may be set back at least to 22-X-51 by information from cod stomachs. It should be noted that on this same date the influx of M. stenolepis is noted although as previously stated the numbers of mysids in the stomachs is low.

The apparent inwards migration of M. stenolepis, at Kempt Head has already been noted, there appears to have been a similar influx of this species into the Baddeck Bay area at about the same time, this indication being found in both stomach data and data from the invertebrate collections.

It is interesting to note the consistent appearance of Erythrops erythrophthalma, in the stomachs of Kempt Head cod. This species could not at all be considered abundant from numbers taken in bottom plankton tows but is nevertheless consistently picked up by the cod.

The degree of mysid occurrence in cod stomachs and the number of animals per stomach among those in which the animals appeared, reflects what was known of mysid abundance and life cycle through bottom plankton towing. No pattern seems to have developed in the Whycocomagh Bay area where the mysid population from both sources of data is seen to be relatively low. What is strikingly illustrated in the stomach examination is the relatively great proportion of cod which have fed on mysids considering the low numbers of these animals in this area. For Baddeck Bay, the pattern is definite and understandable. Mysid abundance is high in the spring and with it high cod intake. Note that in 1951 at any rate this high intake is due to N. americana, and not at all to M. stenolepis which in 1952 was relatively abundant in bottom plankton towing at this time of year. The intake of mysids from late July until late December is very low in this area. This drop coincides with the end of the Neomysis bloom (1952 data), and also with what may be an outward migration of the two species of Mysis. The latter are certainly present in this area in May and June and then do not occur in numbers (M. stenolepis) until late October. M. mixta does not appear in the bottom plankton collections at all for 1951 in Baddeck Bay and must enter this area some time during the late winter. The high mysid content of a few fish, 10-VIII-51, 15-IX-51, is due to the sizes of the cod concerned; these fish are less than 15 centimetres in length. It should be noted that the cod population in this area fell to a low level after the middle of August and had not recovered appreciably by the end of the year. The fall Neomysis bloom and the inwards migration of M. stenolepis are not reflected in the cod intake until the stomach collection of 28-XII-51; this lag may be due to the low numbers of cod in the area. The pattern at Kempt Head follows very closely what was known from bottom plankton towing. There is a high intake recorded for 7-VI-51 when Neomysis, M. stenolepis and M. mixta populations would all be high due to more or less concurrent blooms. A drop in intake then occurred for the months of July, August and September with a rising intake beginning in October, coincident with the fall Neomysis bloom and the inwards migration of M. stenolepis. There is following, a period to the end of our 1951 observations, covering late November and December during which the intake drops appreciably, this is a reflection of the low numbers of mysids taken from this area by bottom plankton towing during late December. No explanation may be advanced at this time for this decrease in mysid population at this time of year.

Nematodes in Invertebrates from Stomachs

The relative abundance of mysids in the Baddeck Bay and Kempt Head areas and the relative scarcity of that invertebrate in Whycocomagh Bay, together with the importance of mysids in the diet of wormy fish from the first mentioned areas gave early indication of the importance of considering this group, mysids, as hosts of the cod worm, Porrocaecum. It was not until the spring of 1952, however, that a nematode was found in a mysid. This find occurred during identification of mysids and near the termination of this work

for 1951-52. It was then thought advisable to dissect a number of mysids in order to determine whether this nematode infested individual was unique or rather whether there was a regularly occurring nematode in mysids, which might prove to be the immature form of Porrocaecum decipiens. A number of mysids from bottom plankton collections were dissected but no nematode infested individuals were found. Then, rather than destroy too many of the mysids from these collections which were wanted for further study, mysids from cod stomachs were dissected, and these yielded very satisfactory results, several nematode infested mysids being found. As will be gone into elsewhere, the finding of nematodes in mysids or other invertebrates, and for that matter in fish is dependent to a great degree upon the treatment of the host after capture, this was not however known at the time of the above mentioned work although it was suspected from the appearance of the nematodes from the cod stomach mysids.

The degree of infection in these stomach mysids is rather difficult to determine since a great part of the dissected material is represented by part rather than whole animals. In view of the fact that nematodes leave their host very readily with various types of provocation, being subjected to dijestive juices, formalin, and mechanical crushing of the mysid and themselves would I think tend to cause most mysid inhabiting nematodes to leave their "part" hosts. The percentages of infection given here are therefore only interpretations and subject to reevaluation.

Neomysis americana

	entire	rear	head	nematodes
#36 B.B.	35	11	12	no nematodes;
#37 B.B.	2			1 nematode lying in same position as #72;
#38 B.B.	22			no nematodes;
#41 B.B.	47	29	20	no nematodes;
#42 B.B.	135			2 nematodes; 1 very small; other circa 1 cm., 3/4 out of mysid, rest in entire body of exopod of uropod and wound around inside base of endopod;
#43 B.B.	(25)			some of these in pieces; 1 minute nematode found in tray at point where mysid being dissected, may have been flipped out and unnoticed;
#44 B.B.	(51)			some in pieces; 2 nematodes; 1 - just under carapace, in thoracic region behind "usual" position; 1 - lying in ant. part of body to one side of "stomach"; carapace split so couldn't see position of whole; one end through antennary peduncle to outside;

	entire	rear	head	nematodes
#47(51?) B.B.	88	7		2 nematodes; 1 - in usual position, i.e. anterior just under carapace, wound around "stomach"; another very small nematode noted in tray after dissection of this same mysid (the first of a group), probably removed from it but not noticed; in separate vial - 47 or 51 - 35 ex N. americana?
#48 B.B.	49	16		no nematodes;
#50 B.B.	56	20	20	1 nematode; found in abdominal region, just under skeleton, wound back and forth, a rather large worm;
#51 or 47 B.B.	20	8	8	no nematodes;
#120 B.B.	20			1 nematode; sticking out rear end of animal, just under skeleton of back of abdomen;
#123 B.B.	18		3	no nematodes;
#126 B.B.	20			no nematodes;
#157 K.H.	3	2	2	no nematodes;
#158 K.H.	5	9	13	no nematodes;
#211 W.B.	1	1		no nematodes;
#706 B.B.	4	5	5	no nematodes;
#1088 K.H.	7	5	23	no nematodes;
	608	113	106	10 (8 definite, 2 doubtful)

The total number of animals examined for nematodes including parts, assuming some duplication of parts would be 608 plus 139 giving a total of 747 "different" animals dissected at least in part.

Percentage of these animals that were found to be nematode infested - 8/747 - 1.1%.

Mysis stenolepis

#252 W.B. - 1 entire, 1 rear end - no nematodes;
#706 B.B. - 7 entire - no nematodes; 0/9 - 0%

Mysis mixta

#158 K.H. - 1 entire - no nematode; 0/1 - 0%

Erythrops erythrophthalma

#1088 K.H. - 1 entire, 4 heads - no nematodes; 0/5 - 0%

Crago septemspinosus

#37 B.B. - 1 - no nematodes;
#38 B.B. - 3 - no nematodes;
#46 B.B. -15 - no nematodes;
#48 B.B. - 2 - no nematodes;

#157 K.H. - 4 - no nematodes; also 3 heads, 3 rear ends;
#158 K.H. - - several (3-4) heads probably Crago dissected - no;
% infection of Crago - 0/28 - 0%

Examination of Invertebrates for Nematodes 1951

During the late fall of 1951, at the time that mysids were being fed to the experimental fish, invertebrates, particularly mysids, were examined shortly after death in order to obtain information on the presence or absence of nematodes in these animals. In many cases, samples of the mysid population, the bulk of which were fed to the cod were examined in this fashion. These animals, although examined soon after death, possibly had lost whatever nematodes had been present by that time, death of the host later noted as one stimulus for evacuation by the nematode. The theory held during the winter of 1951-52, which has proven to be "fact", held that these mysids would not be nematode infested since they were animals of the year and would not become infected until seals had been in the neighborhood for some time. This "fact" is true for the species of Mysis which were exclusively fed to fish, but not for Neomysis, some of which may have been examined for nematodes but none of which were fed to the cod. Certainly during the later part of the experimental feeding the mysids according to this theory would be expected to have at least a low infection of nematodes, but the examination of the recently dead mysids did not reveal any nematode infested individuals.

20-XI-51 Mysis 15 dead?, examined while still transparent - 0/5= 0%
23-XI-51 Mysis 44 alive?, examined while still transparent- 0/44=0%
small mysids - Mysis?Neomysis?,Erythrops? - 0/50=0%
shrimp 7 0/7 =0%
26-XI-51 Mysis 30 examined while still transparent - 0/30=0%
small mysids - 70 0/70=0%
1 small nematode in dissecting dish, possible significance not appreciated at the time, may have evacuated one of the examined animals.
4-XII-51 Mysis 105 -(19 harboring external copepod parasite - Dajus?) very likely Dajus, an isopod as it is noted in collection; - 0/105=0%
small mysids - 64 - (no Erythrops) - 0/64 =0%
gammarids - 9 - - 0/9 =0%

A number of mysids obtained by bottom plankton towing were dissected during the winter of 1952. This has been mentioned above in connection with the dissection of mysids from stomachs. No nematode infested individuals were found by this method in these animals which were of the Mysis species. Attention was, however, originally drawn to these mysids by the finding of a nematode infested individual during the process of identification. This animal, Mysis mixta, was taken at a time, 31-VII-51, when according to theory, (which is considered fact above under - examination of invertebrates for nematodes), this animal and

others in the collection should not be nematode infested since they are animals of the year of which the bulk at any rate would be released after the departure of the seals from the lake.

Mysis mixta

		dissected	nematodes	%infected
#55,56	K.H. 10-VI-51	27	0	0
71,72	K.H. 31-VII-51	55	1	1.8
108	K.H. 4-XII-51	10	0	0
		92	1	1.1

Mysis stenolepis

#108	K.H. 4-XII-51	10	0	0

The examination of recently dead mysids in the fall of 1951, and the dissection of mysids collected by bottom plankton towing, and of mysids from stomachs completed the 1951-52 search for larval nematodes in invertebrates. Nematode infested individuals had been found amongst the many mysids collected by one means or another, none amongst other invertebrates although the search in that area was half-hearted to say the least. The incidence of nematodes in mysids found as a result of these investigations was very low, in the neighborhood of 1% for each of Neomysis americana, determined by dissection of stomach mysids, and Mysis mixta, determined by dissection of "free" mysids after a nematode infested animal had been observed. These low values of infection were, however, considered to be sufficiently high to account for the infection of cod and other fishes with Porrocaecum decipiens.

Examination of Invertebrates for Nematodes 1952

The positions in which the nematodes were found in Neomysis from stomachs, suggested that evacuation of the host by the nematode was a common if not usual occurrence, with the advent of some unfavorable stimulus. The examination of "live" mysids in 1952 was designed to test this supposition. Mysids were examined, that is looked at, while still alive as soon as possible after landing, preserved, and then looked at again at a later date, the preserving fluid being searched for free nematodes at this time. Numbers of these examined mysids were also dissected at a later period again. For this work we were fortunate in having ideal conditions of temperature at least during early May so that mysids were brought to the surface alive and on one occasion, 12-V-52 were even kept for 24 hours alive. On this occasion the bottle containing the mysids was in the laboratory for only a few hours and the remainder of the period was on the sill outside the window. The sea water in the bottle was not changed during this period.

Neomysis americana

12-V-52	B.B.	66	examined alive(4); 38 also dissected(1)	- 5/66=7.6%
13-V-52	B.B.	46	some examined, some dissected	-3/46 =6.5%
21-V-52	B.B.	39	all examined, 20 also dissected	- 1/39=2.6%
4-VI-52	B.B.	6	examined;	- 1/6 =16.7%
16-VI-52	K.H.	25	all examined(3); 15 also dissected(2)	- 5/25=20.0%
20-VI-52	B.B.	54	all examined(5); 14 also dissected(1)	- 6/54=11.1%
4-VII-52	B.B.	100	"examined"	- 9/100=9.0%
4-VII-52	B.B.	13	dissected	- 0/13 = 0%
9-VII-52	B.B.	51	"examined"	- 4/51 =7.8%
		400		34/400=8.5%

Mysis stenolepis

19-V-52	B.B.	15	dissected	1?/15= 6.7%
21-V-52	B.B.	46	all examined(1), 25 also dissected(3)	4/46 = 8.7%
23-V-52	K.H.	9	examined	1/9 =11.1%
10-VI-52	K.H.	4	examined, 2 also dissected;mature;	0/4 = 0%
16-VI-52	K.H.	16	examined(1); 12 also dissected; small;	1/16 = 6.7%
20-VI-52	B.B.	6	immature examined	0/6 = 0%
4-VII-52	B.B.	12	"examined" no note on size	0/12 = 0%
4-VII-52	B.B.	15	dissected	0/15 = 0%
9-VII-52	B.B.	7	"examined"	0/7 = 0%
		130		7/130= 5.4%

"mature" - 6/74 - 8.1%
"immature" - 1/56 - 1.8%

Mysis mixta

21-V-52	B.B.	6	examined	0/6 - 0%
23-V-52	K.H.	41	examined	0/41 - 0%
4-VI-52	B.B.	14	dissected	1/14 - 7.1%
10-VI-52	K.H.	206	examined	0/206 - 0%
		236	dissected, not examined while "alive"	7/236 - 3.0%
		442		7/442 - 1.6%
16-VI-52		38	examined; 25 also dissected;immatures?	0/38 - 0%
		541		8/541 - 1.5%

Not broken down for mature and immature, although it is assumed that the last group, 16-VI-52 is composed of immature individuals.
There is some question of the values for 10-VI-52 since the revords are not too clear as to possible duplication. Here, we have assumed that separate animals are involved so that if anything the degree of incidence estimated here is lower than the actual degree of infestation.

Erythrops erythrophthalma

12-V-52	B.B.	1	examined	0/1 - 0%
13-V-52	B.B.	48	all examined, 27 also dissected;	0/48 - 0%
16-VI-52	K.H.	19	examined, 11 also dissected;	1/19 -5.3%
		68		1/68 -1.5%

Crago septemspinosus

12-V-52	B.B.	7	examined while "alive"	0/7 -0%
13-V-52	B.B.	58	examined	0/58 -0%

gammarids

12-V-52	B.B.	33	examined	0/33 -0%
13-V-52	B.B.	69	examined	0/69 -0%

isopods

12-V-52	B.B.	59	examined	0/58 -0%
13-V-52	B.B.	10	examined	0/10 -0%
		69		0/68 -0%

cumaceans

12-V-52	B.B.	66	examined, several nematodes found amongst animals - free nematodes or recently evacuated cumaceans ?	0?/66-0%
13-V-52	B.B.	50	examined; no nematodes free or otherwise;	0 /50-0%
		116		0/116-0%

Nematodes in Preserved Specimens

gammarid species not determined - 13-V-52 B.B. #2 - nematode in side plate;

caprellid, Aeginina longicornsi - 19-V-52 B.B. #3 - nematode ventrally in first thoracic segment;

shrimp, Crago septemspinosus - 2-VI-52 K.H. #11-lousy with nematodes in thoracic region;

chaetognath -23-V-52 K.H. #5
chaetognath -30-V-52 W.B. #9

Pandalus montagui - from Passamaquoddy Bay

Description of the positions in which nematodes were found in these animals together with remarks on evacuation from their hosts will be found later in this section.

Two points, obvious from the above tables should be noted here. The first, that both examination of invertebrates before and after preservation (including also preservative), and dissection of the invertebrates are necessary to obtain the true degrees of nematode infestation. The second point is that while in theory the young of the year of Mysis stenolepis should not be infected, since they are probably shed after the majority of the seals leave the lake, one immature individual of this species was found to be nematode infested. The difference in rates of nematode incidence for mature and immature individuals of this

species are striking, and assuming our theory to still hold, we can only assume that the larval nematodes (if they hatch free living) or the eggs, remain viable for considerable periods of time such that they might be picked up by immature mysids, occasionally, two months after the departure of the seals.

The finding of nematode infested individuals of forms other than mysids points to the possibility, always kept in the background, that several invertebrates may serve as intermediate hosts of the cod worm. The mysids still appear from circumstantial evidence to be the most probable hosts in the areas investigated here but the possibility of there being other invertebrate carriers of secondary importance should not be overlooked.

Nematodes in Mysids - Location

Erythrops erythrophthalma

16-VI-52 - 1 - found in thoracic region.

Mysis mixta

#72 31-VII-51 - 1 - under carapace, dorsal, see picture.
4-VI-52 - 1 - head region.

Mysis stenolepis

21-V-52 - 1 - thoracic region
1 - thoracic region
1 - thoracic region

16-VI-52 - 1 - one end still in head region, rest probably originally under carapace.

Neomysis americana

Stomachs

#37 - 1 - dorsal, thoracic just under carapace.
#42 - 1 - circa 1 cm. - 3/4 out of mysid, rest in centre of body of uropod and wound around inside base of endopod (see picture).
#44 - 1 - under carapace in thoracic region.
1 - anterior part of body to one side of stomach, one end through antennary peduncle to outside, (see photograph).
#47 - 1 - anteriorly just under carapace wound around stomach.
#50 - 1 - abdominal region, just under skeleton, wound back and forth, a rather large worm (see photograph).
#120- 1 - protruding out rear end of animal, just under skeleton of back of abdomen (photograph ?).

Collections

12-V-52 - 1 - in male - under carapace.
1 - in female, laterally in thorax, just under carapace.
13-V-52 - 2 - seen crawling out from under carapaces of 2 mysids.
1 - under carapace of thorax.
21-V-52 - 1 - in male, under carapace, head, thorax.
16-VI-52 - 1 - head, a very small nematode.
1 - from thorax.
20-VI-52 - 1 - dorsal thoracic region, just under carapace.
10-VII-52- 1 - 2 nematodes found in one mysid, no comment on location, specimen not retained.

The locations of nematodes in the other invertebrates is indicated in the preceding section.

The usual location for the nematodes to be found in mysids appears to be the thorax dorsally and somewhat laterally immediately internal to the carapace. Part of the nematode is often located anteriorly in part of the head but the greater part of the animal is in the thorax, often wound back and forth in that region. A few specimens were found in an abdominal location and a few found almost entirely in the head region, one of the latter was a very small individual. A few "doubtful" parasitic forms of very small size have been found after dissection of the head region (not actually in the animal) and it is possible that these are actually parasitic forms which have been overlooked or flicked out of the head, and that the very small nematodes are found in the anterior or head region and later with increasing size, move into the thorax.

Nematodes in Invertebrates 1951, 1952

	No. Mysids	Nematodes	%Infected
Neomysis americana			
stomachs, dissection	747	8	1.1
1952, examination; dissection	400	34	8.5
Mysis stenolepis			
stomach - dissection	9	0	0
collections-dissection	10	0	0
1952, examination; dissection	130	7	5.4
Mysis mixta			
stomachs - dissection	1	0	0
collections - (examination)dissection	92	1	1.1
1952 examinations; dissections	541	8	1.5
Erythrops erythrophthalma			
stomach - dissection	5	0	0
1952 - examination; dissection	68	1	1.5

	No. Mysids	Nematodes	%Infected
Crago septemspinosus			
stomachs - dissection	28	0	0
1952 - examined	65	0	0
2-VI-52	1 nematode infested		
Gammarids - examined, checked	102	0	0
Isopods - examined, checked	69	0	0
Cumaceans - examined, checked	116	0?	0

gammarid - nematode infested - 13-V-52

Caprellid - nematode infested - 19-V-52

Chaetognaths - 2 nematode infested - 23-V-52, 30-V-52;

Pandalus montagui - Passamaquoddy Bay

Abbreviations used on the following pages

Dr. - Drag
Coel. - coelenterates
M. - medusae
A. - anemones
Poly. - polychaets
G. - gastropods
B. - bivalves
A. - asteroidea
O. - ophiuroidea
E. - echinoidea
H. - holothuroidea
S. - shrimp
C. - crabs
H.C. - hermit crabs
L. - lobsters
S.D. - sand dollars
H.N. - hoop nets
B.Pl. bottom plankton
Coel. H. - hydroid
Crustaceans - M. - mysids
A. - amphipods
C. - cumaceans
I. - isopods
S. - shrimp
C. - crabs
H. - hermit crabs
P. - pycnogonids

Invertebrates of The Great Bras D'Or

Baddeck Bay Drags - 1951

	Coel.			Molusc		Echinoderms				Crustaceans				
	M.	A.	Poly.	G.	B.	A.	O.	E.	H.	S.	C.	H.C.	L.	Por.
24-V-51 #3						x								
Dr. 1						x								
Dr. 3						x								
#4			x		x	x					x			
25-V-51 #6						x	x	x			x			x
#7			x	x	x	x		x						
31-V-51 Dr. 11						x								
Dr. 12						x								
1-VI-51 #11		x			x	x		x				x	x	x
#12						x						x		
#13			x		x	x	x	xxS.D.				x		x
#14						x		x					x	x
#15						x		x				x		
#16														
5-VI-51 #17		x				x		x						
Dr. 18						x								
Dr. 19						x								
6-VI-51 #18		x				x								
Dr. 21						x								
8-VI-51 Dr. 24						x								
Dr. 25		x				x					x			
19-VI-51 Dr.42	x					x		x						
Dr. 43						x								
22-VI-51 #38		x			x	x		x						
26-VI-51 #42	x	x				x		x			x			
Dr. 47						x						x		
14-VII-51 Dr. 62	x													
30-VII-51 Dr. 83		x											x	
Dr. 84													x	
2-VIII-51 Dr. 90													x	
14-VIII-51 Dr. 96								x						
Dr. 97					x								x	
16-VIII-51 Dr. 98	x													
Dr. 99	x	x		x		x		xxS.D.					x	
24-VIII-51 Dr.101						x		x						
10-IX-51 Dr. 107	x					x		x			x		x	
15-IX-51 Dr. 110	x					x		x					x	x
17-IX-51 Dr. 112	x					x		x					x	x
Dr. 113		x			x	x		x					x	x
23-X-51 Dr. 116						x								
30-X-51 #88						x								
#89					x	x		x					x	
13-XI-51 Dr. 123						x								
Dr. 124						x					x			
Dr. 125		x				x		x						

Baddeck Bay Drags - 1951 cont.

	Coel. M.	Coel. A.	Poly.	Mollusc G.	Mollusc B.	Echinoderms A.	Echinoderms E.	Echinoderms E.	Echinoderms H.	Crustaceans S.	Crustaceans C.	Crustaceans H.C.	Crustaceans L.	Por.
26-XI-51 Dr. 130						x		x						
Dr. 131	x	x				x								
Dr. 132		x				x		x						
28-XII-51 Dr. 147						x								
Dr. 148						x								
Dr. 149		x				x								
	51	9	14	3	2	8	44	2	21	0	0	6	5	12	7
			27%			16%	86%		41%					24%	13%
									21						
									2S.D.						

25-V-51 #7 - amphipods;
22-VI-51 #38 - bryozoan;

Great Bras D'Or Drags - 1951

	Coel. M.	Coel. A.	Poly.	Mollusc G.	Mollusc B.	Echinoderms A.	Echinoderms O.	Echinoderms E.	Echinoderms H.	Crustaceans S.	Crustaceans C.	Crustaceans H.C.	Crustaceans L.	Por.
27-VI-51 #44	x			x	x	x	x	xxS.D.			x			
#45	x				x	x		x		x	x		x	
#46			x	x		x		xxS.D.			x	x		x
28-VI-51 #47					x	x						x		x
#48	x				x		x							x
#49			x		x	x						x		x
	3	0	2	2	5	5	2	3	0	1	3	3	1	4
								2 S.D.						
				33%	83%	83%	33%	50%			50%	50%		67%

Whycocomagh Bay Drags - 1951

	Coel. M.	Coel. A.	Poly.	Mollusc G.	Mollusc B.	Echinoderms A.	Echinoderms O.	Echinoderms E.	Echinoderms H.	Crustaceans S.	Crustaceans C.	Crustaceans H.C.	Crustaceans L.	Por.
11-VI-51 #24	x				x									
12-VI-51 #25			x		x	x								x
#26		x	x		x									
#27 bryozoan?														
13-VI-51 #29	x													
Dr. 35					x	x		xS.D.						x
Dr. 36					x	x		xS.D.						x
14-VI-51 Dr. 38					x	x		xS.D.						
Dr. 39					x	x		xS.D.						x
15-VI-51 Dr. 40		x	x		x			x						x
11-15-VI-51 #37					x									
17-VII-51 Dr.65			x?		x									x
Dr.66			x?		x									x
Dr.68	x		x?		x									x
9-VIII-51 Dr.92			x		x									x
18-IX-51 Dr.114	x							xS.D.						
2-XI-51 Dr.120			x		x	x		xS.D.						x
#93			x		x									x

Whycocomagh Bay drags - 1951 cont.

	Coel. M.	Coel. A.	Poly.	Mollusc G.	Mollusc B.	Echinoderms A.	Echinoderms O.	Echinoderms E.	Echinoderms H.	Crustaceans S.	Crustaceans C.	Crustaceans H.C.	Crustaceans L.	Por.
27-XII-51 #116					x			xS.D.						
(Dr.144)					x			xS.D.						
(Dr.145)					x									x
Dr.146								x						x
21	4	2	6/	0	17	6	0	10	0	0	0	0	0	13
								8S.D.						
								2						
					81%	26%		48%						61%
								38%S.D.						

Kempt Head Drags - 1951

	Coel. M.	Coel. A.	Poly.	Mollusc G.	Mollusc B.	Echinoderms A.	Echinoderms O.	Echinoderms E.	Echinoderms H.	Crustaceans S.	Crustaceans C.	Crustaceans H.C.	Crustaceans L.	Por.
6-VI-51 #21						x				x				
26-VI-51#43						x				x				
3-VII-51#50			x			x			x	x				
7-VII-51 Dr.58						x				x				
10-VII-51 #53						x				x				
#54			x			x			x	x		x		
12-VII-51 Dr.61						x		x		x				
31-VII-51 Dr.86						x				x				
25-VIII-51Dr.102						x				x				
Dr.103						x		x		x				
14-IX-51 Dr.109						x		x		x				
22-X-51 #80					x	x				x				
7-XI-51 Dr.122						x		x						
17-XI-51 Dr.126						x		x		x	x			
20-XI-51 Dr.127								x		x				
#102						x		x	x	x		x		
30-XI-51 #107										x		x		
(Dr.134)										x		x		
(Dr.135)						x		x		x				
4-XII-51 Dr.136						x				x		x		
? #109														x
20-XII-51 #110			x			x		x		x				
22-XII-51 #113				x		x		x						x
#114		x		x		x		x				x		x
22	0	1	3	2	1	20		11	3	19	1	5	0	3
						91%		50%		86%		23%		

Baddeck Bay Dredge, Hoop Nets, Bottom Plankton Tows - 1951

		Coel. P.	Coel. M.	Coel. H.	Coel. A.	Coel. N.	Coel. C.	Echinoderm P.	Echinoderm G.	Echinoderm B.	Echinoderm A.	Echinoderm O.	Echinoderm E.	Echinoderm H.	Crustaceans M.	Crustaceans A.	Crustaceans C.	Crustaceans I.	Crustaceans S.	Crustaceans C.	Crustaceans H.
24-V-51	#1dredge					x		x	x	x											
29-V-51	#8dredge					x		x		x								x			
6-VI-51	#19 dredge							x		x						x		x			
7-VI-51	H.N.							x	x	x	x				x	x					
8-VI-51	#23 H.N.										x				x	x			x		
20-VI-51	H.N.							x			x										
4-VII-51	B.P1		x																		
14-VII-51	57B.P1.							x	x		x		x		x	x	x	x	x		
	58B.P1.							x	x	x					x		x				
	59B.P1.							x	x						x						
30-VII-51	68 B.P1.	x					x	x	x	x	x				x	x	x		x		
	69B.P1.							x							x	x	x				
	70B.P1.						x	x							x	x	x		x		
17-IX-51	77B.P1.	x		x?						x					x		x	x			
	78B.P1	x						x		x	x	x			x			x	x		
23-X-51	81Dr.							x		x											
	82,83B.P.							x		x	x				x	x	x	x	x		
29-X-51	87			x				x		x											
30-X-51	90,91B.P.							x		x	x				x	x	x	x	x		
26-XI-51	105,106							x			x				x			x			
28-XII-51	120B.P.							x	x	x					x	x		x			
	#121B.P1.							x							x	x		x	x		
		22	3	1	1?	0	2	2	19	7	13	9	1	1	0	15	11	8	10	8	0	0
									86%	32%	59%	41%				68%	50%	36%	45%	36%		

7-VI-51 #22 H.N. - ascidian;
30-VII-51 #70B.P1. - copepods;
17-IX-51 #77B.P1. - bryozoan;
#78B.P1. - bryozoan;
23-X-51 #82,83B.P1. - copepods;
30-X-51 #90,91B.P1. - bryozoan; argulids;
26-XI-51 #105,106B.P. - copepod;

St. Patrick's Channel Drags - 1951

5 drags - 19-VII-51 - red medusae, no mention of other invertebrates;

West Bay Drags - 1951

29-VIII-51 - sea urchins, medusae, tubeworm, starfish, bivalves, sponge.

Whycocomagh Bay Dredge, Hoop Nets, Bottom Plankton Tows - 1951

		Coel. P.	M.	H.	A.	Nem.	Ctn.	Pol.	Gas.	Bry.	Echinoderm A.	O.	E.	H.	Crustaceans M.	A.	C.	I.	S.	C.	H.	Pis.
12-VI-51	#28S.P.		x																			
14-VI-51	#30dre.					x		x		x												
	#35H.N.		x			x		x	x		x				x	x	x					
	#36N.N.							x		x	x					x						
17-VII-51	60B.Pl.							x		x					x	x						
	61B.Pl.						x	x		x					x	x	x					
	62B.Pl							x	x	x					x	x	x					
	63B.Pl							x							x		x					
	64B.Pl						x	x							x							
18-VII-51	65B.Pl						x								x		x					
	66B.Pl						x	x	x						x							
	67B.Pl						x	x		x					x	x	x					
8-VIII-51	73B.Pl							x		x					x		x					
18-IX-51	79B.Pl		(x)					x		x					x							
25-X-51	84,85B.P.							x	x	x	x				x	x	x	x	x			
2-XI-51	94,95B.P.						x	x							x	x	x		x			
27-XII-51	118B.P.							x		x					x							
	119B.Pl.							x		x												
		18	0	2	?	0	2	6	16	4	11	3	0	0	0	14	8	9	1	2	0	0	0
							11%	33%	89%	22%	61%	17%				78%	44%	50%					

17-VII-51 - #60B.Pl. - copepods;
#62B.Pl. - platyhelminth;
18-VII-51 - #66B.Pl. - copepods;
#67B.Pl. - platyhelminth;
8-VIII-51 - #73B.Pl. - hyperiid?;
25-X-51 - #84,85B.Pl. - copepod, bryozoan;

Kempt Head Bottom Plankton Tows - 1951

		Coel. P.	M.	H.	A.	Nem.	Ctn.	Pol.	Gas.	Bry.	Echinoderm A.	O.	E.	H.	Crustaceans M.	A.	C.	I.	S.	C.	H.	Pis.
10-VII-51	55 B.Pl.						x	x		x					x	x		(x)				x
	56 B.P.						x	x		x					x	x			x			
31-VII-51	71 B.P.					x	x	x	x	x					x	x		(x)	x			x
	72 B.P.					x	x	x	x	x					x	x						
11-IX-51	76 B.P.					x	x	x		x					x	x		(x)	x			x
7-XI-51	97,98B.P.						x	x		x					x	x	x?		x			
9-XI-51	99B.P.?						x															
17-XI-51	100,101						x	x		x					x	x			x			
20-XI-51	103							x	x	x					x	x			x			x
(23-XI-51	104)														x				x			
4-XII-51	108							x							x	x						x
20-XII-51	111					x	x	x							x	x		x	x			
	112							x		x					x				x			
22-XII-51	P167										"no" mysids, all discarded											
	P168										"no" mysids, all discarded											
		11	0	0	0	0	4	8	11	3	9	0	0	0	0	11	10	1?	1?	8	0	0	5
							36%	73%	100%	27%	82%					100%	91%		73%			45%

Kempt Head - 1952

		Coel.							Echinoderm				Crustaceans							
		P.	M.	A.	N.	C.	P.	G.	B.	A.	O.	E.	H.	M.	A.	C.	I.	S.	C.	H.L.	P.
23-V-52	Dr. 5									x										x	
	#5 B.Pl.					x	x						x	x							
27-V-52	#6 Dr. B.P.				x	x	x	x	x					x	x			x		x	x
	Dr. 6								x											x	
29-V-52	Dr. 7										x	x									
	#7 B.Pl.													x				x			
2-VI-52	#11 B.Pl.							x	x					x			x	x			
4-VI-52	#13 B.Pl.													x							
6-VI-52	#15 B.Pl.													x			(x)	x			
10-VI-52	#16 B.P.			x	x	x		x	x					x			(x)	x			
	#17 B.Pl.													x			(x)				
13-VI-52	#18 B.Pl.													x				x			
16-VI-52	#20 B.Pl.													x							
	#21 ?		x																		
21-VI-52	#25 B.Pl.		x			x		x						x				x			
	#26 B.Pl.					x								x				x		x	

10-VI-52 - #16 B.Pl. - euphausids; these are in other collections but this is the only reference to them in the notes.

Since as mentioned above a somewhat different technique was used in sampling in 1952 (and also because of the incomplete records), these data are not comparable with those of 1951, nor do they lend themselves to interarea comparison.

Very little of new note is added by these above data with the excepted notes regarding the presence of ctenophores in Whycocomagh Bay and euphausids off Kempt Head. Neither of these animal groups had been recorded in 1951.

Gross Comparison of The Faunas

Drags - 1951

	Baddeck Bay	Kempt Head	Whycocomagh Bay
Porifera	13%	x	61%
Medusae	18%	0	19%
Anemones	27%	x	x
Gastropods	x	x	0
Bivalves	16%	x	81%
Asteroidea	85%	91%	26%
Ophiuroidea	x	0	0
Echinoidea	41%	50%	48%
S. D.	x	0	38%
Holothuroidea	0	x	0
Shrimp	0	86%	0
Crabs	x	x	0
Hermit Crabs	x	23%	0
Lobsters	24%	0	0

Kempt Head Bottom Plankton Tows - 1951 cont.

10-VII-51 #55 B. Pl. - copepods; platyhelminth; hirudineans?; echiuroids?;
#56 B. Pl. - copepods; bryozoan?;
31-VII-51 #71 B. Pl. - annelids; copepods;
#72 B. Pl. - copepods; bryozoan; rhyonhobdellids?;
11-IX-51 #76 B. Pl. - copepods; polyclad turbellarian;
9-XI-51 #99 B. Pl.?- copepods;
20-XI-51 #103 B. Pl. - ascidians; pteropod??;
23-XI-51 #104 B. Pl. - argulid;

1952

There is not the "detailed" general description of the animals in the drags and tows as in 1951. In most instances not all items were collected, and often groups were probably neglected altogether.

The polychaets have not at this point been grouped into families, as is the case with those collected in 1951, so that they may often not be noted in the description.

The amphipods have at this time only been classified partially, Baddeck Bay - 1951, part 1952 so that again the occurrence of this group may not always have been noted.

Baddeck Bay - 1952

	Coel.							Echinoderm				Crustaceans							
	P.	M.	A.	N.	C.	P.	G.	B.	A.	O.	E.	H.	M.	A.	C.	I.	S.	C.	H. L.
12-V-52 #1 B.Pl.							x	x					x	x	x	x	x		
13-V-52 #2 B.Pl.							x	x					x	x	x	x	x		x
19-V-52 #3 B.Pl.	x					x	x	x					x	x			x		
21-V-52 Dr. 3								x	x		x								
Dr. 4									x		x								
#4 B.Pl.								x					x				x		
4-VI-52 Dr. 11								x			x								
#12 B.Pl.							x						x			x		x	
20-VI-52 #22B.Pl.		x					x	x					x			x	x		
#23B.Pl.		x					x	x					x			x	x	x	
#24 B.Pl.							x						x			x	x		
4-VII-52 #28B.Pl.													x						

Whycocomagh Bay - 1952

	Coel.							Echinoderms				Crustaceans							
	P.	M.	A.	N.	C.	P.	G.	B.	A.	O.	E.	H.	M.	A.	C.	I.	S.	C.	H. L.
30-V-52 Dr.8						x		x											
#8 B.Pl.							x												
#9 B.Pl.					x		x												
25-VI-52#27B.Pl.		x					x	x					x						

30-V-52 #27B.Pl. - ctenophores;

The Baddeck Bay bottom fauna as ascertained by this method of collecting is characterised by starfish (Asterias type), anemones, sea urchins, and lobsters all of more or less general occurrence. Also of more than occasional occurence - bivalves, sponge and medusae.

Characteristic of the Kempt Head benthic fauna are starfish (five rayed and many rayed), shrimp, sea urchins and hermit crabs.

The benthis fauna of Whycocomagh Bay is characterised by bivalves, sponge, and echinoids of the sand dollar type. Also of more than occasional occurrence - starfish and medusae. Also very characteristic of this fauna is tubeworm although because of probable misinterpretation, in the records this item is omitted from "numerical" consideration.

Smaller Invertebrates - 1951

	Baddeck Bay	Kempt Head	Whycocomagh Bay
Porifera	x	0	0
Medusae	x	0	x
Hydroids	x	0	?
Anemones	0	0	0
Nemerteans	x	36%	11%
Chaetognaths	x	73%	33%
Polychaets	86%	100%	89%
Gastropods	32%	27%	22%
Bivalves	59%	82%	61%
Asteroidea	41%	0	17%
Ophiuroidea	x	0	0
Echinoidea	x	0	0
Holothuroidea	0	0	0
Mysids	68%	100%	78%
Amphipods	50%	91%	44%
Cumaceans	36%	?	50%
Isopods	45%	x	x
Shrimp	36%	73%	x
Crabs	0	0	0
Hermit Crabs	0	45%	0
Ascidians	x	x	0
Bryozoan	x	x	x

Some rather striking differences in the faunas are seen to be found by the different methods of collecting. These differences are in part due to the presence of young of the forms obtained by dragging, notably starfish, and in part due to different species being taken by different methods, as in the case of bivalves and shrimp.

Notable is the very common overall occurrence of polychaets. This seems to be reflected in the feeding habits of cod.

There is no point in repeating the figures given above for the occurrence of the smaller forms but rather to point out what might be considered diagnostic of the respective faunas collected

methods. For Baddeck Bay, the comgination of starfish, cumaceans, isopods and shrimp would seem to be diagnostic. For Whycocomagh Bay starfish, cumaceans, nemerteans and chaetognaths in combination or at least partly so would differentiate from the faunas of the other areas. For Kempt Head, pycnogonids alone are diagnostic, while the combination of shrimp, nemerteans and chaetognaths would also serve to differentiate this benthic group from those of the other two areas. Ascidians are common to both Kempt Head and Baddeck Bay but are too irregular in occurrence to be used in differentiating these faunas.

Invertebrate Occurrence, Gross - 1951, 1952

	Baddeck Bay		Kempt Head		Whycocomagh Bay	
	Dr.	B.Pl.	Dr.	B.Pl.	Dr.	B.Pl. etc.
Porifera	13%	x	x	0	61%	0
Medusae	18%	x	0	x	19%	x
Anemones	27%	0	x	x	x	0
Nemerteans		x		36%		11%
Chaetognaths		x		73%		33%
Polychaets	x	86%	x	100%	x	89%
Gastropods	x	32%	x	27%	0	22%
Bivalves	16%	59%	x	82%	81%	61%
Asteroidea	86%	41%	91%	0%	26%	17%
Ophiuroidea	x	x	x	0	0	0
Echinoidea	41%	x	50%	0	48%	0
Sand Dollars	x	0	0	0	38%	0
Holothuroidea	0	0	x	x	0	0
Crabs	x	x	x	0	0	0
Hermit Crabs	x	x	23%	?	0	0
Lobsters	24%	0	0	0	0	0
Shrimp	0	36%	86%	73%	0	x
Mysids		68%		100%		78%
Amphipods		50%		91%		44%
Cumaceans		36%		?		50%
Isopods		45%		x		x
Pycnogonids		0		45%		0
Ascidians		x		x		0
Bryozoan		x		x		x
Euphausids		0		x		0
Ctenophores		0		0		x

Porifera

As indicated in the foregoing tabulations, sponge is rare at Kempt Head, irregularly collected from Baddeck Bay and common in the Whycocomagh Bay collections. In the latter area it was collected in June, July, August, November and December. No record is available for October and sponge was not collected in the single drag recorded for September.

Unfortunately, since the sponges were preserved along with other invertebrate animals in formalin, it is unlikely that

identification of these animals can be carried very far at any future date.

Coelenterata

Medusae were commonly collected in Baddeck Bay from the middle of June until the middle of September; there was one later record for November 26, 1951. These animals were of the Obelia type. Since medusae are surface animals, more or less, they must have been trapped in the drag as it was passing through the upper water during the set and the haul. Medusae were noted in large numbers at the surface on July 14, in this area. Other dates when numbers in drags were noted as being high - June 19, July 4, and August 16.

Medusae of a type known locally as bloodsuckers, with red stinging tentacles were often present in the Baddeck harbour area during the summer period.

In Whycocomagh Bay medusae were noted during the same period as in Baddeck Bay, mid-June to mid-September and were collected about 25% of the time during this period. The medusae collected were generally of the Obelia type but two other types were noted. A large medusa possibly a large Obelia type was collected on June 13 but was later discarded due to lack of a sufficiently large container. On June 12 a "vast" school of the stinging type, red tentacles, of medusae were seen opposite the entrance to Whycocomagh Harbour in rather shoal water.

Numbers of medusae of the stinging variety were present in St. Patrick's Channel on July 19 (19-VII-51). The depth in this area is nowhere over 50 feet.

Medusae and anemones appear to be very rare in occurrence in the area of Kempt Head.

Anemones were occasionally collected or noted in Whycocomagh Bay. On June 12 (12-VI-51) a tree was brought up in the drag which was literally covered with anemones and bivalves.

Anemones were noted or collected with regularity from the waters of Baddeck Bay. The numbers picked up here in one drag were lower than in Whycocomagh Bay but were more frequently recovered.

Nemerteans

These animals are common to all three areas but were relatively more common at Kempt Head than Whycocomagh Bay than Baddeck Bay. It is interesting to note that records of this group for the two latter areas are confined to the months of May and June. From the Kempt Head collections their occurrence is spottier although not at all regular.

It is possible that these animals have in some collections been overlooked and will not be recovered until sorting of the smaller animals has been undertaken.

Chaetognaths

While these animals are not normally associated with the bottom fauna their occurrence in bottom plankton tows is at Kempt Head so regular as to constitute a point of comparison in the faunas. Chaetognaths were regularly recovered during two days in July from Whycocomagh Bay but otherwise were "rare" in occurrence. Similarly for Baddeck Bay, occurrence was limited to one day in July - 30-VII-51. The one recovery for Whycocomagh Bay for 1952 was made in late May.

The peak population point or bloom of these animals appeared to occur in June. At Kempt Head, the terms hundreds and thousands are used respectively for 10-VI-52, and 21-VI-52 concerning numbers obtained in the tows on those dates. The numbers of chaetognaths recovered on various occasions notably those mentioned above, seem to preclude the possibility that chaetognaths are restricted to the upper or middle water layers. Since almost without exception the tows for which the records are above noted were bottom plankton tows behind the drag, there is little opportunity for animals other than bottom forms from being taken into the net even on the set and haul.

Ctenophora

There is one recorded recovery of these animals, Whycocomagh Bay, 30-V-52, which is somewhat doubtful. There was some doubt when originally collected whether these animals were ctenophores or small medusae and no examination has been possible since that time.

Bryozoa

Animals or this group, particularly the encrusting type are recorded from the three areas.

Pycnogonida

These animals were found exclusively in Kempt Head waters and were of common occurrence and characteristic of the fauna of that area. All collected animals are of the genus Nymphon but specific identification has not been undertaken.

Tunicata

Ascidians were collected from Baddeck Bay and Kempt Head. Their occurrence is believed to be sporadic in these areas but as with other of the smaller animals their appearance in the records may not be complete.

Mollusca

As mentioned at the beginning of the invertebrate section, specific identification is in doubt in a number of cases (species), and only those whose identity is certain are considered in this section.

Identification is based upon the key and descriptions of Apgar. Additional works consulted were Pratt , Gould and the latter two for plates and distributions.

Gastropoda

Perusal of the foregoing and following tables shows that the Great Bras D'Or is not very rich in shelled gastropods and that the bulk of recorded gastropods are nudibranchs. Most of the shelled forms, Polinices, were picked up by the drag. Possibly other collecting devices as for example a towing dredge might have revealed a richer and more abundant fauna of this nature.

Polinices (Natica), was taken at least once in each of the three areas and also in the Great Bras D'Or Channel. The occurrence of this form was too rare to warrant further comment, other than a tabular consideration of its occurrence.

Baddeck Bay	Kempt Head	Whycocomagh Bay
27-V-51 #7 Dr. - 4		
7-VI-51 #22 H.N.- 1		
		14-VI-51 #35 H.N.-1
	22-XII-51 #113 Dr.-1	
	#114 Dr.-1	
13-V-52 "2 B.Pl. - 1		

Great Bras D'Or Channel - 27-VI-51 - #46 - 2

In passing, it should be mentioned that Littorina, a shelled gastropod is very abundant along the rocky shore of Baddeck Harbour.

Nudibranchs were taken in all three areas in 1951 but their occurrence during our period of investigation was sporadic as can be seen by the following tabulation. In 1952, in May and June these animals were regularly collected and in much higher numbers than at any time in 1951. Peak numbers were collected early in the season, with "abundance" falling off during June indicating that a "bloom" was in progress during this time which was not recorded in 1951 due, no doubt, to the lack of bottom plankton tows and also to the different meteorological conditions.

It is unlikely that identification of these animals will be carried further than the present category.

Baddeck Bay	Kempt Head	Whycocomagh Bay
24-V-51 #1 dre. - 1		
14-VII-51 #59 B.Pl. -2		
		17-VII-51 #60 B.Pl. - 1
		#62 B.Pl. ♀ 1
		18-VII-51 #66 B.Pl. - 1
30-VII-51 #68 B.Pl. - 1		
	31-VII-51 #71 B.Pl.-2	
	#72 B.Pl.-2	
		18-IX-51 #79 B.Pl.-1
		25-X-51 #84,85 B.Pl.-1
	20-XII-51 #103 B.Pl.-1	
28-XII-51 #120 B.Pl.-1		
12-V-52 #1 B.Pl.-18		
19-V-52 #3 B.Pl.-13		
		30-V-52 #8 B.Pl.-5
		#9 B.Pl.-6
	2-VI-52 #11 B.Pl.-13	
4-VI-52 #12 B.Pl.-4		
	10-VI-52 #16 B.Pl.-8	
20-VI-52 #22 B.Pl.-4		
#23 B.Pl.-3		
#24 B.Pl.-5		
	21-VI-52 #25 B.Pl.-2	
		25-VI-52 #27 B.Pl.-1

Plecypoda

Occurrence 1951

Area	Drags	Recorded	%	Bottom Tows etc.	Recorded	%
B.B.	51(17)	8	16	22(16 B.Pl.)	13	59
K.H.	22(11)	1		11(11 B.Pl.)	9	82
W.B.	21(8)	17	81	18(14 B.Pl.)	11	61

While the larger bivalves were not frequently collected from Baddeck Bay and but once at Kempt Head, the smaller individuals or species were commonly collected, particularly at Kempt Head.

Modiolus modiolus (11)

Baddeck Bay	Kempt Head	Whycocomagh Bay
1-VI-51 #11 Dr.-1		
#13 Dr.-1		
30-X-51 #89 Dr.-3		
	7-XI-51 #97,98 B.Pl.-2	
	27-V-52 #6 B.Pl.Dr.-2	

Great Bras D'Or Channel - 28-VI-51 - #49 - Dr. - 1
1 - source unknown, date unknown, probably Baddeck Bay.

Length	Height	greatest in mms.
108	58	
82		
95		
75	40	
63	34	
45	23	
40	22	
82	43	
74	37	
2 - less than 1.5		bottom plankton K.H.

This bivalve is recorded rarely from Baddeck Bay and Kempt Head with the exception of two individuals taken in one bottom tow at Kempt Head all individuals are of a large size, none intermediate in size being taken.

Nucula delphinodonta (15)

Baddeck Bay

24-V-51	#1	dredge	- 1
29-V-51	#8	dredge	- 2
6-VI-51	#19	dredge	- 2
30-VII-51	#68	B.Pl.	- 1
30-X-51	#90,91	B.Pl.	- 1
28-XII-51	#120	B.Pl.	- 7
12-V-52	#1	B. Pl.	- 1

L.	H.
2.5	2.0
2.5	1.5
2.0	2.0
2.5	2.0
3.0	2.5
2.5	2.0
1.5	1.0

It is possible that this species was often overlooked in collecting from the screens due to their small size; even so their occurrence in Baddeck Bay collections could be termed occasional rather than rare. Note that for #120 the collected number is relatively high, collected items were not sorted at time of collecting but were screened about one year later in Montreal. This suggests that this species had previously been overlooked, but the suggestion is not confirmed by #121 taken on the same day and treated in the same fashion.

Cardium pinnulatum (38)

Baddeck Bay			Whycocomagh Bay		
24-V-51	#1	dredge - 1			
25-V-51	#7	Dr. - 4			
			14-VI-51	#30	dredge - 2
			15-VI-51	#36	H.N. - 2
			11-15-VI-51	#37	Dr. - 1
			25-X-51	#84,85	B.Pl. - 1
12-V-52	#1	B.Pl. - 18			
13-V-52	#2	B.Pl. - 4			
20-VI-52	#22	B.Pl. - 3			
	#23	B.Pl. - 2			

Length	Height
6.5	5.5
8.0	7.0
7.0	6.5
5.0	4.5
5.5	5.0
5.5	5.0
7.0	6.5
14.0	12.0

This bivalve was rarely collected in 1951, in general but rather commonly in May and June. Whether this occurrence is truly representative or whether collecting was not as avid after these months is difficult to say, but the high numbers collected and common occurrence of this animal as recorded for Baddeck Bay in 1952 suggest that possibly our collecting was not at fault in 1951 and that there is a high population of these animals in both areas during the early summer.

Astarte sp. (7)

Two species have been suggested to represent this genus, A. undata, and A. striata, but definite specific identification requires further research.

Baddeck Bay			Kempt Head	Whycocomagh Bay
29-V-51	#8	dredge - 2		
				11-15-VI-51 #37 Dr. - 1
13-V-52	#2	B.Pl. - 3		
			2-VI-52 #11 B.Pl.-1	

This (these) species collected only once or twice in each of the three areas for which the faunas are being compared.

Mytilus edulis (96)

24-V-51 #4 Dr. - 1
1-VI-51 #13 Dr. - 2

11-VI-51 #24 Dr. - 2
12-VI-51 #25 Dr. - 40
#26 Dr. - 39
11-15-VI-51 #37 Dr. - 1

22-VI-51 #38 Dr. - 1

25-X-51 #84,85 B.Pl.- 1
2-XI-51 #93 Dr. - 2
27-XII-51 #116 Dr. - 5

25-VI-52 #27 B.Pl. - 2

Length	Height	Length	Height	Length	Height
50		48	26	7	4.0
5		60	30	4.5	2.5
10		34	21	51	26
32	17	13	7	31	17
23	13	11.5	6	28	16
55	30	10	5.5	48	24
47	24	9.5	5	21	11
50	25	8	4.5	50	25
72	36	8	4.5	27	13
32	19	17	10	47	26
23	13	44	22	70	36
35	20	36	20	21	11
38	20	27	17	13	7
25	14	55	26	13	7
49	26	28	15	62	28
60	32	9.5	6.0	76	38
42	21	41	22	82	40
32	19	27	15	59	40
35	18.5	83	38	90	50
32	16				

The relatively high number of animals of this species collected is due mainly to numbers collected on two occasions from Whycocomagh Bay. On that date two trees were picked up by the drag on two separate occasions and these were well covered by animals of this species and anemones. Excepting these latter collections this species could not be termed abundant in either area and rare in occurrence from Baddeck Bay and very common in occurrence from Whycocomagh Bay. This species was very abundantly distributed on the piles of the Baddeck wharf.

Saxicava arctica (667)

Baddeck Bay	Kempt Head	Whycocomagh Bay
1-VI-51 #13 Dr. - 3		
		11-VI-51 #24 Dr.-69
		12-VI-51 #25 Dr.-349
		#26 Dr.-73
		14-VI-51 #30 dre.-7
		11-15-VI-51#37 Dr.-1
	10-VII-51 #55 B.Pl.-2	
	#56 B.Pl.-2	
		17-VII-51 #60 B.Pl.-1
		#62 B.Pl.-1
		18-VII-51 #67 B.Pl.-1
	31-VII-51 #71 B.Pl.-14	
	#72 B.Pl.-24	
		8-VIII-51#73 B.Pl.-2
	11-IX-51 #76 B.Pl.-6	
		18-IX-51 #79 B.Pl.-2
		25-X-51 #84,85 B.Pl-2
		2-XI-51 #93 Dr. - 34
	20-XI-51 #103 B.Pl.-1	
	20-XII-51#112 B.Pl.-3	
		27-XII-51 #116 Dr.-25
		#118 B.Pl.-1
		#119 B.Pl.-29
		25-VI-52 #27 B.Pl.-15

Kempt Head
Length - 1.5;2(3);2.5(4);3;3.5(3);4(4);5(4);

Length	Height	Length	Height	Length	Height	Length	Height
12		30	16	11	5.5	15	8
8		28	15	23	12	15	8
3.5		26	15	24	12	18	9
29	13	26	11	24	12	14	7.5
27	14	24	14	22	11	13.5	6.5
25	12	25	14	19	9	11.5	5.5
23	13	8	4	36	17	12	6
22	10	7	3.5	10.5		10.5	5
20	10	30	17	10		9	4
18	9	34	18	14		25	13
8.5	4	34	16	9		21	10
22	11	24	12	9		28	15
22	11	25	11	6		29	14
17	9	24	13	5.5		27	14
16.5	8.5	23	11	28	18	30	14
15	7	21	12	25	12.5	28	14
13.5	7	22	10	8	4.5	24	12
13	7	24	12	21	11.5		
8.5	5	22	13	16	9		
5		22	11	23	13		
6.5		18	10	19	11		

Saxicava arctica cont.

Length	Height	Length	Height	Length	Height
32	17	20	12	15	8
26	13	24	13	17	9
25	13	25.5	12.5	13.5	6.5
15.5	9	15	8	22	12

#25 12-VI-51

less than 5 mm.	- 45
5.5-10	- 46
10.5-15	- 75
15.5-20	- 75
20.5-25	- 67
25.5-30	- 33
30.5-35	- 7
35.5-40	- 1

This bivalve is very abundant and regularly in Whycocomagh Bay. It is associated intimately with tubeworm in this area which is likewise very abundant and is found attached to the masses of tube. This is the bivalve which accounts for the high recorded occurrence of bivalves (81%) in drags for this area (M. edulis, to a lesser degree), although it is not named except where collections have been made. As can be seen by the table of lengths and heights (the first 3 in the first column are B.B.), there is a wide range in the sizes of animals collected from this area.

This species does not seem to be so very abundant in the Kempt Head area but sufficiently so that it is regularly collected, in other words, common, but it is only the smaller (younger?) animals that have been collected here, less than 5.5 millimetres, no larger specimens were taken from bottom plankton towing and no specimens have been collected by dragging.

This species has been recorded once for the Baddeck Bay area.

Pecten magellicanus (10)

Baddeck Bay	Kempt Head	Great Bras D'Or
		27-VI-51 #44 Dr. - 1
		#45 Dr. - 1
		28-VI-51 $48 Dr. - 1
	31-VII-51 #72 B.Pl.-1	
30-X-51 #90.91 B.Pl.-1		
	17-XI-51 #100,101 B.P.-2	
	20-XII-51#112 B.Pl. 2	
	10-VI-52 #16 B.Pl. -1	

Length	Height
46	45
46	45
29	31
9	10
9.5	9.5
8.5	9
5.0	5.5
5.5	6.0
7.5	8.5

17-XI-51 K.H. - one resembles P. irradians to a degree in having rib-like structures, but too many of these; also valves are unequal.

20-XII-51 K.H.- These also resemble P. irradians in having rib-like structures on right valve.

The above noted similarity to P. irradians is thought to be due to the sizes of the individuals concerned. The striations appear as raised ridges (ribs) for animals of less than 10 millimetres.

Several larger pectens also probably of this species have not as yet been identified.

This species was not collected from Whycocomagh Bay, once from Baddeck Bay and occasionally from Kempt Head. "Several" specimens were collected from the Great Bras D'Or Channel during the two days of dragging in that area. The specimens collected at Kempt Head and from Baddeck Bay are all small specimens of 10 millimetres or less in length.

Yoldia limatula (43)

Baddeck Bay	Kempt Head	Whycocomagh Bay
25-V-51 #7 Dr. - 11		
29-V-51 #8 dre.- 3		
6-VI-51 #19 dre.- 2		
		15-VI-51 #36 H.N. - 1
		11-15-VI-51#37 Dr. - 1
17-IX-51 #78 B.Pl.- 2	23-X-51 #82 B.Pl.-1	
30-X-51 #90,91 B.Pl.-3		
12-V-52 #1 B.Pl. - 2		
13-V-52 #2 B.Pl. -11		
21-V-52 #4 B.Pl. - 2		
20-VI-52 #22 B.Pl. - 2		
#23 B.Pl. - 2		

Length	Height	Anterior	Posterior
35	15	31	25
33	14		
30	13		
20.5	11		
19	10	22	20
18	9.5		
19	10	21	19
21	10		
27	12.5		
21	10.5	21	18
12	6	18	15
42	19	31	17
8.5	4.5	15	12
4.5	2.5		
-	-	15	12
3	-	-	-
6			
9.5	-	15	13
6	-	15	12
16	8.5	21	19
16.5	9.0	21	17
14.5	8.0	20	18
11.5	6.0	18	17
3.5	2.0	10	8

Anterior and posterior refer to the numbers of hinge teeth in front of and behind the umbo. The numbers of these are anterior - "about 21", posterior - "about 18". It is quite evident from the above tabulation that the numbers of teeth are to a degree dependent upon growth or size and that the numbers of teeth for this species as generally quoted are for individuals neither very large nor very small.

This species was commonly collected from Baddeck Bay, once from Kempt Head and twice from Whycocomagh Bay.

This bivalve is frequently mentioned in the records of the preliminary stomach examination and while not specifically identified it seems likely that this species accounts for a good part of the bivalve content of cod from Baddeck Bay.

As mentioned on several earlier occasions not all the molluscs have been identified. What has been presented above includes only the common and/or readily identifiable forms.

Two bivalves which are very common in certain localities are Oestrea virginica and Mya arenaria. These being shore forms do not really form a part of the study but since their larvae may appear in plankton and in stomachs few remarks are included concerning them.

The oyster is farmed in Whycocomagh Bay and beds are known along the Washabuckt shore of St. Patrick's Channel.

Individuals are scattered along the shore of Baddeck Harbour and a small bed was found at Little Narrows close to the clam bed.

A bed of the soft-shelled clam was found at the northern entrance to Little Narrows. Clams dug from this bed were often used as bait in hand-lining Whycocomagh Bay cod in August, 1951. Since there is no appreciable tidal rise and fall anywhere in the lake, digging was done with a foot or more of water above the sand surface, not a very efficient method of clam digging. Associated here on this sand bed were the clam, eel grass and small shrimp, Crago septemspinosus. At a short distance was located the oyster bed mentioned above. A cautious approach was made through the water until a group of siphons were spotted, a quick lunge of the spade followed after which nothing was seen until the spade was brought to the surface with sandy mud and sometimes clams. The siphons of the clams disappeared some time during the interval between first being sighted and the lunge of the spade. The digging of course disturbed all the clams in the immediate vicinity so that their siphons were withdrawn, this necessitated moving to a "new" area since the animals were not sufficiently abundant that digging might be carried on anywhere but only where the presence of siphons indicated the presence of a number of animals.

Annelida

Polychaeta

The bulk of the "errantia" polychaets have been classified to family level. Quantities of tubeworm tube has not as yet been examined.

As mentioned earlier, the basic work used for segregating these animals was Treadwell which is quite unsatisfactory from every point of view. Fuavel was also consulted but not used as the basic reference.

The table showing gross invertebrate occurrence indicates the regular if not abundant collection of polychaets. Possibly apparatus other than the bottom plankton tow would have revealed a greater abundance of these animals. Their ubiquity if not their abundance is certainly reflected in the stomach contents of cod from the three areas under discussion.

Since numbers of specimens collected in 1951 and all specimens collected in 1952 have not as yet been classified to family, it was thought advisable for our purposes here to consider the relative degrees of occurrence of each family in the three areas with respect to the numbers of collections for which specimens have been identified. This means that for the commoner more readily identifiable forms their degree of occurrence is somewhat lower than indicated here since most of these forms would have been classified.

Nephthydidae (151)

#1 B.B. 24-V-51 dredge - 4 -
#8 B.B. 29-V-51 dredge - 5 -
#19 B.B. 6-VI-51 dredge - 9 -
#22 B.B. 7-VI-51 H.N. - 7 -
#30 W.B. 14-VI-51 dredge - 15 -
#35 W.B. 14-VI-51 H.N. - 9 -
#36 W.B. 15-VI-51 H.N. - 1 -
#57 B.B. 14-VII-51 B.Pl. - 14 -
#58 B.B. 14-VII-51 B.Pl. - 1 -
#59 B.B. 14-VII-51 B.Pl. - 1 -
#61 W.B. 17-VII-51 B.Pl. - 1 -
#62 W.B. 17-VII-51 B.Pl. - 1 -
#64 W.B. 17-VII-51 B.Pl. - 2 -
#67 W.B. 18-VII-51 B.Pl. - 1 -
#68 B.B. 30-VII-51 B.Pl. - 2 -
#76 K.H. 11-IX-5 B.Pl. - 1 -
#82,83 B.B. 23-X-51 B.Pl. - 12 -
#90,91 B.B. 30-X-51 B.Pl. - 12 -
#105,106 B.B. 26-XI-51 B.Pl. - 18 -
#108 K.H. 4-XII-51 B.Pl. - 1 -
#120 B.B. 28-XII-51 B.Pl. - 32 -
#121 B.B. 28-XII-51 B.Pl. - 2 -

Specimens belonging to this family were with the polynoids the most commonly collected of the polychaets being recorded in 50% (22/44) of the collections in which polychaets have been classified. The high numbers collected from Baddeck Bay at the end of the year may be significant in indicating a bloom or may be accidental due to more thorough collecting, for #120 and #121 everything picked up by the net was retained for identification.

The difference in occurrence of this family in the three areas is indicated below.

Area	Occurence
Baddeck Bay	76%(13/17)
Whycocomagh Bay	47%(7/15)
Kempt Head	17%(2/12)

Sabellidae (32)

#1 B.B. 24-V-51 dredge - 2 -
#70 B.B. 30-VII-51 B.Pl. - 1 -
#72 K.H. 31-VII-51 B.Pl. - 17 -
#73 W.B. 8-VIII-51 B.Pl. - 2 -
#82,83 B.B. 23-X-51 B.Pl. - 1 -
#90,91 B.B. 30-X-51 B. Pl. - 5 -
#103 K.H. 20-XI-51 B.Pl. - 1 -
#105,106 B.B. 26-XI-51 B.Pl. - 1 -
#112 K.H. 20-XII-51 B.Pl. - 1 -
#118 W.B. 27-XII-51 B.Pl. - 1 -

Since much of the tubeworm collected in 1951(see below) has not been examined as yet no comment on the occurrence or distribution of this family will be made at this time.

Terebellidae (27)

#8 B.B. 29-V-51 dredge - 2 -
#30 W.B.B14-VI-51 dredge - 3 -
#62 W.B. 17-VII-51 B.Pl. - 2 -
$64 W.B. 17-VII-51 B.Pl. - 1 -
#68 B.B. 30-VII-51 B.Pl. - 1 -
#69 B.B. 30-VII-51 B.Pl. - 1 -
#72 K.H. 31-VII-51 B.Pl. - 6 -
#103 K.H. 20-XI-51 B.Pl. - 1 -
#112 K.H. 20-XII-51 B.Pl. - 1 -
#118 W.B. 27-XII-51 B.Pl. - 4 -
#119 W.B. 27-XII-51 B.Pl. - 2 -
#120 B.B. 28-XII-51 B.Pl. - 3 -

Consideration of the occurrence and distribution of this family will be omitted at this time (see tubeworm below).

Tubeworm

As indicated above much of the tubeworm has not been examined so that information regarding the above families is incomplete. Large amounts of tubeworm are available in collections #24,25,26 and 93 from Whycocomagh Bay and #113 from Kempt Head. Smaller quantities are on hand in collections #43, 54 and 76 from Kempt Head and #37 from Whycocomagh Bay, odd pieces not examined are present in other collections.

Polnoidae s.l.(Polynoidae + Sagalionidae of Treadwell)(144)

The majority of these animals are classifiable to the family Polynoidae in the restricted sense, but since some difficulty was encountered in recognizing members of the Sigalionidae, specimens of this general type have all been included under this single family grouping. The two specimens of the closely related Aphroditae which are readily separated have been considered separately.

#8 B.B. 29-V-51 - 1 - dredge
#22 B.B. 7-VI-51 - 2 - H.N.
#30 W.B. 14-VI-51 - 4 - dredge
#35 W.B. 14-VI-51 - 2 - H.N.
#50 K.H. 3-VII-51 - 1 - Dr.
#55 K.H. 10-VII-51 - 6 - B.Pl. et. seq.
#56 K.H. 10-VII-51 - 2 -
#57 B.B. 14-VII-51 - 1 -
#59 B.B. 14-VII-51 - 1 -
#60 W.B. 17-VII-51 - 9 -
#61 W.B. 17-VII-51 - 4 -
#62 W.B. 17-VII-51 - 6 -
#64 W.B. 17-VII-51 - 3 -
#66 W.B. 18-VII-51 - 3 -

#67 W.B. 18-VII-51 - 14 -
#68 B.B. 30-VII-51 - 2 -
#71 K.H. 31-VII-51 - 5 -
#72 K.H. 31-VII-51 - 9 -
#73 W.B. 8-VIII-51 - 1 -
#76 K.H. 11-IX-51 - 2 -
#78 B.B. 17-IX-51 - 1 -
#79 W.B. 18-IX-51 - 1 -
#81 B.B. 23-X-51 - 3 - drag
#84,85 W.B. 25-X-51 - 3 - B.Pl. et seq.
#90,91 B.B. 30-X-51 - 2 -
#94,95 W.B. 2-XI-51 - 13 -
#97,98 K.H. 7-XI-51 - 2 -
#103 K.H. 20-XI-51 - 2 -
#111 K.H. 20-XII-51 - 6 -
#112 K.H. 20-XII-51 - 3 -
#118 W.B. 27-XII-51 - 5 -
#119 W.B. 27-XII-51 - 15 -

Of the 44 collections in which polychaets have been so far classified to family, specimens of this family occur in 32 or 73% of these collections, making this the most regularly collected group of the polychaets (as of now), Nephthys occurring in 50% of these 44 collections. There is what would appear to be significant variation in the degree of occurrence of this group in the three areas of collecting.

Baddeck Bay - 47%(8/17)
Whycocomagh Bay- 93%(14/15)
Kempt Head - 83%(10/12)

Aphroditidae(2)

#76 K.H. 11-IX-51 B.Pl. - 1 -
#110 K.H. 20-XII-51 Dr. - 1 -

This group is nothing more than accidental in its occurrence in Great Bras D'Or collections but of significance is the restriction of this and other following "minor" families is their complete or almost complete restriction to a single area of the three collecting stations, in this case as indicated the two specimens of the Aphroditidae were collected at Kempt Head.

Leodicidae(26)

#8 B.B. 29-V-51 dredge - 12 -
#19 B.B. 6-VI-51 dredge - 9 -
#22 B.B. 7-VI-51 H.N. - 2 -
#57 B.B. 14-VII-51 B.Pl. - 1 -
#90,91 B.B. 30-X-51 B.Pl. - 1 -
#112 K.H. 20-XII-51 B.Pl. - 1 -

This family was collected only occasionally from the Great Bras D'Or and on 5/6 occasions from Baddeck Bay. The Baddeck Bay occurrence might be considered rather regular (5/17 unless one considers the occurrence with respect to date and method of collecting. Three of the five collections containing this family taken from Baddeck Bay are for late May and early June and the means of collecting - dredge and hoop net - were not continued throughout the year. Whether the collection of this group was due to season or collecting method may not be determined at this time, the 1952 collections may clarify this point.

Phyllodocidae(14)

#22 B.B. 7-VI-51 H.N. - 2 -
#69 B.B. 30-VII-51 B.Pl. - 1 -
#82,83 B.B. 23-X-51 B.Pl.- 1 -
#90,91 B.B. 30-X-51 B.Pl. - 4 -
#118 W.B. 27-XII-51 B.Pl. - 1 -
#119 W.B. 27-XII-51 B.Pl. - 2 -
#120 B.B. 28-XII-51 B.Pl. - 2 -
#121 B.B. 28-XII-51 B.Pl. - 1 -

Specimens of this family were irregularly collected from Baddeck Bay and on one day from Whycocomagh Bay. Of the eight recorded collections containing members of this family four were collected in late December which suggests that the more thorough collecting of that period (everything retained) or that this group as with many others is a migrant into the area at this time of year. The majority of records for this species are for Baddeck Bay - 75% (6/8), with 2 for Whycocomagh Bay and none for Kempt Head.

Amphictenidae(3+)

#30 W.B. 14-VI-51 dredge - 1 -
#55 W.B. 14-VI-51 H.N. -(5)-
#67 W.B. 18-VII-51 B.Pl. - 1 - (2)
#118 W.B. 27-XII-51 B.Pl.- 1 -

The figures in brackets apply to what are considered to be empty tubes of specimens of this family.

Members of this family were collected rarely and exclusively from the Whycocomagh Bay area.

Hesionidae(13)

#62 W.B. 17-VII-51 B.Pl. - 3 -
#119 W.B. 27-XII-51 B.Pl. - 10 -

Another family, specimens of which were collected very rarely and in those instances from Whycocomagh Bay. Note the numbers of #119.

Nereidae(3)

#69 B.B. 30-VII-51 B.Pl. - 1 -
#81 B.B. 23-X-51 drag - 1 -
#120 B.B. 28-XII-51 B.Pl. - 1 -

Another family collected rarely with all recorded specimens from one area in this case from Baddeck Bay.

Maldanidae(3)

#76 K.H. 11-IX-51 - 3 -

This family is represented in only one collection from 1951, from Kempt Head.

Chlorhaemidae(3)

#78 B.B. 17-IX-51 B.Pl. - 1 -
#90,91 B.B. 30-X-51 B.Pl. - 1 -
#97,98 K.H. 7-XI-51 B.Pl. - 1?-

This family is represented definitely by two specimens (from two collections), from Baddeck Bay and one doubtful specimen from Kempt Head.

Sphaerodoridae (2)

#82,82 B.B. 23-X-51 B.Pl. - 2 -

This family is represented by only two specimens taken in one tow from Baddeck Bay.

Family	Occurrence	Baddeck Bay	Whycocomagh Bay	Kempt Head
Nephthydidae	50%(22/44)	76%(12/17)	47%(7/15)	17%(2/12)
Sabellidae	(23%)	X	X	X
Terebellidae	(27%)	X	X	X
Polynoidae **	73%(32/44)	47%(8/17)	93%(14/15)	83%(1/12)
Leodicidae	14%(6/44)	(5/6)	(0)	(1/6)
Phyllodocidae	18%(8/44)	(6/8)	(2/8)	(0)
Amphictenidae	(3/44)	(0)	(3/3)	(0)
Hesionidae	(2/44)	(0)	(2/2)	(0)
Nereidae	(3/44)	(3/3)	(0)	(0)
Aphroditidae	(2/44)	(0)	(0)	(2/2)
Maldanidae	(1/44)	(0)	(0)	(1/1)
Chlorhaemidae	(3/44)?	(2/2or3)	(0)	(1?/3)
Sphaerodoridae	(1/44)	(1/1)	(0)	(0)

The polychaetous fauna of Baddeck Bay so far as our classification to date indicates is characterized by the regular

occurrence of Nephthydidae; the occurrence of sabeelids and terebellids in relatively small numbers, by the more or less regular occurrence of polynoids, and by the exclusive or almost exclusive occurrence of irregularly or rarely occurring groups as the leodicids, phyllodocids, nereids, chlorhaemids, and spheorodorids. Characteristic of Whycocomagh Bay is the regular collection (or recovery) of vast quantities of tubeworm, the very regular collection of Polynoids, the more or less regular occurrence of Nephthys, and the occurrence of rarely collected groups as the phyllodocids, amphictenids, and hesionids. The Kempt Head polychaetous fauna is characterized by a somewhat lower abundance of tubeworm than in Whycocomagh Bay, the regular occurrence of polnoids, the occasional collection of Nephthys, and the collection of the rarer groups, Leodicidae, Aphroditidae, Maldanidae and Chlorhaemidae.

Echinodermata

Asteroidea

Occurrence 1951

Area	Drags	Recorded	%	Bottom Tows etc.	Recorded	%
B.B.	51(17)	44	86	22(16 B.Pl.)	9	41
K.H.	22(11)	20	91	11(11 B.Pl.)	0	
W.B.	21(8)	6	26	17 (14B.Pl.)	3	17

This is a very abundant and commonly occurring group so far as our area is concerned. Both large and small starfish of the Asterias type are abundant and regularly collected from Baddeck Bay. These starfish were particularly abundant in May, both in 1951 and 1952, and thereafter in both years numbers collected dropped off considerably. This would seem to indicate that a marked migration into this area or a filling in of the available space caused by dragging removal took place during the winter months. These starfish from Baddeck Bay are probably Asterias vulgaris but the majority are about two inches in diameter from drag, smaller from tows, and this lack of larger individuals may have caused some of the difficulty encountered in identifying these animals. The key and description found in Clark have been consulted here. Since this work covers a more southerly region it is possible that our species is not represented in it. None of the descriptions of the more northerly forms of Asterias (Leptasterias) seem to fit our animals and nowhere as yet has it been possible to find a source which compares A. vulgaris with these more northern forms.

The starfish from Whycocomagh Bay are also of the Asterias type. Both "large" (2-3" diameter), and smaller individuals have been collected from this area but neither are they as abundant or as regularly collected as from Baddeck Bay.

Larger starfish were regularly collected in the Kempt Head area. None of the smaller individuals of any form were taken by the bottom tow in this region. Some of the individuals collected from this area are of the Asterias type, but the characteristic of the asteroid fauna of Kempt Head is due to the collection more or less regularly of multi-rayed starfish of the Solaster type. Starfish were not as abundant at Kempt Head as Baddeck Bay but were more regularly recorded.

Starfish of the Henricia type are among those collected but there is no record of their occurrence in the records.

There is a period of about six weeks in the 1951 records for Baddeck Bay when starfish are not recorded. This period, July and the first half of August, was covered by seven drags for which there is no record of starfish.

Ophiuroidea

Brittle stars were collected once from Kempt Head and three times from Baddeck Bay, they may be said to be rare in these areas and absent from Whycocomagh Bay.

Echinoidea

Area	Drags	Recorded	%	Bottom Tows etc.	Recorded	%
B.B.	51(17)	21	41	22(16 B.Pl.)	x	
K.H.	22(11)	11	50	11(11 B.Pl.)	0	
W.B.	21(8)	10	48	17(14 B.Pl.)	0	

Sand Dollars

B.B.		x			0	
K.H.		0			0	
W.B.		8	38		0	

Echinoids seem to be of the same abundance and occurrence in the three areas, few in numbers per drag but regularly collected or recorded. The sea urchin involved appears to be Stronglyocentrotus and this occurs with equal regularity at Kempt Head and Baddeck Bay. The sea urchin is not common in Whycocomagh Bay, in fact it is recorded only twice, the echinoid fauna here being represented by the sand dollar type. Sand dollars were also recorded on two occasions from Baddeck Bay.

Holothuroidea

This group was collected on four occasions at Kempt Head. The individuals are all small, possibly Caudina.

Crustacea

The following crustacean groups are represented in collections from the Great Bras D'Or:

Subclass Peracarida - Order Mysidacea
Cumacea
Isopoda
Amphipoda

Subclass Eucarida - Order Euphausiacea
Decapoda

shrimp
lobster
crab
hermit crab

Mysidacea

Occurrence Bottom Plankton Tows, Hoop Nets 1951

Area	No. Tows etc.	Recorded	%
Baddeck Bay	16	15	94
Kempt Head	11	11	100
Whycocomagh Bay	16	14	88

Mysids next to polychaets were the most regularly collected items from the above areas in the Breat Bras D'Or. Furthermore they were collected in much greater numbers generally than any other invertebrate.

The numbers of course varied from time to time due to migration and winter and spring blooms; this will be dealt with under the separate mysid species.

Measurements are for total lengths for extended specimens, from tip of "rostrum" to tip of telson.

Sexing of the mysids collected from this area was done without difficulty except for recently released individuals. Calman (1909) p.179 describes the male reproductive "structures" as papilliform elevations at the bases of the last thoracic pair of limbs, the external openings of the testes are situated on these structures. These structures are round and long rather than flat and can thus be distinguished from the developing oostegites which are flat and leaf-like. Both the male appendages and the oostegites of the female increase in size with the size of the animal and also presumably with the sexual period. Fortunately there is a further character that of abdominal appendages which serves to separate the males and females of the species examined here. In Erythrops, the female pleopods are small and rudimentary while those of the male except for the first are well developed and biramous(Tattersall, Tattersall 1951). In Neomysis, the female pleopods are rudimentary as are those of the male except for the fourth which are biramous and well developed. A somewhat similar condition exists for species of Mysis, all female pleopods being rudimentary while the third and fourth of

the male are biramous. The fourth pleopods of the male are much more highly developed than the third and in the breeding season attain considerable length (mostly from Tattersalls 1951). The oostegites of Mysis are well developed on the seventh and eighth thoracic limbs but rudimentary on the fifth and sixth and in Neomysis integer there is only one pair of rudimentary oostegites on the sicth and two functional pairs (Tattersalls 1951).

The key of Nouvel (1950) was used for gross identification and from there the papers of Tattersall (1939) and Smith (1879) were used for specific identification. Nouvel's key although including Erythrops is not workable for specimens of that genus at hand.

The notations mature and immature are not very definite in connotation although they were originally designed to indicate the limits of the breeding season. So far it has been impossible to define a mature male or in most cases female although we do know more or less which are the "maturest" individuals of each species in our collections.

Tattersall (1939) lists 13 species of mysids from eastern Canadian waters. Many of these species are generally restricted to more northerly waters than considered here and one M. oculata relicta or M. relicta is generally confined to fresh waters. Of these thirteen species five are recorded for the Great Bras D'Or - Neomysis americana, Erythrops erythrophthalma, and three species of Mysis - M. oculaata, M. mixta and M. stenolepis. N. americana and M. stenolepis are shallow water forms restricted (so far as we know) to the lower North American Atlantic coast, while the other three are widely distributed in Atlantic temperate and "subarctic" waters, both off North America and Europe.

For consideration of mysids in stomachs and the relationship between mysid intake by cod and mysid population see pages -

Mysidacea

Erythrops erythrophthalma (336)

Date etc.	No.	Unsexable	Male	Immature Male	Mature Male	Female	Immature Female	Mature Female
#55 K.H. 10-VII-51	2				2-9.0(2)9,9;			
#56 K.H. 10-VII-51	9				6-8.5(3)[illegible]-9;		1-	1-nonovigerous;
#71 K.H. 31-VII-51	39	2-rear ends		2-	21-8.5(5)[illegible]8-9;		3-	11-9.5(2)9,9.5;
#72 K.H. 31-VII-51	28	2-	13-9.0(4)8.5-9;				4-	9-9.0(2)8.5-9.5;
#71,72				1-	32-	5-rear ends;	10-	16- 2 ovigerous - 7 eggs;14 embryos;
#76 K.H. 11-IX-51	32	5-		3-	9-8.5(4)[illegible]-9.5;		5-8.0(2)6,9.5;	10-8.0(4)8;6/10 ovigerous;
#97 K.H. 7-XI-51	21	13-7.5(2)7,7.5;		1-6.5(1);	2-6.5(2)[illegible].5			5-6.5(3)5.5-7;
#98 K.H. 7-XI-51	4	4-						
#97,98(same tow)				1-6.5(1);	2-6.5(2)[illegible].5;		17-7.0(3)6-7.5;	5-6.5(3)5.5-7; 1 ovig.-6 embryos;
#100 K.H. 17-XI-51	10-		2-8.5(1)			1-8.5;		
#103 K.H. 20-XI-51	8		3-(7.5)2)7,8;			5-7.0(3)6-8; lovig		
#104 K.H. 23-XI-51	12		2-			10		
#108 K.H. 4-XII-51	9	5-				4		
#111 K.H. 20-XII-51	51	23-	8-9.0(2)8,10;			20-8.0(3)7-8.5;		
#112 K.H. 20-XII-51	30	18-						9-
#121 B.B. 28-XII-51	2			1-				
#1 B.B. 12-V-52	1							1-
#2 B.B. 13-V-52	48	2-		2-	6-		9-	29- none ovigerous;
#11 K.H. 2-VI-52	2							2-8.5(2)8.5; nonovigerous;
#13 K.H. 4-VI-52	5						5-9.0(3)8.5-9;	
#20 K.H. 16-VI-52	19	2-	5-7.5(2)7.5	2-			8-9.5(2)9.5;	2-
#22 B.B. 20-VI-52	0							
#23 B.B. 20-VI-52	0							
#24 B.B. 20-VI-52	0							
#26 K.H. 21-VI-52	1						1-	
#28 B.B. 4-VII-52	0							
	336							

This species of mysid was collected upon every occasion bottom plankton tows were made at Kempt Head in 1951. Although this species was collected upon only three occasions from Baddeck Bay in 1951 and 1952 the pattern of collection would indicate that this species is a winter resident of the Baddeck Bay area, migrating into the bay with the establishment of stable bottom winter temperature. Since no collections using appropriate equipment were made in Baddeck Bay in 1951 before the beginning of July, this seems to be the likeliest explanation for its nonappearance in Baddeck Bay collections of "early" 1951.

Some difficulty was experienced in sexing the smaller individuals. This was also the case with Neomysis americana, the other small species of mysid recovered from the lake.

Some difficulty was encountered in estimating the degree of maturity in many specimens. Most of those unclassified as to maturity are thought to be mature individuals.

A note accompanying the record for #2 13-V-52 indicates that the specimens from that collection do not quite agree in eye ratio or in telson characters with Erythrops erythrophthalma of Nouvel but are closer to that species than to any others listed by that author. Tattersall (1939) indicates that the eyes of this species are perhaps a little smaller than shown in Sars figure (Sars 18) which seems to agree with our observations. Tattersall indicates further that this species is distinct from E. microphthalma in having outer spines on apex not much more than half as long as inner pair.

The regular collection of this species at Kempt Head has already been noted. Mysids in general, were found to be present in 61% of the cod stomachs collected at Kempt Head, the most commonly occurring single item. What is most interesting is that despite the relatively low numbers of this species collected over the months of 1951 (vs. M. mixta), this species was consistently found in cod stomachs while M. mixta which is present in the area at the same times and apparently is more abundant is not as consistently found in cod stomachs from this area (Kempt Head). The determination of mysid species in the cod stomachs was only of a cursory nature but that E. erythrophthalma was recorded in five series of stomachs from October 22 to December 20 and M. mixta was not (replaced by M. stenolepis) seems rather significant (see pages).

Tattersalls (1951) give a length of 9-11 millimetres for this species. The recorded lengths of Kempt Head specimens range from 6-9.5 millimetres. There are one or two notations in the records indicating that smaller specimens were among those collected but for one reason or another were not measured.

From the data available it is not possible to indicate the growth of this species.

The males and females of this species are not recorded in equal numbers but more nearly so than for the isopod Idotea or for the gammarids of the genus Orchomnella. There are 88 males and 178 females recorded.

Ovigerous females were recorded in July, September and November from Kempt Head and in December from Baddeck Bay (K.H. - collections - July, September, November, December - December not checked for ovigerous females).

31-VII-52	1 -	7 undeveloped eggs
	1 -	14 embryos, eyes appendages, at least 3 pairs legs; some embryos may have fallen out;
11-IX-51	1 -	1 embryo
	1 -	2 embryos
6/10m.F.	1 -	6 embryos
	1 -	3 eggs, undeveloped

1 - 4 eggs, undeveloped
1 - 1 egg plus 2 or 3 disintegrating;

some of the eggs and embryos may have fallen out of brood pouches;

7-XI-51 1 - 6 embryos

1/5 m.F.

20-XI-51 1 - ?
28-XII-51 1 - 1 embryo

From the occurrence of ovigerous animals and the development of the eggs and embryos they are carrying, the breeding period would seem to extend at least throughout the summer and fall. Mating must occur as early as May and as late? as August with embryos being released from August to December and possibly later.

The pattern of growth and the breeding cycle of this animal is so obscure that it is possible that there is no set breeding period but merely a continuous period or overlapping breeding periods.

Five specimens taken from stomachs were dissected for nematode infestation, none were found to be nematode infested. A total of 68 animals were examined in 1952 while alive and after preservation for nematode infestation and one nematode infested individual was recovered. This means a percentage infection of 1.5% on the basis of the 68 animals examined.

Mysidacea

Mysis oculata (10)

This species was collected on three occasions from the Kempt Head area.

31-VII-51 #71 B.Pl. - 5- 2 m.M. - L.17.5;20.5;
2 m.F. - L.-20.5;24;
1 head
spiens - 24(2)28;32;
#72 B.Pl. - 4- 2 m.F. - L.-23;
1 i.F. - L.-13.5;
1 head
spines - 23;26;30;
#71,72 one of the mature females is ovigerous carrying 2 weel developed embryos;
17-XI-51 #100 - 1 - 1 i.M. - L.-; 21 spines; ant. scale - L.5.6 X W.

The similarity of this species to M. mixta is such that there is some possibility of some of the M. mixta species being actually M. oculata. The difference in the antennal scales is

however striking that it is unlikely that misidentification has occurred often if at all. Some of the very immature specimens collected in 1952 have been disignated - Mysis sp. and these are thought to be either M. mixta or the present species, probably some specimens of each.

The major difference between this species and M. mixta is in the shape of the antennal scale as mentioned above. The scale of M. mixta is long narrow and pointed at its extremity while that of M. oculata is relatively much shorter and broader and rounded at its extremity. The difference between M. oculata and M. oculata relicta or M. relicta lies in the relative lengths of the antennal scales or the length-width ratio, the scale of M. oculata being somewhat longer. Nouvel (1950) lists the spines along the lateral border of the telson of this species as being more than 20, while Sars ( ) indicates 26 spines for this species. The range in spine number for the few specimens examined here is 23-32.

The pigmentation of this species and of M. mixta is very similar (if not "identical") and these species cannot be distinguished on that basis.

The similarity in pigmentation, telson spine number, shape of telson, size of notch and distribution of spines leaves only the single character that of antennal scale size and shape for separating these two species - M. oculata and M. mixta.

The occurrence of this species at Kempt Head during early 1951 and in November might be indicative of a migratory movement from colder waters as the "deep hole" but our recoveries of this species are too few to consider this species anything but an accidental visitor or resident of the Kempt Head area.

The size, and state of maturity of these few specimens would indicate a breeding cycle similar to that of the other Mysis species collected in the lake. This would mean a single breeding period during the winter and spring with the concomitant release of larvae during the same period and on to the summer period - July and August. The breeding period indicated by these few specimens would be somewhat later than for M. stenolepis but similar to the rather complicated cycle of M. mixta.

None of these specimens were examined for nematode infection.

One specimen of this species (#71,72) was parasitized by a female Dajus mysidis, (male Dajus attached to female).

Mysidacea

Mysis mixta (997)

Date etc.	No.	Unsexable	Male	Immature Male	Mature Male	Female	Immature Female	Mature Female
10-VII-51 K.H. #55	42			1-			3-10.8(2)9.5;12;	39-21.8(10)21-23;
#56	13			4-			1-13;	8-
31-VII-51 K.H. #71	122		4-	30-12.7(7)10.5-15.5;		11-	37-13.1(9)11-15.5;	40-23.0(7)22-26.5;
#72	194			65-14.7(13)12-13.5;		sample-	(26)13.6(6)13-15;	(15)22.9(9)22-24;
		4 rear ends		95-	6-?	9-	102-	100
11-IX-51 K.H. #76	80			20-18.1(7)16-21;	3-*-18;		14-13.8(4)12-15.5;	43-23.1(11)22-25;**
30-X-51 B.B. #90,91	1							1-
7-XI-51 K.H. #97,98	52			1-	26-+-17.9(8)17-19		5-17.5(3)17-18;	20-20(4)18-23;
450 large mysids from this tow fed to cod;(69)								
17-XI-51 K.H. #100	11				4-17.8(2)17.5,18;			7-19(3)18.5-19.5;
75 large mysids from this tow fed to cod;(19)								
20-XI-51 K.H. #103	24		14-17.5(2)17,18;			10-19(3)18-20;		
400 large mysids from this and 1 other tow and 1 other tow fed to cod;(7)								
23-XI-51 K.H. #104	6		2-			4-		
245 large mysids from this tow fed to cod;(39)								
30-XI-51 K.H. 170 large, 2 tows, to cod;								
4-XII-51 K.H. #108	47			4-?-17.3(2)17-17.5;7-16.9(4)16-17.5;	36		18.3(2)18,18.5;	19(5)18-20;
200 large from this tow to cod;(45)								
20-XII-51 K.H. #111	14	1-			13-19(4)18-20;			
#112	5							4-
22-XII-51 K.H.	"0"							
12-V-52 B.B. #1	0							
13-V-52 B.B. #2	0							
19-V-52 B.B. #3	3							3-19.5(1)
21-V-52 B.B. #4	6			2-8.5(1)		1-		3-
23-V-52 K.H. #5	39							39-19.8(18)17.5-23;
27-V-52 K.H. 750 large - 5 tows								
29-V-52 K.H. 411 large - 5 tows								
2-VI-52 K.H. #11	2							2-
2000 large-6 tows (0)								
4-VI-52 B.B. #12	24							24-
4-VI-52 K.H. 2900 large-4 tows								
6-VI-52 K.H. 2791 large-5≠ tows								
10-VI-52 K.H. #16	1							1-
#17	442							
2192 large-5≠ tows(4)								

Mysis mixta (997) cont'd

Date etc.	No.	Unsexable	Male	Immature Male	Mature Male	Female	Immature Female	Mature Female
13-VI-52 K.H. 287 large -1 tow;								
16-VI-52 K.H. #20	38	9-7.5(2)6,9;		19-9.7(3)8-1;			10-	
408 small ?-4 tows(16)(25)								
20-VI-52 B.B. #22	3			1-9;				2-
#23	0							
#24	0							
thousands small - 3 tows(9)(72)								
21-VI-52 K.H. #25	2							2-
#26	3			1-			2-10.5(1)	
1200 small ? - 2 tows (0)(0)								
4-VII-52 B.B. #28	0							
also none in sample dissected;								

* many approaching maturity, none may actually be mature;
** oostegites not fully expanded for most;

This species of mysid was regularly collected at Kempt Head in 1951, in every collection-11/11 and similarly for 1952. One specimen was collected from Baddeck Bay on October 30, but this was probably an accidental occurrence for this species at that time of year. Several Baddeck Bay collections of "early" 1952 contain this species so one would assume that M. mixta is a winter resident of Baddeck Bay migrating into the area some time after the beginning of the year and leaving the area towards the end of June.

During the fall of 1951 and the spring and early summer of 1952, a large proportion of the mysids collected from Kempt Head were used in the experimental study on worm infection of cod. The numbers collected of this species and M. stenolepis are thus only a part of the mysid haul of the tows of these periods as is indicated in the tabulation above. While it is not possible to establish accurately the ratios of the two species amongst the animals fed to cod, some indication is provided by the numbers of the respective species found in the collections (M. stenolepis numbers in brackets opposite numbers fed to cod). From a consideration of these ratios it would seem that the increase in the fall population of Mysis at Kempt Head is attributable to M. stenolepis which migrates into this area at that time and that the numbers of M. mixta remain fairly constant throughout the period of July to December. The situation in the spring when the peak Mysis population in this area occurs seems to be reversed although for this period the circumstantial evidence is less abundant. What is interesting about this population peak is that regardless of whether the bulk of this population rise is due to M. mixta or not, it is due apparently entirely to adult individuals not to a bloom of young animals which occurs at a somewhat later period and includes three species M. mixta, M. stenolepis and N. americana. This peak population assumedly mainly of M. mixta then, peters out and is for all purposes back to a more or less "normal" level by the time the bloom of young mentioned above occurs (mid-June in 1952). The migration into this area of M. stenolepis in the fall must be accompanied probably at a later date by an inward migration of M. mixta which does not seem to have occurred by the end of the year but which shows up the following spring. Since the breeding time of this species appears to occupy the period for which no data are available and during which this rise in population occurs it is possible that the large numbers are concentrated in this region of Kempt Head for breeding purposes and that in the spring there is a gradual dying off of the population, particularly of the males who are no longer required and of the females who have shed their young, together with an outward migration to deeper water areas.

As mentioned under the discussion of Dajus mysidis, females of that species were originally taken for brood pouches of the mysids. Only superficial examination was made of these structures so that none of the contained eggs would be lost or destroyed. This has resulted in notations for which there is reasonable doubt with respect to the ovigerous condition of the females taken in late fall, 1951 and in early 1952. Some of the specimens have been checked but those for which data are most desirable from late November, December and from May and June, 1951, have not been reexamined. In the original notes ovigerous females are noted for collections #100, 103, 108, 1951 and #4, 5, 1952. Some of these are probably cases of Dajus in the brood chamber but others (#4 definite) are probably records of ovigerous females. The ovigerous female in collection #4, 21-V-52, is carrying an embryo while in collection #3-19-v-52 free embryos, fully developed were found. Finally, while it is necessary to reexamine many of the females of this period to determine the numbers of ovigerous specimens and the degree of development of their eggs or embryos, it can safely be stated that the breeding period of this species in the Kempt Head area takes place between December and the following May and that embryos are being released at least as late the middle of May and probably later. It was assumed for some time that the newly released embryos of this species and other mysids immediately entered the benthos but it appears now from further evidence accumulated on Kempt Head specimens and on data from other sources that these larval forms enter the plankton for a time before beginning a benthonic existence. No measurements of newly released embryos or well advanced embryos are available, although specimens are at hand and will be measured in the future, but despite the size of these embryos they are not nearly as large as the smallest young recorded. Some specimens as noted earlier have because of their small size not been classified to species but these aside, the first young M. mixta are recorded for Baddeck Bay - 21-V-52, one of these being 8.5 millimetres. Young are first recorded at Kempt Head for 20-VI-52 and specimens ranging in size from 6-11 millimetres. Tattersalls (1951) give the length of this species as February - 4-5; May 6-9; etc. (from Apstein?) so that smaller individuals than those recorded are actually found free but since they were not picked up in the benthos we must assume that they have existed as plankters prior to their mass appearance on the bottom. (The bottom plankton nets used in collecting would certainly pick up these animals of 4 millimetres as witness the sizes of N. americana collected.)

The development of the male of this species is as yet not understandable. It is necessary to reexamine the males collected in November and December and also to reexamine the plates of Sars in order to determine or estimate what constitutes a mature male. The 4th pleopods lengthen as mentioned at the beginning of the mysid section with growth and the attainment of the breeding condition but to what size these appendages grow is not at present certain. Another characteristic of the mature male noted for N. americana is the great size attained by the tubular elevations on which are located the openings of the testes, a similar relative

size was noted for these structures in any specimens of Mysis mixta. The difficulty is that the size distribution of males for this species is unimodal and no so-called mature specimens are recorded until November although specimens of similar size and larger are recorded in July and September of 1951. Since no ovigerous females are recorded for the period July 10-November 7 it is reasonable to assume that there is no second breeding period for this species in this region. What probably occurs here is that mature males and females are present by November and mating occurs at this time and continues for some time into the new year, ovigerous females begin to appear in the population at least by December and embryos of these ovigerous females are shed over a lengthy period probably from February until June. Some time in June the bulk of the young animals which have resulted from the main mating period in December? appear on the bottom where there are already present females of the past generation which coexist with the young for some time after shedding before finally dying off. Our data seem to show that these females are still around as late as September, these probably being females of late release, but it still means a life period of well over a year, about 16 months, for females but of about one year for males.

At one point #108 4-XII-51, there is a comparative not on the development of this species and M. stenolepis, which indicates that the female oostegites of this species are more fully developed than those of female stenolepis. The earlier breeding of this species may also be borne out by the presence of male mature stenolepis in the spring of 1952 and the complete lack of mature male mixta from the same period.

There are more females recorded for this species than males as was found for Erythrops erythrophthalma, but here the ratio is 2.5 females to 1 male (542 vs. 212) as 2:1 for Erythrops.

The Tattersalls (1951) extracting from Apstein (1906), intidate that the numbers of eggs carried by a female is dependent upon its size, a female of 13 millimetres carrying 9 eggs and one of 23 millimetres carrying 67 eggs. It is indicated there that temperature is not a factor in the egg carrying capacity of a female (probably is indirectly in influencing the size), and that not all of the eggs originally carried by a female complete development. Figures for specimens from the lake are of course not available as yet.

Tattersalls (1951) p. 52((Apstein 1906?)), give figures on growth for this species some of which have already been quoted, they are given for an entire year together with figures for growth of Kempt Head specimens of this species.

Month	Tattersalls	I. Male	M. Male	I. Female	
February	4-5				
May	6-9				
VI-51		-	-	-	-
VII-51		14.0(20)10.5-15.5	-	13.0(18)9.5-15	22.5(26)21-26.5
VIII-51	9-15	-	-	-	-
IX-51		18.1(7)16-21	-	13.8(4)12-15.5	23.1(11)22-25
X-51		-	-	-	-
XI-51	10-23	17.8(12)17-19		17.5(3)17-18	19.4(10)18-23
				19.0(12)17-23	
XII-51		17.4(7)16-19.5		18.9(11)18-20	
Feb.	12-24,4-9				
V-52		8.5(1)	-	-	19.8(18)17.5-23
VI-52		9.5(4)8-11	-	10.5(1)	present but not measured

Since the two years 1951 and 1952 do not coincide quite in weather conditions the calendar year shown above is not quite characteristic of a full year of development. The lengths shown for June 1952 would probably be comparable to those of May of 1951, the apparent mean increase in growth of males would be thus 4-5 millimetres for two months rather than for a single month.

The parasitism of this species by Dajus mysidis has already been mentioned above and is dealt with more fully under discussion of that animal. Since not all specimens of that species have been recorded as yet it is not possible to discuss the occurrence of the parasite on this mysid with respect to time of year. All specimens of this parasite for which a host is definitely known have come from this species (one from M. oculata), in other words we have no evidence that M. stenolepis has been used as a host although it occurs in the same regions at the same time as this species. In one case on record to date Dajus has been identified from a collection in which both M. mixta and M. stenolepis are found, but all or most of these animals have fallen from speciemsn of M. mixta. This parasite is found in the same position as are the developing eggs and embryos and as most specimens were collected from females and in normal position were inside the oostegites, they were not identified as parasites. Instances of what appears to be sex modification due to the presence of this parasite has been described in the section devoted to Dajus.

From the first of this investigation the mysids, because of their relative abundance in Baddeck Bay and Kempt Head and scarcity in Whycocomagh Bay and their importance in the diet of cod from the first mentioned areas, have been considered likely hosts of the cod worm, Porrocaecum decipiens. During the course of identifying and measuring specimens of this species from collection 72 one specimen was noted to be nematode infested, the nematode lying in the thoracic region just under the carapace. The picture of this mysid (only photographed specimen of nematode

infested M. mixta) is found in the section devoted to a consideration of nematodes in mysids. After finding this single infested specimen, other animals from this same collection and others were dissected in order to confirm the belief that this find was not accidental, no nematodes were found in these specimens but N. americana from cod stomachs were found to have what was then thought to be a high rate of infestation and in 1952 other nematode infested animals were found amongst all recorded species of mysid but M. oculata which is somewhat rare in the areas investigated. (Note 1 nematode was found free in same collection as nematode infested animal).

Tattersalls (1951) the latest general work dealing with mysid biology do not mention any nematode parasite found in mysids.

The rate of nematode infection as found for this species is outlined below, more detailed data are found elsewhere.

	No. Mysids	Nematodes	% Infected
Stomachs - dissection	1	0	0
Collections - dissection	92	1	1.1
1952 - examination, dissection	540	7	1.5

Before the beginning of the 1952 season this rate of infection of about 1% (N. americana from stomachs - 1.1%), was thought to be sufficiently high to account for the infection of cod, but at the same time it was suspected that many of the once nematode infested mysids had lost their parasites, which suspicion was found to be true in 1952. The rate of infection of M. mixta for 1952 is then considerably below the level found for N. americana and M. stenolepis for the same period. It is interesting to note that the rate of infection of S. erythrophthalma, a deep water species like M. mixta, is similar to that of the latter species (1.5%).

Data from the preliminary stomach examination provides some additional information on population fluctuations of this and other mysid species. The influx of M. stenolepis into the Kempt Head region has been noted and this appears to be reflected in what at this point of progress, appears to be a marked change in the cod food habits. As mentioned earlier, the M. mixta population does not appear to vary appreciably from July to December, yet in the five stomach collections from 22-X-51 to the end of 1951, M. stenolepis is recorded but not M. mixta. More detailed examination of the stomach contents will probably reveal the presence of some M. mixta but the bulk of the Mysis intake during this period will likely be confirmed as M. stenolepis.

Consideration of the taxonomic characters of this species and its differentiation from the other Mysis species will be given later in a special section devoted to that subject.

Smith (1879) found that of specimens collected between August 4 and October 17 most were between 12 and 20 millimetres in length with a few females of 20-25 millimetres. The latter with nearly fully developed ovigerous lamellae but none carrying eggs. This state of development is similar to that found in the lake in 1951, the songle point of contention with Smith's observations would be in the reported condition of the oostegites of the large females. According to our observations and the work of Apstein as reported by Tattersalls (1951) these large females should be fully mature females of the previous year which are gradually dying off. Some of the specimens taken at Kempt Head in October, however, are of this size and are apparently animals of the year and females of this type may be what are referred to by Smith and the larger females of the previous year not noted by him during this period having died at an earlier period in the Vinyard Sound? region.

In the living condition this mysid is transparent with pigment spots (Smith for detailed pigmentation description 1879), black or dark brown in color. Upon death the muscle turns white in color.

Mysis stenolepis (804 ≠ 9)

Date, etc.			No.	Unsexable	Immature Male	Mature Male	Immature Female	Mature Female
7-VI-51	B.B.	#22	2				2-10.3(2)9,11.5;	
22-VI-51	B.B.	#39	2				2-	
14-VII-51	B.B.	#59	2				2-13.0(2)12,14;	
17-VII-51	W.B.	#60	9		6-13.8(2)12,14.5;		3-13.5(2)13,14;	
	W.B.	#61	7		5-		2-	
	W.B.	#62	15		10-		5-	
	W.B.	#63	2		1-		1-	
	W.B.	#64	10		3-13.3(2)13,13.5;		7-	
18-VII-51	W.B.	#65	1		1-			
	W.B.	#66	2				2-	
	W.B.	#67	74		19-12.0(8)11-14.5;		65-13.8(13)12-15.5;	
30-VII-51	B.B.	#68	2		1-16;		1-	
	B.B.	#69	2		2-			
	B.B.	#70	21		4-15(1)		17-14.5(6)12-17;	
31-VII-51	K.H.	#71	13		4-16(1)		9-16(2)15,17;	
	K.H.	#72	5		2-15(1)		3-13(1)	
8-VIII-51	W.B.	#73	4		2-18(1)		2-16.5(1)	
11-IX-51	K.H.	#76	10		3-18(1)		7-18.3(2)18,18.5;	
17-IX-51	B.B.	#77	0					
	B.B.	#78	0					
18-IX-51	W.B.	#79	1				1-15;	
23-X-51	B.B.	#82,83	1		1-21(1)			
25-X-51	W.B.	#84,85	0					
30-X-51	B.B.	#90,91	170		88-*-20.8 (15)19-22.5;		82-?-21.8(16)19.5-23.5;	
2-XI-51	W.B.	#94,95	59		33-20.8(1 0)19.5-21.5; all clos e to maturity		26-21.6(9)20-23; all close to maturity	
7-XI-51	K.H.	#97,98 or- 450 large to cod (52)	69		38-20.6(8)19-22; 38-	2-?	31-22.1(9)20.5-23; 2-	27-?
17-XI-51	K.H.	#100,101 75 large to cod (11)	19		8-21.5(1)		11-23.3(2)22,24.5;	
20-XI-51	K.H.	#103 400 large (2) to cod (24)	7		4-21.5(2)21,22;			3-?
23-XI-51	K.H.	#104 245 large to cod (6)			26-22.2(5)21.23;		13-23.0(3)22-25;	
26-XI-51	B.B.	#105 (2 tows)	32		11-21.9(7)21-23;		21-23.0(6)20-24;	
4-XII-51	K.H.	#108 200 large to cod (47)	45		33-21.9(8)18.5-23.5;		12-23.5(5)23-25;	
20-XII-51	K.H.	#111	9				9-24.5(6)22-26;	
	K.H.	#112	4					4-
22-XII-51	K.H.	2 tows	"0"					
27-XII-51	W.B.	#118(some lost)	1		1-			
28-XII-51	B.B.	#120	0					
	B.B.	#121	0					
12-V-52	B.B.	#1	0					
13-V-52	B.B.	#2	1					
16-V-52	B.B.	500 small 2 tows-Neo?						1-25.5

Mysis stenolepis (cont'd)

Date, etc.			No.	Unsexable	Immature Male	Mature Male	Immature Female	Mature Female
17-V-52 B.B.								
310 small								
2 tows-Neo?								
19-V-52 B.B.		#3	32					32-26.4(10)25-28;
21-V-52 B.B.		#4	45		1-		1-large;	43-26.4(18)24.5-28;
23-V-52	K.H.	#5	8		1-?-25.5;			7-26.4(4)23-29;
27-V-52	K.H.							
750L-5Tows								
29-V-52	K.H.							
411L-5Tows								
2-VI-52	K.H.							
2000L-6T.								
4-VI-52 B.B.		#12	11					11-24.7(5)23.5-25;
4-VI-52	K.H.							
2900L-4T.								
6-VI-52	K.H.							
2791L-5¼T.								
10-VI-52	K.H.	#17	4					4-27.5(2)27,28;
2192L-5¼T.								
(442)								
13-VI-52	K.H.							
287L-1 T.								
16-VI-52	K.H.	#20	16	8-			6-8.8(2)8,9.5;	
408-4T.(38)								
20-VI-52 B.B.		#22	1					1-25.5(1)
B.B.		#23	2	1-	1-			
B.B.		#24	6				6-10.0(3)9.5-10.5;	
20-VI-52 B.B.								
"Gs"-3T.								
44N.:6M.s.								
69N.:9M.s.								
21-VI-52	K.H.	#25	0					
	K.H.	#26	0					
1200S.?-2T								
24-VI-52 B.B.								
2500S.-2T.								
25-VI-52	W.B.	#27	0					
26-VI-52 B.B.	K.H.							
1158S.-3T.								
27-VI-52 B.B.								
2080S.-2T.								
2-VII-52 B.B.	K.H.							
557S.-2T.								
3-VII-52 B.B.								
(6000)3T.								
4-VII-52 B.B.		#28	29		12-8.8(3)8-9.5; 8-11.5(5)10.5-12.5;			9-10.9(6)10-12;
527S.-1T.								
100N.:12M.s.								
7-VII-52 B.B.								
369S.-3T.								
9-VII-52 B.B.								
432S.-2T.								
51N.:7M.s.								
10-VII-52B.B.								
246S.-1T.								

This mysid species was regularly collected from all three areas of the Great Bras D'Or for which collections are available.

1951,1952

Area	Mysids Recorded %	Mysis stenolepis Recorded%
Baddeck Bay	96% (25/26)	71% (17/24)
Kempt Head	100% (23/23)	82% (9/11) 1951
Whycocomagh Bay	79% (15/19)	75% (12/16)

From Baddeck Bay from July 30 to October 30 three collections were made and this mysid (1 specimen) was recorded in only one of these. The numbers taken in all collections of early 1951 are low, but the almost total absence of this species during the above mentioned period when it is shown to be so regularly collected over the year, might be indicative of an outward (inshore or offshore) migration but our data are too few to establish this point. The other major "gap" in the occurrence of this species for Baddeck Bay is for 28-XII-51 and no explanation of this absence is possible due to the absence of following collections.

The collections from Kempt Head for 1952 were not general in nature and the bulk of the mysids were used in the experimental work so that only 1951 data are tabulated above. In 1951 this species was collected on every day but one on which mysids were collected, this was 10-VII-51.

Although collected in very low numbers from Whycocomagh Bay throughout the year this species on all but one occasion in 1951 (12/13) when identifiable mysids were collected. No specimens were collected in any of the three tows made in this area in 1952.

The numbers collected from Baddeck Bay and Whycocomagh Bay throughout the period of collections of the two years do not indicate anything very definite in the way of cyclical abundance, although the numbers of young M. stenolepis in Baddeck Bay in June and July would seem to be great, based upon circumstantial evidence but unfortunately no large collections are available for this period (mysids fed to fish) and all we have for indicating this peak population are a few ratios of this species to N. americana (ratios similar 7-8:1) and the vast numbers of small mysids in the tows which were fed to the cod.

Interesting, but probably coincidental are the high numbers of this species collected from each area during the period October 30-November 7. This "peak" is continued at Kempt Head for a time, and also at Baddeck Bay but again by late December the numbers are down or the species is not recorded at all.

As noted under discussion of M. mixta, there is a marked rise in the population of Mysis at Kempt Head, commencing according to our collections with #97,98 - 7-XI-51, see above, which on

the basis of relative numbers of the two species collected would appear to be due almost entirely to an influx of individuals of this species. The numbers collected at this period are not very high as the bulk of the hauled specimens were used in the experimental feeding program. This influx of M. stenolepis is evidenced by the feeding habits of the cod in this region, this species replacing M. mixta (preliminary identification), in the cod diet from stomach collections of 22-X-51 to the end of the year, 5 collections all told. This stomach data would place the influx of stenolepis at a somewhat earlier date than can be estimatec by the bottom plankton tows, between 14-IX-51 and 22-X-51. This species being a shallow water form as opposed to M. mixta, the migrants into the Kempt Head area and also the coincidental "rises" in the populations in the other areas may be the result of offshore movements of this species before the onset of icing of the surface shore waters. The suggested greater abundance of this species with respect to that of M. mixta in the fall was reversed by the time of collecting of 1952, and the numbers collected of this species were of the magnitude of collections #71,72-31-VII-51 and #76-11-IX-51.

The spring mysid "bloom" has been referred to for M. mixta but it would seem that most of our data for this being from Baddeck Bay would pertain to this species and to N. americana. There is definitely a sudden appearance of small individuals at Kempt Head but as the numbers collected per tow were lower than for Baddeck Bay and numbers were desired for cod feeding the bulk of the towing was conducted in Baddeck Bay. As the numbers in these tows were often not very accurately given and the establishment of species numbers would be based upon two ratios of N. americana - M. stenolepis there is little to be gained by projecting this bloom arithmetically. This Baddeck Bay bloom commenced between June 4 and June 20 in 1952 and still seemed to be in evidence on July 10 when the last tow was made, although by this time the numbers collected per tow had dropped to what for that period was a low level. The low level of M. stenolepis, N. americana found in Baddeck Bay in mid-July of 1951 was not reached by this last collection; however, probably a further reflection of the lateness of 1952 with respect to 1951.

As for M. mixta, the development of the females and recording of egg carrying has been somewhat obscured by the presence of Dajus mysidis. Although no specimens of that parasite have been found on this mysid to date, it is necessary to reexamine females collected in late 1951 and early 1952 before complete information on the reproductive cycle may be presented.

Also for this species as for M. mixta, it was assumed for some time that the newly released larval mysids were bottom dwelling but such seems not to be the case and these along with other larval mysids spend a considerable time in the upper water layers (plankton?) before moving to the benthonic habitat. The mass numbers of small mysids collected in Baddeck Bay in June represents the first indication of the mass downward movement of mysids in that case of M. stenolepis and N. americana. The first

immatures of this species are recorded for Kempt Head on 16-VI-52 and are followed by Baddeck Bay records for 20-VI-52. The Baddeck Bay downward movement may have occurred any time between the 4th and 20th of June but that at Kempt Head is commenced between the 13th and 16th of June. The immatures of these earliest records range in size from 8-10.5 millimetres and half of them at that size are already sexable.

The breeding period of this species is probably slightly later in occurrence than that of M. mixta but the two overlap for the greater part of their durations.

This species seems to be somewhat shorter lived than M. mixta, its life span being of 12-14 months while that of M. mixta being 2-4 months longer. Associated with this difference in life span is the absence of an appreciable overlap in the generations on the bottom for this species as there is for M. mixta. No mature individuals of this species were collected in early 1951, 7-VI-51 et. seq., and none were collected in 1952 after 20-VI-52.

The range in size for this species including the immature unsexable individuals is 8-29 millimetres, with the females being somewhat larger than the males no doubt due to a longer life span (Tattersalls 1951 growth continues after sexual maturity p. 52 ((after Aspstein?))).

The sex ratio for this species is closer to equality than for either E. erythrophthalma (2;1) or for M. mixta (2.5:1) being 1.4:1(459 vs. 324). The ratios of females to males are so different for the three areas that they are separately indicated below.

Area	Males	Females	Ratio
Baddeck Bay	118	230	1.9:1
Kempt Head	125	115	.92:1
Whycocomagh Bay	81	114	1.4:1

Tattersall (1951) gives the number of embryos in the brood chamber of a 28 millimetre female of this species as 190, an extraordinarily high number. No comparative values for embryo and egg numbers with respect to size are at this time available for Great Bras D'Or specimens.

Smith (1879) has given in tabular form (p. 105) the sizes of specimens collected from different areas at Different times of the year. Most of these collections are from Vineyard Sound with others from Casco Bay and Halifax.

Date		Number	Age,Sex	Length	Remarks
July 4	V.S.	10♂	young	10-15	
14	C.B.	50♂	young	10-18	
16	C.B.	100♂	young	12-18	
Aug.19	C.B.	200♂	young	15-18	
25	H.	2	young	14	
27	C.B.	20♂	young	15-20	
Sept.2	V.S.	3	young	17	
6	H.	9	young	14-16	
15	H.	8	young	14-16	
Dec.13	V.S.	80	female	25-30	ovigerous sacs well developed, many with eggs;
		16	male	21-24	
Jan.	V.S.	100♂	female	24-28	nearly all ovigerous;
		1	male	21.5	
April 3	V.S.	50♂	female only	25-29	all with fully developed young or empty ovigerous sacs;
24	V.S.	100♂	female only	25-30	most empty;
May 12	V.S.	100♂	female only	25-29	"all" empty;

The meagre information so far available on breeding of this species in the lake would indicate that the breeding period in Vineyard Sound is somewhat earlier as would be expected.

The mean lengths of Great Bras D'Or specimens for the different months are compared below with the values for Vineyard Sound specimens.

Date	Vineyard Sound	Great Bras D'Or	
		Male	Female
VI-51(late)		-	10.3(2)9,11.5;
July 4	10-15		
VII-51		13.3(16)11-16;	13.9(23)12-17;
VIII-51		-	16.5(1)
Sept. 2	17		
IX-51		18(1)	17.2(3)15-18.5;
X-51		20.8(16)19-22.5;	21.8(16)19.5-23.5;
XI-51		21.3(33)29-23;	23.3(29)20-25;
Dec. 13	male-21-24; female 25-30;		
XII-51		21.9(8)18.5-23.5;	24.1(11)22-26;
Jan-	only 1 male; female 24-28;		
April 3	no males; female 25-29;		
April 24	no males; female 25-30;		
May 12	no males; female 25-29;		
V-52		25.5(1)	26.4(32)23-29;
VI-52		immatures not measured;	25.8(8)23.5-28; 9.5(5)8-10.5;
VII-52 (early)		11.5(5)10.5-12.5;	10.9(6)10-12;

No nematode infested animals of this species were recorded in 1951 but 5.4%(7/130) of those examined and/or dissected in 1952 were found to be carrying nematodes. This rate of infection is relatively much greater than that of M. mixta (1.5%) and E. erythrophthalma (1.5%) but lower than for N. americana for the same period (8.5%). The figure for M. mixta may actually be lower than it should be as treatment of the majority of this species was different to that of the others and there is also some record difficulty concerning these animals. An interesting point to be noted for the infection of M. stenolepis is the difference in degree of infection of mature and immature individuals. On the basis of the original theory that the spring mysid bloom was due to newly released animals, it was assumed that the young would not be nematode infected (if this is Porrocaecum), since by the time of this bloom there is a period of months since the departure of seals from the lake (this assumes an obligatory parasitic existence, short viability of the eggs).

There is reason to believe now that the young are planktonic and despite this different conception, the theory of the nematode young young should still hold. (As intimated above, the"Porrocaecum" eggs may or may not remain in a viable condition on the bottom for a considerable period, which would mean that over a time period nematodes would be found in the young of the year of this species, the nematode may also be free living at least for part of its early existence although the evidence so far does not indicate this (Scott thesis). After this preamble the percentage of infection for mature and immature specimens are given below and do seem to bear out part of this theory (?)

mature M. stenolepis - 8.1% nematode infected (74)
immatures - 1.8% nematode infected (56)

The single infected immature specimen does of course pose a problem so far as our theorizing is concerned.

The taxonomic characters of this species and the separation of this species from the other Mysis species will be dealt with in the following section.

Smith (1879) describes M. stenolepis as an annual species, the young appearing in the early summer, reach maturity in the early winter, produce young from mid-winter to spring, and all mature individuals disappear before the second summer the males long before the females. This life cycle patters as described by Smith is consistent with our findings for this species in the Great Bras D'Or.

In life this species is basically transparent with the characteristically located pigment spots (stellate dendritic) of black or dark brown. The pigmentation of this species is described in detail by Smith (1879).

Mysids likely of this species were occasionally noted inshore in the region of the floating tanks during the fall of 1951. Since these animals were "large" and were in 2 or 3 feet of water only a few yards off Kidston Island it was most likely stenolepis. These animals in the water have a rather ghostly appearance since they are basically transparent and as observed from above the water only the blurs of the pigment spots are seen. The movement of these animals was not recorded.

The Taxonomic Characters of the Species of Mysis

The key of Nouvel (1950) was used as far as identification to genus but from there more specific sources were used. Nouvel includes in his key two of the species from this region - M. oculata and M. mixta but not M. stenolepis. One characteristic used by Nouvel and by other authors in separating the species of Mysis is the relative length width relationship of the antennal scale. Both Smith (1879) and Zimmer ( ) indicate the same ratios for M. mixta (9:1) and M. stenolepis (12:1); ratio for M. oculata and M. relicta are given by Nouvel but since no specimens of M. relicta and few of M. oculata were available no comment will be made with respect to those ratios. This ratio of the length to width of the antennal scale is used as a key point in separating these species but nowhere does it seem to be indicated that these ratios are for adult specimens. The first specimens which were examined with respect to specific identification, from the lake were those taken in the early summer and were therefore immature specimens. No inconsiderable time was wasted trying to fit this character of antennal scale ratio to these specimens. Afterwards when specimens taken in December were examined an approximation to the desired ratio was found but not for the immature specimens which were identified on the basis of other characteristics. Both Smith and Zimmer note the difference in the shape of the antennal scale that of mixta being straight and that of stenolepis concave, this is not an obvious difference and both species need to be examined to appreciate this difference

The telsons of these two species are different that of mista being wider and deeper and also the numbers of spines along the lateral border are different in M. mixta 30 or more (Smith, Zimmer) and M. stenolepis 24 or 25. The spine number is quite variable for these species and probably is at least partially a matter of size (growth) of the specimen. The lateral telson spines for specimens from the lake are tabulated below:

No. Spines	M. mixta	M. stenolepis
15	1	
16	0	
17	0	
18	1	3
19	0	0
20	1	4
21	1	13

No. Spines	M. mixta	M. stenolepis
22	1	11
23	1	22
24	3	30
25	2	35
26	11	19
27	9	7
28	22	4
29	13	148
30	28	
31	19	
32	9	
33	2	
34	1	
35	1	
	126	
	28.6(15-35)	23.9(18-28)

These mean values approach the numbers suggested for the respective species but the range indicates the great overlap and that this number in itself cannot be used in distinguishing the two species. Smith does point out that his values are for adult specimens. The greater range in sping numbers for M. mixta may be due to a greater range in sizes of specimens available.

The spine numbers with respect to total length are available for a few specimens and these are given below.

Mysis mixta		Mysis stenolepis	
Length	No. Spines	Length	No. Spines
8.5	21	8	21
10.5	25	9	20
12	27	9.5	21
13	23	11.5	20
20	28	12	21
21	31	14	23
21.5	32	15	25
22	29	21	24
22	31	25.5	23
22.5	30	25.5	26
		27	24
		28	25

The above tabulation indicates that the spine number is at least partially a matter of the size of the animal.

Both Smith and Zimmer (latter probably getting his information from Smith), note the difference in the extent of the

spines along the telson border. Zimmer indicates that for mixta, the spines reach the end of the telson but do not in stenolepis, Smith that few or no spines arise posterior to the bottom of the sinus in stenolepis but 3 or 4 in mixta. This character has been found to be characteristic of both mature and immature specimens from the lake.

Smith refers to what is probably the most obvious difference between M. stenolepis and M. mixta, M. oculata, that is the pigmentation. Smith describes this in detail but we will confine ourselves to the obvious differences noted from Great Bras D'Or specimens which differences are noted by Smith. First the general pigment pattern of M. mixta and M. oculata is similar and while differences are likely they are not superficially obvious (specimens from subarctic also examined). The first obvious difference in the two types then is that the dorsal pigment spots (dendritic or stellate in nature) are much larger and more obvious for M. stenolepis. There is an obvious difference in the location of the pigment on the posterior dorsal regions, there being no pigment spot on the last abdominal dorsum of M. mixta etc. and one pair spot on the telson, while in M. stenolepis, there is a pigment spot on the last abdominal dorsum and two pairs spots in line on the telson. This difference in pigmentation was latterly used almost exclusively in separating the species stenolepis from mixta after it was found by using several characters in combination that the pigmentation was characteristic for all sizes of a given species. There are cases when due to poor preservation bleaching results in the obliteration of pigmentation so that other characteristics must be used in identification.

Smith mentions a further distinguishing feature for mixta and stenolepis that of habitat, stenolepis in shallow water and mixta in deeper water, but as was found in the lake notably Baddeck Bay and Kempt Head both species can be found coexisting in the same water.

Key to the Canadian Atlantic Species of Mysis*

A. Antennal scale broadly rounded at tip (relatively short compared to that of M. mixta) pigmentation as M. mixta; - Mysis oculata

A.A. Antennal scale pointed at tip, border straight or concave.

B. No spines lateral border of telson posterior to bottom of sinus, pigment spot last abdominal dorsum, 2 pairs pigment spots on telson - Mysis stenolepis

B.B. Spines on lateral border of telson reach tip or almost so, at least some spines posterior to bottom of sinus, no pigment spot last abdominal dorsum, one pair pigment spots on telson - Mysis mixta

Number of spines along lateral border of telson for M. mixta generally greater than for M. stenolepis but

considerable variation noted for both species.

M. stenolepis - 21-26 (18-28)
M. oculata - 26-32 (15-35)

*Since M. relicta or M. oculata relicta is reported for only one marine locality by Tattersall (1939) it is omitted here. The differentiation of this species from M. oculata by Nouvel (1950) is based upon antennal scale length width ratios, that of M. oculata being greater.

Neomysis americana (3914 ≠747)

Date etc.			No.	Unsexed, Unsexable	Male	Immature Male	Mature Male	Female	Immature Female	Mature Female	Fed to Co
10-VII-51	#56	K.H.	1				1-				
14-VII-51	#57 B.B.		1						1-		
	#58 B.B.		1							1-	
18-VII-51	#65	W.B.									
30-VII-51	#68 B.B.		14				8- 8.0(3)7.8;			4-9(1)	
	#70 B.B.		34			7-8.0(3)7.5,8.5;	15- 9.0(6)7-11;		3-8(1)	9-9.5(3)7.5-13;	
	68,70								6-	9-nonovig.	
										2-ovigerous;	
31-VII-51	#71	K.H.	5				2- 12(1)	1-		2-12(1)	
	#72	K.H.	5		1-		1- 12.5(1)	3-			
	71,72					1-	3- 12.5(2)12,12.5;		1-	5-12(1);	
17-IX-51	#77 B.B.		1							1-	
	#78 B.B.		22		10-			12-		9-nonovig.;	
	77,78					2-5.5(1)	8- 7.5(5)7-8;		1-5.5(1)	3-ovigerous;	
										12-8.5(8)7.5-10;	
23-X-51	#82 B.B.		59	30-identified only; 12-4.0(12)3.5-5.0;		10-6.0(10)4.5-7.5;?			3-6.0(3)5.5-6;	4-8.5(4)7.5-10;	
same tow	#83		52	51-identified only; none mature;						1-	
	82,83			80-identified only, none mature;		10-6.0(10)4.5-7.5;			3-6.0(3)5.5-6;	3-ovigerous; 6-8.5(4)7.5-10;	
25-X-51	#84,85	W.B.	32	11-unsexable parts; 6-4.0(3)3.5-5;		14-6.5(4)5-7.5;	1-		10-6.0(3)5-6.5;	1-	
30-X-51	#90 B.B.		1609	1552-unsexed whole and parts; 6-4.0(4)3-4.5;		23-6.0(16)4.5-8; 1-4.0(1)	1- 8(1) 1-		23(6.0)(12)4.5-7.5; 2-5.5(2)5.5;	1-ovigerous; 4-9.5(2)8.5,10;	
same tow	#91		29	2-4.0(2)3.5,4.0; 23-unsexed;							
	90,91			1575-unsexed whole, parts; 8-4.0(6)3-4.5;		24-6.0(17)4-8;	2- 8(1)		25-6.0(14)4.5-7.5;	4-9.5(2)8,10; 3/13 ovig.;	
2-XI-51	#94	W.B.	4	1-4.0(1)		1-7.5(1)			1-7(1)	1-8(1)	
same tow	#95		9	9-none mature; 3-parts 4-4.0(1)		3-7.5(1)			2-7(1)	1-8(1)	
	94,95										
7-XI-51	#97	K.H.	596	529-immature;		8-6.5(8)4.5-9;	13 -9(1)(12≠1)		12-7.5(12)5.5-9;	34-8.5(5)8-9.5;	
	#98		105	94-may be mature;							

Neomysis americana (cont'd)

Date etc.			No.	Unsexed, Unsexable	Male	Immature Male	Mature Male	Female	Immature Female	Mature Female	Fed to Cod
sample- 97,98				7-3.5(7)2.5-4.5; 529-immature; 94-mat.not deter.;		1-5(1)			3-5.0(3)5,5.5;		
				7-3.5(7)2.54.5;		9-6.5(9)4.5-9;	13 -9(1)		15-7.0(15)5-9;	34-8.5(5)8-9.5; 2/8 ovig.;	
17-XI-51	#100	K.H.	107	28-small;	11-	26-7.0(7)5.5-9.5;	2- 10(1)	9-	25-8.0(4)7-10;	6-9.0(3)9-9.5;	380S(1)
	#101		9	9-rear ends,disc.;							
20-XI-51	#103	K.H.	5			2-9(1)			3-7(1)		
23-XI-51	#104	K.H.	34		2-	2-?	3- 10(3)9-11;	32-	5-9.5(5)8-10;	4-9.5(4)9.10;	
26-XI-51	#105	B.B.	117	90-inc.rear ends; 2-		10-6.5(3)6,6.5;			15-6.5(6)5.5-9;		
same tow	#106		18	18-							
4-XII-51	#108	K.H.	65	2-	4-rear ends	25-8.0(8)6.5-9;	1- 10.5(1)	5-r.ends	24-8.0(6)6.5-9;	4-10.5(4)9.5-11; 1-ovig.;	
20-XII-51	#111	K.H.	267	222 immature		6-8.5(6)7-9	7- 9(1)?		4-8.0(4)7.5-9;	28-10.0(9.5-11;(4);?	
	#112	K.H.	9	8-immature						1-	
27-XII-51	#118	W.B.	1			1-					
28-XII-51	#120	B.B.	27	4-rear ends 3-		12-			7-	1-	
	#121	B.B.	254	208-immature			10 -			15-nonovig.	
						6-7.0(6)6-8	1- 9.5(1)		13-7.0(13)5-8.5	1-11(1)nonovig.	
12-V-52	#1	B.B.	137	75-rear ends etc. 1-		14-9.5(14)7.5-10.5	10 -10.0(4)9-10.5		26-8.5(10)6.5-11;	11-10.5(5)9.5-11.5;nonovig.	
13-V-52(*)	#2	B.B.	49	5-others		11-7.0(3)6.5-7.5;	7- 9.5(2)7.5,10;		11-9.0(6)7.5-10;	15-10.0(5)9-11;nonovig.;	500S(2
16-V-52		B.B.									310S(4
17-V-52		B.B.									
19-V-52(*)	#3	B.B.	1-				1- 11.5(1);				
21-V-52	#4	B.B.	39-			8-10.5(4)9.5-11.5;	15 -10.5(4)9.5-11;		8-6.5(1)	8-10.5(3)8.5-12;	
23-V-52	#5	(K.H.)	0								
30-V-52	#8	(W.B.)	0								
4-VI-52	#12	B.B.	6-				6- 10.0(3)9-12;				
	#13	K.H.	1-				1- 10.5(1)				
16-VI-52	#20	K.H.	25	3-others 1-	5-	7-			2-	7-	
20-VI-52	#22	B.B.	5	1-rear end		2-				2-	thousa
	#23	B.B.				6- 10.5(3)9.5-11.5;			4-10.0(1)	8-11.5(4)10-12.5;	S(3)44
										1-ovigerous	
	#24	B.B.				19 -10.5(7)9.5-11.5;			5-10.5(4)10-11;	25-10.5(10)9.5-12;	
										17-ovigerous;	

Neomysis americana (cont'd)

Date etc.		No.	Unsexed, Unsexable	Male	Immature Male	Mature Male	Female	Immature Female	Mature Female	Fed to Cod
21-VI-52	#25,26 K.H.	(0)								1200S(2)?
24-VI-52	B.B.								3-12.5(1)	2500S(2)
25-VI-52	#27 W.B.	3								
26-VI-52	B.B.K.H.									1158S(3)
27-VI-52	B.B.									2080S(2)
2-VII-52	B.B.K.H.									557S(2)
3-VII-52	B.B.									(6000)S(3)
4-VII-52	#28 B.B.	29				14-11.5(7)10-12;		3-9.5(3)9-10.5;	12-11.0(6)10.5-11.5;	527S(1)
									9-n.10.5(3)	100:12;
									3-o.11.0(3)	
7-VII-52	B.B.									369S(3)
9-VII-52	B.B.									432S(2)
										51:7
10-VII-52	B.B.									246S(1)

Occurrence Bottom Plankton Tows, Hoop Nets, 1951, 1952.

Area	Recorded	N. americana Recorded
Baddeck Bay	96%(25/26)	83%(20/24)
Kempt Head	100%(23/23)	91%(10/11) - 1951
Whycocomagh Bay	79%(15/19)	31%(5/16)

This species was regularly collected from Baddeck Bay and off Kempt Head but irregularly from Whycocomagh Bay, the numbers collected from the latter area were always low with the possible exception of the collection of 25-X-51. No specimens were collected by means of hoop nets so that possibly those collections should not be considered in estimating the occurrence, 2 hoop net collections are included in the Baddeck Bay totals. The other occasions on which Neomysis was not collected at Kempt Head and Baddeck Bay are for "early" 1951 when collected numbers from both areas were low. The vast numbers of this species collected in late June and early July of 1952 and which were for the most part fed to the fish are not in the right hand column of the foregoing tabulation. This bloom was not recorded in 1951 although bottom plankton tows were being made in 1951 before the middle of July. The difference in the seasons of 1951 and 1952 already noted would likely account for this lack of similarity in abundance for the two years.

The relative abundance of Neomysis appeared to increase in 1951 from lows in July to populations of maximum abundance in October and November followed by what appears to be a tapering off in abundance but which is difficult to verify due to the conclusion of the 1951 collections at the end of December. A second peak abundance period is recorded for May?, June and early July of 1952, this as mentioned above was probably missed in 1951 on account of different weather conditions. The fall "bloom" of this species was due to young of the year while the spring "bloom" involved mature and immature individuals but only a very small proportion of recently released individuals.

The mysids fed to cod in 1952 of the small variety were of this species and young of M. stenolepis, but the bulk would seem to be N. americana as evidenced from the three sample ratios available - 20-VI-52 44N.:6 M. stenolepis
4-VII-52 100N.:12 M. stenolepis
9-VII-52 51N.:7 M. stenolepis
The ratio is thus approximately 7-8:N. americana: 1 M. stenolepis.

The lack of very small (i.e. unsexable) individuals and the scarcity of immature animals in the 1952 collections would seem to indicate that the spring population rise is due to a migration of adult individuals into the Kempt Head and Baddeck Bay areas at some time during the winter or spring.

Ovigerous females were recorded in all months of 1951 for which specimens were available, July, September, October, November, December. No ovigerous animals were collected in May

of 1952 but several in June and July of that year.

Preliminary Tabulation of Ovigerous Females

Date etc.			%Ovigerous/ m.F.	Numbers and State of Development
30-VII-51	68,70	B.B.	18%	1-2 or 3 disintegrating eggs 1-9 apparently undeveloped eggs
17-IX-51	77,78	B.B.	25%	1-1 disintegrating egg 1-6 eggs 1-12 well developed embryos
23-X-51	82,83	B.B.	50%	1-2 well developed embryos 1-8 well developed embryos circa 1.5 mm. 1-19 less well developed embryos
30-X-51	90,91	B.B.	23%	1-1 well developed embryo 1-3 " " " 1-5 " " " heads facing posteriorly;
X-51			32%	
7-XI-51	97,98	K.H.	25%	1-3 fully developed embryos 1-4 " " "
4-XII-51	108	K.H.	25%	1- eggs
V-52			0%	
20-VI-52	23	B.B.	13%	1-
	24	B.B.	68%	17-
VI-52			32%	
4-VII-52	28	B.B.	25%	3-

The brooding period for this species appears to extend over the summer months with release of the young taking place from September until the end of the year. The condition of the embryos of females collected in the fall would suggest that this is so. Smith (1879) stated that Mysis americana, breeds during the spring and summer and very likely during the larger part of the year since young and old are often found together in the spring and summer and very likely during the larger part of the year since young and old are often found together in the spring and summer. This does not quite agree with our findings since the young animals are found in company with the adults during the fall period rather than during the spring and summer. Fish (1925) found that larvae and often adults are very characteristic members of the Woods Hole plankton. The species has a definite pelagic period swarming in the surface waters from December to April. Larvae appeared the last week of April in 1899, 1900 and continued in small numbers until July, the young being liberated in the form of adults. In 1923 the first adult appeared on May 17. Tattersalls (1951), quoting further from Fish states that this pelagic period coincides with the breeding period of this species. The occurrence of this species in the surface waters at Woods Hole during the winter and spring suggests the likelihood of similar behavior of animals of the Great Bras D'Or and would explain the sudden appearance of great numbers of this species in the benthos in June and July of 1952. There does not, however, appear to be a major release of

young at this time of year. The lengths of the unsexable individuals in the bottom plankton collections of October 1951 are as low as 2.5 millimetres and the length of well developed embryos in the brood pouch of a female collected in October are about 1.5 millimetres which would suggest that those embryos are near releasing stage and furthermore that little if any time would be spent in the surface waters before entering the benthos. The point being labored here is that while the breeding period (s.l.) may occur during the winter months the brooding period extends over the summer and fall with release of the young occurring in the fall and almost immediately entering the benthos. There is no evidence for the spring release of young for the Great Bras D'Or unless it be assumed that release is occurring throughout the early summer and fall periods and that the earlier released animals enter the surface plankton but not the later animals. This might explain the sudden appearance in the benthos of relatively large (circa 4-5) animals in October, the first of the bloom and later by the appearance of much smaller animals (circa 2-3). Smith (1879) found ovigerous females to vary in length from 9.5-14 millimetres. While data are not complete for specimens from the Great Bras D'Or the lower limit of size as noted by Smith seems to hold for these specimens although mature females are of somewhat lesser lengths and no specimens of any collections were found of the size maximum as indicated by Smith.

Tattersalls (1951) describe the presence of thoracic sternal processes on the 2nd to 5th thoracic sterna of immature females of Neomysis which disappear when the females mature and are replaced by long scythe-like soft walled processes on each of the last 2 or 3 thoracic sterna. These processes were not noted during the examination of N. americana. Sternal processes appearing to have a similar course of development and sexual association have been noted for Crago septemspinosus where there is generally a single thoracic sternal spine in the immature female which tends to disappear or fold down and disintegrate (?) once the animal becomes mature.

Consideration of the taxonomic characters which theoretically separate this species from others of the genus (non-American Atlantic) are not available in completed form at the present time.

The sex ratio of this species (860 specimens) was found to be closer to equality than for other mysid species of the lake being 1.2:1, with little variation between the three areas from which animals were collected. The corresponding values for other species as follows - M. mixta 2.5:1; E. erythrophthalma 2:1; M. stenolepis 14:1.

The mean lengths of specimens for the respective collecting months are tabulated on the following page with respect to the sex and estimated condition of maturity of the individual.

Date	Unsexable	Immature Male	Mature Male	Immature Female	Mature Female
late VII-51	-	7.8(3)7.5,8.5;	8.8(9)7-11;B.B. 12.3(4)12,12.5 K.H.	8.0(1)	9.5(4)7.5-13;
VIII-51	-	-	-	-	-
IX-51	-	5.5(1)	7.6(5)7-8;	5.5(1)	8.5(8)7.5-10;
X-51	4.0(21)3-5;	6.0(31)4.0-8.0;	8.0(1)	6.0(20)4.5-7.5;	8.8(6)7.5-10;
XI-51	3.8(8)2.5-4.5;	6.7(20)4.5-9.5;	9.8(5)9-11;	7.4(32)5.0-10;	8.9(13)8-10;
XII-51	-	7.9(20)6-9;	9.7(3)9-10.5;	7.5(23)5.0-9;	10.3(9)9.5-11;
V-52	-	9.0(11)6.5-11.5;	10.0(11)9-11.5;	8.6(17)5.5-11;	10.2(13)8.5-12;
VI-52	-	-	10.4(14)9-12;	10.3(5)10-11;	10.9(15)9.5-12;
early VII-52	-	-	11.3(7)10-12;	9.7(3)9-10.5;	10.9(6)10.5-11;

The peak occurrence of mature males in May, June and July would corroborate the suggestion that the main breeding period for this species occurs at that time and also probably earlier but the presence of large mature individuals at other times of the year would seem to suggest that breeding is not restricted to that time of year.

Animals of this species taken from stomachs in late May and early June of 1951 included ovigerous females bearing well advanced embryos, this would indicate release of embryos in June? and July but these were never collected in the bottom plankton.

Collecting all the foregoing discussion on breeding and considering the information supplied by Fish (1925) regarding the presence of the mature and young in the plankton it would seem that a minor (for the Great Bras D'Or) breeding period occurs in the early winter and continues until the late spring with the main breeding time occurring latterly. The young of the first period being released during May and June and entering the plankton along with the adults which are at that time planktonic. The adults resume a benthonic existence (May, June, July) during the late spring and early summer but the young of this early breeding continue as planktonts for several months(?). The late breeding females brood their young over the summer months and these young are released in the late fall (November et. seq.) and unlike the young of the earlier breeding immediately enter the benthos. More or less coincidental with this event the young of the early breeding leave the upper water and enter the benthos so that there is at this time of year a great influx of very small unsexable animals ranging in size from 2.5-5.0 millimetres. The size distribution of these animals does not seem to be bimodal although the larger of these animals are from the earlier part of the continuous winter breeding period and have led a planktonic existence while the smaller are the outcome of the end (major) of the breeding period and have not been planktonic or hardly so (2.5-3/). While there is no 1951 data which indicates an abundance such as was found in May, June and July of 1952, the stomach data indicates that this species was very abundant at that time in 1951. The mysid intake at that time of year is high and this species is almost exclusively recorded for cod stomachs from Baddeck Bay during that time. Whether these animals were taken on the bottom or whether the cod left the bottom to feed in the upper water layers is difficult to establish, although the other animals found in the stomachs at that time are strictly benthonic which would suggest that the animals taken were adults (no note in stomach records of immatures) and were taken on or near the bottom. What happens to these great numbers of adult or immature mysids (not the unsexables) after their sudden appearance on the bottom is not established but as indicated previously there seems to be a gradual decrease in the numbers of this species collected in 1952 and the numbers collected in the bottom tows of 1951 until late October are very low and also the mysid intake by cod from late July until late December is very low. Possibly this species along with M. stenolepis moves closer inshore with increasing water temperatures but this is at present not known,

at any rate there is a dispersal of the great numbers entering the benthos (after the winter spent in the upper layers) before the middle of July in 1951 and apparently somewhat later in 1952.

No external parasites were noted on this species.

This species was found to be the most highly nematode infested of the four mysid species examined.

Source	No. Examined	Nematodes	%Infected
stomachs, dissection 1951	747	8	1.1%
examination and/or dissection 1952	400	34	8.5%

Photographs showing nematodes in specimens of this species taken from cod stomachs are found elsewhere.

Comparative values for the degree of infection for the other mysids are given below -

E. erythrophthalma - 1.5%
M. mixta - 1.5%
N. stenolepis - 5.4%
N. americana - 8.5%

It is interesting to note that the highest degree of infection found in mysids of the Great Bras D'Or is for this species and next for M. stenolepis, these two species being the true littoral species found in this area, while the rate of infection (still high) for the other species is considerably lower. M. mixta is a littoral species (s.l.) and E. erythrophthalma is is found at depths ranging from . It might be suggested at this time what is possibly already evident that the high degree of infection of the inshore mysid species as opposed to the lower degree of infection of the forms normally associated with somewhat deeper water may in part be related to the recorded higher worm infestations in inshore as opposed to offshore cod. Furthermore, the breeding cycle of N. americana appears to be such that infected specimens are found at all times of the year as contrasted with the suggested situation in Mysis where the young appear after the departure of the seals in the spring and the one year old animals die off more or less concurrently.

One instance of double nematode infection has been recorded for this species, an individual collected on 10-VII-52.

Cumacea

Occurrence Bottom Plankton Tows etc. 1951, 1952.
(Figures for 1951)

Area	No. Tows etc.	Recorded	%
Baddeck Bay	16	8	50
Kempt Head	11	1?	
Whycocomagh Bay	16	9	56

Cumaceans were collected regularly in 1951 from both Baddeck Bay and Whycocomagh Bay although both at the beginning and end of the 1951 period cumaceans were not collected from either area. The absence of cumaceans in the early 1951 collections is probably due to the methods of collection then employed rather than to the absence of this group although a similar reason cannot be found for noncollection from Baddeck Bay after the end of October and for December from Whycocomagh Bay.

Cumaceans form a major item insofar as occurrence is concerned in the diet of Whycocomagh Bay cod, but despite the more or less regular collection of this group from Baddeck Bay cumaceans do not figure in the diet of cod from that region.

Some 116 cumaceans were examined while alive and after preservation for nematode infestation. These animals were collected from Baddeck Bay in 1952. No nematode infested individuals were recovered although a number of very small nematodes were found amongst the cumaceans. These nematodes were collected but it is considered likely that they are free living rather than parasitic forms.

Identification of the collected cumaceans has not yet been undertaken.

Amphipoda

Occurrence Bottom Plankton Tows 1951, 1952.
(Figures for 1951)

Area	No. Tows etc.	Recorded	%
Baddeck Bay	20	11	55
Kempt Head	11	10	91
Whycocomagh Bay	17	8	46

Amphipods were commonly collected from all three areas but more so from Kempt Head than from either of the other two. Amphipods were more regularly collected in Whycocomagh Bay in June and July of 1951 than later in the year.

Two sources were used for separating the amphipods Stephensen (1935-1942), and Stebbing (1906) plus the plates of Sars (1895). Other sources were consulted for specific animals.

Only part of the amphipod group has been classified to date and these specimens are all from Baddeck Bay.

With respect to secondary sex characters these are in the species examined often noted in descriptions and are generally quite obvious. The branchiae and oostegites of a caprellid (after Sars) are figured by Calman (1909) p. 227. Calman states that the branchiae are attached to the inner surfaces of the coxopodites near their posterior borders, generally vesicular or lamellar in form, the greatest number being 6 pairs - Gammaridae and usually 2 pairs in the Caprellidae. The same author p. 232 describes the oostegites as arising from the inner surface of the coxopodites on the proximal side of the branchial plates. Four pairs are commonly present on the 3rd to 6th somites. In the Caprellidae the two pairs only are present on the 4th and 5th somites. This distinction between the branchiae and the oostegites is mentioned as some difficulty was at first encountered in sexing these animals as the branchiae were mistaken for oostegites.

Caprellidea

Capprellids were differentiated in the preliminary examination of the cod stomachs but in the bottom plankton collections everything is merely listed as amphipod or occasionally gammarid. They are only occasionally recorded in Baddeck Bay and Kempt Head stomachs but are one of the most commonly occurring items in the Whycocomagh Bay cod stomachs.

Aeginina longicornis (4)

Date etc.	Male	Female
#23 B.B. 8-VI-51 H.M.		
#82 B.B. 23-X-51 B.Pl.	1-	1-L.-6.5;
#2 B.B. 13-V-52 B.Pl.	1-	
#3 B.B. 19-V-52 B.Pl.	1-L.-24;	

Since this species was recorded only twice in 1951 (20), it may be said to be rare in occurrence in Baddeck Bay.

The specimen collected on May 19, 1952, was found to be nematode infested. The nematode is located ventrally in the first thoracic segment.

Amphipoda

Gammaridea

Orchomnella pinguis (177)

Date etc.	No.	Unsexable	Male	Female
#22 B.B. 7-VI-51 H.N.	151	79-L.-2.0(3)2.5;	1-L.-6;	37 nonovigerous 34 ovigerous 5.0 - 12 eggs; 5.0 - 14 eggs; 5.5 - 18 eggs; 6.0 - 14 eggs; 4.5 - 11 embryos; all measurements for #22 in relaxed position
#23 B.B. 8-VI-51 H.N.	15	2-L.-2.0. ext. L.-2.5;		9 nonovigerous; 4 ovigerous; 5.5 - 18 eggs; 5.5 - 17 eggs; relaxed lengths;
#39 B.B. 22-VI-51 H.N.	2			2-L.-5.5;(ext. L.-6.0) spines - 3,3;3,2;
#120 B.B. 28-XII-51 B.Pl.	1		1-L.-5.0; rel.L.-4.5; spines 3,3;	
#1 B.B. 12-V-52 B.Pl.	6		4-L.-6.8(2) 6.5,7.0;	2-L.-7.0(1); spines on above specimens - 3,3;3,4(2);4,4;
#2 B.B. 13-V-52 B.Pl.	2		1	1-ovigerous;

It appears at first sight as if this species was collected mainly either because of position or method of collecting (hoop net) as it was not collected from June to late December; however the fact that one specimen was collected at that time together with the collection of specimens in 1952 by means of the bottom plankton tow indicates that this species along with others of other groups undergoes some form of migration, into Baddeck Bay during the winter and elsewhere for the summer.

The sexes of this species seem to be very unevenly divided, although in May 1952 (in collections so far classified) there is a preponderance of males probably indicating the breeding period.

Amphipoda

Orchomnella pinguis cont.

Ovigerous females were collected in June of 1951 and May of 1952. The presence of small unsexable individuals in May of 1951 would seem to indicate that breeding takes place in April or earlier and that the embryos are shed commencing in early June. (Possibly there is a second breeding period in the winter for which we have no record.)

The mean number of eggs for six females was found to be 15.6 (12-18) while in the single specimen carrying embryos recognizable as such the number was eleven. It is very difficult to handle this species and also O. minuta and not cause discharge of eggs from ovigerous females so that in handling some eggs from the above tallied females may have fallen out.

The separation of this species from O. minuta was at first done with great difficulty in fact several days were initially spent in identifying the first specimen (probably O. pinguis but not recorded) of this genus.

Gammaridea

Orchomnella minuta (19)

Date etc.	No.	Male	Female
#57 B.B. 14-VI-51 B.Pl.	1		1-ext.L.-4.5 spines 1,2;
#69 B.B. 30-VII-51 B.Pl.	1		1-ext.L.-4;(rel.L.-3);
#82,83 B.B. 23-X-51 B.Pl.	2		2-ext.L.-2.5;3.0; rel.L.-2.0;2.5;
#90,91 B.B. 30-X-51 B.Pl.	6		6-ext.L.-3.0(2); rel.L.-2.5(2);
#1 B.B. 12-V-52 B.Pl.	8	2-L.-5.0(1)	6-L.-4.7(3)4.5-5.0; all ovigerous; 4.5-4 eggs 4.5-4 embryos 5.0-14 eggs spines - 1,1(4);2,2;
#2 B.B. 13-V-52 B.Pl.			

This species appears to be rather irregular in its occurrence in Baddeck Bay. While there is a period of almost three months, August, September, October, when this species was not collected, it is not possible to suggest a migratory movement as collections during this period were few and far between and furthermore the numbers collected at other times are very low.

Note that for this species as for O. pinguis, males are or almost so at times other than what is thought to be the breeding period.

Ovigerous females have been recorded only in May of 1952 (some 1952 specimens not identified) and since that year was in phenology somewhat behind 1951 it is likely that the breeding period had passed in 1951 before any specimens were collected.

What are probably young of the year were collected in October of 1951 and at that time no larger individuals were collected. Also the specimens collected in May 1952 are all of a size so that this species probably has only a single annula breeding period.

Gammaridea

Argissa hamatipes (13)

Date etc.	No.	Male	Female
#68 B.B. 30-VII-51 B.Pl.	1		1-4.5;(ext.L.)
#82,83 B.B. 23-X-51 B.Pl.	1		1
#90,91 B.B. 30-X-51 B.Pl.	4		4-L.-3.0(ext.L.)
#121 B.B. 28-XII-51 B.Pl.	5		5-
#1 B.B. 12-V-52 B.Pl.	2	1-L.-5.5;	1-

This species was not commonly collected from Baddeck Bay in 1951 but was at least collected over the entire 1951 season after the institution of bottom plankton towing.

Aceroides latipes (2)

#90,91 B.B. 30-X-51 B.Pl. - 1 - not sexed or unsexable;
#1 B.B. 12-V-52 B.Pl. - 1 - female;

This species was collected only once in 1951 and only once in the 1952 collections identified to date.

Dulichia monocantha (1)

#1 B.B. 12-V-52 B.Pl. - 1 - male; no tubercle on finger; side plate
- 1 - not produced as much as Sars
Pl 230-1;

Pontogeneia inermis (1)

#57 B.B. 14-VII-51 B.Pl. - 1 - male L.-6.0 (ext. L.)
(Stephensen describes the family
Pontogeneidae but misses it in key)

Gammaridea sp.

Several specimens from Baddeck Bay 1951 collections have not as yet been identified (as well as many specimens of the genus Monoculodes below).

Monoculodes sp.

Members of this genus were collected in about the same numbers as Orchomnella and with about the same degree of regularity. Several species are involved in the specimens collected from Baddeck Bay but as yet only a few individuals from two species have been specifically identified.

Monoculodes tuberculatus (5)

#2 B.B. 13-V-52 B.Pl. - 5 -

Monoculodes packardi (4)

#2 B.B. 13-V-52 B.Pl. - 4 - females L.-6.4(4)6.0-6.5

Hyperiidea

No members of this suborder were collected by our conventional methods but several of the cod stomachs collected at Kempt Head in December (22-XII-51) contained hyperiids. This is the only record of this group from any area investigated and suggests another case (euphausids etc) of migration into the area during the winter.

Amphipoda Parasites

A number (102) of gammarids were examined while alive for hematode parasites and then checked after preservation along with the preserving fluid. No nematodes or nematode infested individuals were found by this means.

The nematode infested caprellid (19-V-52 B.B.) has already been mentioned above. One gammarid of an undetermined species (B.B. 13-V-52) was found to be nematode infested. The nematode is located in the side plate of this specimen.

Isopoda

Occurrence Bottom Plankton Tows 1951, 1952.
(Figure for 1951)

Area	No. Tows etc.	Recorded	%
Baddeck Bay	20	10	50
Kempt Head	11	1 (plus)	-
Whycocomagh Bay	17	1	-

Only from Baddeck Bay were isopods regularly collected. In that area it is difficult to interpret the occurrence of isopods because of the lack of bottom tows during the early part of 1951 but only once from June 6, 1951, until September 17 were isopods collected although during this period bottom tows were made on three dates. Isopods were collected only once from each of the other areas in 1951 both in the late fall, October -

Whycocomagh Bay, December - Kempt Head. There are other isopods collected from Kempt Head but these are parasitic forms. It seems safe to say that isopods are only accidental in occurrence in Whycocomagh Bay and Kempt Head during the periods of collection. The occurrence of the accidental isopods from the above areas in the late fall may be an indication of a movement as is suggested by the Baddeck Bay collections, unfortunately our data are rather meagre for establishing a movement of this nature.

Isopods were regularly collected from Baddeck Bay in the "spring" of 1952 at times in great numbers and again once from Kempt Head (omitting occurrence of parasitic forms).

Idothea phosphorea (1)

#90,91 B.B. 30-X-51 B.Pl. - 1 - L.-13; w.-4; L.abd.-4.5;males;

Readily distinguished from I. irrorata and I. baltica. A purely accidental occurrence.

Idothea baltica (1)

#11 K.H. 2-VI-52 B.Pl. - 1 - L.-17;w.-6.5;L.abd.-7;16 segments 2nd antennular flagellum;male;

This species apparently is as I. phosphorea only accidental in occurrence in any of the three areas under investigation.

Richardson , gives the number of segments of the second antennular flagellum as 14 of this species (16 for I. phosphorea) but Sars , indicates a range of 16-20 articles for this appendage for this species.

Cirolana impressa (1)

#2 B.B. 13-V-52 B.Pl. - 1 - L.-19;w.-6; flagellum 1 - 9-11;2-20; Richardson 1 - 12 2-20;

Another isopod which has been collected only once from all of the three areas.

Unidentified isopod (1)

#55 K.H. - 10-VII-51

There is no indication of what this is or what difficulty was involved in determining the species. Possibly this is one of the parasitic forms many of which have not as yet been recorded.

Dajus mysidis (95)

Date etc.	No.	Host	Male	Female
#55,56 K.H. 10-VII-51	21	M. mixta	4(2 free) (2 attached)	14 nonovigerous - eggs being formed in about 9 cases;
				3 ovigerous;
#71,72 K.H. 31-VII-51	2	M. oculata	1	1 nonovigerous; both from same animal;
	35	M. mixta	4-1.0(2); 1.5;	8-imm."L."-1.5;2.0(2); 2.5(3);
				23-m. -"L."-2.5(4);3.0(7); 3.5(3);4.0;
				L.-3-1216 eggs;nodev.; 3-1015 eggs;nodev.; 3-1055 eggs;nodev.; 3.5-1010 eggs; some dev.; Measurements of eggs - 0.2X0.25; in latter specimen L.-0.25;
#76 K.H. 11-IX-51 B.Pl.	37	M. mixta?	11-4inm.F. 5 in i.F. 2 free	13 imm. - almost mature; 13 m. - dev. eggs variable; recently formed eggs in some - females carrying embryos with appendages;

This form parasitic on two species of mysids is in other collections but has not as yet been recorded. Initially because of the appearance of the ovigerous female and because of their position on the host, these animals were thought to be brood pouches of the mysids which became detached, resulting in a number being classified as part of ovigerous female mysids. Reclassification of these items (animals) has only partially been completed. Note that in no case was this parasite definitely recorded from M. stenolepis. Collection #76 includes 10 M. stenolepis so that the Dajus cannot definitely be assumed to have been from M. mixta although the greater number must have been associated with that host.

The lengths of the females are necessarily only an indication of size since the form of these animals is somewhat aberrant.

Giard and Bonnier (1899) created a new species of this genus D. mixtus for forms parasitic on M. mixta. They contended that they knew of no epicarid found on two distinct hosts no matter how close they might be in ecological proximity. Richardson (1904) points out that Sars refuted this contention of Giard and

Bonnier (who icidentally had not studied D. mysidis ex M. mixta, that no epicarid parasite was found on more than one host and since that time Dajus from both species of Mysis have been referred to this species.

Sars (1899), found this species only on female specimens. In position the head turned backwards the ventral face towards the belly of its host. The position of Dajus on specimens from Kempt Head has not been noted. Sars noted that in no instance had the female incubatory plates (oostegites) attained full size in infected specimens and he thought it probable that the presence of the parasite put a stop to the growth of these plates. In collection #5 K.H. 23-V-52, three specimens of M. mixta are classified as intersexes. These specimens have biramous 4th pleopods (characteristic of male Mysis) and are carrying between the last pairs of pereiopods what were originally classified as brood pouches but which undoubtedly are female Dajus. What is interesting about these animals is first that they appear to be males (Sars indicates only females parasitized) and furthermore that the "males" have structures on the last thoracic segment which are characteristic of neither male nor female but appear to be in between the two types. The male Mysis has on the last thoracic segment a tubular structure originating from the base of the appendage (?), while the female has flat leaflike oostegites on that and preceding segments. The difference in structure is obvious at a very early period (no unsexables) and the structures on these three males as indicated above appear to be in between in nature.

Sars indicated that larval individuals were often found free in the sea and also that not infrequently this stage was found attached to the rudimentary pleopods. Numbers of male individuals of this species have been found free in collections but it was thought likely that these had dropped off mysids since in no case have these parasites (as yet), been recorded in collections in which no mysids were collected. Although not in the records male or larval forms of this species have often been noted attached to the pereiopods, carapace and pleopods of Mysis.

Phryxus abdominalis (5)

#11,15,16 K.H. 2,6,10-VI-52 - 5 - ex Pandalus montagui

1 male L.-2.5; attached to female L.-5.5 ovigerous;
1 - female L.-8.5; empty but for a few undeveloped eggs - eggs fell out?
1 male attached to female still attached to shrimp - between pleopods;

lengths include overlap of brood pouch of females;

As indicated above the single male and female of this species which remain attached to the shrimp are located between the pleopods.

These are the only specimens of this species in our collections from the Great Bras D'Or.

Sars (1899) and Chopra (1930) have indicated that the generic name of this species is invalid. Sars points out the preoccupation of Phryxus and Chopra (abstract) uses Hemiarthrus for Phryxus. Since Richardson (1905) uses Phryxus and we are following in general the work of Richardson, the generic name Phryxus is retained here.

Edotea (474)

Date etc.	No.	Male	Female
#8 B.B. 29-V-52 dredge	2	1-L.-8;w.-5;	1-L.-5;w.-2.5; 4 prs oostegites;
#19 B.B. 6-VI-52 dredge	1	1-L.-4.5;w.-2.0;	
#57 B.B. 14-VII-51 B.Pl.	4	1-L.-6.5;	3-L.-3.5;5;6;latter ovigerous, 67 embryos, 6 prs legs; lengths embryos - 0.8-1.1 mm.;
#77 B.B. 17-IX-51 B.Pl.	1		1-L.-3.5;
#78 B.B. 17-IX-51 B.Pl.	1		1-L.-4;
#82,83 B.B. 23-X-51 B.Pl.	10		10-L.-3.5(3);4(2);
#84,85 W.B. 25-X-51 B.Pl.	2	1-L.-8;	1-L.-5;
#90,91 B.B. 30-X-51 B.Pl. 82,83,90,91	31	1-L.-6;	30-L.4.3(29)2.5-6.5; 1/41 ovigerous; L.-4-14 eggs no development;
#105,106 B.B. 26-XI-51 B.Pl.	5		2-L.-3.5;8; 3 not sexed L.-3;3.5;4;
#120 B.B. 28-XII-51 B.Pl.	15	2-L.-5.5;7;	13-L.-4.6(13)3.0-6.0;
#121 B.B. 28-XII-51 B.Pl.	5		5-L.-3.5(3);4;
#1 B.B. 12-V-52 B.Pl.	360	86-L.-6.2(10)5.0-7.5	241-L.-4.5(23)3.0-6.0;
#2 B.B. 13-V-52 B.Pl. #1,2	10		90/370 - ovigerous, ie. eggs forming or nearly formed 4.0-5.5; also 9 specimens in which the sternal plates are readily separated - ??
#12 B.B. 4-VI-52 B.Pl.	3		
#22 B.B. 20-VI-52 B.Pl.	12	4-L.-6.3(4)4.5-8;	3-L.-4.3(3)4-4.5;nonovig.; 5-L.-4.6(5)4-5;ovigerous;
#23 B.B. 20-VI-52 B.Pl.	4		
#24 B.B. 20-VI-52 B.Pl.	8	4-L.-6.1(4)5.5-7;	4-L.-5.5(4)5-6;
	101		320

Edotea is the only isopod taken regularly in the Great Bras D'Or. It appears likely that there is an increase in the "spring" population due either to migration or to a winter bloom, the numbers taken on May 12, 1952 and the high proportion of males would indicate this.

Richardson (1900,1905) lists three species of Edotea - E. triloba (Say), E. acuta (Richardson) and E. montosa (Stimpson). According to the key characteristics and the descriptions (but not the figures) these species should be readily separated but such was not the case with the specimens from the Great Bras D'Or. The description of E. montosa (Idotaea montosa), by Stimpson (1854) is extremely sketchy and it would be impossible to separate the other species of the genus on the basis of that description. Miers (1883), suggests that from the description E. montosa is not distinct from E. triloba. Wallace (1919) lumped all three species because of the complete gradation found in the Bay of Fundy. Richardson (1905) has separated the three species on the basis of the relative lengths of the antennae, length and form of lateral projections of the head, tubercles on head, tubercles on thoracic segments, margin of thorax (shape), relative lengths of segments of antennae. Wallace found that the length and form of the lateral projections of the head, borders of thoracic segments, general shape of the abdomen and the difference in the relative lengths of the antennae were all so slight as to be useless in distinguishing the species. For the specimens from Baddeck Bay etc. a combination of the characteristics of the three species seemed to be in evidence. The relative lengths of the segments of the two antennae did not seem to be satisfactory for separating E. montosa and E. triloba but seemed to agree with Richardson's values for both or neither. The figures of the maxillipeds of these two species seemed at times to agree with that of the specimen at hand but at times the specimens maxilliped did not agree with either figure. The presence of horn-like projections and four dorsal tubercles on the head (for separating E. acuta) was often noted along with characters common to the other species. The thoracic tubercles (figures for both E. triloba and E. montosa) appeared on all specimens. The nature of the lateral margins of the thorax seemed somewhat variable or else the description straight, rounded is open to interpretation.

1 division - 0.0095 mm.;

Collection		Richardson *	Richardson **	1,2/52	1,2/52	1,2/52	1,2/52	1,2/52	1,2/52
Sex				M.	M.	F.	M.	F.	M.
Length				7.5	7	4.5	7.5	4.5	8
1st ant. -	1	x_1	x_1	34	32	18	34	20	28
	2	x_1	x_1	30	30	11	34	14	22
	3	$2x_1$	$2x_1$	50	45	22	53	27	43
	4	$2/3x_1$	1/2 3rd	29	31	17	-	19	25

Collection	Richardson *	Richardson **	1,2/52	1,2/52	1,2/52	1,2/52	1,2/52	1,2/52
2nd ant. - 1	y_1	y_1	9	12	7-10	9	10	12
2	y_1	y_1	12	9	6	10	6	10
3	y_1	y_1	15	17	7	17	10	18
4	$1\ 1/2y_1$	y_1 ♂	24	19	8	23	12	17
5	$1\ 1/2y_1$	$1\ 1/2y_1$ ♂	27	23	12	27	13	22
(6)	1/3 5th	$1/2y_1$ ♂	8	11	5	13	5	11

* E. triloba
**E. montosa

There are available other figures but the above data should suffice to show that so far as the relative lengths of the antennal segments are concerned there is little to choose between the species E. triloba and E. montosa.

In conclusion with respect to the differentiation of the species of this genus we will follow the suggestion of wallace and consider that the three species are actually one with considerable variation shown within the species, this single species is then Edotea triloba (Say).

Wallace indicates a length in this species up to 10 millimetres. None of our specimens reach that maximum length and most are rather small. The range in length is for males 4.5-8.0 and for females 3.0-8.0.

An interesting point so far as our data for this species is concerned is the difference in size (length) of the males and females, the males being relatively much the longer. For males the mean length for 25 specimens is 6.0 and for 97 female specimens is 4.1. Most of the males were collected in the spring of 1952 but note that on each occasion when males were collected it or they is larger than all or most of the females collected at the same time.

The males are distinguished from the females by the presence of a plate-like structure attached to the last thoracic somite. This structure, the penes, is shown in the figure for Calman (1909) for Idotea baltica, and is more or less characteristic of the structure in Edotea. The females are those which do not have this plate. The sex ratio of the collected specimens is very unequal 101 males to 320 females and males were as mentioned above quite rare except during May and June of 1952.

Calman has this to say about the oostegites of the female p/203 - "In Valvifera the coxopodites are more or less completely coalesced with the corresponding somites and the oostegites appear to spring from the ventral surface of the body close to the bases of the legs". He also mentions that usually only the first five free somites bear oostegites and that in Asellus they appear as

small buds from the coxopodites increasing in size at each successive moult until maturity is reached. The development of the oostegites in Edotea seems to be similar to that of Asellus. Ovigerous females were collected in July, October 1951 and in May and June 1952. The October female had undeveloped eggs and the so-called ovigerous females collected in 1952 carried newly formed eggs which broke up very readily when moved about. The occurrence of these ovigerous animals and the condition of the eggs or embryos suggest that the main breeding period observed takes place during the early summer with the embryos being released in July, and that a second breeding period occurs in the fall with release in the winter or spring. This October breeding female may have been an accidental specimen or it might have been an early individual in the fall breeding period no more of which were collected that year. It seems unlikely that this female collected in October (eggs not developed) would not be releasing her embryos until the following spring or summer although I have not located a source which indicates the elapsed time for development in this or closely related forms. Calman states that all Isopoda leave the brood pouch with the last pair of thoracic limbes undeveloped so that the ovigerous female collected on July 14, 1951, carried embryos which were apparently in a releasable condition. Whether these embryos are released at this size - 0.8-1.1 millimetres is not known but it must be difficult for a female of 6 millimetres in length to retain 67 embryos much over this size.

Euphausiacea

These animals were collected at Kempt Head on several occasions in the spring of 1952 but there is only one note in the records, that for June 10, 10-VI-52. This note indicates that as many as six animals of this type were noted in a single tow for that date. The appearance of this animal at this time of year possibly represents another case of the inward winter migration from areas of deeper and/or colder water as seems to be the case with fish eg. Squalus and other invertebrates eg hyperiids for this area. This winter migration also seems to occur in Baddeck Bay for such animals as plaice and Erythrops although there was never any indication of euphausids in Baddeck Bay. It seems possible that migration to the Kempt Head area of deep water forms has taken place with the end of the fall turnover? and the lowering of bottom temperatures. This source of deep water fauna could be the area in the neighborhood of Big Shoal where water of over 100 fathoms is found. It is in this area that Gadus ogac has been recorded. Similarly during the same period there would be a migration into Baddeck Bay of types which during the summer months are characteristic of the Kempt Head fauna and actually could originate from that area.

Decapoda

Shrimp

Large shrimp were regularly collected at Kempt Head but not from either of the other two areas. Smaller shrimp were also

regularly collected from Kempt Head (bottom plankton tow) and to a lesser degree from Baddeck Bay. Shrimp were twice collected from Whycocomagh Bay (bottom plankton tow).

1951

Area	Drags	Recorded	%	Bottom Tows etc.	Recorded	%
B.B.	51(17)	0		22(16 B.Pl.)	8	36
K.H.	22(11)	19	86	11(11 B.Pl.)	8	73
W.B.	21(8)	0		17(14 B.Pl.)	2	

Decapoda

Shrimp - Argis dentata (7)

#54 K.H. 10-VII-51 Dr. - 1 - female; L.-82; ovigerous; no obvious development of eggs;
#80 K.H. 22-X-51 Dr. - 1 - female; L.-69; ovigerous; eyes visible, legs also appear to be developed;
#107 K.H. 30-XI-51 Dr. - 1 - female; L.-79; nonovigerous;
#110 K.H. 20-XII-51 Dr.- 1 - female; L.-79; ovigerous; eyes, appendages quite obvious;

#6 K.H. 27-V-52 Dr.,B.P.-2 - 1 - unsexable L.-77; only 2 thoracic sternal spines; no abdominal sternal spines;
1 - male; L.-37.5; 5 thoracic sternal spines, 4 abdominal sternal spines;
#11 K.H. 2-VI-52 B.Pl. - 1 - male; L.-27.5;(c.-6;)

The sternal spines mentioned above have been looked for in only two specimens and in these there appears to be a difference in number which may be associated with sex or size or species. These spines are single and occur in the ventral midline, one associated with each segment.

This shrimp was collected only from Kempt Head and then only occasionally. Ovigerous females (3) were collected in July, October and December. Basing the development upon these three it would seem that mating occurs in late spring or early summer and that the young are shed shortly after the beginning of the year. Note that no individuals smaller than 27.5 millimetres were collected. Some difficulty was experienced in sexing one of the animals collected 27-V-52, why is not indicated in the records; this is a rather large animal to be without any indication of reproductive aperature.

Decapoda

Shrimp - Sabinea septemcarinata (5)

	Male	Female
#54 K.H. 10-VII-51 Dr.		1-L.-54; ovigerous; no obvious development of eggs; agrees with description, but 2nd pereipod very short, reach only as far as merus cf. Rathbun fig. 29;
#100,101 K.H.17-XI-51 Dr.	1-L.-22;	
#107 K.H. 30-XI-51 Dr.		1-L.-66; ovigerous; eyes, appendages visible;
#7 K.H. 29-V-52 B.Pl.		2-L.-52;68;

This shrimp was collected only at Kempt Head and there its occurrence was rare. Ovigerous females were collected in July and November, one on each occasion. From the difference in development of the eggs of these females it seems possible that mating occurs in the spring or early summer and that the young are released during early winter (circa December).

Smith (1879) points out that the male of this species is much smaller than the female - largest male - 45
largest female - 72

Smith records ovigerous females in August and September, which does not quite agree with the recorded appearance of the above ovigerous females (2). Quite possibly his observations (collections) do not cover as extended a period as is represented here. He makes no comment on the reproductive cycle.

Decapoda

Shrimp - Spirontocaris macilenta (25)

Date etc.	Sex	r.	r/c	L.	Spines	Remarks
#71 K.H. 31-VII-51 B.P.	M.	3	8	25	9/2/1	
#72 K.H. 31-VII-51 B.P.	M.	3.5	9.5	31.5	11/2/1	rostrum "typical"
#111 K.H. 20-XII-51 B.P.	M.	3	9.5	-	10/2/1	telson broken; L.-29/;
#6 K.H. 27-V-52 B.Pl.D.	M.	3	8.5	27.5	10/2/1	
	F.	2.5	7	22.5	9/2/1	also two probably of this species rostrum broken;

Date etc.	Sex	r.	r/c	L.	Spines	Remarks
#7 K.H. 29-V-52 B.Pl.	M.	2.5	8	26.5	10/1/1	
	M.	2.5	7	23	9/2/1	
	M.	3.5	11	36.5	10/2/1	"typical" rostrum;
	F.	3.5	9.5	30	10/1/2	
	F.	2.5	7.5	25	9/2/1	
	F.	2.5	7	22	10/2/3	
#11 K.H. 2-VI-52 B.Pl.	F.	3.5	8.5	27	9/2/2	paired sternal spines, thoracid - 5,6,7,8;?
	F.	2.5	7.5	25	8/2/2	spines as above;
	F.	2.5	7	21.5	8/2/1	spines as above;
#15 K.H. 6-VI-52 B.Pl.	F.	6	17.5	56	17/2/2	right species?
#16 K.H. 10-VI-52 B.Pl.	?	3	9	26	10/2/1	
#18 K.H. 13-VI-52 B.Pl.	?	3	9	30	9/2/2	
	?	2.5	7	24	11/1/1	
	?	2.0	6.5	22	9/2/1	
#25 K.H. 21-VI-52 B.Pl.	M.	3	9	29	10/2/1	
	M.	2.5	7	23.5	7/2/2	
	F.	5	13.5	43.5	12/2/3	"typical" rostrum;
#26 K.H. 21-VI-52 B.Pl.	?	2	6	21	8/2/2	
	?	2.5	7	23.5	9/2/2	
	M.	5	14.5	45	13/1/2	"typical" rostrum;

Measurements are to the nearest half millimetre.
Five individuals are classes as unsexable, what difficulty was experienced is not indicated in the records, note that individuals of a similar or smaller size than most have been sexed.
One female, 6-VI-52, is so large that it seems out of place, it agrees with Rathbun (1929) except in rostral formula.
The paired sternal spines mentioned above in a few cases have been investigated only in those cases.

This shrimp was collected only at Kempt Head and only by means of the bottom plankton tow. Prior to 31-VII-51 there were only two bottom plankton tows at Kempt Head in 1951. The occurrence of this species in spring and winter? in this area suggests a migration into the area in the late fall and early winter. Unfortunately, as noted above, the absence of bottom tows in May, June 1951 makes it impossible to be certain that this migration does take place and that the regular occurrence and abundance of this species during May and June of 1952 was not purely accidental for that year.

Rathbun, 1929, includes this species in her key and description of the genus Spirontocaris, but unfortunately the key characteristics and parts of the description for this species are based upon mature individuals only. The "young" of this species differ somewhat from the more mature individuals particularly in the shape of the rostrum. The figure (Fig. 18) of the rostrum of this species based upon Krøyer is that of a more mature individual

than most of the animals collected at Kempt Head. The notations in the above data to "typical" rostrum refer to the type of rostrum as figured by Rathbun. Note that with one exception (which will be checked), the rostrum of all individuals over 30 millimetres is noted as being "typical" while all individuals of a lesser size have a rostrum which is not typical in this sense but is straighter and not expanded below. Smtih (1879) points out that there is individual variation within this species and that the young differ from the adults in the form of the rostrum and the number of rostral spines. Smith describes the rostrum in young animals as slender, nearly horizontal, only slightly expanded vertically, armed with fewer teeth than the adult although at least 9 above and 1 below. With this additional information from Smith separation of this species from others of the genus is readily accomplished for animals from 21-56 millimetres in length but using Rathbun alone only the mature individuals can be classified to this species.

No ovigerous females were collected. Only two of the mature animals are females and only five of the 25 collected are mature. Quite likely since this species seems to be only a winter resident of this area the mature breeding population is located elsewhere in the lake.

Of the sexable animals nine are females and ten are males. Concerning sexual difference Smith (1879) points out that the secondary sexual characteristics are well marked in the antennulae and abdominal appendages of 30 millimetre specimens. Furthermore, that the secondary appendage peculiar to males is only just making its appearance on the inner lamellae of the second pair of abdominal appendages of males of 26 millimetres. This means of differentiating the sexes was not employed but would possibly be of assistance in sexing the larger of the remaining unsexable individuals. Sex of the above specimens was established on the basis of the presence of an aperature on the coxa of either the 3rd or the 5th pereiopod.

There is no record of the color pattern of this species in the living condition from Kempt Head neither is there any mention of color by Rathbun. My recollection of this and other Spirontocaris species is that they are translucent with red markings, similar to Pandalus montagui, in fact specimens of this genus were after purely superficial examination without benefit of keys thought to be young of Pandalus montagui.

The rostral formula of this species is quite variable as indicated by the above listed 25 specimens. Rathbun gives the roastral formula as 9-16/1-4 with 0-3 spines of the carapace. Smith as mentioned above has noted the difference in roastral shape for young and old and also pointed out the difference in numbers of spines for small and larger individuals. The tabulation given below shows that, although there are exceptions, in general the total number of dorsal rostral spines is directly proportional to the total length or to the rostral length of the animal.

Rostral Spines		Mean Total Length	Mean Rostral Length
7/2/2	- 1	23.5	2.5
8/2/1	- 1		
8/2/2	- 2	22.5(3) 21-25	2.3(3)2-2.5
9/2/1	- 5		
9/2/2	- 3		
10/1/1	- 1		
10/1/2	- 1	25.5(10)22-30	2.8(10) 2-3.5
10/2/1	- 5		
10/2/3	- 1		
11/1/1	- 1	27.5(6) 22-36.5	2.9(7) 2.5-3.5
11/2/1	- 1	31.5	3.5
12/2/3	- 1		
13/1/2	- 1	44.3(2) 43.5,45	5.0(2)5,5;
17/2/2	- 1	56	6.0

Note that the ventral spines do not like the dorsal spines bear this relationship with the total length and the rostral length.

Decapoda

Shrimp - Spirontocaris fabricii (5)

Date etc.	Sex	r.	r/c	L.	Spines	Remarks
#45 G.B.D. 27-VI-51	M.	6	11	31.5	2/2/1	5 prs dorsal spinules on telson - N.B.
#6 K.H. 27-V-52 Dr.B.Pl.	F. 2M.	11.5	19	(55)	2/2/3	
#11 K.H. 2-VI-52 B.Pl.	M.	6	11	30	2/2/3	appear to be only 6 carpal segments; antennal flagellum, (inner) exceeds rostrum;

This species like others of the genus were collected only during the months of "cold water". Its occurrence at Kempt Head could be termed rare even during these periods. There are no representatives of this species from early summer 1951 or from December of that year. This species like S. macilenta, probably migrates into the Kempt Head area in December or at some later time and leaves in late May or early June, its occurrence here is, however, much rarer than that of S. macilenta.

Rathbun, 1929, describes the rostrum of this species as reaching the tip of the antennal flagellum. In one of the above specimens, the flagellum is noted as exceeding in length the rostrum. Rathbun states that there are four pairs of dorsal spinules on the telson, but one of the above specimens, whose identity does not seem to be in doubt has five pairs of dorsal spinules.

Rathbun gives the rostral formula to be 2-6/1-5 with 0-2 spines on the rostrum. None of the 3 examined specimens have a high dorsal spine count but the characteristic absence of spines over the greater length of the rostrum is found in these specimens.

Smith, 1879, gives the rostral formula as usually 3/1/3 or 2/2/3 and the range as 3-5/2-6. He includes a tabulation which shows the rostral formula for a number of individuals. Smith notes a range in the dorsal aculei of the telson as 4,4;5,5;4,5;3, 3;3,4; the latter two formulae were found to be uncommon by Smith.

Smith found the largest male to be 39 millimetres in length and the largest female to be 50 millimetres in length.

Smith collected ovigerous females in April 1876 but none (100) taken between July and October were ovigerous.

Decapoda

Shrimp - Spirontocaris gaimardii (2/1)

Date etc.	Sex	r.	r/c	L.	Spines	Remarks
#6 K.H.27-V-52Dr.B.Pl.	F.	6.5	12	41	3/2/5	
#11 K.H. 2-VI-52B.Pl.	F.?	8	8	35.5	5/3/6	1 other probably of this species; presumably female from shape of rostrum; agrees with S.g.belcheri in having rostrum exceed antennal scale.

This species may another of the winter residents of the Kempt Head area but its occurrence in collections from that area could not be termed anything other than accidental.

Shrimp - Spirontocaris pusiola (1)

Only one specimen of this species was collected and that from Baddeck Bay in June, 1952 (#24 20-VI-52). This specimen is

an ovigerous female in a somewhat mangled condition, its identification was rather difficult on account of its condition. No measurements could be made of this animal. Both Smith (1879) and Rathbun (1904) give measurements (individual) for this species.

Smith records ovigerous females for July, August, September, October and April, the only months for which collections were available.

Decapoda

Shrimp - Crago septemspinosus (336)

Date etc.	No.	Unsexable	Male, with spine	Nonovigerous Female with Spine	Nonovigerous Female no Spine	Ovigerous Female
#23 B.B. 8-VI-51 H.N.	1					
#57 B.B. 14-VII-51 B.Pl.	1	1-16;				1-30.5;no spine;egg,shells, still attached;
#68 B.B. 30-VII-51 B.Pl.	1					1(26) spine?;measurement?;
#70 B.B. 30-VII-51 B.Pl.	2					2-23.0(2)22.5,23.5;some eggs of each hatched;
#76 K.H. 11-IX-51 B.Pl.	1	1-13.5;				
#78 B.B. 17-IX-51 B.Pl.	1	1-4.5;				
#82,83 B.B. 23-X-51 B.Pl.	8	8-5.5(8)3.5-11;				
#84,85 W.B. 25-X-51 B.Pl.	13	13-most larvae, undoubtedly of this species -subchelate 1st pereiopod;				
#90,91 B.B. 30-X-51 B.Pl.	22	20-8.4(8)4.5-14.5 includes four larvae undoubtedly of this species;	2-26.0(2)24.5,27.5;			
#94,95 W.B. 2-XI-51 B.Pl.	1			1-19.5;		
#97,98 K.H. 7-XI-51 B.Pl.	11	includes 1 larva;				
#100,101 K.H. 17-XI-51 B.Pl.	3					
#97,98,100,101 K.H.	(19)	7-11.3(6)5-18.5 includes 1 larva;	7-21.3(6)16-25.5;		5-25.4(5)20-29.5;	
#103 K.H. 20-XI-51 B.Pl.	5					
#104 K.H. 23-XI-51 B.Pl.	7	2-15.8(2)15,16.5;	3-23.8(3)18-20.5;		2-24.3(2)23,25.5;spine?;	
#111 K.H. 20-XII-51 B.Pl.	3					
#112 K.H. 20-XII-51 B.Pl.	6	(14.5;16.5;18.5;21; 24.5;26-ovig.;)				
#111,112 K.H.	(9)	2-16.3(2)14.5,18;	3-22.0(3)17-27.5;	3-22.8(3)20.5-25;		1-27; no spine; no dev. eggs;
#121 B.B. 28-XII-51 B.Pl.	2	2-13.5(2)				
#1 B.B. 12-V-52 B.Pl.	11	10-10.8(10)8-16.5;		1-22;		
#2 B.B. 12-V-52 B.Pl.	62	23-13.1(16)9-21.5	26-18.4(24)13.5-28;	8-19.8(7)15.5-24;		5-27.8(5)24.5-30.5; little dev.;
#3 B.B. 19-V-52 B.Pl.	25		14-22.5(13)19-26.5;	7-23.4(7)20-30;		4-25.8(4)25-27;no obv.dev.
#4 B.B. 21-V-52 B.Pl.	2			2-21.0(2)20,22;		
#6 K.H. 27-V-52 B.Pl. Dr.	6		4-28.3(4)22-30;	1-	1-24.5;	
#7 K.H. 29-V-52 B.Pl.	24	2-14.3(2)14,14.5;	11-20.8(11)16-24;	5-21.2(5)17.5-23;	2-27.5(2)25.5,29.5;	3-27.0(3)25.5-29.5;no spine;
#11 K.H. 2-VI-52 B.Pl.	110	9-20.1(7)16-25;	53-21.9(48)16.5-34.5;	4-25.5(4)22-27;	20-22.2(20)16-25.5;	24*16-28.0(16)22.5-33.5; no spine
#16 K.H. 10-VI-52 B.Pl.	1					1-24.5;no spine; no dev.;
#22 B.B. 20-VI-52 B.Pl.	3		2-20.8(2)20,21.5;		1-24.5;spine?	
#23 B.B. 20-VI-52 B.Pl.	1		1-17.5			
#24 B.B. 20-VI-52 B.Pl.	2		2-26.8(2)21,31.5;			
#26 K.H. 21-VI-52 B.Pl.	1					1-26.5;no spine; no obv. d dev.;
	336	102	128	32	28	43

*24-16 - no spine,
2 - with spine;

Length - tip of "rostrum" - tip of telson;
Sex - determined by presence of aperature on coxa of 3rd or 5th pereiopod;
Spine - single thoracic sternal spine;

This species was collected from all three areas. Its occurrence in bottom plankton tow collections from Baddeck Bay was regular in 1951 and 1952. It was collected on only two occasions in October and November 1951 from Whycocomagh Bay, a winter migrant? and from Kempt Head from every bottom tow from September 11 onward in 1951 (one exception) and regularly in May and June of 1952.

The numbers collected at Kempt Head and from Baddeck Bay in May and early June of 1952 are much higher than at any other period of collecting. Whether this "rise" in the population was due to migration or to a cumulative effect of the bloom of the previous year (surface to bottom movement) is not clear.

Ovigerous females were recorded in June, July and December of 1951 and May and June of 1952. The eggs of ovigerous females collected in 1952 showed little or no development as was true of those of the single ovigerous female collected in December. On the other hand three of those collected in June and July of 1951 had in each case already released all or part of embryo complement. Since there is an overlap in the time period but apparently not in the sequence of events it seems likely that the difference is attributable to the difference in phenology of the two years (1952 - several weeks later than 1951). While no estimate of the total elapsed time from breeding to release of the embryos is possible it seems probable that development from egg to releasable embryo in this species takes a period of about two months. This period is based upon the assumption that our collections reveal almost all of an entire year of development for this species and not that the presence of shedding females in June and July (1951) and of recently mated females (1952) in May and June is purely coincidental. Young individuals of this species including Schizopod larvae appear in the collections from September 11 to November 17, 1951. Small individuals are also recorded from Baddeck Bay in early May of 1952. Males and for that matter females are not abundant in any of the 1951 collections. A few males were collected in November and December of 1951 from Kempt Head.

From the foregoing observations on the data presented above it seems likely that the apparent confusion so far as growth and breeding period may be interpreted on the basis of a single breeding period extending from December to July and that more than one year is required from the appearance of the schizopods on the bottom to their development as mature individuals and further that females possibly each are capable of existing through two complete breeding periods.

Rathbun, R., (1884), refers to the occurrence of Cragon vulgaris on both sides of the Atlantic and Rathbun, M. J, (1904) points out the synonomy of Crago and Cragon. The species referred to by R. Rathbun is probably C. septemspinosus. Considerable work has been done in Europe on the life cycle of Crangon vulgaris

Fabr. (Crangon vulgaris L.) and this species is sufficiently allied to Crago septemspinosus to enable us to apply knowledge of the life cycle of that species to the rather incomplete data on Crago septemspinosus from the Bras D'Or Lake. Lloyd, A. J. and Yonge, C. M. (1947) studied Crangon vulgaris L. in the Bristol Channel and Severn Estuary. Secondary sex differences are marked in this species and are indicated in detail. Sex differentiation using these characters was not attempted with the present species. No suggestion of a thoracic sternal spine is mentioned by these authors as constituting a sexual difference although the presence and absence of this spine in Crago septemspinosus seems to be related to sex or rather to breeding condition. These same authors mention the apparently well known migration of C. vulgaris from inshore waters in the winter to deeper waters in the North Sea in the summer. Whether C. septemspinosus is making a somewhat modified migration of this sort is not clear as is mentioned above. The higher numbers of animals collected in the late fall and early summer do suggest that some sort of winter inshore migration does take place but the evidence is not too convincing.

Havinga (1930) abstract, records two spawning periods for C. vulgaris, November to March (large eggs) and March to September (smaller eggs). He suggested that females mature in November spawn at least twice probably three times (1 winter, 2 summer) before October of the following year. Females born from winter eggs mature after two years, length of 58 millimetres (length after first winter 40 millimetres). The absence of noncollection of ovigerous females from any area of the lake during the summer months suggests that this two cycle continuous breeding period of C. vulgaris is not characteristic of C. septemspinosus.

This species was noted inshore in the Little Narrows region as already noted in the discussion of the bivalves. Their movements were rather erratic, short spurts through the water just above the sand followed by a partial burial in the sand. In about one foot of water these shrimp were quite invisible when in this buried condition and tended to startle the observer as they shot about from underfoot. The living color of Crago is a translucent light brown. Rathbun (1929) describes it as more or less speckled with gray. Preserved in formalin these animals assume an opaque white color.

In addition to the Crago identified from plankton collections etc an additional 29 specimens from cod stomachs were identified and all or parts of these were dissected for purposes of determining nematode infestation. No nematodes were recovered by this means. Crago specimens totalling 65 were examined while alive or shortly after death in May 1952 and these specimens formed parts of collections #1, 2. No nematodes were observed in these living animals nor were nematodes recovered from the preserving fluid at a later examination. One nematode infested individual of this species has been found, it is from #11 - 2-VI-52 K.H. and appears to harbor many nematodes. This nematode(s) may be the intermediate stage of Porrocaecum and Crago one of its many intermediate hosts.

Decapoda

Shrimp - Pandalus montagui (113)

Date etc.	No.	Sex	R.	L.	r.	r/c	L.	Spines	
#21 K.H. 6-VI-51 Dr.	18								*
		m/f	22	65	25	41.5	90	5/4/5	
		m/f	-	62	22	36.5	77	8/3/6	
		m/f	-	62	-	-	-	6/4/6	
		m/f?	19	57	24	38	84	6/4/6	**
		m/f	-	64	23	38.5	81	6/4/6	
#43 K.H. 26-VI-51 Dr.	6								***
#50 K.H. 3-VII-51 Dr.	8								left-60-65;
#53 K.H. 10-VII-51 Dr.	3								left-60-65;
#54 K.H. 10-VII-51 Dr.	7								
#56 K.H. 10-VII-51 B.Pl.	5								****
#50,53,54,56		m/f	18	53	15	25.5	54	5/4/6	
		m/f	18	60	19	31.5	65	6/4/5	
		m/f	18	-	22.5	38	81	6/4/6	
		m/f	18	63	26	43	88	6/4/5	
		m/f	20	-	23.5	38	80	6/4/5	
		m/f	20	59	18.5	30.5	66	6/3/6	
		-	21	63	16.5	28	58	6/4/6	
#71 K.H. 31-VII-51 B.Pl.	2								
		m/f	19	-	17.5	29	59	7/4/6	
		m/f	21	-	17.5	28	58	6/4/5	
#76 K.H. 11-IX-51 B.Pl.	1	m/f	22	60	18	29	62	6/4/6	*****
#100,101 K.H. 17-XI-51 B.P	2								
#102 K.H. 20-XI-51 Dr.	13								
#103 K.H. 20-XI-51 B.Pl.	8								
#100,101, 102,103		m/f	20	58	20.5	33	66	6/4/6	
		m/f	20	65	19	32	68	6/4/6	
		m/f	22	63	24	39.5	83	6/4/5	
		m/f	18	60	28	29	58	6/4/5	
		m/f	-	64	18	30	62	6/4/5	
		m/f	21	65	14.5	24.5	54	5/3/5	
		m/f	21	63	16	26.5	53	6/4/6	
		m/f	20	53	12	19.5	41	6/4/5	
		m/f	18	-	25.5	41	84	6/4/6	******
#104 K.H. 23-XI-51 B.Pl.	3								
#107 K.H. 30-XI-51 Dr.	4								
#104,107		m/f	18	57	20.5	33	65	6/4/5	
		m/f	20	62	19.5	32	65	6/4/6	
		m/f	21	64	24	39	81	6/3/6	
		m/f	19	59	13	20	55	7/4/5	
		m/f	20	60	26.5	43.5	90	5/4/5	*******
		m/f	17	57	24.5	40	80	6/4/6	********

* usually 64 annulations occasionally less seldom more; right circa 20 usually less;
** can't be sure of female aperature;
*** annulations - left - 54-74; right - 17-23;
**** preserved color - macroscopic - white; microscopic - bands of red stellate bodies;
***** red matter attached to male pore - sperm?

Pandalus montagui cont.

****** ovigerous; eyes, appendages obvious; 4 other specimens in collection ovigerous - total 5/23 ovigerous; 2 - no obvious development; 2 - eyes, appendages visible;
******* ovigerous - eyes obvious;
******** ovigerous - eyes, appendages obvious; 3/7 from 104,107 ovigerous;

Date etc.	No.	Sex	R.	L.	r.	r/c	L.	Spines	
#6 K.H. 27-V-52 B.Pl.Dr.	1	m/f	20	64	20	33.5	70	5/4/5	
#7 K.H. 29-V-52 B.Pl.	14								
		m/f	21	72	-	-	-	-	
		m/f	-	-	17	29	62	7/4/6	
		m/f	-	60	-	-	-	-	
		m/f	19	62	20.5	34	70	7/4/6	
		m/f	22	71	24	39.5	83	5/4/6	
		m/f	18	60	23	38	78	6/4/6	
		-	20	63	-	-	-	7/4/5/?	
		m/f	21	62	17.5	29	64	7/4/6	
		m/f	17	59	26	41.5	85	6/4/5	
		m/f	20	64	-	-	-	6/3/5/?	
		m/f	22	68	24	38	77	6/4/6	
		m/f	20	60	18.5	30.5	65	6/4/5	
		m/f	22	66	-	-	-	-	
		m/f	20	67	-	-	-	7/4/6/?	
#11 K.H. 2-VI-52 B.Pl.	7								
		-	20	60	-	-	-	5/3/6	
		-	18	58	-	-	-	6/4/4/?	
		-	19	-	-	-	-	6/4/6	
		-	19	60	-	-	-	7/4/5/?	
		-	19	62	-	-	-	7/4/6	
		-	19	57	-	-	-	-	
		-	20	57	-	-	-	-	
#15 K.H. 6-VI-52 B.Pl.	4								
		m/f	19	60	-	-	-	-	c-13;
		m/f	21	68	21.5	38	-	7/4/7	
		m/f	19	64	-	-	-	-	c-17;L.-(80)
		-	20	68	24.5	42	93	6/4/6	
#16 K.H. 10-VI-52 B.Pl.	4								
		*	22	64	20.5	34	73	6/4/6	*
		m/f	21	69	-	-	-	-	
		-	22	66	18.5	32	69	6/4/6	
		-	-	56	12	19.5	44	6/4/6	**
#25 K.H. 21-VI-52 B.Pl.	2								
		-	20	-	13	22.5	50	5/4/5	***
		m/f	18	64	-	-	-	-	
#26 K.H. 21-VI-52 B.Pl.	1	m/f	19	58	14	23.5	54	7/4/6	****

* Can't see bases of 3rd pereiopods well; male opening plugged with red substance - sperm?

Pandalus montagui cont.

** parasitized by Phryxus;
*** can't see female aperature but probably there; male pore blocked by red substance;
**** red substance attached to male pore;

Several of the abbreviations in the foregoing tabulation require elucidation -

sex - m/f - Secondary sex characters were not used in differentiating the sexes. Both male and female genital aperatures were observed in most cases hence the designation.

R. - right - annulations on the carpus of the second right pereiopod.

L. - left - similarly for the left second pereiopod.

r. - length of the rostrum in millimetres (to nearest half millimetre).

r/c - length of the rostrum plus the carapace as above;

L. - total length to nearest half millimetre, in practice probably to the nearest millimetre; measured from the tip of the rostrum to the tip of the telson;

Spines - rostral spine formula; the first number refers to the dorsal rostral spines on the rostrum itself; the second number to the dorsal spines on the carapace; the rostrum incidentally being measured from its tip to the posterior limit of the ocular concavity; the third figure refers to the ventral spines on the rostrum;

While Crago septemspinosus is the shrimp commonly collected from Baddeck Bay this is the commonly collected shrimp at Kempt Head. Pandalus was not collected at Kempt Head in every drag or in every bottom tow but at least in over half the collections obtained by either method it is found. No specimens of Pandalus were collected between September 9 and November 17, 1951, although during this period only one collection was made at Kempt Head (#80 Dr. 22-X-51). A more important and possibly more significant absence of this species is noted in the six collections from Kempt Head during December 1951. These collections were made on three days, December 4, 20, 22. Whether this absence is purely accidental or whether it indicates a movement away from Kempt Head for the winter cannot of course be dtermined as our collections end for 1951 with those of December 22. There is a slightly greater abundance of this shrimp in the "springs" of both 1951 and 1952 but the difference is so slight that it is probably coincidental.

Considerable difficulty was encountered in differentiating this species from others of the genus particularly P. borealis. The key characters and descriptions of Rathbun (1929) would indicate a rather facile separation of these species but such is not the case. The dorsal median abdominal spine(s) of P. borealis (one noted in description and figure, two in key) does not seem to be very prominent as noted in specimens from Passamaquoddy Bay. The apparent overlap in numbers of carpal annulations of the two species, not indicated by Rathbun, caused some speculation that a new subspecies was involved; however, the use of a number of characters together proved to be satisfactory as means of separating the two species and it seems now that the difficulty was due to the annulation figures quoted by Rathbun which for the P. montagui collected at Kempt Head were too high, being closer to the annulation figures quoted by Rathbun for P. borealis.

The characters used for identifying this species were - the ascending nature of the rostrum, the rostral spine formula (not necessary), the rostral spines reaching the mid point of the rostrum (the anterior half of the rostrum naked), annulations of the 2nd pereiopod (for separating P. propinquis).

The annulations on the 2nd pereipods (carpus) are with some specimens difficult to make out particularly for the left appendage and particularly at the extremities of the carpus. It is possible that the low numbers of annulations noted here as compared to those indicated by Rathbun may be due to interpretation or technique but several of the specimens were subjected to repeated countings of the carpus at intervals and as many annulations as possible "squeezed" into the records apparently without avail so far as reaching the quoted - about 74 annulations. The mean number of annulations of the second right carpus is 19.78 (56) 17-22. Rathbun suggests about 20 for this species which agrees fairly closely with the above figure. The mean number for the left second carpus however is 61.75(53)53-72 which is considerably lower than Rathbun's about 74. This is really closer to the suggested number for P. borealis - about 58. It is possible that the specimens used by Rathbun in determining this value were very large mature specimens, since there appears to be some relationship between the number of annulations on the left second carpus and the total length of the animal.

Length	Annulations Left 2nd Carpus
40-49	54.5(2)53,56
50-59	60.14(7)53-56
60-69	61.18(11)57-66
70-79	63.33(6)60-68
80-89	62.25(8)57-71
90-	64.33(3)60-68

Rathbun gives the length range of this species as 50-110 and possibly she has used for these annulation counts

animals of over 100 millimetres. The lengths quoted by Rathbun for this and other species are presumably the lengths of the animals in definitive adult form after they have become bottom dwelling. The lower limit for this species may be increased by our observations from 50 to 41 so that the range in lengths of the specimens from Kempt Head would be 41-93 and appending this to the range given by Rathbun - 41-110.

The rostral formula of Rathbun is 10-12/6-7 with 3-5 spines on carapace. The rostral formulae of Kempt Head shrimp are given below with their frequencies.

5≠3/5	- 1	
5≠3/6	- 1	2
5≠4/5	- 4	
5≠4/6	- 2	
6≠3/6	- 2	6
6≠4/5	- 12	
6≠4/6	- 18	
7≠4/5	- 1	
7≠4/6	- 6	
7≠4/7	- 1	
8≠3/6	- 1	8

The commonest number of dorsal spines is 10 and the two common formulae are 6≠4/5 and 6≠4/6. The general rostral formula for Kempt Head Pandalus is then 8-11/5-7 with 3-4 spines on the carapace. Appending this to the general formula given by Rathbun we get 8-12/5-7 with 3-5 spines on the carapace.

Unlike the situation in Spirontocaris macilenta where there appears to be a direct relationship between the total length (or rostral length) and the number of dorsal rostral spines, there seems to be no increase in dorsal spine number here with increasing total length.

No. Spines (Dorsal)	Mean Total Length
8	54 (1)
9	72.6 (8) 50-90
10	70.2 (28) 41-93
11	63.0(7) 54-77

Since the rostrum is proportional in length to the total length of the animal there does not seem to be any relationship between this length and the number of dorsal spines. The difference in spine development for these two shrimp (S. macilenta) is possibly due to the difference in the numbers of spines, the number for P. montagui being low compared to that of S. macilenta.

Rostral Length	Total Length
12-14 -13.0	48.8(5)41-54
14.5-16.5-15.5	54.8(4)53-58
17-19 -18.0	63.2(12)58-69
19.5-21.5-20.5	66.5(6)65-73 *
22-24 -23	80.5(10)77-84
24.5-26.5-25.5	87.1(7)84-93

*there are no specimens with rostrums of 21,21.5, so that this mean value is probably low on that account.

The "red Substance" attached to the male pore as noted in several of the collected specimens is, if not sperm, at least associated with the reproducing male. Microscopic examination of this substance did not prove to be enlightening. Assuming that these males are in mating condition from June to October. Ovigerous females were collected in November only (8/30) when the eggs of most were in an advanced condition of development (eyes, appendages). Since there were no collections for a period of two months (with this species) it is impossible to establish the beginning of the ovigerous period of these females. From the above noted condition of the eggs in November it is likely that ovigerous females would occur at Kempt Head as early as August and certainly by September (only one specimen from July 31 to mid November - the "functional male").

Smith (1879) notes 7 out of hundreds of animals as ovigerous between August and October. These ovigerous animals were between 75 and 100 millimetres in length. The three ovigerous specimens from Kempt Head for which there are total lengths are 80,84,90 millimetres in length.

Sex reversal in Pandalus was first brought to my attention by remarks by Steinbech and Ricketts (Sea of Cortez) p. 249. The authors referred to "Canadian Pandalus" as also having male-female succession. All animals are born male and all become female on passing a certain age. Berkeley A.A. (1929)(A.B. Needler) has worked on this sex change in Pandalus danae. She outlines secondary sex characters for that species which might apply equally well to this species but as this reference was not located until after "sexing" was completed on the basis of genital aperatures such investigation remains to be done. Berkeley noted that the oval depression representing the "other" sex was present in all cases but indicated that the extra opening did not appear to be functional in either case. These depressions covered by flaps of tissue represent the covered over openings of the genital tracts. It was found generally with the Kempt Head specimens that both openings were present but often that one was more readily discernable than the other. This was probably associated with the functional condition of the specimen but was not appreciated at the time of investigation.

This shrimp is translucent in color when alive with red bands. After preservation the non-red parts bleach and with age or very strong formalin the bleaching reaches the point where no red is left and the animal is a dirty yellow or white color.

Several of the specimens collected in June, 1952, were parasitized by the isopod Phryxus abdominalis. The females of this species attach themselves to the pleopods in about the position in which the eggs are attached. One Pandalus specimen has the female Phryxus still attached and a male Phryxus is attached to the female. The male Phryxus is small and insignificant compared to the female and is probably overlooked many times when the female is noted. One specimen probably a male Phryxus was found in a Baddeck Bay collection (#57 14-VII-51), there seems to be some doubt about the identity of this specimen.

None of the Pandalus were dissected to determine nematode infection, nor were any specimens noted to be nematode infested during the process of identification. One specimen from a collection from Passamaquoddy Bay was, however, noted from external examination to be nematode infested. Identification of the nematode(s) from this specimen has not been undertaken as yet.

A collection of shrimp and other animals from Passamaquoddy Bay was examined during the course of this work. The shrimp were identified as Pandalus montagui, Pandalus borealis and Dichelopandalus leptocerus. Identification of the latter was relatively simple since it has an exopodite on the external (3rd) maxillipeds which is not present in Pandalus. What was interesting with respect to the separation of the pandalids was that the suggested overlap in carpal annulations as indicated by the Kempt Head P. montagui, does occur. Furthermore the discrepancy in Rathbun with respect to the abdominal dorsal spine(s) appears to be a matter of variation in P. borealis. Unfortunately length measurements of these specimens were not taken so that carpal annulations and length cannot be compared.

Pandalus montagui		Pandalus borealis		Dichelopandalus leptocerus	
Left	Right	Left	Right	Left	Right
-	19	53	25	56	5
61	19	-	22	56	5
62	20	-	24	52	6
59	22	-	22	52	6
59	-	-	23	60	6
59	19	-	25	62	5
69	21	-	24		
66	19	-	22		
70	20	50	23		
60	19	50	22		
58	18	50	24		
63	18	48	23		
54	19	53	21		

(cont'd)

Pandalus montagui		Pandalus borealis		Dichelopandalus leptocerus	
Left	Right	Left	Right	Left	Right
		49	25 spine on 3rd abdominal only;		
		54	22 no spine 4th;3rd?		
		48	22 no spine 4th small 3rd;		
		51	- no spine 4th rostrum a la borealis;		
		-	20 no spines; rostrum a la borealis;		
		50	20 no spines;		
		47	20 no spines;		
		-	21 no spines; rostrum a la borealis;		
		53	26 no spine 4th; probably borealis;		
		-	21 no spine 4th;		

The latter borealis specimens are questionably placed with the others of that species.

Decapoda

Lobster - Homarus americanus

Commercial lobster fishing is carried on in Baddeck Bay and around the south end of Boularderie including the area inshore of the dragging ground off Kempt Head.

Lobsters were only dragged in Baddeck Bay, none were picked up off Kempt Head, although lobster pots were at times probably less than two hundred yards inshore. The bottom in the Baddeck Bay dragging area is mud as previously indicated, as it is at Kempt Head. Lobsters are said to frequent gravel beds but were picked up with great regularity in Baddeck Bay from the end of July until the middle of September. Before and after these dates only occasionally were lobsters recorded.

Date etc.	Sex	C.	C⁄r	L_1	L_2
?	M.	73	97	82/16"(206)	85/16"(211)
?	F.	79	106	92/16"(232)	95/16"(237) ovigerous;
?	M.	94	122	107/16"(266)	1011)16"(272) - about 25 M. edulis (all less than 10 mm.) attached to bases of appendages;
#11B.B.1-VI-51	M.	82	109	92/16"(232)	95/16"(237)
#14B.B.1-VI-51	M.	(45) r-18	63	135	140

C. - carapace r - rostrum c⁄r - carapace plus rostrum
L_1 - length L_2 - length including setae at tip of telson

There is a generally known color change from living to dead condition (formalin).

None of the lobsters from Baddeck Bay were dissected for nematodes in the approved fashion. The numbers of these animals which are consumed in the environs of Baddeck without comment would suggest that these animals are not important intermediate hosts of the cod worm if the immature nematodes are inhabitants of the extra-viscereal areas.

C. J. Bayers who has had considerable experience lobster fishing pointed out that lobsters generally stayed clear of traps which already contained crab(s). The tabulation which follows is designed to bear out this observed "animosity".

Date	1	2	3	4
8-VI-51	4C(combined 1,2)		3C	2C
19-VI-51	3L,1 cod	2 cod	5C,1L	2C
20-VI-51	1L,1C	1C	1C	0
22-VI-51	3L	2L	1L	1C
23-VI-51	0	0	0	1C
3-VII-51	1C	1L	2C,1L	0
7-VII-51	0	0	4C	0
10-VII-51	2L	2L	0	1L
12-VII-51	0	0	0	1L
14-VII-51	0	2L	1L	-

crabs alone - 11
lobsters alone - 11
crabs and lobsters - 3

Decapoda

Crab - Cancer irroratus

This crab was occasionally picked up by the drag in Baddeck Bay and once at Kempt Head. Several of this species were collected from the Great Bras D'Or Channel in June, 1951. Small individuals were collected on two occasions from Baddeck Bay in 1952 using the bottom plankton tow. This crab was commonly found in the lobster traps set in Baddeck Bay.

Place	Date	Male	Female
?B.B.?	-	2-w.-98;112;	
B.B. #4 Dr.	24-V-51	1-w.-30;	1-w.-19;
B.B. #6 Dr.	25-V-51		1-w.-20;
B.B. L.T.	25-V-51	1-w.-97;	
B.B. L.T.	31-V-51	1-w.-109;	
B.B. #13 Dr.	1-VI-51		1-w.-23.5;
B.B. L.T.	5-V-51	1-w.-111;	
G.B.D. #44 Dr.	27-VI-51		1-w.-12;
			1-w.-74; ovigerous; tips - dact., prop.- purple (preserved);
G.B.D. #45 Dr.	27-VI-51	2-w.-9;11.5;	4-w.-11;22;30; 69 - ovigerous; latter colored as above;
G.B.D. #46 Dr.	27-VI-51	1-w.-41;	
B.B. B.Pl. #12	4-VI-52	2-w.-10-21;	2-w.-7.5;22;
B.B. B.Pl. #23	20-VI-52		1-w.-22;

None of the crabs have been examined for nematodes. Most of those listed above are still available for dissection if that is deemed advisable.

There is no appreciable color change in these animals from living to preserved (formalin) condition.

There was some difficulty encountered in interpreting the difference between this species and C. borealis, no specimens of the latter were available. It was finally decided that "margin of lateral teeth of carapace entire" - Rathbun ( ) p.-32.

Decapoda

Hermit Crabs

Hermit crabs were collected from Kempt Head, Great Bras D'Or Channel and Baddeck Bay. They were collected regularly in the few drags in the G.B.D. channel, occasionally at Kempt Head and in several drags on one day in Baddeck Bay (1-VI-51).

Pagurus acadianus (10)	Male	Female
#11 B.B. 1-VI-51 Dr.	1-L.-6	
#12 B.B. 1-VI-51 Dr.	1- note animals on gastropod shell;	
#13 B.B. 1-VI-51 Dr.	2	
#12,13	(3)L.-5.5(2);6;	
#46 G.B.D. 27-VI-51 Dr.(2)		
#47 G.B.D. 27-VI-51 Dr.(1)		
#49 G.B.D. 27-VI-51 Dr.(2)		
#46,47,49	4-L.-7(2);8.5;9.5;	1-L.-9.5;
#114 K.H. 22-XII-51 Dr.	1-L.-4.5;	

This species was collected only on one day from each area where it was collected, it would seem to be rare at both Kempt Head and Baddeck Bay and its collection no more than accidental.

Pagurus pubescens (23)

	Male	Female
#15 B.B. Dr. 1-VI-51		1-L.-4;
#54 K.H. Dr. 10-VII-51	1-L.-7.5;	
#102 K.H. Dr.20-XI-51	1-L.-8;	
#107 K.H. Dr.30-XI-51	1-L.-6.5;	
#114 K.H. Dr.22-XII-51	4-L.-6.5(3);8;	
#6 K.H. Dr.B.Pl. 27-V-52	6-4.7(6)3.5-5.5;	2-4.0(2)3,5;nonovig.; 6-5.1(6)5-5.5;ovig.;
#26 K.H. B.Pl. 21-VI-52		1-6.5;ovigerous, "no development";

The collection of this species from Baddeck Bay could be termed accidental as was the collection of P. acadianus. Note that the single specimen of this species was collected on the same date as were the specimens of P. acadianus. The bulk of the hermit crabs collected at Kempt Head are seen to be of this species, which while not of common occurrence seems to be more than occasional in its occurrence in this area.

The lengths quoted above for the two hermit crabs are the lengths of the carapace or hard dorsal area, this seems to be a more exact measurement than total length although it is not known whether this might not exhibit a relative growth difference.

Note that the majority of the females collected in 1952, May and June, are ovigerous and that the only accompanying notation for one female indicates that no appreciable development has occurred in the eggs.

Preliminary Stomach Examination

Great Bras D'Or

As indicated in the heading the examination of the stomach contents of the fish collected from the Great Bras D'Or has been of a preliminary nature. An attempt was made to estimate the most important single item in a stomach (bulk) and this item is generally indicated first in the raw tabulations of the individual stomachs. In the tables of collected data the figures refer to the number of stomachs in a given size class which contain that particular item and following this is a bracketed figure which indicates the number of stomachs of that group in which that item was found to be dominant. This evaluation of the bulk is of course only preliminary but it does seem to show that although a particular item is of very regular occurrence in the stomachs of a given group, that item may not have the overall importance in the diet of that group that is assumed by some other item of less frequent occurrence. A more refined method of estimating this point can probably be attempted when specific identification of the stomach contents is undertaken. The rate of occurrence of a given item in the stomachs of a species or size group is taken to indicate a measure of the abundance of that particular item at that time and seems to be more or less so as will be indicated in the tables given later in this section and the discussion involving the abundance or availability of the different invertebrates and fish as determined by our collecting methods, notably bottom plankton towing.

The cod stomach data have for purposes of analysis been separated into different calendar periods for the purpose of noting the change in food preference throughout the period of investigation, this preference assumedly being associated with availability of the different food items. These calendar periods are not of equal length nor do they correspond for the different areas, they were selected on the basis of an examination of the bottom temperature for the three areas and as such may or may not represent very valid entities. The temperatures (bottom) for each area are indicated below together with the calendar divisions used here and associated(?) with those temperatures.

Month	Baddeck Bay	Kempt Head	Whycocomagh Bay	
			A	B
VI-51	8.9(10)	4.7(1)	2.5(1)	7.5(1)
VII	16.2(4)	4.0(1)	3.0(1)	-
VII	15.9(2)	5.2(1)	-	-
IX	17.3(3)	-	-	17.1(1)
X	12.3(4)	-		11.8(1)
XI	9.6(4)	8.7(2)	5.0(1)	10.2(1)
XXI-51	3.5(2)	7.5(3)	1.8(1)	0.7(1)
V-52	4.4(3)	1.5(1)	2.5(1)	4.5(1)
VI	8.8(3) (?)	1.5(1)	2.7(1)	6.9(1)
VII-52	early 2.9(2)	-	-	-

The surface temperatures are not given here but may be found in the section dealing with the physical conditions of the lake.

For Baddeck Bay, the period May-June appears to be characterized by slowly rising bottom temperatures, August and September by rapidly rising temperatures by high stable summer temperatures (turnover complete, bottom approximately equal to surface), October and November by falling bottom temperatures, the bottom water being slightly warmer than that of the surface and December by stabilizing winter bottom temperature.

The same periodicity is used for Whycocomagh Bay with the exception that July is considered along with May and June of 1951 rather than with the following group. The temperature data here are rather meagre but the pattern of temperature changes appear to correspond to those of Baddeck Bay. The two ends of the dragging area in Whycocomagh Bay are of rather different depths hence the two sets of temperature values. Temperatures were likewise taken at both ends of the area for Kempt Head and Whycocomagh Bay but these have been added since the depth differences and temperatures are not appreciably different.

The data for Kempt Head are even more meagre particularly for critical periods. Since nothing is known of September and October temperatures, data for those months have been grouped. It is assumed that during that period there occurred a gradual rise in bottom temperature and that the period November, December is characterized by maximum bottom temperatures and the beginning of the winter temperature drop. This may be assuming too much as it is conceivable that the maximum is actually attained during the blank period and the temperatures of November, December represent the beginning of the winter decrease. Against this possibly are two points, the first that the temperatures of early November (8.7) and early December (8.3) are very similar indicating what would correspond to the summer stable period in the other shallower water areas, and the second that in November the bottom temperature is lower than the surface temperature while in December the reverse is true. There is furthermore the single temperature taken in mid-December which is considerably lower than that taken in early December (6.0) which after the comparatively stable temperature of the preceding month (or more) would tend to indicate the beginning of the winter temperature lowering.

Since only a short period of investigation is involved in 1952, no separation of the data has been made. The June bottom temperature for Baddeck Bay includes one doubtful value, which if eliminated would be given a value more in accord with our knowledge of the different phenology of 1951 and 1952. The temperatures for the corresponding calendar period for Kempt Head are notably different and the surface temperatures for Baddeck Bay for this period are somewhat lower in 1952 than in 1951.

Stomach Examination

Bras D'Or Lake 1951, 1952

Baddeck Bay - Cod

Date	Reference Numbers	Total
31-V-51	#36-64	29
5-VI-51	#116-126	11
30-VII-51	#664-667	4
2-VIII-51	#704-718	15
10-VIII-51	#764-770	7
15-IX-51	#933-943	11
17-IX-51	#950	1
24-X-51	#998-1000	3
30-X-51	#1008-1016	9
13-XI-51	#1063-1066	4
26-XI-51	#1119-1125	7
28-XII-51	#1250-1258	9
12-V-52	#1,2	2
13-V-52	#3-5	3
21-V-52	#16-27	10
4-VI-52	#64-70	7
18-VI-52	#89-100	12
		144

Whycocomagh Bay - Cod

Date	Reference Numbers	Total
12-VI-51	#208-224, except 210,215,220-222	12
13-VI-51	#234-260, except 241,247,254-256	22
17-VII-51	#551-553,558,561,566,588-599	22
18-VII-51	#600,606,607,614,615	5
8-VIII-51	#724-745	22
13-IX-51	#870-880	11
18-IX-51	#951-967	17
25-X-51	#1001-1007	7
2-XI-51	#1017-1029	13
28-XI-51	#1117,1118,1141-1143	5
27-XII-51	#1230-1240	11
30-V-52	#44-47	4
25-VI-52	#121-136	16
		167

Kempt Head - Cod

Date	Reference Numbers	Total
7-VI-51	#150-158	9
10-VII-51	#458-467	10
31-VII-51	#668-679	12
11-IX-51	#861-869	9
14-IX-51	#881-895	15
22-X-51	#978-991	14
7-XI-51	#1039-1042	4
20-XI-51	#1082-1090	9
29-XI-51	#1144-1155	12
22-XII-51	#1189-1199	11
15-V-52	#6-15,28	11
29-V-52	#29-35	7
2-VI-52	#48-63	16
21-VI-52	#101-120	20
		159

Common Hake

Date		Otolith Nos.	Total
2-VIII-51	B.B.	#720-723	4
16-VIII-51	B.B.	#800-805	6
24-VIII-51	B.B.	#806-816	11
13-XI-51	B.B.	#1052-1062	11
20-XI-51	K.H.	#1091-1095	5
26-XI-51	B.B.	#1126-1131	6
22-XII-51	K.H.	#1207-1211	5
			48

Smelt

Date		Reference Numbers	Total
24-VIII-51	B.B.	#817-821	5
15-IX-51	B.B.	#930-932	3
22-X-51	K.H.	#992-995	4
13-XI-51	B.B.	#1043-1051	9
20-XI-51	K.H.	#1105-1111	7
26-XI-51	B.B.	#1133	1
29-XI-51	K.H.	#1156-1159	4
29-V-52	K.H.	#36-43	8
			41

Winter Flounder

Date		Otolith Numbers	Total
2-VIII-51	B.B.	#719	(1)
16-VIII-51	B.B.	#760-763,789,790,799	7
20-XI-51	K.H.	#1101-1104	4
26-XI-51	B.B.	#1135,1136	2
22-XII-51	K.H.	#1203-1206	4
			17+(1)

Mailed Sculpin - Kempt Head

Date	Otolith Numbers	Total
25-VIII-51	#822	(1)
22-X-51	#996-997	2
20-XI-51	#1113-1114	2
		4 (1)

Canadian Plaice - Kempt Head

Date	Otolith Numbers	Total
10-VII-51	#468-477	10
20-XI-51	#1096-1100	5
22-XII-51	#1212-1214	3
		18

Miscellaneous Species

Date	Species	Place	Otolith Numbers	Total
20-XI-51	Herring	K.H.	#1112	1
20-XI-51	Alligatorfish	K.H.	#1115	1
20-XI-51	4 Bearded Rockling	K.H.	#1116	1
26-XI-51	Pollock	B.B.	#1132	1
26-XI-51	Long-horned Sculpin	B.B.	#1134	1
26-XI-51	Yellowtail	B.B.	#1137-1138	2
26-XI-51	Brill	B.B.	#1139-1140	2
22-XII-51	Brill	K.H.	#1215-1216	2
22-XII-51	Yellowtail	K.H.	#1217	1
22-XII-51	Longhorn Sculpin	K.H.	#1218	1
				13

Preliminary Stomach Examination of Cod and Other Fishes

Bras D'Or Lake 1951, 1952.

Otolith No.	Length	Contents
36	31	Mysids only;
37	33	Mysids; gammarids; shrimp; polychaets; 1 large crust.; 75% disc. un.;
38	37	Mysids; gammarids; caprellids; shrimp; probably Crago; isopods; polychaets?; stones?; 25% discarded;
39	33	Fish; polychaets; Crago?; gammarids; Mysids; 50% disc. unident.;
40	55	Fish;
41	29	Mysids; polychaets; 1 bivalve, probably Yoldia; 20% disc. unident.;
43	36	Mysids; gammarids; polychaet; 75% disc. unident.;
44	29	Mysids; polychaets; crab; 25% disc. unident.;
45	29	Fish; mysids; gammarids; polychaets; 35% disc. unident.;
46	35	Shrimp; gammarids; polychaets; 10% disc. unident.;
47	35	Mysids; gammarids; 50% disc. mainly polychaet;
48	33	Mysids; 1 shrimp; 2 isopods; 20% disc. unident.;
49	37	Gammarids; mysids; a few polychaets; 50% disc. unident.;
50	28	Mysids; 1 gammarid; 5% disc. unident.;
51 or 47	34	Gammarids; mysids; a few polychaets; 2 fish; 40% disc.-Gamm.; mys.;
52	31	Shrimp; mysids; caprellids; polychaets; 50% disc. unident.;
53	34	Mysids; gammarids; 35% disc. unident.;
54	35	Mysids; a few shrimp; 1 polychaet; 60% disc. mainly polych.;
55	33	Mysids; 1 caprellid; 1 polychaet; 50% disc. mainly polych.;
56	35	Mysids; 2 shrimp; 40% disc. including parts of polychaets(4);
57	36	Mysids; 1 shrimp; 2 polychaets; 10% disc. unident.;
58	37	Mysids; polychaets; shrimp(1); 2 gammarids; 60% disc. unident.;
59	49	Polychaets; ?; 75% discarded - worms;
60	34	Gammarids; 60% discarded;
61	35	Mysids; a few gammarids; 1 shrimp; 60% discarded;
62	36	Gammarids; a few mysids; 50% discarded;
63*	33	Mysids; gammarids;
64*	32	Gammarids; mysids;
116	38	2 crabs; 1 mysid; 60% discarded including polychaet parts;
117*	59	1 fish;
118	27	Polychaets; gammarids; a few mysids; 60% discarded mainly polych.;

* Entire contents retained for later examination.

Otolith No.	Length	Contents
119*	28	Mysids; 1 shrimp?; worms?;
120	30	Mysids; gammarids; 1 shrimp; 50% discarded - mostly polych.;
121*	31	Mysids;
122	30	Mysids; 1 hermit crab; 25% disc-polychaets;
123	37	Mysids; 1 gammarid; 1 polychaet; 25% disc.- polychaets;
124*	45	Fish; shrimp; worms;
125	40	Gammarids; 1 caprellid; worms; 75% disc- mainly polychaets;
126*	38	Mysids; shrimp; parts of hermit crab?;
150		discarded;
151	51	Shell of bivalve - Yoldia?; otherwise empty;
152*	-	1 fish; hermit crab?; plus;
153*	45	2 shrimp;
154	40	worms plus much unident. including some very small items; 75% discarded - probably polychaet;
155	33	Empty;
156*	24	Mysids; gammarids;
157	-	Mysids; shrimp; gammarids; 10% discarded;
158	18	Mysids; gammarids; 1 shrimp; 5% discarded;
208	49	Cumaceans; 1 gammarid; 1 worm; 60% discarded;
209	51	1 gammarid;
211	38	a few mysids; 1 gammarid;
212	43	1 cumacean?;
213	40	Cumaceans; 60% discarded - mainly polychaets; contents well dig.;
214	51	Polychaets; 1 cumacean; many nematodes; 85% disc.; cont. well dig.;
216	13	Empty;
217	18	Caprellids; 1 mysid; 5% discarded;
218	24	Cumaceans; mysids; caprellids; gammarids; 25% disc.;
219	61	1 gammarid;
223	34	A few cumaceans; caprellids; 1 gammarid; 10% discarded;
224	38	Gammarids; sand; parts of polychaets; 95% discarded;
237*	17	Cumaceans;
234*	46	Cumaceans; plus;
235*	58	Almost empty; nothing distinguishable;
236*	20	A few caprellids?;
238	17	Gammarids; plus; 80% discarded;
239	17	Caprellids; mysids; gammarids; 0discarded;
240	14	Packed with gammarids; 0 discarded;
242	42	Cumaceans; polychaets; 1 gammarid; 85% discarded;
243*	69	Nothing distinguishable;
244	56	Cumaceans; a few gammarids; polychaets; 90% discarded - mainly poly.;
245	48	Cumaceans; polychaets; gammarids; 80% discarded;

Otolith No.	Length	Contents
246*	44	Gammarids; almost empty;
248	38	Gammarids; polychaets; 95% disc. appears to be mainly polych.;
249	65	Fish; 3 caprellids; 1 cumacean; 30% disc. mainly fish;
250*	74	Polychaets; plus;
251*	36	Cumaceans; gammarid; polychaet; many nematodes;
252	19	Gammarids; mysids; polychaets; 50% disc. mainly polych.;
253	46	Polychaet plus; 95% disc. including parts of polychaets;
257*	23	Cumaceans; gammarids;
258	28	Gammarids; 1 polychaet; 50% disc. mainly parts of gammarids;
259*	29	Gammarids; egg cases of snail?;
260	36	Tubeworm tube; polychaets; 50% discarded?;
458*	28	Nothing distinguishable;
459	26	1 polychaet; 1 mysid; 5% disc.;
460	43	Almost empty; part of 1 polychaet; 0 discarded;
461*	24	Gammarids; caprellids; tubeworm tubes;
462	28	Candycane gammarids; small white bodies; 25% discarded;
463	27	Large polychaet; 5% discarded;
464*	36	Mysids; shrimp; Yoldia; plus other interesting items;
465	30	Polychaets; gammarids; 20% discarded - parts of gammarids;
466*	29	Nothing distinguishable;
467	31	Full; mysids- bits and pieces; 95% discarded - mysid;
551*	28	Almost empty; 1 mysid; plus;
552	31	Cumaceans; polychaets; 1 caprellid; 95% discarded-polychaet.;
553*	30	Tubeworm tubes; caprellids; shrimp;
558	28	Tubeworm tubes; Yoldia; 10% disc. - bivalve plus;
561*	37	Well digested, nothing distinguishable;
562*	27	Mysids; gammarid;
563	25	Caprellids?; parts of other large crustaceans; 50% discarded;
564	34	Gammarids; 50% discarded;
565	28	Cumaceans; gammarids; isopods; 1 bivalve; 15% discarded;
566	24	Empty;
588*	18	Mysid;
589	17	Caprellid; polychaet; 90% discarded - parts of crustaceans;
590	20	Gammarids; polychaets; 75% discarded - polychaetous;
591*	24	Polychaet; gammarid; cumacean;
592	24	Polychaets; 1 gammarid;1 cumacean; 75% disc. - polych., crust.;

Otolith No.	Length	Contents
593	27	Polychaets; 5% discarded;
594*	30	Polychaet; gammarid; 1 fish;
595	27	1 cumacean; 99% discarded - polychaets, well digested;
596*	35	Polychaets; gammarid;
597	34	1 gammarid; 0 discarded;
598	30	1 gammarid; 99% discarded - highly digested polychaets;
599	29	Empty;
600	46	Almost empty; 1 gammarid; parts of shrimp; part of polychaet;
606*	47	Polychaet; gammarid; plus;
607*	52	Almost empty; tubeworm tubes;
614	43	Cumaceans; gammarids; polychaets; 95% discarded - digested polych.
615	49	Empty; a few polychaet setae;
664	42	Crab - 1½" wide, prob. C. irroratus; 2 gammarids; 1 stone; 0 disc.;
665	12	Gammarids; mysids; polychaets; 0 discarded;
666*	12	Gammarids; polychaets; plus;
667	12	Shrimp; polychaet; gammarid; mysid;
668	36	Polychaet; shrimp; 1 gammarid; 1 mysid; small white bodies; 40% discarded - polychaet plus;
669	29	1 mysid; parts of polychaets; 0 discarded;
670*	27	Gammarid; caprellid; polychaet; shrimp;
671*	25	Polychaets;
672*	30	Gammarids; plus;
673	27	Polychaets, mainly tubeworm; 2 gammarids; 2 mysids; small white bodies; 10% discarded;
674*	40	Well digested; bivalves - probably Yoldia; mysids; gammarid; polychaet setae;
675	40	Almost empty; 1 nereid plus tubeworm; 1 gammarid; 10% disc. poly.;
676	30	Well digested; 1 crab; mysids; polychaet (tubeworm); 75% disc. crust.;
677	23	Tubeworm; gammarids; mysids?; 25% discarded - crustacean;
678*	23	Gammarids; shrimp; polychaet;
679*	24	Tubeworm; crustacean probably gammarid; a few bivalves;
704*	38	Gammarid; shrimp; mysid; bivalve;
705	33	2 shrimp; polychaets; gammarids; 1 mysid; bivalves, small; 30% discarded - mainly polychaets;
706*	36	Mysids only;
707	35	Gammarids; shrimp; plus; 50% disc. - mainly crust., some polychaet.
708	39	1 hermit crab; 1 isopod; polychaets; gammarids; 60% discarded mainly polychaets;

Otolith No.	Length	Contents
709	38	Gammarids; mysids; polychaet jaws; yellow eggs? 25% discarded - polychaets; eggs; crustacean;
710	39	Stomach inside out; no statement;
711	45	Polychaets; crab? legs; 10% discarded;
712	48	Polychaets; 75% discarded - polychaets plus bivalve?, no shell found but appears to resemble bivalve guts;
714	66	2 fish; one of which is a Common Hake;
713*	44	Polychaets; shrimp; plus;
715*	48	Polychaets;
716	43	Almost empty; in fact it is empty; stomach lining, possibly some well digested food;
717*	43	Polychaets;
718	49	Gammarids; 75% discarded - gammarids, polychaets;
724	36	Almost empty; part of mysid?; 0 discarded;
725	38	Egg case?; polychaet; 10% discarded - egg case, polychaet;
726*	36	Tubeworm tubes; bivalves; plus;
727	33	?; polychaet?; 50% discarded- polychaet, plus?;
728*	43	Almost empty; jellylike mass - stomach lining?; polychaet setae; mysid eyes;
729	43	Tubeworm tubes; polychaets; caprellid; plus?; 75% discarded - mainly polychaet;
730*	41	Polychaets;
731	32	No statement; empty or contents lost; hole in stomach;
732	55	Caprellids; tubeworm tubes; 90% discarded - stomach lining, fish, polychaet or bivalve?;
733*	50	Nothing distinguishable;
734	59	1 caprellid; stones; 95% discarded - polychaets, also possibly fish??; many nematodes;
735*	68	Almost empty; well digested; a few fish scales noted;
736*	63	3 fish;
737*	56	Caprellid; polychaet?; fish?;
738	40	Tubeworm tubes; 1 mysid?; 1 crab - very small?; 20% discarded - including stomach lining?;
739*	29	Tubeworm tubes; caprellid; bivalve;
740	28	Cumaceans; gammarids; 1 caprellid; egg case; crust. - 3 unid.; tubeworm tubes; 60% discarded - polychaet; egg case; crust. limbs;
741*	24	
742	25	3 Caprellids; 1 gammarid; eggs of?; 0 discarded;
743*	17	

Otolith No.	Length	Contents
744	15	Nothing distinguishable but crustacean appendages; almost all retained for further examination;
745	36	Caprellids; polychaets; 1 gammarid; 75% discarded - polychaet; crustacean appendages; stones; etc.;
764	19	Stomach torn; 1 polychaet; 1 gammarid; 10% discarded;
765*	17	
766	17	Polychaets? with eggs - orange; gammarids; 50% discarded - mainly polychaet?;
767*	14	
768	15	Gammarids; 1 mysid; 75% discarded - crustacean, mostly gammarid;
769	13	Small mysids or larval shrimps?; 1 gammarid; 10% disc. - mysid, gammarid appendages;
770*	12	
719*	17-35	W.F.Bivalves; worms; 7 stomachs;
720*	35	C.H.Mysids; 1 shrimp;
721*	29	C.H.Mysids; 1 polychaet;
722*	21	C.H.Mysids; polychaet setae;
723*	17	C.H.Shrimp; mysids; gammarids;
760*	36	W.F.Worms; pelecypods; gastropods; 2 stones;
761*	28	W.F.Worms; bivalves;
762*	28	W.F.Worms, mainly tubeworms; cumaceans; bivalves; caprellids; gamm.;
763*	32	W.F.Gastropods; pelecypods; polychaets;
789*	23	W.F.Almost empty; bivalves; cumaceans; polychaet setae;
790*	21	W.F.Polychaets;
729*	12	W.F.Polychaets;
800*	50	C.H.Empty;
801*	33	C.H.Mysids;
802*	29	C.H.Bivalves;polychaets;gammarids;
803*	26	C.H.Polychaets;shrimp;
804*	22	C.H.Gammarids;
805*	22	C.H.Polychaets; gammarids;
806*	34	C.H.Fish;
807*	28	C.H.Polychaets; mysids; shrimp;
808*	24	C.H.Shrimps;mysids;
809*	21	C.H.Polychaets; gammarids;
810*	23	C.H.Shrimps; polychaets;
811*	23	C.H.Fish; gammarids; shrimp; polychaets; bivalves;
812*	20	C.H.Polychaets; gammarid; shrimp;
813*	18	C.H.Polychaets; shrimp; gammarid;
814*	17	C.H.Shrimp; polychaet; gammarids; crab;
815*	16	C.H.Shrimp; gammarids; polychaets;
816*	13	C.H.1 gammarid;
817*	16	Sm. 1 shrimp; polychaet; bivalve; plus?;
818*	16	Sm. Empty;
819*	16	Sm. Mysids;
820*	17	Sm. Empty;
821*	16	Sm. Empty;

Otolith No.	Length		Contents
	16-17	Sm.(3)	Empty - 1; Mysids - 2;
	11-12	M.Sc.(3)	Mysids - 3;
		C.H.(5)	Mysids - 5;
861	37		Shrimps; mysids?; gammarid?; eggs; plus; 75% disc.-stomach lining; plus?;
862*	39		Polychaets; mysids;plus?;
863	30		Almost empty; 2 gammarids; plus?; 80% discarded - ?;
864*	29		Mysids; polychaets; plus;
865	47		Rotted - discarded;
866	36		Polychaets (white "tubes" also?); crab; mysids; gammarid; 75% discarded - polychaet;
867	31		Crabs; polychaets; mysids; gammarids; plus; 10% discarded;
868*	29		Crabs; polychaets; mysids; mollusc; plus;
869*	32		Crab; mysids; shrimp; polychaet; plus;
870*	40		Caprellids; polychaets;
871*	52		Polychaets; caprellids; plus;
872	42		Fish?; polychaets; caprellids; mysids; 1 gammarid; 5% disc.;
873	40		Almost empty; 1 gammarid; minute eggs; crust. app.; 0 disc.;
874*	40		Polychaets; mysids; fish?; plus;
875	50		Fish?;
876*	30		Polychaets; caprellids; mysids; (3 clams used as bait);
877	55		Polychaets; gammarids; fish?; (clam - bait);
878*	54		Fish;
879	46		Polychaets (tubeworms); 1 mysid; 1 gammarid; Caprellid app.; (clam - bait); 50% discarded - polychaet plus;
880*	47		Fish; polychaets; caprellids;
881	17		mysids; 10% discarded - crustacean appendages;
882*	19		
883*	18		Mysids;
884*	25		Mysids; polychaets;
885	23		1 shrimp; polychaets; mysids; gammarids; 25% discarded;
886*	25		
887	30		Tubeworms?; 1 mysid; gammarids; 10% discarded;
888	28		Polychaets; mysids; gammarids; 50% discarded - mainly poly.;
889*	28		Polychaets; mysid;
890	34		Crabs; polychaets; mysids; gammarids; 20% disc. - crab; some poly.;
891*	35		Tubeworm; mysids; gammarids;
892	35		Empty;
893	40		Fish; 0 discarded;
894*	39		Crab; polychaets;
895*	41		Almost empty; tubeworm; gammarid?;
930	14	Sm.	Fish (fry); mysids; cumacean; almost empty; 0 discarded;

Otolith No.	Length	Contents
931	16 Sm.	Copepods;
932	24 Sm.	Empty;
933	33	Crab; shrimp?; polychaet; mollusc; 75% discarded - polychaet, small as indicated by size of jaws;
934*	51	Almost empty; bivalve; tubeworm?;
935	40	Almost empty; mysids; 0 discarded;
936*	28	Packed with well digested crustacean matter; gammarids plus?;
937*	28	Packed with gammarids;
938*	19	Gammarids; polychaets;
939*	16	Packed with gammarids;
940	16	Packed with gammarids and polychaets; 10% discarded mainly poly.;
941*	14	Packed with mysids;
942	13	Gammarids; mysids; polychaets; 90% discarded - crustacean;
943*	15	
950*	40	Mysids; bivalves;
951	26	Polychaets; mysids; gammarids; 50% disc. - crustacean;
952	31	Gammarids; parts mysids; parts caprellids; 25% discarded;
953*	34	Gammarids;
954	23	Mysids; polychaets; cumaceans?; fish?; 10% discarded - crustacean;
955*	23	Gammarids; mysids; polychaets;
956*	19	
957	40	Well digested polychaet; 90% discarded - polychaet;
958	32	Stomach torn badly; polychaet setae; otherwise empty;
959	36	Mysid; polychaet; stone; 50% discarded - polychaet setae;
960*	37	Almost empty; polychaet; plus;
961	34	Stomach torn; almost empty; polychaets; fish scale; 0 discarded;
962*	30	Almost empty; gammarid; plus;
963	34	Stomach torn; almost empty; polychaet;
964*	35	Polychaets (tubeworms);
965*	36	Polychaet; plus?; almost empty;
966	41	Empty;
967*	42	Almost empty; polychaet; mysid;
978*	39	Polychaets; mysids;
979	39	Stomach torn; crab; polychaet; as usual - small white bodies; 20% discarded - crustacean;
980	37	Mysids; shrimp? polychaets; fish scales; plus small items; 50% discarded - mainly unidentified;
981*	37	Shrimps?; polychaets; gammarids;
982	32	Shrimps?; polychaets; mysids; crab claws; 25% disc. mainly poly.;

Otolith No.	Length		Contents
983*	32		Polychaets; bivalves; shrimp?; mysids;
984*	33		Crab; polychaets; shrimp?; gammarid;
985*	27		Mysids; crab;
986	28		Packed full; crabs; mysids; gammarids; shrimp; 5% disc. - crust.;
987*	28		Mysids; polychaet; part of crab?;
988	25		Crabs; mysids;
989	21		Mysids; crab; 50% discarded - mysids;
990*	20		Mysids;
991*	19		
992	17	Sm.	Empty;
993	17	Sm.	Empty;
994	18	Sm.	Mysids; 10% discarded - mysid;
995	18	Sm.	Empty;
996	12	M.Sc.	Gammarids?; tubeworm; 0 discarded;
997	12	M.Sc.	Mysids; gammarids; shrimp?; polychaet?; 5% discarded - mysid;
998*	39		Shrimps?; mysids;
999	39		Shrimps; 1 gammarid; fish bone; 50% discarded - shrimp;
1000*	39		Shrimp; polychaet; mysids; bivalve;
1001	12		Mysids; shrimp?; 1 gammarid; 25% discarded - mysid;
1002*	24		Shrimp?; polychaets;
1003	30		Fish; shrimp; polychaets; 2% discarded - polychaet;shrimp;
1004*	37		Polychaets; shrimp;
1005	41		Shrimp; fish; polychaet; 50% discarded - shrimp, fish, polych.;
1006*	44		Fish; shrimps; polychaets;
1007	50		Empty;
882	11-12	M.Sc.	Empty-4; unidentified - 3;
1008	37		Shrimps; mysids; polychaet setae, mandibles; 10% disc. - shrimp;
1009*	37		Shrimps; polychaets; mysids;
1010*	38		Shrimps; polychaets; part of crab; fish?; bivalves, small;
1011	42		Shrimps; 1 mysid; 5% discarded - shrimp app.; polych. setae;
1012*	43		Crabs; shrimp; polychaet; small bivalves;
1013*	43		Shrimps; bivalves (Yoldia);
1014*	44		Shrimps; Yoldia;
1015	46		Crab; shrimps; polychaet setae; 10% discarded - do;
1016	49		Empty but for one stone; polychaet setae;
1017*	14		
1018*	18		Packed with caprellids; a few gammarids;
1019	19		Shrimps; 1 mysid; 10% discarded - shrimp;
1020	20		
1021*	22		Shrimps; polychaets;
1022	24		Bits and pieces of caprellids; 25% discarded - do.;
1023*	23		Shrimps; polychaets;
1024	26		Almost empty; polychaet setae; part of shrimp; 0 discarded;
1025	30		Part of shrimp; part of caprellid; polychaet; 25% disc. -?;

Otolith No.	Length	Contents
1026*	31	Shrimp; polychaets;
1027	34	Polychaets; 5% discarded - polychaet;
1028*	37	Fish; shrimp; caprellids;
1029	39	Part of shrimp; part of mysid; polychaet; 50% disc.-polych.;
1039*	21	Mysids; shrimp; gammarids;
1041*	31	Crabs; mysids; gammarids;
1041	32	Shrimps; mysids (small); gammarids; small white body; 5% discarded - crustacean;
1042	39	Shrimps; mysids; gammarids; bivalves; polychaets; 40% disc.- mainly brown matter, some crust., some bivalve;
1043	19 Sm.	Empty;
1044	18 Sm.	Empty;
1045	16 Sm.	Empty;
1046	16 Sm.	Empty;
1047	14 Sm.	Empty;
1048*	14 Sm.	Plankton;
1049*	14 Sm.	Plankton;
1051*	13 Sm.	Stomach full of plankton; mouth full of mysids; 1 small shrimp, 2 gammarids; 5% discarded - mysid;
1051	14 Sm.	Unidentified;
1052	34 C.H.	Fish; shrimps; mysids;
1053*	31 C.H.	Fish; shrimps;
1054	27 C.H.	Polychaets; shrimp; 0 discarded;
1055*	23 C.H.	Almost empty; mysid eyes; plus;
1056	21 C.H.	Shrimps; 5% discarded;
1057*	20 C.H.	Nothing identified;
1058	19 C.H.	Empty;
1059	16 C.H.	Packed with small mysids; a few small shrimp; 1 isopod; 10% discarded;
1060*	13 C.H.	Small mysids; shrimp;
1061*	12 C.H.	Mysids; a few shrimp;
1062	12 C.H.	Mysids; a few small shrimp; 0 discarded;
1063*	50	Several small flatfish;
1064	49	Many small crabs; several bivalves (Yoldia); 2 shrimp; 1 plum stone; 1 stone; tubeworm; 5% disc.-crab; poly.;biv.;
1065*	44	Fish; black item?; shrimps;
1066	37	Small shrimps; polychaets; 20% discarded - shrimp, polychaet setae;
1082*	43	1 large shrimp;
1083	40	Mysids, large and small; small shrimps; tube-worm tubes; gammarids; bivalves; small white bodies; 75% discarded - well digested crustacean appendages, mysid eyes;
1084*	40	Bivalve (Yoldia); shrimps; mysids; gammarid;
1085	34	Nematodes, large and small; bivalves; shrimp; polychaet; mysids; 1 nebalacean?; small white bodies; 60% discarded - polychaet; bivalve?;

Otolith No.		Length		Contents
1086*		32		Crab; polychaet; shrimp; mysid; plus;
1087		31		Mysids, many small, few large; shrimps; 1 gammarid; many small nematodes; small white bodies; 50% discarded - crustacean appendages etc.; mysid eyes;
1088		28		Many small mysids; shrimp; 1 small bivalve; small white bodies; many small nematodes; 50% discarded - mysid;
1089*		26		Almost empty; mysid; small nematodes; plus;
1090		11		Shrimp; gammarid; small nematode; 0 discarded;
1091		45	C.H.	2 mysids, 1 large, 1 small; 0 discarded; stomach torn;
1092*		38	C.H.	Shrimp; mysids;
1093		34	C.H.	Mysids, large and small; 1 shrimp; 5% discarded - crustacean;
1094*		30	C.H.	Packed with mysids, mainly small;
1095		26	C.H.	Mysids; small nematodes; 5% discarded - crustacean;
1096		38	C.P.	Polychaets; part of bivalve; 20% discarded - polychaet, plus;
1097		33	C.P.	Mysids, large; bivalves; part of caprellid?; 0 discarded;
1098*		18	C.P.	Mysid;
1099		15	C.P.	Empty;
1100		11	C.P.	Empty;
1101		35	W.F.	Empty;
1102		30	W.F.	Empty;
1103		25	W.F.	Full of bivalves;
1104		17	W.F.	Empty;
1105*	M.	19	Sm.	Mysids;
1106*	F.	19	Sm.	Empty?;
1107	M.	18	Sm.	Nothing identified;
1108*	F.	17	Sm.	Mysids;
1109*	M.	16	Sm.	1 large mysid;
1110*		13	Sm.	Nothing identified;
1111*	F.	18	Sm.	Mysids; 1 shrimp;
1112*		19	H.	Nothing identified;
1113*		13	M.Sc.	Mysids, small;
1114*		13	M.Sc.	Mysids, small;
1115*		14	All.	Gammarids;
1116*		24	4B.R.	Polychaet; small gammarids;
1119		45		Crab; shrimp; polychaet; 10% discarded - shrimp; polychaet;
1120*		39		Packed full; 3 small smelt (in stomach); polychaets; shrimp;
1121*		14		Empty;
1122*		42		Shrimp; polychaet; mysid;
1123 or 1124		47 or 48		Full; 5 small smelt (4 in mouth); shrimp; bivalves; polychaets plus?; 2% discarded - bivalve; polychaet; shrimp;
1123 or 1124*		47 or 48		Full; crab; shrimp; polychaets; bivalves; mysids;
1125		52		6 smelt (4 in mouth); green matter?; 1 shrimp; 0 discarded;

Otolith No.	Length	Contents
1126	34 C.H.	Stomach torn; small shrimp; 0 discarded;
1127*	28 C.H.	Stomach torn; part of polychaet; part of shrimp;
1128	23 C.H.	Shrimp; mysid; polychaet; 70% discarded - polych.; shrimp; mysid;
1129*	18 C.H.	2 mysids; 1 shrimp;
1130*	16 C.H.	
1131	15 C.H.	Shrimp; 1 large, 1 small; mysid eyes; 0 disdarded;
1132	21 Poll.	Stomach torn; polychaet mandibles; small white bodies; 0 discarded;
1133	16 Sm.	Mysids; gammarids(1); 0 discarded;
1134	30 L.H.Sc.	Crab; polychaet setae; 0 discarded;
1135	18 W.F.	Empty;
1136	11 W.F.	Empty;
1137	17 Y.T.	Polychaets 1 isopod; 0 discarded;
1138	15 Y.T.	Shrimp; polychaet; isopod; 0 discarded;
1139	19 Br.	Mysids, all but one small; 0 discarded;
1140	14 Br.	Small mysids;
1117	51	Polychaets; shrimp; 1 small nematode (½ cm.); 5% discarded - polychaet, plus;
1118	47	Shrimp; polychaet?; caprellid; part of bivalve shell; (2 pieces of herring bait, discarded); 2% disc. - polychaet, shrimp;
1141	45	Full; mysids; 1 gammarid; polychaet; 95% discarded - polychaet, well digested;
1142*	43	Polychaets; shrimp; mysid; plus;
1143	43	1 shrimp; 1 mysid; eggs probably from herring; 1 piece of bait herring and most of eggs discarded;
1144*	14	Mysids;
1145	25	Packed with nematodes, mainly very large, but some very small mysids; 1 gammarid; 10% discarded - ?;
1146*	28	Hermit crab; mysids; several nematodes, small;
1147	31	Hermit crab; shrimps; mysids (including yellow eyes); 1 gammarid; small nematodes; 5% discarded - do.;
1148*	31	Polychaets; mysids; part of crab; gammarids; fish eggs; nematodes;
1149	31	Polychaets; mysids; shrimp; fish eggs; small white bodies; many nematodes, medium and small; 50% discarded - mainly white tube - polychaet?; some crustacean;
1150*	33	Mysids, mainly yellow eyes;
1151	38	Part of crab; mysids, mainly yellow eyes; shrimp; gammarids; polychaet; fish eggs; small white bodies; small nematodes; 50% discarded - crab; mysid; polychaet;

Otolith No.	Length		Contents
1152	41		Hermit crabs; small white bodies; 1 small nematode; 10% discarded - crab; stomach lining;
1153*	44		Crab; shrimps; fish eggs; small nematodes;
1154	44		Crab; polychaet; shrimp; mysid, small red eye; eggs; small white bodies; small nematodes; 60% discarded - polychaet; crab; plus;
1155*	47		Bivalve; shrimp; polychaet;
1156*	19	Sm.	Small mysids; gammarids;
1157*	18	Sm.	Small mysids;
1158*	17	Sm.	Nothing identified;
1159*	15	Sm.	Mysids;
1189*	65		Fish;
1190*	52		Fish; polychaet; shrimp; gammarid;
1191*	49		Crab; shrimp; polychaet; small white bodies; lobster?;
1192*	46		Fish; crab;
1193*	43		Hyperiids; mysids; stones; plus;
1194*	43		Polychaets; crab; fish; mysids; eggs;
1195*	39		Shrimp; mysids; polychaets;
1196*	40		Hermit crabs; shrimp; hyperiids; mysids; polychaets;
1197*	36		Hermit crab; shrimp; polychaets mysids;
1198*	36		Hermit crabs; polychaets; hyperiid; bivalve; mysid;
1199*	33		Shrimp; polychaet; mysid;
1203	36	W.F.	Empty;
1204	31	W.F.	Empty;
1205	27	W.F.	Empty;
1206	25	W.F.	Empty;
1207	35	C.H.	
1208	35	C.H.	
1209	29	C.H.	
1210	25	C.H.	
1211	23	C.H.	
1212	39	C.P.	Empty;
1213	29	C.P.	Empty;
1214	23	C.P.	Empty;
1215	31	Br.	Empty;
1216	17	Br.	Empty;
1217	34	Y.T.	Empty;
1218	30	L.H.Sc.	Empty;
1230*	40		Polychaets; mysids;
1231*	37		Polychaets; shrimp; mysid;
1232*	37		Gammarids; caprellids;
1233*	38		Polychaets; caprellids; mysid;
1234*	33		Gammarids; polychaets; caprellids;
1235*	32		Polychaets; caprellids;
1236*	31		Shrimp; polychaet; mysid;
1237*	29		Shrimp; polychaet; caprellid;
1238*	28		Polychaet; shrimp;
1239*	28		Polychaet;
1240*	10		Polychaet; 1 gammarid;
1250*	18		
1251*	29		Polychaet; shrimp; mysid;

Otolith No.	Length	Contents
1252*	35	Fish; mysids; shrimp;
1253*	36	Mysids; isopod; bivalve;
1254*	39	Polychaet; shrimp; mysids; gammarids;
1255*	39	Polychaets; shrimp; gammarid;
1256*	39	Shrimp; fish; mysid;
1257*	44	Crab; polychaet; shrimp;
1258*	44	Shrimp; polychaet; isopods; mysids;

Stomach No.	Length	Contents
1	36-40	Shrimp; polychaet; gammarid;
2	36-40	Polychaet; shrimp; gammarid;
3		Isopods; polychaets; gammarids;
4		Polychaet; mysid; bivalve; many small nematodes;
5		Isopods; polychaet shrimp; bivalve;
6	10-14	Mysids; shrimp; small nematodes;
7	15-19	Mysids; polychaet;
8	15-19	Polychaet; mysids; shrimp; small nematodes;
9	15-19	Polychaet; gammarid; mysid;
10	25-29	Shrimp;
11	25-29	Nothing identified;
12	25-29	Polychaet; hermit crab;
13	30-34	Polychaet; shrimp; gammarid;
14	35-39	Polychaet; shrimp;
15	35-39	Polychaet;
16	30-34	Fish; shrimp; polychaet; small nematodes;
17	30-34	Shrimp; polychaet; mysid;
18	30-34	Fish; polychaet;
19	35-39	Mysids; polychaet; shrimp; isopods; gammarid; small nematodes;
20	35-39	Polychaet; mysids; shrimp; gammarid; small nematodes;
21	35-39	Fish; polychaets; shrimp; gammarid; small nematodes;
22	35-39	Many isopods; polychaet; shrimp; mysid;
23	35-39	Fish; polychaet; shrimp; mysid;
24	35-39	Fish; polychaet shrimp; mysid;
25	40-44	Fish; shrimp; N.B. Nematodes found in bottle;
26	40-44	Polychaet; shrimp; mysid; 25,26,27 - preserved
27	40-44	Polychaet; crab; shrimp; in separate vial;
28	10-14	Mysids, immature; gammarid;
30	15-19	Mysids; small nematode;
31	15-19	Polychaet; shrimp; mysid; gammarid; small nematode;
32	30-34	Gammarids; mysid; many nematodes; plus;
33	30-34	Shrimp; polychaet; gammarid;
34	30-34	Hermit crab; shrimp; small white bodies;
35	30-34	Polychaet; hermit crab; mysids; gammarid; nematodes;
36 Sm.	14-17	Mysids; gammarid;
37 Sm.	14-17	Shrimp;
38 Sm.	14-17	Empty;
39 Sm.	14-17	Mysids; small white bodies;
40 Sm.	14-17	Gammarids; shrimp;

Stomach No.	Length	Contents
41 Sm.	14-17	Gammarids; small white bodies;
42 Sm.	14-17	Polychaet;
43 Sm.	14-17	Empty;
44	15-19	Gammarids; mysid;
45	40-44	Polychaet; caprellid; plus?;
46	40-44	Polychaet; shrimp; cumacean; nematode;
47	40-44	Polychaet; gammarid; cumacean; nematodes;
48	15-19	Polychaet; gammarid;
49	15-19	Polychaet; mysid; gammarid;
50	15-19	Polychaet; gammarid; shrimp;
51	15-19	Polychaet; gammarid; mysid?; nematodes;
52	20-24	Polychaet; shrimp; mysid; gammarid; nematode;
63	20-24	Polychaet; gammarid; shrimp;
54	20-24	Shrimp; mysids; gammarid; nematodes;
55	20-24	Empty;
56	25-29	Polychaet; shrimp; gammarid; mysid; nematode;
57	25-29	Polychaet; gammarid;
58	25-29	Hermit crab; polychaet; mysid; shrimp; gammarid; nematode;
59	25-29	Shrimp; polychaet; gammarid; nematode;
60	25-29	Packed with polychaets;
61	30-34	Shrimp; mysids; hermit crab; polychaets; gammarid; packed with nematodes;
62	30-34	Polychaets; shrimp; gammarids;
63	30-34	Polychaet; shrimp;
64	35-39	Polychaets; gammarids;
65	35-39	Polychaet; shrimp mysid; gammarid;
66	35-39	Crab; shrimp; hermit crab; polychaet;
67	40-44	Polychaet; hermit crab; shrimp; bivalve;
68	40-44	Polychaet; hermit crab; shrimp; mysid; gammarid; nematodes;
69	40-44	Polychaet; shrimp; gammarid;
70	40-44	A few isopods;
89	42	Empty;
90	37	Mysids; 1 isopod;
91	34	Mysids; a few isopods;
92	33	Mysids; a few isopods; polychaet;
93	37	Hermit crab; mysids;
94	42	Polychaet; mysids;
95	36	Polychaet; mysids; hermit crab; nematodes;
96	31	Mysids; hermit crab; polychaet; isopods;
97	41	Shrimps; mysids; nematodes; polychaet; amphipods;
98	41	Shrimps; nematodes;
99	37	Isopods; bivalves; shrimp;
100	15	Shrimps; polychaets;
101	20-24	Polychaet; mysids; amphipods; shrimp;
102	20-24	Mysids; nematodes;
103	35-39	Sea cucumber; polychaet; nematodes;
104	35-39	Smelt; polychaet; gastropod;
105	35-39	Polychaet;
106	35-39	Polychaet; amphipods;

Stomach No.	Length	Contents
107	30-34	Mysids;
108	30-34	Fish;
109	30-34	Empty?; nematodes;
110	30-34	Shrimp; amphipods; nematodes;
111	15-19	Mysid;
112	15-19	Amphipod; nematodes;
113	40-44	Shrimp; mysids;
114	40-44	Polychaet; amphipods; mysids;
115	40-44	Bivalves; shrimps; mysid;
116	40-44	Fish;
117	25-29	Fish - smelt;
118	25-29	Amphipod; nematodes;
119	25-29	Mysids;
120	25-29	Mysids, polychaets;
121	34	Amphipods; bivalves; polychaet; cumacean;
122	20	Amphipods; polychaet;
123	16	Nothing identified;
124	36	Empty;
125	36	Amphipods; polychaet;
126	17	Polychaet;
127	41	Empty;
128	39	Cumacean; amphipods; polychaet;
129	14	Amphipod;
130	13	Empty;
131	39	Shrimp; nematodes; polychaet;
132	44	Polychaet; amphipods;
133	15	Empty;
134	16	Amphipods;
135	42	Polychaet; amphipods;
136	42	Polychaet; amphipods;

In the case of each stomach collected in 1952, Stomach Nos. 1-70, 89-136, the entire stomach contents were retained for further examination.

Stomach Examination

Mysids and other animals were in the case of certain stomach, counted, sexed, degree of maturity noted, and in part dissected for nematode infection determination. The species, number and number dissected are noted below in each instance. The disposal of the remainder has not been noted so that they may have been returned to the vial with the original stomach contents or may have been placed in separate vials according to species with due respect for stomach number. The data obtained here with respect to sex and development is given elsewhere under the section devoted to specific invertebrates. Also given in that same place are data on nematode infection.

#36 - N. americana - 45 - also 11 rear ends, 12 heads; 35 whole, all parts dissected;
14 small nematodes, less than 1 cm. in separate vial; these were found free and some may have come from the above noted mysids;
#37 - N. americana - 2 - both dissected;
C. septemspinosus - 1 -
#38 - N. americana - 22 - all dissected;
C. septemspinosus - 3 - dissected;
#41 - N. americana - 62 - also 29 rear ends, 20 heads; 47 whole, all parts dissected;
11 nematodes in separate vial;
#42 - N. americana - 135 - all dissected;
C. septemspinosus - 1 -
several nematodes lying free in collection in separate vial;
#43 - N. americana - 25 - includes some pieces; all dissected;
nematodes lying free in collection in separate vial;
several N. americana, removed from brood pouch of female, replaced with remainder of stomach contents which is unidentified;
minute nematode found in tray where mysid was being dissected, may or may not have come from that particular animal, labelled - 43-36 ex. N. americana?
#44 - N. americana - 51 - all dissected;
larval mysids from brood pouch (presumably of N. americana), replaced with unidentified items;
nematodes lying free placed in separate vial;
#46 - C. septemspinosus - 15 - all dissected; (other shrimp probably of this species, not identified or dissected at this time);
#47 or 51 - N. americana - 88 - also 7 rear ends; all dissected; free nematodes in separate vial;
#48 - N. americana - 49 - also 16 rear ends; all dissected;
C. septemspinosus - 2 - dissected;
#50 - N. americana - 76 - 20 of these are parts; all dissected; free nematodes placed in separate vial;
#51 or 47 - N. americana - 20 - also 8 rear ends and 8 heads; all dissected; Note - other animals of this species in collection not identified;
#120 - N. americana - 20 - all dissected; others of this species not touched as yet;
#123 - N. americana - 18 - also 3 heads; all dissected;
#126 - N. americana - 20 - all dissected; others not examined;
#157 - N. americana - 3 - also 2 heads, 2 rear ends; all dissected;
C. septemspinosus - 4 - also 3 heads, 3 rear ends; all dissected; 1 whole gammarid; 1 part; polychaets - bits and pieces - discarded; 2 small white bodies;
#158 - N. americana - 4 - also 13 heads, 9 rear ends; all dissected;
Crago - 6 heads - identified by eyes only; some doubt; some of these dissected;

gammarids - 3 - 2 dissected;
M. mixta - 1 - dissected;
mysid brood pouch - probably Dajus;
nematodes - 2 -

#211 - N. americana - 1 - also 1 rear end; dissected; may be other mysids in vial;

#252 - M. stenolepis - 1 - also 6 heads, 1 rear end; dissected; may be other mysids in vial;

#706 - N. americana - 4 - also 5 rear ends, 5 heads; dissected;
M. stenolepis - 7 - dissected;
32 nematodes found free in separate vial;

#1087 - N. americana - 22 - also - 9 rear ends, 23 heads;
M. stenolepis - 2 -
Mysis sp. - 1 - rear end;
E. erythrophthalma - 1 - also 1 head;
20 nematodes in separate vial, these were found free;
most under 1 cm.;
part of 1 gammarid;
part of shrimp;
small white bodies; N.B. nothing in this collection dissected;

#1088 - N. americana - 7 - also 5 rear ends, 23 heads; all dissected;
E. erythrophthalma - 1 - also 4 heads; all dissected
3 free-found nematodes in separate vial;

Abbreviations used in the following tables

F.	- frequency
Mys.	- mysid
Poly.	- polychaet
Gamm.	- gammarid, not amphipod except possibly in the case of the samples of late June, 1952
Biv.	- bivalve
Capr.	- caprellid
Isop.	- isopod
H. Crab	- hermit crab
Cum.	- cumacean
Other	- other items not separately listed, if of any size or consequence they are itemized at the bottom of the table;

The bracketed figure following the frequency of a given invertebrate in the stomachs of a particular size class, refers to the number of stomachs in which that particular invertebrate appeared to be the most abundant or rather most important single item.

Preliminary Stomach Examination

Cod

Baddeck Bay

Table 1 May, June 1951

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Capr.	Isop.	Crab.	H.Crab	Biv.
25-29	(6)	6(4)	5(1)	3	1	1(1)			1		1
30-34	(15)	14(10)	7	8(2)	6(1)	2(2)	2	2		1	
35-39	(14)	13(9)	10	9(2)	8(2)		1	1	1(1)	1	
40-44	(1)		1(1)	1			1				
45-49	(2)		2(1)		1	1(1)					
50-54											
55-59	(2)					2(2)					
	(40)	33(23)	25(3)	21(4)	16(3)	6(6)	4	3	2(1)	2	1

Miscellaneous items, bettles, stones, in three stomachs.

Table 2 July, August, September, 1951

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Capr.	Isop.	Crab	H. Crab	Biv.
10-14	(6)	4(2)	4	5(3)	1(1)						
15-19	(6)	1	4(2)	6(4)							
20-24											
25-29	(2)			2(2)							
30-34	(2)	1	2	1	2(1)				1(1)		2
35-39	(5)	3(2)	3(2)	4(3)	2			1		1	1
40-44	(6)		2(2)	1	3(2)		1		1(1)		1
45-49	(4)		4(3)	1(1)					1		1
50-54	(1)		1								1(1)
55-59											
60-64											
65-69	(1)					1(1)					
	(33)	9(3)	20(8)	20(13)	8(4)	1(1)	1	1	3(2)	1	6(1)

One stomach, 40-44, was empty

Table 3 October, November 1951

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Capr.	Isop.	Crab	H.Crab	Biv.
35-39	(8)	3	7	1	8(7)	3(1)			1		3
40-44	(6)	2	4		6(4)	1(1)			1(1)		3
45-49	(6)	1	6(1)		5	1(1)			4(4)		3
50-54	(2)				1	2(2)					
	(23)	6	17(1)	1	20(11)	7(5)	0	0	6(5)		9

One stomach, 10-14, was empty.
Two stomachs contained other items in the form of stones.

Table 4 December 1951

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Capr.	Isop.	Crab	H.Crab	Biv.
25-29	(1)	1	1(1)		1						
30-34											
35-39	(5)	4(1)	2(2)	2	4(1)	2(1)		1			1
40-44	(2)	1	2		2(1)			1	1(1)		
	(8)	6(1)	5(3)	2	7(2)	2(1)		2	1(1)		1

Table 5 May, June 1952

Length	F.	Mys.	Poly.	Gamm.*	Shrimp	Fish	Capr.*	Isop.	Crab	H.Crab	Biv.
15-19	(1)		1		1(1)						
20-24											
25-29											
30-34	(6)	4(3)	5		2(1)	2(2)		2		1	
35-39	(15)	10(2)	12(5)	7	11(1)	3(3)		4(2)	1(1)	3(1)	1
40-44	(11)	4	7(6)	3	8(2)	1(1)		1(1)	1	2	1
	(33)	18(5)	25(11)	10	22(5)	6(6)		7(3)	2(1)	6(1)	2

One stomach, 40-44, was empty.

* For many of the stomachs of this group there was no differentiation of the amphipods. Consequently, the figures under the gammarid heading may include some caprellid containing stomachs.

Table 6 Summary of Baddeck Bay Cod Stomach Contents by Periods

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Capr.	Isop.	Crab	H. Crab	Biv.
M.J.51	(40)	33(23)	25(3)	21(4)	16(3)	6(6)	4	3	2(1)	2	1
J.A.S.	(33)	9(3)	20(8)	20(13)	8(4)	1(1)	1	1	3(2)	1	6(1)
O.N.	(23)	6	17(1)	1	20(11)	7(5)			6(5)		9
D. 51	(8)	6(1)	5(3)	2	7(2)	2(1)		2	1(1)		1
M.J.52	(33)	18(5)	25(11)	10	22(5)	6(6)		7(3)	2(1)	6(1)	2
	(137)	72(32)	92(26)	54(17)	73(25)	22(19)	5	13(3)	14(10)	9(1)	19(1)

Table 7 Summary of Baddeck Bay Cod Stomach Contents by Size

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Capr.	Isop.	Crab	H.Crab	Biv.	Em.
10-14	(7)	4(2)	4	5(3)	1(1)							1
15-19	(7)	1	5(2)	6(4)	1(1)							
20-24												
25-29	(9)	7(4)	6(2)	5(2)	2	1(1)			1		1	
30-34	(23)	19(13)	14	9(2)	10(3)	4(4)	2	4	1(1)	2	2	
35-39	(47)	33(13)	34(8)	23(5)	33(11)	8(5)	1	7(2)	3(2)	5(1)	6	
40-44	(26)	7	16(9)	19(9)	19(9)	2(2)	2	2(1)	4(3)	2	5	2
45-49	(12)	1	12(5)	1(1)	6	2(2)			5(4)		4	
50-54	(3)		1		1	2(2)					1(1)	
55-59	(2)					2(2)						
60-64												
65-59	(1)					1(1)						
	(137)	72(32)	92(26)	54(17)	73(25)	22(19)	5	13(3)	14(10)	9(1)	19(1)	3

Table 8 Cod Stomach Contents Baddeck Bay, Period Analysis.

Values expressed as percentages.

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Capr.	Isop.	H.Crab	Crab	Biv.
M.J.51	(40)	83	63	52	40	15	10	8	5	5	
J.A.S.	(33)	27	61	61	24				3	9	18
O.N.	(23)	26	74		87	30				26	39
D. 51	(8)	75	63	25	88	25		25		13	
M.J.52	(33)	55	79	30	67	18	-	21	18	6	
	(137)	53	67	39	53	16		9	10	7	14

Two points should be made clear before discussing the intake of the various invertebrate groups in the course of the period under study. First, there is not an actual overlap in conditions despite a calendar overlap, the spring of 1952 being somewhat later than that of 1951. Secondly, as indicated in Table 7 and in the following tables and discussion, the intake of particular animal groups is to a great degree dependent upon the size of the cod.

Polychaets are the most common item in the diet of the cod from this area insofar as occurrence may be used as a measure. This regular intake of polychaets agrees with the abundance of polychaets as estimated on the basis of regularity of collecting from this area (86% of collections - 1951). The variation in intake of this group for the periods considered above is not considered to be of great significance. The differences between periods are not great relatively and may be due to chance, relative availability, or to blooms of different forms (no information available).

Cod over 35 centimetres in length account for the bulk of the bivalve intake (Table 7). Bivalves were of more than accidental occurrence in stomachs of cod collected from July to November.

Period	% Cod over 35 cms.
Overall	68%
July-November	71%
October, November	100%

Large cod were not relatively abundantly examined during the period July to September but for that period the availability of other forms appears to be low (eg. mysids, shrimp).

The intake of fish by these cod appears to be dependent upon the length of the cod and also upon the availability of small fish. The importance of size may be gained from Table 7. Of the six cod collected on November 26, 1951 (containing identified items) all were over 39 centimetres in length and 4/6 contained fish, smelt in this case. The dragging records for that week show that while smelt were not collected in great numbers they were more

abundant per drag than at any other period in 1951. Most of those picked up by the drag were of course larger than those found in the cod stomachs (7-18) but the smaller at least would be of about comparable size. Also, in the plankton tows of that date small smelt were collected, these would be of the size eaten by the cod. One of the drags of 21-V-52 was characterized by the taking of a large number of smelt including some as small as 7 cms. in length. Of 11 cod stomachs collected on that date (over 30 cms.) 6 contained fish, smelt being identified in the case of one stomach specimen.

Caprellids were found in a number of stomachs collected in May and June of 1951 but not thereafter in 1951. Unfortunately the amphipods were not separated into gammarids and caprellids in 1951 records so it is not possible at this time to say whether this caprellid intake was accidental or is regular for this period of the year.

Cumaceans were collected in half of the bottom tows etc. of 1951 and yet are not recorded as being found in any of the stomachs from this area.

The vast numbers of small (2" diam.) starfish collected from Baddeck Bay in May and June of 1951 and 1952 have been alluded to under discussion of that group. Even specimens of this are probably too large for cod of the sizes examined for with such abundance it is unlikely that cod would pass over this group.

The intake of isopods seems to agree with what we know of their varying abundance from the bottom plankton tows. The presence of isopods in a few stomachs taken in May and June of 1951 would suggest that Edotea (?) was abundant at that time of year as in 1952 although confirmation is lacking as bottom tows were not instituted until after that time in 1951. The scarcity of isopods during the summer months (to late October?) has been mentioned under the discussion of that group and agrees with the absence of specimens from stomachs during this period. Relatively great numbers (for 1951) of isopods were collected from Baddeck Bay from October 23 to the end of December but no reflection of this increased abundance is apparent in cod feeding until December.

Small crabs were not collected at any period so that it is impossible to compare cod intake with abundance as gauged by this means. Size of cod is certainly a limiting factor so far as crab intake is concerned, but as indicated below availability is also a major consideration.

	% Cod 35 cms. ≠	% Stomachs containing Crab
M.J. 51	48%	5%
J.A.S.	51%	9%
O.N.	100%	26%
D.	88%	13%
M.J. 52	79%	6%

Hermit crabs were collected on only one day in 1951 (1-VI-51) and not at all in 1952. The occurrence of these animals in cod stomachs suggests a spring (and winter?) abundance in Baddeck Bay which was not established by our collecting methods, and which may be due to migration or to the appearance of young individuals which do not remain in the area during the summer.

The pattern of intake of gammarids cannot be explained at the present time. The high rate of intake during the late spring and summer may be due to the bloom of the species of Orchomnella (and to Monoculodes) while that of December may be due to Monoculodes (large numbers #120,121). The difference in rate of intake for the period May, June in the two years may be due to the different weather conditions of those years.

Only shrimp was collected more than once from Baddeck Bay, Crago septemspinosus. This shrimp was collected in greatest numbers in May of 1952 from Baddeck Bay. The numbers taken in October are higher than at any other period in 1951 but almost no specimens were collected after this from Baddeck Bay. The young of Crago (4.5 plus) first appear in mid- September and it is possible that the high rate of intake of shrimps for the period of October-December is due to this group which were not collected in numbers except during the week of November 23-30.

Mysid intake is clearly associated with the "blooms" as found by bottom plankton collecting. The high May, June intake is for 1951 due to Neomysis for which we have no plankton record but have for 1952. The young Mysis appear at that time but at least in 1951 were not utilized. The lack of mysids in the summer and fall period is reflected in the intake, which rises again for December somewhat after the appearance of the multitudes of young Neomysis were recorded. The spring appearance of Neomysis in the benthos occurred for the most part after the last series of stomach samples were taken in 1952 (20-VI-52 et seq.) which probably accounts for the different rates of intake for the same period of the two years, the same phenomenom probably having occurred a few weeks earlier in 1951.

Table 9 Summary of Baddeck Bay Cod Stomach Contents by Size

Values expresses as percentages otherwise as Table 7.

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Capr.	Isop.	Crab	H.Crab	Biv.
10-14	(7)	57	57	71	14						
15-19	(7)	14	71	86	14						
20-24	(0)										
25-29	(9)	78	67	56	22	11			11		11
30-34	(23)	83	61	39	43	17	x	17	4	9	9
35-39	(47)	70	72	49	70	17	x	15	6	11	13
40-44	(26)	27	62	19	73	8	x	8	15	8	19
45-49	(12)	9	100	9	50	17			63		33
50-54	(3)		33		33	67					33
55-59	(2)					100					
60-64	(0)										
65-69	(1)					100					
50-69	(6)		(17)		(17)	(83)					(17)
	(137)	53	67	39	53	16		9	10	7	14

2.2% of the 137 stomachs were empty.

The importance of fish, crabs, hermit crabs and bivalves in the diet of cod 35 centimetres in length and over has already been referred to. Isopods were found in fish of 30-44 centimetres in length. Shrimp are utilized by fish of all lengths but are more commonly found with increasing size up to the point where crabs and fish become prime dietary items. Gammarids and mysids are common food items of fish of 10-44 centimetres but the gammarids are utilized mainly by the smaller of this group (10-19) as the more important such as Orchomnella and Monoculodes are as small or smaller than most Neomysis, while the mysids are most commonly found in fish of of 25-39 centimetres. Polychaets are utilized by fish of almost all sizes (10-54) and with little variation for occurrence in stomachs of fish of 10-44 centimetres. As will be seen from the following tables the cod appears to use polychaets and bivalves as filler so that the values for occurrence of polychaets in 45-54 centimetre fish may be at variance with the values for the other size groups because of the low numbers involved and also due to lack of more satisfactory food items at the time taken.

Table 10 Baddeck Bay Cod 35-39 centimetres.

Period	F.	Mys.	Poly.	(Gamm.)	Shrimp	Fish	Cap.	Isop.	Crab.	H.Crab.	Biv.
M.J.51	(14)	13(9)	10	9(2)	8(2)		1	1	1(1)	1	
J.A.S.	(5)	3(1)	3(1)	4(3)	2			1		1	1
O.N.	(8)	3	7	1	8(7)	3(1)			1		3
D.51	(5)	4(1)	2(2)	2	4(1)	2(1)		1			1
M.J.52	(15)	10(2)	12(5)	7	11(1)	3(3)	?	4(2)	1(1)	3(1)	1
	(47)	33(13)	34(8)	23(5)	33(11)	8(5)	1	7(2)	3(2)	5(1)	6

Table 10A As above values expressed as percentages

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Fish	Cap.	Isop.	Crab.	H.Crab.	Biv.
M.J.51	(14)	92	71	64	57				7	7	
J.A.S.	(5)	60	60	80	40			20		20	20
O.N.	(8)	38	88	13	100	38			13		38
D.51	(5)	80	40	40	80	40		20			20
M.J.52	(15)	67	80	47	73	20		27	7	20	
	(47)	70	72	49	70	17	x	15	6	11	13

The intake for fish of this size group with respect to calendar period is similar to that of cod as a whole for this area. The variation in mysid intake is not as pronounced as seen in Table 8 and there is much greater fluctuation in the polychaet intake. As mentioned above the polychaets and bivalves appear to act as fillers, buffering against the lean periods of abundance of mysids, gammarids and shrimp. This assumption that polychaets are available at all times but are not always fully utilized cannot be definitely established until further work on that group has been accomplished. Crabs, hermit crabs, isopods and propably fish are utilized as they become readily available.

Preliminary Stomach Examination

Cod

Whycocomagh Bay

Table 11 (May), June, July 1951

Length	F.	Poly.	Gamm.	Cum.	Mys.	Capr.	Shrimp	Fish	Isop.	Biv.	Empty
10-14	(2)		1(1)								1(1)
15-19	(7)	2(1)	3(1)	1(1)	4(1)	3(3)					
20-24	(7)	3(3)	5	4(2)	1	2(1)					1(1)
25-29	(10)	4(3)	4(2)	2(1)	2(2)	1(1)			1	2	1(1)
30-34	(7)	4(4)	5(2)	2(1)		3	1	1			
35-39	(6)	5(3)	4(1)	1(1)	1(1)						
40-44	(5)	3(1)	3(1)	4(3)							
45-49	(7)	6(4)	4	3(3)			1				
50-54	(3)	2(2)	1(1)	1							
55-59	(2)	2(1)	1	1							1(1)
60-64	(1)		1(1)	1							
65-69	(1)					1		1(1)			
70-74	(1)	1(1)									
	(59)	32(23)	32(10)	20(12)	8(4)	10(5)	2	2(1)	1	2	4(4)

Table 12A August 1951

Length	F.	Poly.	Gamm.	Cum.	Mys.	Capr.	Shrimp	Fish	Isop.	Biv.	Crab
25-29	(3)	2(1)	2	1(1)		3(1)				1	
30-34	(1)	1(1)									
35-39	(4)	3(2)	1		1(1)	1				1	
40-44	(4)	4(4)			2	1					1
45-49	(0)										
50-54	(0)										
55-59	(3)	3(1)				3(2)		1			
60-64	(1)							1(1)			
65-69	(1)							1(1)			
	(17)	13(9)	3	1(1)	3(1)	8(3)	0	3(2)	0	2	1

One fish 35-39 cms. contained as the largest single item what appeared to be an egg case (skate?).

Note the remarkable change in diet from the preceding period when gammarids and cumaceans formed such an important part of the food intake. The proportion of fish containing polychaets and caprelids has increased over the earlier period and the bulk of those items must also have increased considerably as no other invertebrates appear to have been utilized in quantity for this period. (All stomachs taken for this period were collected on one day - 8-VII-51).

Table 12 August, September 1951

Length	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Crab	Fish	Biv.	Empty
20-24	(2)	2	1(1)	1			2(1)		1		
25-29	(4)	3(2)	3	1(1)		3(2)	1			1	
30-34	(8)	6(5)	3(3)		1	3	1		1		
35-39	(8)	7(5)	1		1(1)	1	1(1)			2	
40-44	(11)	9(7)	3(1)		3	3(1)	1	1	2(1)		1(1)
45-49	(2)	2(1)	1		1	2			1(1)		
50-54	(3)	1(1)				1	1		2(2)		
55-59	(4)	4(2)	1			3(2)			2		
60-64	(1)								1(1)		
65-69	(1)								1(1)		
	(44)	34(23)	13(5)	2(1)	6(1)	16(4)	7(2)	1	11(6)	3	1(1)

1 stomach 35-39, largest single item - egg case;
1 stomach 35-39, includes stone;

Compared to the period June, July, 1951 the polychaet and mysid occurrence is about the same, gammarid slightly lower, cumacean down to almost nothing, and caprellid, shrimp and fish occurrence up considerably. Comparison with the August summary (Table 12A) shows that the increased intake of shrimp and fish occurred after the August samples were collected, that the overall drop in gammarid intake is due to the low occurrence in the August sample and that there are minor decreases in the occurrence of polychaets and caprellids probably associated with the increase in gammarids, shrimp and fish.

Table 13 October, November 1951

Length	F.	Poly.	Gamm.	Mys.	Cap.	Shrimp	Fish	Biv.	Empty
10-14	(1)		1	1(1)		1			
15-19	(2)		1	1	1(1)	1(1)			
20-24	(3)	2		1	1(1)	2(2)			
25-29	(2)	2(1)				2(1)			
30-34	(4)	4(1)			1	3(2)	1(1)		
35-39	(3)	2(1)		1	1	3(1)	1(1)		
40-44	(4)	3(1)		1		4(2)	2(1)		
45-49	(3)	2	1	1(1)	1	1(1)		1	1(1)
50-54	(1)	1(1)				1			
	(23)	16(5)	3	6(2)	5(2)	18(10)	4(3)	1	1(1)

The analysis of October, November stomachs shows that the "intake" of polychaets and cumaceans is approximately the same as for the previous period, the intake of gammarids, caprellids and fish has decreased while that of mysids and shrimp has increased.

Table 14 December 1951

Length	F.	Polychaet	Gammarid	Mysid	Caprellid	Shrimp
10-14	(1)	1(1)	1			
15-19	(0)					
20-24	(0)					
25-29	(3)	3(2)			1	2(1)
30-34	(3)	3(1)	1(1)	1	2	1(1)
35-39	(3)	2(2)	1(1)	2	2	1
40-44	(1)	1(1)		1		
	(11)	10(7)	3(2)	4	5	4(2)

From the preceding period there has been an increase in the occurrence (intake) of polychaets, gammarids, mysids and caprellids and a decrease in shrimp. Cumaceans and fish which during earlier periods were important dietary items are absent from this list as are the minor groups isopods, bivalves and crabs.

Table 15 May, June(July) 1952

Length	F.	Poly.	Amph.*	Cum.	Mys.	Cap.	Biv.	Empty	Shrimp
10-14	(2)		1(1)					1(1)	
15-19	(4)	1(1)	2(2)		1			1(1)	
20-24	(1)	1	1(1)						
25-29	(0)								
30-34	(1)	1	1(1)	1			1		
35-39	(4)	3	2(1)	1(1)				1(1)	1(1)
40-44	(7)	6(6)	4	2		1		1(1)	1
	(19)	12(7)	11(6)	4(1)	1	1	1	(4)	2(1)

* for most stomachs all amphipods were recorded under that heading.

The period covered in Table 15 does not quite coincide with the calendar period of Table 11 (June, July 1951) nor does it phenologically 1952 being somewhat retarded with respect to 1951.

Unfortunately the amphipod data are at present in a condition which makes them incomparable with those of 1951. One interesting item so far as evidence for cyclical feeding is concerned, is the reappearance of cumaceans. This group was seen to be of major importance in the diet of cod collected in June and July of 1951 but thereafter was recorded only rarely (August, September) or not at all (October-December).

Table 16 Summary of Whycocomagh Bay Stomach Contents by Size

Length	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Crab	Fish	Isop.	Biv.	Empty
10-14	(6)	1(1)	4(2)		1(1)		1					(2)
15-19	(13)	3(2)	6(3)	1(1)	6(1)	4(4)	1(1)					(1)
20-24	(13)	8(3)	7(2)	5(2)	2	3(2)	4(3)		1			(1)
25-29	(19)	12(8)	7(2)	3(2)	2(2)	5(2)	5(2)			1	3	(1)
30-34	(23)	18(11)	10(7)	3(1)	2	9	6(3)		3(1)		1	
35-39	(24)	19(11)	8(3)	2(2)	5(2)	4	6(2)	1	1(1)		2	(1)
40-44	(28)	22(16)	10(2)	6(3)	5	4(1)	2(1)		4(2)			(2)
45-49	(12)	10(5)	6	3(3)	2(1)	3	2		1(1)		1	(1)
50-54	(7)	4(4)	1(1)	1		1			2(2)			
55-59	(6)	6(3)	2	1		3(2)			2			(1)
60-64	(2)		1(1)	1					1(1)			
65-69	(2)					1			2(2)			
70-74	(1)	1(1)										
	(156)	104(64)	62(23)	26(14)	25(7)	37(11)	33(15)	1	17(10)	1	7	(10)

The "amphipods" of May, June 1952 are all classed as gammarids.

Table 16 and 16A (below) show that size of cod is much less of a factor in diet for Whycocomagh Bay fish than for those of Baddeck Bay. Almost all the major food items are utilized by all sizes of fish, excepting bivalves and fish, and larger fish have not discriminated against the smaller food items as gammarids and to the same degree cumaceans as do the Baddeck Bay cod. The smaller animals have not been consumed by the largest fish but with the exception of polychaets and fish, there seems to be no increase or decrease in intake of a particular item with increasing size of the cod.

Table 16A Whycocomagh Bay Cod Stomachs - Invertebrate Occurrence with respect to cod size
Values expressed as percentages

Length	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Crab	Fish	Isop.	Biv.	Empty
10-14	(6)	17	67		17		17					
15-19	(13)	23	46	8	46	31	8					
20-24	(13)	62	54	38	15	23	31		x			
25-29	(19)	63	37	16	11	26	26			x	x	
30-34	(23)	78	43	13	9	39	26		13		x	
35-39	(24)	79	33	8	21	17	25		4		x	
40-44	(28)	79	36	21	18	14	21	x	14			
45-49	(12)	84	50	25	17	25	17		8		x	
50-54	(7)	57	14	14		14	29		29			
55-59	(6)	100	33	17		50			33			
60-64	(2)		50	50					50			
65-69	(2)					50			100			
70-74	(1)	100										
	(156)	67	40	17	16	24	21		11			6

Table 17 W.B. Cod Food "Preference" and Utilization Cycle

Period	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Crab	Fish	Isop.	Biv.	Empty
(M)J.J.51	(59)	32(23)	32(10)	20(12)	8(4)	10(5)	2		2(1)	1	2	(4)
A.S.	(44)	34(23)	13(5)	2(1)	6(1)	16(4)	7(2)	1	11(6)		3	(1)
O.N.	(23)	16(5)	3		6(2)	5(2)	18(10)		4(3)		1	(1)
D.51	(11)	10(7)	3(2)		4	5	4(2)					
M.J.(J)52	(19)	12(7)	11(6)	4(1)	1	1?	2(1)				1	(4)
	(156)	104(65)	62(23)	26(14)	25(7)	37(11)	33(15)	1	17(10)	1	7	(10)

Table 17A As Table 17 Values Expressed as Percentages

Period	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Crab	Fish	Isop.	Biv.	Empty
(M)J.J.51	(59)	54	54	34	14	17	3		3	x	x	7
A.S.	(44)	78	30	5	14	36	16	x	25		x	2
O.N.	(23)	70	13		26	22	78		17		x	4
D.51	(11)	91	27		36	45	36					
M.J.(J)52	(19)	63	58	21	5	(5)	11				x	21
	(156)	67	40	17	16	24	21		11			6

There is nothing known so far from our bottom plankton tows concerning varying abundance of polychaets. The fluctuations in occurrence of this group in stomachs are not regular and coupled with the rates of occurrence of the other invertebrates would suggest that this group acts as a filler as was suggested in the case of the Baddeck Bay Cod.

A common group or rather species found in this region is Saxicava arctica a bivalve. Small specimens of this species were on occasion (12-VI-51), found to be very abundant and yet the utilization of bivalves is much lower in Whycocomagh Bay than in Baddeck Bay where there appeared to be a much lower availability of bivalves. Since detailed examination of the stomach material has not yet been undertaken, the species and sizes of bivalves contained in the stomachs are unknown. It is possible that most of the Baddeck Bay bivalves intake is made up of Cardium and Nucula small forms which may have been ingested accidentally along with polychaets.

The rates of occurrence of gammarids suggests cycles of abundance in the spring and early winter. The spring abundance appears to be somewhat greater and corresponds to the period of abundance found for Baddeck Bay. Amphipods were collected in only 46% of the bottom plankton tows in Whycocomagh Bay and there is no indication from superficial examination of the collections of great abundance at any time or particularly for the early summer periods, in fact the two collections for 1952 (#8,9 30-V-52) contain very few amphipods. Possibly there has been maximum utilization of this group, or feeding has been done outside the collecting area.

Cumacean intake certainly appears to be associated with a cyclical abundance which is greatest in the spring-summer period so far as our records show. This group was taken in 53% of the bottom tows in 1951 at scattered intervals throughout the year. Since no study has been done on this group it is not possible to give figures on the relative abundance of this group in the different tows taken at different periods.

The peak period of mysid occurrence in stomachs is for the October-December period which may be associated with the Neomysis bloom noted at that time of year for Baddeck Bay and Kempt Head. The species of mysid collected from Whycocomagh Bay are Mysis stenolepis (75% collections) and Neomysis americana (30% of collections). The overall mysid occurrence in collections is 88% but the numbers taken per tow are generally low over the entire collecting period when compared to the other areas and there is very little indication of any rise in numbers during the fall period. The numbers of mysids per stomach is also very low when compared to the other areas and there is no indication of an appreciable rise in numbers found in stomachs for the fall period coincident with the increased rate of occurrence of this group in stomachs. The collection of 25-X-51 (#84,85) contains as many Neomysis as any other collection and also includes small unsexable individuals of this species. One stomach taken on the same date contains by far the greatest number of mysids recorded in a stomach from this area so that despite the generally low numbers of mysids in stomachs even at this period (1,2 etc.) the fall bloom of Neomysis is probably accounting for the greater part of the occurrence of mysids in stomachs collected at that time of year.

Since the amphipods from this area have not been classified it is not possible to discuss the intake of caprellids with respect to availability.

Shrimp seem to be abundant in Whycocomagh Bay particularly in the fall period (October,November) and of somewhat lesser abundance before and after that time. Shrimp (Crago septemspinosus) were collected on only two occasions from this area (25-X-51, 2-XI-51) and on the first of these occasions the number was 13 and these were larval forms. The meagre evidence afforded by bottom tows then suggests that Crago is more "common" at that time of year. The rate of intake of shrimp in the Baddeck Bay area (Crago) is likewise higher for that period than for any other. The Baddeck Bay collections for this period are few (2 with Crago) but the numbers collected are higher than for any other 1951 collections which would indicate that had more collections been made in both areas the abundance of Crago at that period might have been more readily evident.

There is nothing in the fishing records which would suggest cause for the varying rates of utilization of fish by the cod in this area. Fish in the actual dragging area were rare and although the forms which would be consumed by cod would not generally be picked by the drag, sudden increases in fish species including small are usually indicated.

Bivalves were very commonly collected by the drag in 1951 (81%) and regularly in the bottom plankton tows (61%) but as mentioned above they do not appear to be utilized to any appreciable degree by the cod in this area.

Table 18 Whycocomagh Bay Cod 35-39 centimetres

Period	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Fish	Biv.	Others	Emtpy
(M)J.J.51	(6)	5(3)	4(1)	1(1)	1(1)						
A.S.	(8)	7(5)	1		1(1)	1	1(1)		2	2(1)	
O.N.	(3)	2(1)			1	1	3(1)	1(1)			
D.51	(3)	2(2)	1(1)		2	2	1				
M.J.(J)52	(4)	3	2(1)	1(1)			1(1)				1(1)
	(24)	19(11)	8(3)	2(2)	5(2)	4	6(3)	1(1)	2	2(1)	(1)

Table 18A Values Expresses as Percentages

Period	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Fish	Biv.	Others	Empty
(M)J.J.51	(6)	84	67	17	17						
A.S.	(8)	88	13	0	13	13	13		x	x	
O.N.	(3)	67			33	33	100	33			
D.51	(3)	67	33		67	67	33				
M.J.(J)52	(4)	75	50	25			25				x
	(24)	79	33	9	21	17	25				

In general while the values are not the same, the "preference" of this size group agrees with that of the entire size range. The values for polychaet rate of occurrence are considerably different but appear to accentuate the supposition that they act as filler. The presence and absence of gammarids, cumaceans and shrimp are somewhat more accentuated by this sample while mysid and caprellid intake for this group show slightly different periods for peak intake as compared to the entire group.

Table 19 Whycocomagh Bay Cod 40-44 centimetres

Period	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Crab	Fish	Other	Empty
(M)J.J.51	(5)	3(1)	3(1)	4(3)							
A.S.	(11)	9(7)	3(1)		3	3(1)	1	1	2(1)	1	(1)
O.N.	(4)	3(1)			1		4(2)		2(1)	1	
D.51	(1)	1(1)			1						
M.J.(J)52	(7)	6(6)	4	2		1	1				(1)
	(28)	22(16)	10(2)	6(3)	5	4(1)	6(2)	1	4(2)	2	(2)

Table 19A Values Expressed as Percentages

Period	F.	Poly.	Gamm.	Cum.	Mys.	Cap.	Shrimp	Crab	Fish	Other	Empty
(M)J.J.51	(5)	60	60	80							
A.S.	(11)	82	27		27	27	9	x	18	x	x
O.N.	(4)	75			25		100		50	x	
D.51	(1)	100			100						
M.J.(J)52	(7)	86	57	29		14	14				x
	(28)	79	36	21	18	14	21		14		

The separate tabulation of 40-44 centimetre fish adds little to our knowledge of the peak periods of availability and utilization of the invertebrates. Polychaet occurrence is very similar, that of gammarids and cumaceans is accentuated compared to the general pattern, as is that of shrimp occurrence. Mysid occurrence seems to be more similar to that of the 35-39 centimetre fish than to the general size range.

Preliminary Stomach Examination

Cod

Kempt Head

Table 20 June, July(August) 1951

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Crab	Capr.	Empty
15-19	(1)	1(1)		1	1				
20-24	(5)	2(1)	4(2)	5(2)	1	1		1	
25-29	(7)	3(1)	6(4)	3(2)	1			1	
30-34	(5)	1	2(1)	2(1)	1(1)		1(1)		(1)
35-39	(2)	2(1)	1(1)	1	2	1			
40-44	(4)	1	4(3)	2		1(1)			
45-49	(1)				1(1)				
50-54	(1)					1(1)			
	(26)	10(4)	17(11)	14(5)	7(2)	4(2)	1(1)	2	(1)

Samples	F.	Mysid	Polychaet	Gammarid	Shrimp	Bivalve
June 7, July 10	(14)	29%	43%	38%	29%	x
July 31	(12)	50%	92%	75%	25%	x

Separation of the data from the different samples reveals that there was a marked increase in the rate of occurrence of the major food items for the third sample but with no change in their relative rankings as food items. This change may have been peculiar to the particular sampling date or may actually indicate increases in abundance of the major groups since the previous sample of July 10.

Table 21 September, October 1951

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	Other	Empty
15-19	(2)	2(2)								
20-24	(3)	3(2)	1	1	1(1)			1		
25-29	(9)	9(4)	6(2)	2	1	1		5(3)		
30-34	(8)	6	6(2)	5(1)	5(1)	1		5(4)		
35-39	(10)	7(1)	8(4)	5	3(2)		1	3(2)	3	(1)
40-44	(2)		1(1)	1			1(1)			
	(34)	27(9)	22(9)	14(1)	10(4)	2	2(1)	14(9)	3	(1)

The rate of occurrence of shrimp and polychaets is about the same as for the previous period, that of gammarids down slightly and of mysids and crabs considerably higher.

Note the decreasing rate of occurrence of mysids with the increasing size of the cod.

Table 22 November, December 1951

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab.	H.Crab	Other*
10-14	(2)	2(1)		1	1(1)					
15-19	(0)									
20-24	(1)	1(1)		1	1					
25-29	(4)	4(3)		1	1	1			1(1)	1
30-34	(10)	10(2)	5(2)	5	7(2)	1(1)		3(2)	1(1)	5
35-39	(5)	5	5	2	5(2)	2		1(1)	2(2)	2
40-44	(9)	6(1)	5(1)	2	6(1)	2(1)	1	3(2)	2(2)	7(1)
45-49	(3)		2		2	1(1)	1(1)	2(1)		1
50-54	(1)		1	1	1		1(1)			
65-69	(1)						1(1)			

* includes hyperiids, found in 3 stomachs;

The rate of occurrence of mysids is the same as compared to the preceding period, that of polychaets, gammarids and crabs lower and of shrimp bivalves, hermit crabs and fish higher. The increased rate of occurrence of fish is probably due to the increased number of larger cod sampled.

Table 23 May,June 1952

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Cap.	H.Crab	Other	Empty
10-14	(2)	2(2)		1	1						
15-19	(11)	8(3)	9(7)	6(1)	3						
20-24	(6)	4(1)	4(3)	4	4(1)						(1)
25-29	(11)	5(2)	5(4)	5(1)	4(2)		1(1)		2(1)		
30-34	(12)	4(1)	6(4)	7(1)	7(3)		1(1)		3(1)	1	(1)
35-39	(6)		6(4)	1	1		1(1)			2(1)*	
40-44	(4)	3	1(1)	1	2(1)	1(1)	1(1)				
	(52)	26(9)	31(23)	25(3)	22(7)	1(1)	4(4)	0?	5(2)	3(1)	(2)

* one stomach contained a holothurian as the largest single item; as for cod stomachs from the other areas for this period, the amphipods were not recorded separately as gammarids and caprellids.

The data here are probably not comparable with those for the similar period in 1951 because of the differing weather conditions. Discussion of difference and similarities in the intake of the different invertebrates will be considered in a later section dealing with the cyclical nature of feeding.

Table 24 Summary of Kempt Head Stomach Contents with respect to cod size

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Other	Empty	Cap
10-14	(4)	4(3)		2	2(1)							
15-19	(14)	11(6)	9(7)	7(1)	4							
20-24	(15)	10(5)	9(5)	11(2)	7(2)	1		1			(1)	1
25-29	(31)	21(10)	17(10)	11(3)	7(2)	2	1(1)	5(3)	3(2)	1		1
30-34	(35)	21(3)	19(9)	19(3)	20(7)	2(1)	1(1)	9(7)	4(2)	6	(2)	
35-39	(23)	14(2)	20(9)	9	11(4)	3	2(1)	4(3)	2(2)	7(1)	(1)	
40-44	(19)	10(1)	11(6)	6	8(2)	4(3)	3(2)	3(2)	2(2)	7(1)		
45-49	(4)		2		3(1)	1(1)	1(1)	2(1)		1		
50-54	(2)		1	1	1	1(1)	1(1)					
55-59												
60-64												
65-69	(1)						1(1)					
	(148)	91(30)	88(46)	66(9)	63(19)	14(6)	10(8)	24(16)	11(8)	22(2)	(4)	2

Table 24A Values expressed as Percentages

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Cap.	Other	Empt
10-14	(4)	100		50	50							
15-19	(14)	78	64	50	29							
20-24	(15)	67	60	73	47	7		7		x		x
25-29	(31)	68	55	35	23	6	3	16	10	x	x	
30-34	(35)	60	54	54	57	6	3	26	11		x	x
35-39	(23)	61	87	39	48	13	9	17	9		x	x
40-44	(19)	53	58	32	42	21	16	16	11		x	
45-49	(4)		50		75	25	25	50			x	
50-54	(2)		50	50	50	50	50	50				
55-59												
60-65												
65-69	(1)						100					
	(148)	61	59	45	43	9	7	16	7	x	*	2.7

*mainly small items, probably ingested accidentally

The increasing intake of fish with increasing cod size is demonstrated by these data even more clearly than with the data from the other areas. Increasing size of cod is also shown here to be a factor in bivalve intake, this was vaguely suggested for Baddeck Bay fish. Mysids are seen to be of decreasing rate of occurrence with increasing cod size, the pattern for the other areas is not at all clear. Intake of polychaets does not appear to be associated with fish size, although such was the indication for Whycocomagh Bay cod, possibly the different species of polychaets involved account for this difference. Gammarid intake like that of polychaets does not appear to be related to cod size. Shrimp occurrence likewise does not appear to be related to cod size here but this was suggested in the case of Baddeck Bay fish. Crabs and hermit crabs are by their size restricted to the diet of the somewhat larger fish. There is some indication here as for Baddeck Bay cod that crab intake is influenced by cod size. Hermit crabs both in this analysis and that of Baddeck Bay are seen to be found in cod stomachs taken from animals of a restricted size range.

Table 25 Period Summary Kempt Cod Stomach Analysis

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Cap.	Other
J.J.(A)51	(26)	10(4)	17(11)	14(5)	7(2)	4(2)		1(1)		2	
S.O.	(34)	27(9)	22(9)	14(1)	10(4)	2	2(1)	14(9)			3
N.D.51	(36)	28(8)	18(3)	13	24(6)	7(3)	4(3)	9(6)	6(6)		16(1)
M.J.52	(52)	26(9)	31(23)	25(3)	22(7)	1(1)	4(4)		5(2)		3(1)
	(148)	91(30)	88(46)	66(9)	54(19)	14(6)	10(8)	24(16)	11(8)	2	22(2)

Table 25A Values expressed as Percentages

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Cap	Other	Em
J.J.(A)51	(26)	38	65	54	27	15		x		x		x
S.O.	(34)	79	65	41	29	6	x	41			x	x
N.D.51	(36)	78	50	36	67	19	x	25	17		x	
M.J.52	(52)	50	60	48	40	x	x		10		x	x

The period September to December is clearly the peak period of occurrence of mysids in cod from this area. This peak occurs simulataneously with the known peak abundance of mysids in the area as determined by bottom plankton towing. Cursory examination of the mysids in the cod stomachs shows (page) that not only is the rate of occurrence of mysids in cod highest at this time of year but also the actual numbers of mysids per stomach is highest. The peak period is associated with the fall bloom of Neomysis and with the influx of M. stenolepis into the area. The rate of intake of mysids is similarly high for fish from Baddeck Bay and Whycocomagh Bay, but Baddeck Bay has in addition for 1951 an additional peak presumably associated with the spring Mysis bloom and with the down movement of mature Neomysis.

Polychaet intake varies little over the course of the period under study. Polychaets were collected in every bottom tow in 1951 and there is little indication at the present state of analysis of the group of any increases in numbers of the different families. There is much more variation in rate of occurrence of this group in the stomachs from Baddeck Bay and Whycocomagh Bay but even there no cyclical abundance has been found. Rather it is suggested that the varying degrees of utilization of this group are dependent upon the quantities of other animals available for food in the area.

Spring abundance of gammarids is indicated for this area as with the other two but a suggested fall increase in gammarid numbers in the other areas is not evident from these data.

The fall winter abundance of shrimp already alluded to for the other areas is again evident from the rate of occurrence of shrimp in these stomachs. The shrimp probably involved here is Crago septemspinosus although a number of other shrimp species have been recorded from Kempt Head. As discussed under the comparable Baddeck Bay section, this shrimp was not very abundant at the time of year when the rate of occurrence in fish is greatest although for each area there is some indication of greater abundance at that time than at any other period in 1951. Significant for those collections is the presence of small and larval forms which were not collected even in the spring of 1952 when in a few collections at least numbers collected were very high.

The significance of the varying bivalve occurrence is not apparent at the present time.

The rate of fish intake is as pointed out previously dependent upon the size of the cod rather than to abundance of small fish (exceptions known see Baddeck Bay discussion).

Crab rate of intake is highest during the late summer and fall or early winter. This agrees with the results from Baddeck Bay but as for that region we have no information on crab abundance (small or large) since very few were collected by any means.

Hermit crabs were collected occasionally in June, July, November and December of 1951 in low numbers and in May and June of 1952 in much higher numbers. The rate of occurrence of this group in stomachs then agrees to a degree with the estimated abundance and periods of occurrence as obtained by free collecting methods. The absence of hermit crabs in stomachs collected in June and July of 1951 is unexplainable at the present time, similarly the lower rate of occurrence in early 1952 as opposed to late fall of 1951, this however is probably due to the few samples involved both of stomachs and of collections for this period. The spring abundance of hermit crabs is found in the case of the Baddeck Bay stomachs, although there, there is no corresponding abundance of the group so far as free collections

are concerned, also there is no indication for that area of any fall abundance of this group either from the collections or from the stomach analysis.

Hyperiids were taken from three stomachs collected in late December from Kempt Head, this with the exception of one specimen taken in a bottom plankton tow in Whycocomagh Bay is the only record of this group in the lake. The time of appearance of this group suggests that it along with a number of others is migratory, in this case moving into the Kempt Head area for the winter (??).

Caprellids are of no significance as dietary items at any time of the year for this region. No information is at present available on their abundance as estimated by bottom plankton towing.

Isopods and cumaceans as would be expected from our bottom towing results are not food items of fish in this area.

Large starfish are very abundant in this area (91% collections) but these would on the whole be much too large to be utilized by fish of the size under consideration here.

Table 26 Kempt Head Cod 25-29 centimetres

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Cap.	Other
J.J.(A)51	(7)	3(1)	6(4)	3(2)	1					1	
S.O.	(9)	9(4)	6(2)	2	1	1		5(3)			
N.D.	(4)	4(3)		1	1	1			1(1)		1
M.J.52	(11)	5(2)	5(4)	5(1)	4(2)		1(1)		2(1)		

Table 26A Values expressed as percentages

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Cap.	Other
J.J.(A)51	(7)	43	86	43	14					x	
S.O.	(9)	100	67	22	11	x		56			
N.D.51	(4)	100		25	25	x			25		x
M.J.52	(11)	45	45	45	36		x		18		

This sample of the entire size range shows even more clearly the supposed periods of abundance of mysids and gammarids. The rate of occurrence of polychaets is not any more understandable here than for the entire analysis. The rate of occurrence of shrimp as indicated here seems to agree more closely with the known abundance of Crago than does the complete analysis. The high spring population does not seem to be accounted does not really seem to be reflected in Table 25A. The young of Crago appear in the fall months, in other words the population is increased considerably at that time and our records indicate a higher population of that species in the spring than in the fall. The intake of crab and hermit crab by this size range agrees with that of the entire group.

Table 27 Kempt Head Cod 30-34 centimetres

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Other	Empty
J.J.(A)51	(5)	1	2(1)	2(1)	1(1)			1(1)			(1)
S.O.	(8)	6	6(2)	5(1)	5(1)	1		5(4)			
N.D.51	(10)	10(2)	5(2)	5	7(2)	1(1)		3(2)	1(1)	5	
M.J.52	(12)	4(1)	6(4)	7(1)	7(3)		1(1)		3(1)	3	(1)
	(35)	21(3)	19(9)	19(3)	20(7)	2(1)	1(1)	9(7)	4(2)	8	(2)

Table 27A Values expressed as percentages

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Other	Empty
J.J.(A)51	(5)	20	40	40	20			20			x
S.O.	(8)	75	75	63	63	x		63			
N.D.51	(10)	100	50	50	70	x		30	10	x	
M.J.52	(12)	33	50	58	58		x		25	x	x

The rates of intake of mysids, crabs and hermit crabs agree with those of the complete analysis. The earlier suggestion that polychaets act as filler does not seem to be borne out by fish of this group. The abundance of gammarids and shrimp as measured by the rates of occurrence in the stomachs does not agree at all with our meagre information from bottom plankton tows or from our knowledge gained from the overall analysis. Quite possibly several species of each of the gammarids and shrimp are involved so that different breeding periods would be found and result in different periods of abundance, this suggestion will remain unconfirmed until such time as detailed analysis of the stomach contents can be made.

Table 28 Kempt Head Cod 35-39 centimetres

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Other	Empty
J.J.(A)51	(2)	2(1)	1(1)	1	2	1					
S.O.	(10)	7(1)	8(4)	5	3(2)		1	3(2)		3	(1)
N.D.51	(5)	5	5	2	5(2)	2		1(1)	2(2)	2	
M.J.52	(6)		6(4)	1	1		1(1)			2(1)	
	(23)	14(2)	20(9)	9	11(4)	3	2(1)	4(3)	2(2)	7(1)	(1)

Table 28A Values expressed as percentages

Period	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Other	Empty
J.J.(A)	(2)	100	50	50	100	x					
S.O.	(10)	70	80	50	30		x	30		x	x
N.D.	(5)	100	100	40	100	x		20	40	x	
M.J.52	(6)	0	100	17	17		x			x	

The rates of occurrence of the different invertebrates in stomachs of this size group do not generally agree with those of the overall size range with the samples previously discussed or with the periods of abundance of the invertebrates as estimated from the bottom plankton hauls. Possibly, because of the larger size of these fish, different species of the mysids, gammarids and shrimp are concerned here to those utliized by the smaller fish.

Preliminary Stomach Examination

Cod

Great Bras D'Or

Table 29 Rate of Occurrence of food items with respect to cod length

Values expressed as percentages

Length	F.	Mys.	Poly.	Gamm.	Shrimp	Crab	H.Crab*	Cap.	Cum.**	Biv.	Fish
10-14	(17)	53	29	65	24	0	0	0	0	0	0
15-19	(34)	53	50	56	18	0	0	12	8	0	0
20-24	(28)	43	61	64	39	4	0	14	38	4	4
25-29	(59)	51	59	39	24	10	8	10	16	10	3
30-34	(81)	52	63	47	44	12	10	14	13	6	10
35-39	(94)	55	78	43	53	7	10	5	8	12	12
40-44	(73)	30	67	48	45	11	9	8	21	12	12
45-49	(28)	11	86	25	39	25	0	11	25	21	14
50-54	(12)	0	50	17	33	0	0	8	14	17	42
55-59	(8)	0	75	25	0	0	0	38	33	0	50
60-74	(7)	0	14	14	0	0	0	14	20	0	71

* for Baddeck Bay and Kempt Head
** for Whycocomagh Bay

Combining the data for the three areas does not really show anything new with reference to food utilization and size. The decreasing utilization of mysids and gammarids with increasing fish size is more or less evident. Similarly for the increasing utilization with increasing size, of polychaets, bivalves, fish and crabs. Shrimp utilization may increase at first with increasing fish size and then fall off again with further increase in fish size. There seems to be no relationship between fish size and occurrence for cumaceans and caprellids. Hermit crabs are restricted to the diet of fish of 25-44 centimetres.

Polychaets

Length	W.B. Total
10-14	17
15-19	23
20-24	62
25-29	63
30-34	78

Length	Combined Data Smoothed
10-19	43
20-29	60
30-39	71
40-49	72
50-59	60

Polychaets (cont'd)

Length	W.B.Total
35-39	79
40-44	79
45-49	84
50-54	57
55-59	100
60-64	0
65-69	0
70-74	100

Length	Combined Data Smoothed
60-74	14

Gammarids

Length	B.B.Total
10-14	71
15-19	86
20-24	-
25-29	56
30-34	39
35-39	49
40-44	19
45-49	9
50-54	0

Length	B.B.Total Smoothed
10-19	79
20-24	-
25-34	44
35-44	38
45-54	7
55-	0

Length	Combined Total Smoothed
10-19	59
20-29	47
30-39	45
40-49	28
50-59	20
60-74	14

Mysids

Length	K.H. Total
10-14	100
15-19	78
20-24	67
25-29	68
30-34	60
35-39	61
40-44	53
45-49	0

Crabs

Length	K.H. Total Smoothed
10-19	0
20-29	13
30-39	22
40-49	22
50-	0

Length	B.B. Total Smoothed
-24	0
25-34	6
35-44	10
45-54	33
55-	0

Length	Combined Total Smoothed

Crabs (cont'd)

Total B.B., K.H. Length	%
10-14	0
15-19	0
20-24	7
25-29	15
30-34	17
35-39	10
40-44	16
45-49	44
50-	0

Total B.B., K.H. Smoothed Length	%
10-19	0
20-29	13
30-39	13
40-49	23
50-	0

Shrimp

Combined Total Smoothed

Length	%
10-19	20
20-29	29
30-39	50
40-49	44
50-59	20
60-	0

Bivalves

B.B. Total

Length	%
10-14	0
15-19	0
20-24	-
25-29	11
30-34	9
35-39	13
40-44	19
45-49	33
50-54	33
55-	0

K.H. Total

Length	%
10-14	0
15-19	0
20-24	7
25-29	6
30-34	6
35-39	13
40-44	21
45-49	25
50-54	50
55-	(0)

Combined Total Smoothed

Length	%	Length	%
10-19	0	10-14	0
20-29	8	15-24	2
30-39	9	25-34	8
40-49	15	35-44	12
50-59	10	45-54	20
60-	0	55-	0

Fish

B.B. Total

Length	%
10-14	0
15-19	0
20-24	-
25-29	11
30-34	17
35-39	17
40-44	8
45-49	17
50-54	67
55-59	100
60-64	-
65-69	100

W.B. Total

Length	%
10-14	0
15-19	0
20-24	8
25-29	0
30-34	13
35-39	4
40-44	14
45-49	8
50-54	29
55-59	33
60-64	50
65-69	100
70-74	0

W.B. Total Smoothed

Length	%
10-19	0
20-29	3
30-39	9
40-49	13
50-59	30
60-69	75
70-74	0

K.H. Total

Length	%
10-14	0
15-19	0
20-24	0
25-29	3
30-34	3
35-39	9
40-44	16
45-49	25
50-54	50
55-64	-
65-69	100

Table 30 Comparison of the Rates of Occurrence in Three Areas of the Different Food Items Found in Cod Stomachs

Area	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H.Crab	Cap.	Isop.	Cum.	Other	Empty
B.B.	(137)	72(32)	91(26)	54(17)	73(25)	19(1)	22(19)	14(10)	9(1)	5	13(3)	0	3	(3)
K.H.	(148)	91(30)	88(46)	66(9)	63(19)	14(6)	10(8)	24(16)	11(8)	2	0	0	22(2)	(4)
W.B.	(156)	25(7)	104(65)	62(23)	33(15)	7	17(10)	1	0	37(11)	1	26(14)	4(1)	(10)

Table 30A As Above Values Expressed as Percentages.

Area	F.	Mys.	Poly.	Gamm.	Shrimp	Biv.	Fish	Crab	H. Crab	Cap.	Isop.	Cum.	Other	Empty
B.B.	(137)	53	66	39	53	14	16	10	7	x	9	0	x	2.2
K.H.	(148)	61	59	45	43	9	7	16	7	x	0	0	x	2.7
W.B.	(156)	16	67	40	21	5	11	x	0	24	x	17	x	6.0

The different invertebrates and fish are placed in descending order of importance below for each area.

Baddeck Bay	Kempt Head	Whycocomagh Bay
Polychaets	Mysids	Polychaets
Mysids	Polychaets	Gammarids
Shrimp	Gammarids	Caprellids
Gammarids	Shrimp	Shrimp
Fish	Crabs	Cumaceans
Bivalves	Bivalves	Mysids
Crabs	Fish	Fish
Isopods	Hermit Crabs	Bivalves
Hermit Crabs	Caprellids	Crab
Caprellids		Isopods

The same four items are found most commonly in stomachs from Baddeck Bay and Kempt Head all being found in at least 39% of the stomachs from those areas. Of those four items three are of the same ranking, if not the same absolute value for Whycocomagh Bay cod, the item missing from this important aggregation so far as Whycocomagh Bay stomachs are concerned is of course the mysid, which occurred in that group to a considerably lesser degree (16%).

Crabs and hermit crabs found more than occasionally in Baddeck Bay and Kempt Head cod stomachs are absent or in effect so, from stomachs from Whycocomagh Bay.

The rates of occurrence of shrimp in stomachs from the wormy areas are more similar than that for Whycocomagh Bay fish.

Baddeck Bay stomachs reveal a slight but possibly significantly greater rate of occurrence of bivalves, while isopods were recorded from them occasionally and but once from Whycocomagh Bay stomachs.

Caprellids and cumaceans are very characteristic of the stomach contents of Whycocomagh Bay fish, the former group being recorded on a few occasions from Kempt Head and Baddeck Bay stomachs and the latter group not at all, although it has been pointed out earlier that the cumaceans as a group are by no means absent from Baddeck Bay.

Because of their somewhat similar rates of occurrence, polychaets, gammarids, fish and bivalves (?) may be omitted from consideration as carriers of the worm in cod although later investigation may actually prove that the similarities in rates of occurrence are coincidental and different species of these groups are involved.

Caprellids and cumaceans being found in quantity only in stomachs from Whycocomagh Bay would not appear to be very likely hosts of the worm.

Isopods, because of their restricted occurrence in stomachs (to Baddeck Bay cod), do not appear to be likely general carriers of the worm.

Mysids, because of their more important position in the diet of cod from wormy areas, not only in rate of occurrence but also in absolute numbers (see invertebrate section dealing with this) and their utilization by fish of all sizes (a factor against crabs, Hermit crabs and to some extent shrimp) seem to be the most likely general carrier of the larval cod worm. Nematodes have been recovered to a fair degree from mysids and these are suspected to be the larval cod worm. Cursory examination of other invertebrates has not resulted in the finding of nematode infested individuals in any quantity, but specimens so affected have been found in the gammarid, caprellid, shrimp and chaetognath groups so that while it seems very likely from a study of stomach contents of cod from these areas that mysids are the prime carriers of the cod worm, other of the invertebrates as shrimp, crabs, hermit crabs and others could function as carriers to a lesser degree.

Smelt

Baddeck Bay

Length	Mysid	Gammarid	Shrimp	Polychaet	Bivalve	Fish	Cum.	"Cop."	Empty
10-14(5)	2	1	1			1(1)	1	3(3)	(1)
15-19(11)	2(2)	1	1(1)	1	1			1(1)	(7)
20-24(1)									(1)
(17)	4(2)	2	2(1)	1	1	1(1)	1	4(4)	(9)
	24%	12%	12%	6%	6%	6%	6%	24%	53%

Kempt Head

Length	Mysid	Gammarid	Shrimp	Polychaet	Other	Empty
14-17(8)	2(2)	3(2)	2(1)	1(1)	2	(2)
15-19(15)	10(10)					(5)
(23)	12(12)	3(2)	2(1)	1(1)	2	(7)
	52%	13%	9%	4%		30%

Smelt Total

Length	Mysid	Gammarid	Shrimp	Polychaet	Fish	Bivalve	Cum.	"Cop"	Em.	Other
10-14(5)	2	1	1		1(1)		1	3(3)	(1)	
14-17(8)	2(2)	3(2)	2(1)	1(1)					(2)	2
15-19(26)	12(12)	1	1(1)	1		1		1(1)	(12)	
20-24(1)									(1)	
(40)	16(14)	5(2)	5(2)	2(1)	1(1)	1	1	4(1)	(16)	2
	40%	13%	13%	5%				10%	40%	

Mysids are the most commonly occurring item in the stomachs of fish from both areas and most markedly from Kempt Head stomachs. In the Baddeck Bay sample the so-called copepods, really better referred to here as planktonts are as commonly occurring in the stomachs and in fact appear to form the most important single dietary item in more stomachs than mysids. It is interesting to note that along with mysids, shrimp are more than of accidental occurrence in these stomachs (gammarids also, but does not apply here) since the rate occurrence of shrimp in the stomachs from different areas suggest that they may also be suspected carriers of the cod worm. The high number of empty stomachs is noteworthy, particularly since the stomachs were taken in small samples on different dates. Whether this "emptiness" is a characteristic of smelt stomachs is not known.

Common Hake

Baddeck Bay

Length	F.	Mys.	Gamm.	Shrimp	Poly.	Biv.	Fish	Crab	Isop.	Empty
10-14	(4)	3(3)	1(1)	3						
15-19	(8)	4(2)	4	7(3)	3(2)			1	1	(1)
20-24	(11)	4(2)	5(1)	6(4)	7(4)	1	1(1)			
25-29	(6)	2(1)	1	4	6(4)	1(1)				
30-34	(5)	2(1)		3(1)			3(3)			
35-39	(1)	1(1)		1						
	(35)	16(10)	11(2)	24(9)	16(8)	2(1)	4(4)	1	1	(1)
		46%	31%	69%	46%		11%			

Kempt Head

Length	F.	Mysid	Shrimp
25-29	(1)	1(1)	
30-34	(2)	2(2)	1
35-39	(1)	1	1(1)
40-44			
45-49	(1)	1(1)	
	(5)	5(4)	2(1)
		100%	40%

Stomachs collected on one day

Common Hake Total

Length	F.	Mys.	Gamm.	Shrimp	Poly.	Biv.	Fish	Crab	Isop.	Empty
10-14	(4)	3(3)	1(1)	3						
15-19	(8)	4(2)	4	7(3)	3(2)			1	1	(1)
20-24	(11)	4(2)	5(1)	6(4)	7(3)	1	1(1)			
25-29	(7)	3(2)	1	4	6(4)	1(1)				
30-34	(7)	4(3)		4(1)			3(3)			
35-39	(2)	2(1)		2(1)						
40-44										
45-49	(1)	1(1)								
	(40)	21(14)	11(2)	26(9)	16(8)	2(1)	4(4)	1	1	(1)
		53%	28%	65%	40%		10%			

As in the case of smelt, mysids and shrimp are the two most commonly occurring items in the stomachs of hake. Gammarids, which were of equal occurrence with shrimp in the case of smelt, are here of fourth rank, the approximate position they occupy for Baddeck Bay and Kempt cod. Polychaets, which were of slight occurrence in smelt stomachs, have here assumed a major position in the diet but still are not of the importance as found in cod stomachs from these areas. The hake so far examined from the Kempt Head area were all taken on one day (20-X-51) (Neomysis bloom), so that the restriction of the diet of those fish to mysids and shrimp is possibly accidental.

Mailed Sculpin

Kempt Head

Length	F.	Mysids	Gammarids	Polychaets	Shrimp	Empty
10-14	(11)	6(6)	2(1)	2	1	(4)
		55%	18%	18%	9%	36%

As with the smelt and hake, mysids are the most commonly occurring item in the stomach contents and as was the case with smelt, excepting the empty stomachs, mysids are found to occur in a very high proportion of the stomachs. Although this is a small sample, it represents several collections, so that the low degree of occurrence of shrimp compared to that as found in smelt and hake is of some importance.

Canadian Plaice

Kempt Head

Length	F.	Mysids	Polychaets	Bivalves	Caprellid	Empty
10-14	(2)			1(1)		(1)
15-19	(3)	1(1)				(2)
20-24	(4)			3(3)		(1)
25-29	(3)			2(2)		(1)
30-34	(2)	1(1)	1(1)	2	1	
35-39	(4)		1(1)	3(2)		(1)
	(18)	2(2)	2(2)	11(8)	1	(6)
		11%	11%	61%		33%

20-XI-51 2/5 empty
22-XII-51 3/3 empty

The importance of bivalves in the diet of this species is apparent. Note that mysids have been recorded from two of the five stomachs collected late in the year, that is in 2/3 that contained food. All stomachs collected on 10-VII-51 containing food items contained bivalves, one also containing polychaets.

Winter Flounder

Baddeck Bay

Length	F.	Poly.	Biv.	Gastro.	Cum.	Cap.	Gamm.	Other	Empty
10-14	(2)	1(1)							(1)
15-19	(1)								(1)
20-24	(2)	2(1)	1(1)		1				
25-29	(2)	2(2)	2		1	1	1		
30-34	(1)	1	1	1(1)					
35-39	(1)	1(1)	1	1				1	
	(9)	7(5)	5(1)	2(1)	2	1	1	1	(2)
		78%	55%	22%	22%				

2-VIII-51 (7) - bivalves, worms (= polychaets?)

26-XI-51 2/2 empty;

Kempt Head

Length	F.	Bivalves	Empty
15-19	(1)		(1)
20-24			
25-29	(3)	1(1)	(2)
30-34	(2)		(2)
35-39	(2)		(2)
	(8)	1(1)	(7)

20-XI-51 3/4 empty;
22-XII-51 4/4 empty;

Canadian Plaice Total

F.	Polychaets	Bivalves	Gastropods	Cumaceans	Caprellids	Gamm.	Other	Em.
(17)	7(5)	6(2)	2(1)	2	1	1	1	(9)
	41%	35%	12%	12%				61%

The importance of Polychaets and bivalves in the diet of this fish are apparent. Note that as with the plaice, most of the stomachs collected in the late fall are empty.

Other Fish Species

Supposedly not infected by Cod Worm (Scott)

Species	Polychaets	Shrimp	Isopods	Mysids	Empty
Pollock (1)	1(1)				
Yellowtail (4)	2(1)	1(1)	2		(2)
Brill (4)				2(2)	(2)
(9)	3(2)	1(1)	2	2(2)	(4)

In the case of both flatfish, the samples taken in December were empty, those taken in late November contained food.

Comparison of the Feeding Habits of Fish other than Cod

Values expressed as Percentages

Species	F.	Mys.	Gamm.	Shrimp	Poly.	Biv.	Fish	Cum.	"Cop."	Crab	Isop.	Gas.	Emp.
Smelt	(40)	40	13	13	5	x	x	x	10				40
C.Hake	(45)	58	24	58	36	x	9			x	x		x
M.Sculpin	(11)	55	18	9	18								36
C.Plaice	(18)	11			11	61							33
W.Flounder	(17)	0	x		41	35		12				12	61
Po.,Y.T.	(5)	0		20	60						40		40
Brill	(4)	50											50

Caprellids and others have been omitted from the above tabulation.

Note that with the exception of brill, the fish known to carry the cod worm, Porrocaecum decipiens, have in common a preference in their diet for mysids, in other words that is the common feature of their diet, while those in which the worm is rare or not known do not contain any mysids in this sample. Gammarids are a common constituent of the diet of "wormy" fish except plaice, but even without this anomally, the fact that gammarids are common to the diet of cod from Whycocomagh Bay as well as those from the wormy areas, would tend to rule out that group as a carrier. The two brill specimens containing mysids complicate the matter and prevent a nice pat conclusion, but we may suggest here that either the sample is small and the intake of mysids accidental and coincidental or that possibly the brill is in fact found to contain flesh nematodes of the Porrocaecum type at least in certain areas. Unfortunately, time did not permit the investigation of the species of fish other than cod in the area for worm infestation to any degree and brill happens to be one of the fish that was not examined. Furthermore, due to their small size and meatless appearance, none of that species was eaten by the local populace to our knowledge, so that unlike the winter flounder in the Kempt Head area nothing is known of the worm content as determined by that means.

In conclusion it is possible to state, despite the bothersome brill, that the dietary item that is common to all species of fish examined here known to B.B., K.H. cod carry the worm and not generally found in the stomach contents of fish not believed to carry the worm (not as common W.B. cod) is the mysid. Other invertebrates are common to several species and groups (shrimp) and could also be theoretically capable of carrying the nematode but are not found here to be an item in the diet of all forms supposedly worm carrying.