ART. XXVIII.—*Brief Contributions to Zoology from the Museum of Yale College.* No. XXXIV.—*Results of Dredging Expeditions off the New England Coast in* 1874; by A. E. VERRILL.

[Continued from p. 43.]

OUR investigations show conclusively that there is a very decided flow of cold currents through Fisher's Island Sound and Block Island Sound into Long Island Sound, and along the deeper parts of the latter for a great distance, especially toward the southern and deeper side. The influence of this

List of Dredging Localities where Temperatures were taken on the Steamer Bluelight, 1874.

Current No.	Date. 1874.	Hour.	Sky.	Locality.	Bearings.	Nature of bottom.	Depth in fathoms	Temperature. (F.)		
								Air.	Surface.	Bottom.
27	Jul. 22	-------	-------	Fisher's I. Sd.	Middle Clump, ¼m. S.E.	Sand and shells,	11-9	65°	64°	62°5
28		-------	-------	Fisher's I. Sd.	Middle Clump, ¼m. S.S.E.	Sand and shells,	11	65	64	62·5
29		-------	-------	Fisher's I. Sd.	West Clump, ⅛m. S.S.W.	Sand and shells,	8	65	64	63
30	23	2.53 P.M.	-------	Fisher's I. Sd.	Eel Grass Lt. Ship, ¼m E. by W.	Sand and gravel,	7	66	64	62·5
31		3.22	-------	Fisher's I. Sd.	Latimer's Reef, 1m. N.N.E.	Sand, grav., shells,	10½	65·5	62·5	61·5
32		3.59	-------	Fisher's I. Sd.	Latimer's Reef, W.; Napatree Pt., 2m. E.	Sand and rock,	11	65	62·5	61
33	24	10.34 A.M.	-------	Fisher's I. Sd.	Groton Long Pt., ⅛m. N.E. by N.; N. Hummock Lt., S.W.	Sand and shells,	8	72	66	63
34		11.06	¾ Clear,	Fisher's I. Sd.	Between Groton L. Pt. & Sea-flower Reef,	Sand and shells,	7	71	65·5	62·5
35		12.14 P.M.	-------	Long I. Sd.	Race Pt. Rock, 1¼m. E.	Rocks and shells,	50	72	68	59
36		12.41	Clear,	Long I. Sd.	Race Pt. Rock, 2m. E.	Rocks and gravel,	50	68	68	58
37		2.33	-------	Nepeague B.	Off Culloden Pt., L. I.	Sand and mud,	12½	74	66	61
39	27	2.40	Clear,	Fisher's I. Sd.	E. part of Sweeper Ground,	Sand and shells,	4	70·5	66·5	65
40		3.10	Clear,	Fisher's I. Sd.	Hotel on Ram I., ⅛m. N.E., ½ E.	Sand,	4	68·5	66·5	65·5
41		3.31	Clear,	Fisher's I. Sd.	Ram I., ¼m. N.E.	Sand,	3½	68·5	66·5	65
42		3.58	Clear,	Fisher's I. Sd.	Off Middle Clump,	Gravel and stones,	14	68·5	66·5	64
43		4.21	Clear,	Fisher's I. Sd.	Off Middle Clump,	Gravel and stones,	10½	67	66	64·5
44	29	11.00 A.M.	Cloudy,	Fisher's I. Sd.	Eel Grass Light Ship, ¼m. S.E	Sand, grav., shells,	7	----	----	----
45	30	11.10	Clear,	Block I. Sd.	Little Gull I. Lt., W.; Race Rock, N.W.	Sand,	45	76	62·5	57
48		1.15 P.M.	Clear,	Block I. Sd.	Gardiner's Point Light, ⅜m. S.	Gravel,	14½	71	66	63·5
49		2.50	Clear,	Gardiner's B.	In Gardiner's Bay, L. I.,	Mud,	6½	71·5	67·5	64·5
50		3.46	Clear,	Gardiner's B.	In Gardiner's Bay, L. I.,	Sand,	4½	72·5	66·5	65
51		4.10	Clear,	Gardiner's B.	In Gardiner's Bay, L. I.,	Gravel,	3	72	66·5	65
52		4.27	Clear,	Gardiner's B.	In Gardiner's Bay, L. I.,	Mud,	6½	69·5	68·5	65
53	31	12.54	Clear,	Block I. Sd.	Watch Hill Light, 3m. N. by W.	Sand,	18	68	66	56
55	Aug. 3	10.30 A.M.	Clear,	Long I. Sd.	Bartlett's Reef Light Boat, 1½m. E. ½ S.	Sand and mud,	22	60·5	64·5	63·5
56		10.56	Clear,	Long I. Sd	Bartlett's Reef Light Boat, 2½m. E. ½ S.	Gravel and sand,	14	59	64	63
57		11.33	Clear,	Long I. Sd.	Bartlett's Reef Light Boat, 3m E.	Sand, grav., shells,	15½	67	64·5	63·5
58		12.15 P.M.	Clear,	Long I. Sd.	Hatchet's Point, 2m. N.W.	Gravel and shells,	19	61·5	64	63
59		1.00	Clear,	Long I. Sd.	Off Saybrook, Conn.	Sand,	4	67	64·5	63·5

Current No.	Date. 1874.	Hour.	Sky.	Locality.	Bearings.	Nature of bottom.	Depth in fathoms	Temperature. (F.) Air.	Surface.	Bottom.
61	Aug. 4	12.19 P.M.	Clear,	L. Peconic B.	Little Peconic Bay, L. I.	Gravel and shells,	7½	66°5	74°	71°5
63		1.16	Clear,	L. Peconic B.	Little Peconic Bay, L. I.	Gravel,	7	----	----	72
64		2.02	Clear,	L. Peconic B.	Little Peconic Bay, L. I.	Sand and gravel,	10–13	67	72	71·5
66		3.29	Clear,	Gt. Peconic B.	In Great Peconic Bay, L. I.	Mud and gravel,	5½	67·5	74	72
67		3.50	Clear,	Gt. Peconic B.	In Great Peconic Bay, L. I.	Sand,	5½	68	73	72·5
68		4.09	Clear,	Gt. Peconic B.	In Great Peconic Bay, L. I.	Gravel,	4½	66·5	73	72·5
69		4.56	Clear,	L. Peconic B.	Little Peconic Bay, L. I.	Sand and shells,	9½	66	72·5	71
71	5	1.45	¾ Clouds,	Gardiner's B.	Gardiner's Bay, L. I.	Sand,	3½	70·5	----	68
73	6	9.35 A.M.	Clear,	Block I. Sd.	Watch Hill Lt. 3m N. ¼ W.	Sand,	18	63	63	60
74		11.10	Clear,	Block I. Sd.	Montauk Pt., 6m. S.W. ½ S.	Sand,	17	66	63·2	60
75		12.06 P.M.	Clear,	Block I. Sd.	Block I. Lt., 3m. E.N.E.	Mud and stones,	19½	67	63·5	60
76		12.48	Clear,	Block I. Sd.	Block I. Lt., 4m. S.E. by E.	Sand and mud,	18½	68	64	60
77		1.22	Cloudy,	Block I. Sd.	Block I. Lt., 7m. E.S.E.	Mud,	19	68	64	59
78		2.50	Clear,	Block I. Sd.	Watch Hill, 4m. N.W. ½ N.	Sand,	23	70	64	58·5
79		--------	--------	Block I. Sd.	Watch Hill, 3m. N.W. ½ N.	Sand and shells,	22	----	----	----
80		3.20	Clear,	Fisher's I. Sd.	West Harbor, Fisher's I.	Sand and shells,	4	74	66·5	65·2
81	10	3.20	Clear,	Fisher's I. Sd.	West Harbor, Fisher's I.	Sand and shells,	3½	74	66·5	65·3
82		--------	Clear,	Fisher's I. Sd.	West Harbor, Fisher's I.	Sand and mud,	5½	74	66·5	----
83		--------	Clear,	Fisher's I. Sd.	West Harbor, Fisher's I.	Sand and gravel,	5½–2	74	----	----
84		5.13	Clear,	Fisher's I. Sd.	Off Middle Clump,	Mud and shells,	12½	73·5	69	64·7
85	11	--------	Clear,	Block I. Sd.	Fisher's I., N.	Sand,	15	75	66	61
86		10.35	Foggy,	Block I. Sd.	Fisher's I., N.	Sand,	8½	75	65·5	62·5
87		11.25	Clear,	Block I. Sd.	Fisher's I., N.	Stones,	8	72	65·5	63
88		11.52	Clear,	Block I. Sd.	Fisher's I., N.E.	Stones,	7½	76	66·5	63
89		12.24	Clear,	Block I. Sd.	Fisher's I., N.E.	Stones and gravel,	6	78	66·5	63·2
90		1.17	Clear,	Block I. Sd.	Fisher's I., N. W. by W.; Race Point, W.	Stones and gravel,	5½	76·5	66·5	63·2
91		2.40	Low fog,	Block I. Sd.	Fisher's I., N.	Sand and shells,	32½	75	66·5	58·5
93	12	2.57	Clear,	Long I. Sd.	Seaflower Reef, S.S.W.	Sand.	4¾	76	67·5	62·5
94		3.13	Clear,	Long I. Sd.	Seaflower Reef, S.S.W.	Sand and gravel,	4½	75	67	64·5
95		3.46	Clear,	Long I. Sd.	Seaflower Reef, E.	Fine sand and mud	6	----	67	64·5

Current No.	Date. 1874.	Hour.	Sky.	Locality.	Bearings.	Nature of bottom.	Depth in fathoms	Temperature. (F.) Air.	Surface.	Bottom.
96	Au. 12	4.14 P.M.	Clear,	Long I. Sd.	Seaflower Reef, 1 m. E.	Mud and sand,	6	72°	67°	64°5
97	13	10.40 A.M.	Cloudy,	Block I. Sd.	Montauk Pt., 7m. S.S.E.; Middle Ground, 1¼m. W. by N.	Sandy,	15½	74	65	64
98		11.20	Cloudy,	Block I. Sd.	Montauk Pt., 7½m. S.S.E.	Sand and gravel,	9	71	65	64
99		11.48	Cloudy,	Block I. Sd.	Montauk Pt., 7⅝m. S.S.E.	Sand and rocks,	5½	72	65	64
100		12.45 P.M.	Cloudy,	Block I. Sd.	Montauk Pt., 4½m. S. by E.	Fine sand,	19	72	65	63·5
101		1.10	Cloudy,	Block I. Sd.	Montauk Pt., 3m. S. by W.	Sand and shells,	20	72	66	63·5
102		2.15	Cloudy,	Block I. Sd.	Montauk Pt., 2½m. S.S.W.	Stones,	8	72·5	65	65
103		2.45	Cloudy,	Block I. Sd.	Montauk Pt., 2m. W.S.W.	Rocks,	7½	72	65	64·5
104		3 10	Cloudy,	Block I. Sd.	Montauk Pt., 2m. W.	Rocks,	7½	72	65	64·5
105	14	2.43	Clo.&rain	Fisher's I. Sd.	Between Eelgrass Lt. Boat & White Rock,	Sand and gravel,	5¼	67	66	64·5
106		.....	Clo.&rain	Fisher's I. Sd.	Bet. Eelgrass Lt. B. & White R., 1m. E. by N.	Sand and gravel,	6	67	....	....
107		.....	Clo.&rain	Fisher's I. Sd.	Stonington Lt., 1m. N.E. ½ E.	Sand and gravel,	5	67	....	....
108		.....	Clo.&rain	Fisher's I. Sd.	Eelgrass Lt. B., ⅝m. W.N.W.	Rocks,	5½	67	....	....
109	17	3.30	Clear,	Fisher's I. Sd.	Eelgrass Lt. B., ⅝m. N.W. by W.	Stones,	7	69·5	67	63
110		3.43	Clear,	Fisher's I. Sd.	Eelgrass Lt. B., 1m. W.N.W.	Sand,	6½–3	69·5	67	63
111		3.49	Clear,	Fisher's I. Sd.	Eelgrass Lt. B., 1¼m. W. by N.	Rocks,	5½	69	....	....
112		4.25	Clear,	Fisher's I. Sd.	Stonington Lt., 1¼m. E.N.E.	Sand,	4	69	66·5	....
113		5.10	Clear,	Fisher's I. Sd.	Eelgrass Lt. B., 1m. W. ½ N.	Stones,	7	70	67	63
114		5.40	Clear,	Fisher's I. Sd.	Eelgrass Lt. B., 1m. E.	Sand,	7½	70	66·5	63
115	18	12.10	Clear,	Block I. Sd.	Mont. Pt. 9m. W.; S.E. end Block I., 6½m. N.E.	Sand,	20	71	66	47·5
116		2.43	Clear,	Off Block I.	Mont. Pt., 11m. N.W. by W.; S.E. end Block I., 9m. N.E. by N. ½ N.	Sand and shells,	25	70	67·5	45·5
117		.....	Clear,	Off Block I.	Same as last,	Sand and shells,	23½	70	....	....
118		.....	Clear,	Off Block I.	Same as last,	.....	23½	70	....	....
119		3.37	Clear,	Off Block I.	Old Harbor Point, 5m. N.	Sand and stones,	11	....	67	55
120		.....	Clear,	Off Block I.	Old Harbor Point, 5m. N.	Sand and stones,	11	70	....	
121		4.38	Clear,	Off Block I.	Off New Shoreham,	Gravel and stones,	14	70	66	57·5
122		5.00	Clear,	Off Block I.	Off New Shoreham,	Sand and gravel,	18	70	66·5	52·5
123	19	9.00 A.M.	Clear,	Off Block I.	New Shoreham, 6m. N.W. by N.	Sand and gravel,	14	73	66·5	54

Current No.	Date. 1874.	Hour.	Sky.	Locality.	Bearings.	Nature of bottom.	Depth in fathoms	Temperature. (F.) Air.	Surface.	Bottom.
124	Au. 19	9.37 A.M.	Clear,	Off Block I.	New Shoreham, 6m. N.N.W.	Coarse sand,	14½	73°	66°	50°5
125		10.37	Clear,	Off Block I.	Block I., N.W.	Gravel,	14½	69·5	66·5	53
126		12.34 P.M.	Hazy,	Off Rhode I.	Point Judith, 4m. N.W.	Sand and gravel,	13½	75	67·5	54·5
127		1.10	Hazy,	Off Rhode I.	Point Judith Lt., 2½m. N.	Stones,	9	----	69·5	61
128		1.43	Hazy,	Off Rhode I.	Point Judith Lt., 3m. E.	Rocks and sand,	4	76	67·5	63
129		--------	Hazy,	Off Rhode I.	Off Narragansett Beach,	Sand and gravel,	8½	----	----	----
130		--------	Hazy,	Off Rhode I.	Off Narragansett Beach,	Gravel and stones,	10½	----	----	----
131	21	11.00 A.M.	Hazy,	Block I. Sd.	Watch Hill Lt., 3m N. ½ E.	Sand and gravel,	21	80	67·2	56·5
132		--------	Hazy,	Block I. Sd.	Watch Hill Lt., 3½m. N. by E. ½ E.	Sand,	20	80	67·2	----
133		1.25 P.M.	Hazy,	Block I. Sd.	Watch Hill Lt., 4m. N.E. by N.	Sand,	17½	79·2	67·2	----
134		1.25	Hazy,	Block I. Sd.	Off E. end Fisher's I.	Gravel,	9	78	66·5	63·5
135		2.00	Hazy,	Block I. Sd.	E. end Fisher's I., 2m. N.	Sand,	19½	78	67	57·5
136	24	11.45 A.M.	Cloudy,	Napeague B.	Fort Pond Bay,	Mud,	7½	76	73·2	65·5
142	25	3.00 P.M.	½ cloudy.	Long I. Sd.	Off Hay Harbor,	Sand,	4½	70	65·5	64·5
143		3.30	--------	Long I. Sd.	Race Point, ½m. S.	Mud and sand,	7½	70	65·5	----
144		3.40	--------	Long I. Sd.	Race Point, 1m. S.S.E.	Find sand,	8½	----	----	----
145		4.20	--------	Long I. Sd.	Off Race Point,	Rocks,	5½	----	----	----
146		5.30	--------	Fisher's I. Sd.	Between E. Clump & Ram I. Reef,	Hard,	7½	74·5	65·5	65
147		--------	--------	Fisher's I Sd.	Between E. Clump & Ram I. Reef,	Hard,	14	----	----	----
148		6.00 P.M.	--------	Fisher's I. Sd.	Ram I. hotel, W.N.W.	Hard,	7½	----	----	----
149	27	11.17 A.M.	Part clo.	Long I. Sd.	Off Niantic, Two-Tree I., E.	Sandy,	5	70·5	65	64
154		3.50 P.M.	Part clo.	Long I. Sd.	Plum I. Lt., 3m. S.E. by E.; Saybrook Lt., N.W. by W.	Gravel,	22	73·5	66	65
155		4.10	Clear,	Long I. Sd.	Same as last.	Gravel,	26	73·5	66	65
157	30	9.14 A.M.	Clear,	Off Block I.	Near Coxe's Ledge, Block I., 20m. W.N.W.	Sand, stones, rock,	21	67	62	51·5
158		--------	Clear,	Off Block I.	Near Coxe's Ledge,	Rocky,	21	----	----	----
159		9.00 A.M.	Clear,	Off Block I.	Near Coxe's Ledge, Block I., 20m. W. by N.	Rocks and sand,	21	----	----	----
161		1.40 P.M.	Clear,	Off Block I.	Old Harbor Point. 10m. N.W. by W., ½ W.	Mud,	34	70	64	52
162		2.00	Clear,	Off Block I.	10m. off Block I., near last,	Mud,	34	70	64	52
172	Sept. 2	2.26	Clear,	Off Block I.	Coxe's Ledge,	Hard,	21	72·5	62.5	50

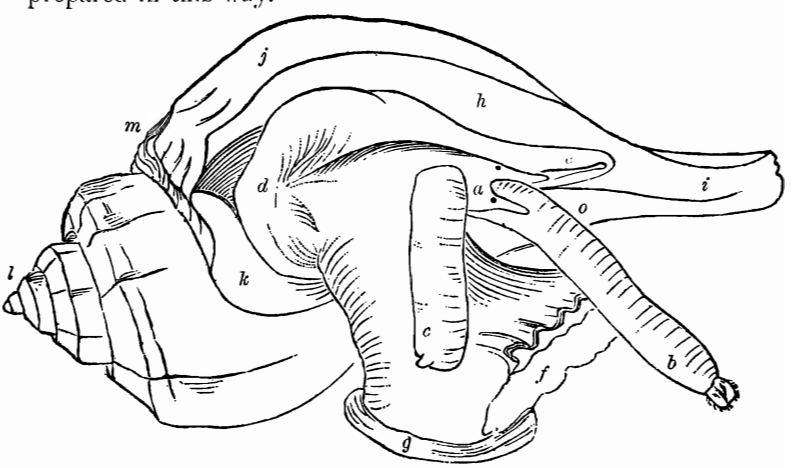
cold current is very apparent as far west as New Haven, in the deeper parts of the sound.* This cold water is doubtless derived directly or indirectly from the arctic current that flows southward along our Atlantic coast; but its flowing into Long Island Sound may be due largely to the influence of the tidal currents, modified by the local wind currents. On the other hand, the much higher temperatures of such enclosed localities as the Peconic Bays may be safely attributed to the direct heat of the sun over a broad expanse of shallow water, from which the cold currents are excluded.

Improved methods of preserving specimens.—During the summer numerous experiments were made by members of the party, but more especially by Prof. W. N. Rice and the writer, to ascertain the effects of various chemical preparations upon marine invertebrates. The special objects were: 1st, to improve the methods of preserving specimens for museum purposes, or to devise new methods; 2d, to ascertain the best means of killing in an expanded state species that ordinarily contract badly when put directly into alcohol. Besides numerous negative results, several of value were obtained. Numerous very perfect and beautiful preparations of *Actiniæ* (chiefly *Metridium marginatum*), in a state of nearly complete expansion, were made by slowly adding a saturated solution of picric acid to a small quantity of sea water in which they had been allowed to expand. When fairly dead they were transferred to a pure saturated solution of the acid and allowed to remain from one to three hours, according to size, &c. They were then placed in alcohol of about 60 to 70 per cent for permanent preservation. The alcohol should be renewed after a day or two, and this should be repeated until the water is all absorbed from the specimen. Hydroids (*Tubulariæ* thus preserved are especially beautiful) and most kinds of jelly-fishes can be easily and beautifully preserved in the same way, but with these the specimens may usually be placed alive directly into the acid, of full strength. Even delicate Ctenophoræ (*Hemiopsis*, *Idyia*, &c.) can be thus preserved so as to make fair specimens. With osmic acid we did not succeed so well, for the specimens contracted more, and finally became so darkly stained as to render them useless.

Hydro-chloral was also experimented with. It proved to be useless as a permanent preservative of marine invertebrates, as it apparently had a caustic or solvent action, and all the soft parts gradually dissolved, but without putrefaction. It was,

* The following temperatures were taken May 17th, a short distance off the outermost of the Thimble Islands, a few miles east of New Haven: surface 45½°, at 1 P. M., wind southerly, tide 4 hours ebb, sky clear; bottom 43½°, in 5 fathoms, rocks and mud; surface 48°, at 5.30 P. M., tide two hours flood.

however, found very useful for killing certain kinds of animals in an extended condition. It succeeded well, in this respect, with many nemerteans and some annelids, but did not affect all the species alike. Our success with it, in this way, was so great as to encourage us to make many additional trials of this kind during the coming summer. Many experiments were made last season, as in previous years, to find some poison that will kill mollusks, especially Gastropods, in a fully extended state. Although numerous drugs have thus been tried, the results have hitherto been mostly negative. At least, no method has been discovered that is more generally successful than by allowing them to suffocate in stale sea-water, through excess of carbonic acid and deficiency of oxygen. Many excellent preparations of the larger species (*Fulgur*, *Buccinum*, *Natica*, &c.) were thus made last summer. In most cases when the animal was found to be well extended, and at the same time so stupified as to be nearly inactive, the soft parts were forcibly held out by the hand while it was killed by immersion in alcohol Sometimes it could be tied to the body of the shell so as to keep it from withdrawing when it was placed in alcohol. The accompanying figure was made from a specimen prepared in this way.*



* Figure 1. *Sycotypus canaliculatus*, two-thirds natural size; *a*, head; *b*, proboscis extended, showing the odontophore at the end; *c*, male organ, bent forward, (it is ordinarily bent back under the mantle; in *Fulgur carica* this is a quite different, thin, flat, tapering, tongue-shaped organ); *d*, mantle; *e*, siphon; *f*, lower side of foot; *g*, operculum; *h*, aperture of shell; *i*, canal; *j*, body whorl; *k*, inner lip; *l*, *m*, spire; *o*, columella.