THE FIFTH ANNUAL REPORT OF THE BOWDOIN SCIENTIFIC STATION

Bulletin No. 7 Bowdoin College, Brunswick, Maine February 1, 1941

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THE BOWDOIN SCIENTIFIC STATION

Kent Island, Bay of Fundy

New Brunswick, Canada

THE FIFTH ANNUAL REPORT OF THE BOWDOIN SCIENTIFIC STATION

Bowdoin College
Brunswick, Maine
February 1, 1941

To the President and
Trustees of Bowdoin College

Sirs:

I have the honor to submit the fifth annual report of the Bowdoin Scientific Station covering the years 1939 and 1940.

The Station is now under the supervision of a special committee of the College Boards consisting of Albert T. Gould, Boston, Massachusetts; Edward N. Goding, Boston, Massachusetts; Sumner T. Pike, Washington, D.C.; and Alfred O Gross of the Bowdoin College faculty.

During the summer of 1939 the field work of the station was under the direction of Charles E. Ruckstuhl Jr., and for the summer of 1940 James Blunt, Bowdoin '40 was in charge. Their respective reports follow. I am pleased to announce that Mr. Blunt has accepted the Field Directorship for the season of 1941.

On May 13, 1940 your committee sent the following report to the President, - "The Kent Island Committee report that the work done the past year and the plans for operating during the present season fully justify the appropriation of five hundred dollars ($500.00) suggested by the Director."

The above report was accepted and the amount of five hundred dollars was voted by the Boards for the use of the Station. The appropriation has been expended for the salary of the warden, Mr. Ernest Joy, taxes, and the issuing and mailing of this report and a few miscellaneous minor expenses.

We are especially grateful to Mr. Sumner T. Pike for a contribution of $100.00 for use in remodelling one of the laboratories and the construction of a fire place in a section of the dormitory to be used as a study and reading room.

Although there were fewer men at the station during the past two seasons the amount and character of the work was excellent as shown by the following series of contributions submitted by the members.

Through the personal efforts and enthusiasm of the Field Director, James Blunt, a promising group of Bowdoin undergraduates will attend the session of 1941.

Kent Island has proven to be an interesting educational experiment in field work which has served well to create initiative and resourcefulness on the part of the students who attend.

We again wish to express our gratitude to Mr. John Sterling Rockefeller of New York City, who by his generous gift of the island to Bowdoin College, has made this station possible.

Alfred O Gross
for the Committee.

REPORT OF C. E. RUCKSTUHL JR., FIELD DIRECTOR - 1939

This year (1939) a smaller group than usual were present at the station. It was found, however, that such a group with the present equipment can accomplish a great deal and can take care of itself without the amount of guidance necessary for a larger group.

Little addition was made to the equipment since that which is already present was adequate for the group. A new punt was made for the warden and two new radio masts were erected with two more cut and ready to install.

The summer was a very happy and healthful one for all concerned. No casualty or sickness was experienced.

I take great pleasure in announcing that Lowell Thomas has accepted with great enthusiasm a place on our Board of Advisors.

THE STAFF

The present group of advisors of the station includes:

Alfred O Gross, Bowdoin College, Brunswick, Maine
J. Sterling Rockefeller, 25 Broadway, New York City, N.Y.
Henry S. Shaw, 136 High Street, Exeter, New Hampshire
Albert T. Gould, 1 Federal Street, Boston, Mass.
Edward N. Goding, 626 Tremont Building, Boston, Mass.
Sumner T. Pike, Washington, D.C.
Charles F. Brooks, Blue Hill Observatory, Milton, Mass.
Alger W. Pike, Lubec, Maine
Manton Copeland, Bowdoin College, Brunswick, Maine
Donald B. MacMillan, Provincetown, Mass.
Lowell Thomas, Rockefeller Place, New York City, N.Y.
William A. O. Gross, U. S. Steel Corporation, 121 Centennial Avenue, Sewickley
Sewickley, Pa.

The field staff which was based at the station from June 1 until September 1, 1939 were C. E. Ruckstuhl, Jr., Field Director, M.I.T., Cambridge, Mass.; Brewster Rundlette, Bowdoin '38, Yale University, New Haven, Conn.; Frederick Sargent, M.I.T., Cambridge, Mass.; Ivan Spear, Bowdoin '44, Portland, Maine; Robert M. Cunningham, M.I.T., Cambridge, Mass.; Dr. Thomas Ippolito, Welfare Island Hospital, New York City, N.Y., and Gordon P. McCouch, Harvard University, Cambridge, Mass.

NEEDS

A small power boat is much needed. Such a boat would not require the services of a pilot if used with discretion. Under the strict supervision of the Field Director or Dr. Gross, when here it would be used only under the most favorable weather and only when urgently necessary. The need of such a boat is apparent as a means of obtaining supplies, mail and passengers. The cost of hiring a boat has been very high this year and it is believed that it would pay for itself in a few years. There are other less apparent needs for a small boat. Perhaps the most vital is in the event of an accident or acute illness. Even at best it would take several hours for a doctor to get to the island. A small boat such as I have in mind would be able to reach Grand Manan in less than an hour. Other needs for a boat are for the scientific work carried on at the station. For example much work was upheld by lack of fish bait for the gull trap and for food for experimental birds. In short a small economical boat is essential to the welfare of the staff and the experimental work of the island. The cost of a boat adequate for our needs should not exceed $200.00

A new service car is needed. The old Ford is worn out and the general condition is beyond repair. A secondhand half-ton truck would be desirable.

A new well cover is needed for sanitary protection.

Several lambs and pigs should be purchased and allowed to graze in an enclosed area. In this way much could be saved on fresh meat.

A new laboratory building should be provided, the plans and much of the material is already on hand in storage in the wharf house.

There is a need for certain standard text books to be used in connection with subjects studied at the station. There should be books on Marine Invertebrate Zoology, Marine Vertebrate Zoology, Marine Botany, Histology, Embryology, Comparative Anatomy and certain popular books on insects, birds, flowers, etc.

CONCLUSION

This summer has definitely proven that a small group of men are able to work with much efficiency, happiness, and general well being.

With war in Europe it is realized that certain activities will have to be curtailed, but it is earnestly hoped that the station will not be adversely affected. The island with it thousands of sea birds, its stable temperature for physiological studies, its truly excellent location for radio research, and its general climatic conditions for meterological work, is just the place for a young man who wishes to do this kind of work.

ACKNOWLEDGEMENTS

With many thanks we wish to acknowledge that the following companies very generously contributed to this summer's list of material. The Typographic Service Company, The Electrographic Corporation, The Corning Glass Works, C. and S. Crystals, Barker and Williamson, The Astatic Microphone Laboratory, Inc., The Burgess Battery Company, The Sangamo Electric Company, The Sprague Products Company, Doolittle and Falknor, The Triplett Instrument Company, Westinghouse

Electric Manufacturing Company, Ward Leonard Company, Trimm Radio Manufacturing Company, Harvey Radio Company, Taylor Tubes Inc., Hytronic Laboratories, Inc. Amperex Electronic Company, Kenyon Transformer Company, and Eitel-McCullough Inc.

Respectfully submitted,

C. E. Ruckstuhl, Jr.,
Field Director, 1939

REPORT OF JAMES BLUNT, FIELD DIRECTOR, 1940

The summer of 1940 at the Bowdoin Biological Station on Kent Island was a success. It was successful in every way: the weather was wonderful; the work done on projects was resourceful, edufational, and scientifically constructive; the staff was small and congenial; and the physical plant came one step nearer completion.

For a major portion of the summer the student staff was limited to four men. But the quality and quantity of work done made up for the small number. The projects undertaken by the members of the expedition were well carried out and the data gathered scientifically important. Fred Crystal did a very complete job on his census of Herring Gulls resident on Kent Island. Tom Sheehy's collection of invertebrate life found between the tide marks of the Island has proven new ranges of distribution and gave the whole staff an insight into the technique of careful classification. The figures that Dave Wells and I gathered on the size of the endocrine glands of the Herring Gull have indicated certain trends in the relation of size fluctuation of the organs to the season. The small amount of work done on the histology of the Gull has opened a very interesting field for a project next summer. Ernest Joy, the permanent warden of the Island and Carrie Chase, his housekeeper were essential to the summer's success. We were fortunate to have things work out so that Lester Tate could be at the Station for most of the summer as master carpenter, mason, and mechanic, expert cook and barber. His and Ernest's ever ready commonsense and good humor are great helps to us "city fellars" who like to go off to let our beards grow occasionally.

The monotony of the summer was broken by visits by Dr. and Mrs, Gross, W. B. Hall, Mr. and Mrs. Robert Wait, Robert Cunningham, Paul Sheehy, and over two hundred tourists who came out from Grand Manan to view the work of the Station.

In the course of the summer many improvements were made in the Station's equipment. The two major items were the conversion of the upper wharf house into a laboratory building and the arranging of a reading room, with a fireplace in it. These two projects were made possible by a gift from Sumner Pike which covered most of the construction costs. The new laboratory was made by laying a spruce floor over the old wharf house planking, installing work benches around the room, and putting in ten windows to provide adequate lighting. To make a reading room we knocked out the partition between the old laboratories and built a fireplace in the east end of the room; this makes a nice comfortable room for rainy days and a place to gahter to hear Ernest and Lester spin yarns of fishing and boat wrecks in the evenings. A cover for the well was built and a second-hand car added to the equipment.

The ideal situation for the Station would be reached when there is an annual appropriation of a thousand dollars, this would cover adequately all salaries and equipment for the Island; but that is a dream for the future. There are a few musts which will have to be attended to right away. The first is a boat; at present, with our radio licence suspended due to the war we are completely without means of obtaining aid in case of an emergency. A boat is also necessary to the carrying out of the Station's work. A small twenty-five foot launch could be built and equipped with a motor for less than two hundred dollars. The second need is a building given over completely to meteorology. At present the instruments are scattered and inadequately housed. The new building would be situated between the Administration Building and the Radio Shack and would be similar in structure to the latter, escept that it would be furnished with a cat-walk along the ridge pole. These two needs plus building a tank to provide running water for the laboratory and general repairs are on the must list for next summer.

There are a number of things which will be done next summer at the Island in the way of Station policy that may be of interest to the readers of this report. The experience of the early expeditions to Kent Island has shown that a large staff of students is unwieldy and unrest among the members becomes prevalent; this is primarily due to the size of the Station and of the Island itself. The facilities of the Station are adequate for ten men, a group latger than this soon breeds friction between the members. For this reason the size of the student staff will be limited to ten men in the future. This last summer the average food bill for each man was about thirty-five dollars; on the basis of this figure and that given by Mr. Ruckstuhl, my predecessor as director of the Station I am planning to charge each man a flat rate of seventy-five dollars to be paid to the Bursar's Office of Bowdoin College before the student comes to Kent Island. Twenty-five dollars of each fee will remain at the College as a tuition charge, the remainder will be used to pay for the food consumed by the individual while at the Station. At the end of the summer the remainder of the fifty dollars will be refunded to the student. I feel that this is the fairest way that the finances of commissary department can be handled and it places no particular burden on any individual.

We are already looking forward to a bigger and better summer at the Bowdoin Biological Station for the season of 1941.

J. L. Blunt, Jr.
Field Director 1940-1941

BIRD BANDING

As in past years the banding of birds, especially Herring Gulls has been continued as one of the major projects at the Kent Island Station.

In 1939 Ivan Spear, Bowdoin, 1944, was in charge of the work. He and his cooperators banded 3,110, including 110 adult Herring Gulls. The trapping of adults is especially important since banded individuals are obtained which give us information concerning the origin of the Kent Island gull population.

In addition to the numbered aluminum U. S. Biological Survey bands, Mr. Spear marked the gulls with colored celluloid bands using a yellow band on the left leg and a black band over the B.S. band on the other leg for all immature gulls. For the adults he used a black band on the left leg and a black band over the B. S. band on the right leg. These combinations were selected by the Co-operative Gull Banding Project sponsored by the Linnean Society of New York. Each year from 1937 to 1939 inclusive the gulls of about a dozen selected colonies chiefly along the Atlantic seaboard, have been marked with different color combinations to make possible sight recoveries in the field. This work has greatly stimulated observations, resulting in a large increase in the numbers of returns.

The colored bands have been of assistance in various problems. During the summer of 1940, June 15 to September 1 no less than 50 gulls marked in 1937, twenty marked as young and eight as adults in 1938 and fifteen as adults and two as young in 1939 were obtained as sight records. Of particular importance is four birds, presumably females, banded as immatures in 1937, were observed from a blind to be nesting. This serves as direct evidence that fourth year birds (third season after hatching in their third nuptial plumage, breed. These and various other questions can be answered only through banding.

During the summer of 1940, 800 immature Herring Gulls were banded and for purposes of a local problem were marked with two black celluloid bands on the left leg and a numbered aluminym B. S. band on the right leg. About 100 gulls were collected by Mr. James Blunt for his work on the thyroid and other glands. A number of these banded were birds originally banded on Kent Island. (See list which follows.)

Since banding operations were started in 1934, 29,692 immatures and 1,480 adult gulls have been banded at the Kent Island Station. Up to January 1, 1941 we have received 990 returns. A summary of the results of 773 returns obtained up to the end of 1939 has been published in Bird Banding, Vol. 11, pp. 129-155. A separate of this paper will be sent upon receiving your request.

Following are the returns of 329 Herring gulls banded on Kent Island which have not been previously listed in the Kent Island Annual Reports.

Number	Banded	Recovered	Place of Recovery	How Recovered
B-614284	7-21-34	3-15-39	Kent Island, N. B.	Trapped
B-624620	7-22-34	6-18-40	Kent Island, N.B.	Found dead
B-624793	7-22-34	8-7-40	Kent Island, N.B.	Collected
34-516051	7-25-34	7-20-40	Kent Island, N.B.	Collected
34-516385	7-29-34	5-14-40	Fall River, Mass.	Found dead
34-542011	8-12-34	5-28-35	Grand Lake, N.B.	Found dead
34-542138	8-12-34	10-23-35	Winter Harbor, Maine	Found dead
34-542212	8-12-34	6-18-40	Kent Island, N.B.	Found dead
34-542689	8-13-34	8-9-40	Kent Island, N.B.	found dead
34-543456	8-27-34	8-6-40	Kent Island, N.B.	Collected
34-543548	8-27-34	8-4-40	Knet Island, N.B.	Collected
34-628010	7-30-34	5-29-35	Jordan Station, Ont.	Injured
34-628178	7-30-34	1-2-39	Norfolk, Virginia	Found dead
34-628471	8-17-34	10-7-39	East Boston, Mass.	Found dead
35-526136	8-11-35	11-10-36	Bethany Beach, Del.	Found dead
35-528992	8-11-35	11-21-35	Lee Valley, Tenn.	Shot
35-529155	8-6-35	11-18-35	Waynesboro, Georgia	Shot
35-529454	8-6-35	11-19-35	Newport, Rhode Island	Found dead
35-529666	8-6-35	11-5-35	Cape Fear River Bar, N.C.	Caught- Shrimp net
35-530139	8-7-35	11-2-35	Gloucester Co. N.B.	Killed
35-530221	8-7-35	10- -35	Houlton, Maine	Caught, Release
35-530373	8-7-35	11-15-35	Seaside Park, N.J.	found dying
35-530419	8-7-35	11-15-35	Scott's Creek, Penn.	Found dead
35-530607	8-7-35	9-17-35	Mantoloking, N.J.	Found dead
35-530710	8-7-35	11-20-35	New Gretna, N.J.	Killed
35-531063	8-8-35	10-1-35	Treat's Island, Maine	Found dead
35-532365	8-9-35	11-6-35	Brooklyn, Maryland	Killed
35-532426	8-9-35	9-9-35	Little Wood Id., N.B.	Found dead
35-532475	8-9-35	10-4-36	Ocean City, Md.	Found dead
35-532559	8-9-35	11-12-35	Point Pleasant Beach, N.J.	Found
35-532609	8-9-35	9-24-36	Sagmore Beach, Mass.	Caught
35-532933	8-8-35	10-9-35	Treat's Id., Maine	Found dead
35-548061	8-4-35	10-23-39	Gaspe County, Quebec	Found
35-548388	8-1-35	8-6-40	Kent Island, N. B.	Collected
35-548782	8-1-35	1-23-40	Fort Pierce, Florida	Found dead
35-548792	8-1-35	9- 37	Dorchester, Mass.	Found dead
35-548804	8-1-35	3-15-40	Cedarhurst, N. Y.	Found dead
35-548910	8-1-35	6- -40	Bunker's Harbor, Maine	Shot
35-548934	8-8-35	11-28-35	New Haven, Conn.	Found dead
35-549366	7-22-35	11-1-36	Long Island, N. Y.	Found dead
35-549367	7-22-35	12-13-39	Ft. Raleigh, N. C.	Found dead
35-549606	7-22-35	8- - 39	Kent Island, N.B.	Trapped-released
35-549611	7-22-35	7-5-40	West Yarmouth, Mass.	Found dead
35-549724	7-22-35	7-18-39	West Dover, Nova Scotia	Found dead
35-550307	8-10-35	11-24-39	Borden, Prince Edward Id.	Taken
35-550713	8-10-35	6-28-40	Kent Island, N. B.	Collected
35-550791	8-10-35	10-28-35	Canso, Nova Scotia	Crippled
35-550910	8-10-35	Summer 39	White Bay Dish, Newfoundland,	Shot
35-550988	8-10-35	6-27-39	Grosses Coques, N. S.	Found
35-551404	8-1-35	4-17-39	Ventnor, N. J.	Found dead
35-551488	8-1-35	8------39	Kent Island, N. B.	trapped-released

Number	Banded	Recovered	Place of Recovery	How Recovered
35-551580	8-1-35	11-25-39	Gulfport, Miss.	Injured wing
35-551835	8-1-35	8-5-39	Fire Island, N. Y.	Found dead
35-552414	7-29-35	9-21-39	Cape St. Mary, N.S.	Found dead
35-552638	7-29-35	7-24-40	Kent Island, N.B.	Collected
35-555180	8-25-35	1-3-39	Howard Beach, L.I, N.Y.	Found dead
35-555404	8-25-35	8-6-40	Low Duck Id., Grand Manan, N.B.	Found
35-555630	8-25-35	8-8-40	Kent Island, N.B.	Collected
35-555682	8-25-35	7-16-40	Kent Island, N.B.	Collected
35-555720	8-25-35	1-6-39	Campobello Id., N.B.	Found dead
35-555732	8-25-35	1-18-40	Gravesend Beach, Brooklyn	Found frozen
35-556082	8-26-35	8-8-40	Kent Island, N. B.	Collected
35-556096	8-26-35	8-----39	Kent Island, N.B.	Trapped-released
35-556123	8-26-35	3-27-40	L. Blandford, Lunenberg Co., N.S.	Found dead
35-556159	8-26-35	4-3-39	Buckroe, Virginia	Caught
35-556261	8-27-35	8---39	Kent Island, N.B.	Trapped-release
35-556269	8-27-35	5-13-40	West Lubec, Maine	Found dead
35-556361	8-27-35	3-18-39	Saint John, N.B.	Found dead
35-556370	8-27-35	12-19-38	New London, Conn.	Found dead
35-556640	8-27-35	7-16-37	Margaretsville, N.S.	Found dead
35-556676	8-26-35	11-16-39	Plum Beach, Brooklyn, N.Y.	Found dead
35-556800	8-27-35	6-18-40	Kent Island, N.B.	Found dead
35-556874	8-29-35	11-24-38	Ocean city, Maryland	Founddead
35-556893	7-16-38	3-10-39	Biloxi, Miss.	Captured-released
35-557208	7-21-38	4-22-39	Massapequa, L.I., N.Y.	Found dead
35-557213	7-22-38	7-14-40	Kent Island, N.B.	Collected
35-557223	7-31-38	8-----39	Kent Island, N.B.	Trapped-released
35-557226	7-31-38	7-10-40	Kent Island, N.B.	Collected
35-557240	8-2-38	11-17-38	Buctouche, N.B.	Found dead
35-557247	8-2-38	8-16-40	Kent Island, N.B.	Collected
35-557248	8-2-38	11-29-39	East Weymouth, Mass.	Found dead
35-557254	8-6-36	4-----40	Nantasket Beach, Mass.	Found
35-557443	8-9-36	7-27-39	Pleasant Bay, Mass.	Shot
35-557478	8-9-36	3-26-39	Staten Island, N.Y.	Found dead
35-557736	7-25-36	12-5-38	Coney Island, N.Y.	Found sick
36-641384	7-11-38	11---39	Miquelon Island, Nfd.	Shot
36-641609	7-27-36	7---38	Sambro, Halifax, N.S.	Found
36-641956	7-28-36	10---39	Jersey City, N.J.	Found dead
36-642145	7-26-36	3-2-40	Westport, Conn.	Found dead
36-642256	7-26-36	8----39	Kent Island, N.B.	Trapped-released
36-642362	7-26-36	1-3-40	Glen Head, L.I., N.Y.	Found sick
36-642390	7-26-36	6-18-40	Kent Island, N.B.	Found dead
36-642591	7-26-36	4-1-40	Newcomb, Maryland	Found dead
36-642760	7-26-36	6-18-40	Kent Island, N.B.	Found dead
36-642970	7-26-36	8----39	Kent Island, N.B.	Trapped - released
36-643046	7-26-36	6-20-40	Kent Island, N.B.	Found dead
36-643309	7-26-36	7-17-40	Kent Island. N.B.	Collected
36-643323	7-30-36	3-28-39	Idelwild, L.I. N.Y.	Found dead
36-643349	7-26-36	5-22-40	Port Maitland, Yarmouth Co.	Found injured
36-643714	7-26-36	1-4-40	Oldham Pond, Pembroke, Mass.	Found dead
36-643856	7-26-36	5-23-39	Staten Island, N.Y.	Found dead

Number	Banded	Recovered	Place of Recovery	How Recovered
36-644032	7-30-36	4-10-39	Tibitha, Virginia	Found
36-644054	7-30-36	12-3-39	Barnegat City, N.J.	Found dead
36-644149	7-30-36	12-27-38	New York City, N.Y.	Caught
36-644733	7-30-36	7-16-39	Scituate, Mass.	Found dead
36-644775	7-30-36	10-11-39	Gloucester, Mass.	Found dead
36-644926	7-30-36	2------39	Buzzards Bay, Mass.	Found dead
36-645148	7-30-36	5-21-40	Fisher's Island, N.Y.	Found dead
36-645433	6-3-36	10-22-38	Old Pelican, Newfoundland	Shot
36-645634	8-3-36	11-9-38	Portland, Maine	Found dead
36-645852	8-3-36	6-----39	Salisbury Beach, Mass.	Found dead
36-645856	8-3-36	10-20-39	Charlotte Co., N.B.	Washed ashore
36-645866	8-3-36	1-18-39	South Creek, N.C.	Found
36-646239	8-6-36	8-20-39	Chatham, Mass.	Broken wing, killed
36-646245	8-6-36	4-7-39	Wilmington, N.C.	Caught
36-646461	8-10-36	6-6-39	Hemstead Bay, L.I., N.Y.	Found dead
36-646931	8-10-36	8-6-40	Lynn Beach, Lynn, Mass.	Found
36-648177	8-13-36	7-29-39	Gt. Egg Harbor Bay, N.J.	Found dead
36-648574	8-12-36	1-17-40	Jones River, Kingston, Mass.	Found dead
36-648600	8-12-36	2-19-39	Camden, Maine	Found dead
36-648988	8-13-36	2-24-40	Rockaway Point, L.I., N.Y.	Found dead
36-649105	8-8-40	8-10-40	Kent Island, N.B.	Collected
36-650023	6-27-37	2-4-40	Huntington, L.I., N.Y.	Found dead
36-650086	7-10-37	1-28-39	Newark, New Jersey	Killed
37-645027	7-12-37	8-9-40	Rome, Miss.	Found
37-653118	7-10-37	2-21-39	New York City, N.Y.	Found
37-653346	7-11-37	12-27-38	Barnstable, Mass.	Found dead
37-653453	7-11-37	7----39	Bear River, Nova Scotia	Found dead
37-653514	7-11-37	4-2-40	Groton, Conn.	Found dead
37-653716	7-11-37	4-2-40	Norwich, Conn.	Broken wing
37-653782	7-11-37	2-3-39	Hampton, Virginia	Found dead
37-653916	7-12-37	11-20-39	Roger's Id., N. Lubec, Me.	Found
37-654058	7-12-37	6-20-40	Kent Island, N.B.	Found dead
37-654298	7-12-37	6-18-40	Kent Island, N.B.	Found dead
37-654796	7-16-37	7-8-39	North Truro, Mass.	Found dead
37-654932	7-18-37	12-30-38	Wilmington, N.C.	Found
37-655057	7-18-37	12-31-38	Cape Island, S.C.	Caught-released
37-655238	7-19-37	Fall-38	Center Moriches, L.I., N.Y.	Found dead
37-655281	7-19-37	7-----39	Montauk Point, L.I., N.Y.	Shot
37-655350	7-19-37	12----38	Leipsic, Delaware	Caught, trap
37-65505	7-20-37	7-23-40	Eastport, Maine	Found band
37-655577	7-20-37	10-25-39	Point O'Woods, N.Y.	Found
37-655736	7-20-37	6-14-40	Kent Island, N.B.	Found dead
37-656099	7-20-37	6-18-40	Kent Island, N.B.	Found dead
37-656151	7-21-37	8-29-39	Boston Harbor, Mass.	Found dead
37-656539	7-21-37	12-24-38	Brooklyn, N.Y.	Found dead
37-656578	7-21-37	11-12-38	Stamford, Conn.	Found dead
37-656682	7-21-37	10-30-38	Village Ste. Croix, N.B.	Found
37-656767	7-21-37	3-13-39	West Bay, Florida	Caught
37-656857	7-24-37	5-18-39	Babylon, New York	Killed by turtle
37-656911	7-24-37	8-29-38	Advocate Harbor, N.S.	Sick-died
37-656944	7-24-37	9-11-38	Bear Island, N.S.	Found dead
37-657106	8-27-37	8-6-40	Kent Island, N.B.	Collected

Number	Banded	Recovered	Place of Recovery	How Recovered
37-657123	8-27-37	8-4-40	Kent Island, N.B.	Collected
37-657167	8-27-37	3-5-40	Floyd Bennett Field, N.Y.	Found dead
37-657172	8-27-37	7-23-40	Kent Island, N.B.	Found dead
37-657180	8-27-37	7-18-40	Kent Island, N.B.	Collected
37-657197	8-27-37	7-17-40	Kent Island, N.B.	Collected
37-657219	8-6-37	8-9-39	Portsmouth, N.H.	Caught-released
37-657334	8-29-37	10-22-39	Nantucket, Mass.	Found
37-657402	8-29-37	9-26-39	Newport, Rhode Island	Found dead
37-657507	8-27-37	8-26-40	Kent Island, N.B.	Found dead
37-657560	8-27-37	9-30-39	Beverly, Mass.	Found dead
37-657588	8-27-37	7-5-40	Kent Island, N.B.	Collected
37-657670	8-28-37	2-18-39	Vinalhaven, Maine	Found dead
37-657938	7-17-38	11-13-38	Swansboro, N.C.	Found dead
37-657955	7-17-38	6-14-40	Kent Island, N.B.	Found dead
38-660380	7-27-39	11-12-39	Warren, Rhode Island	Found sick
38-669660	7-28-38	6-18-40	Kent Island, N.B.	Found dead
38-669749	7-25-38	1-22-39	Wilmington, Delaware	Found dead
38-669793	7-25-38	2-19-39	Golden Meadow, La.	Caught
38-669853	8-1-38	10-31-39	Fire Id. Lightship off Seaford, Virginia	Caught
38-669940	8-1-38	4-20-40	Southport, N.C.	Found crippled
38-669949	8-1-38	2-5-39	Golden Meadow, La.	Caught
38-670032	8-1-38	2-2-39	Panacea Springs, Florida	Found dead
38-670070	8-4-38	1-29-40	Portland, Maine	Found frozen
38-670085	8-13-38	8-7-40	Kent Island, N.B.	Collected
38-670186	8-2-38	11-27-38	St. Simons Ids., Ga.	Shot
38-670290	8-9-38	12-26-38	Apalachicola, Fla.	Caught
38-670301	8-1-38	11-6-38	Jacksonville, Fla.	Found dead
38-670369	8-13-38	7-15-40	Kent Island, N.B.	Collected
38-670390	8-14-38	2-11-40	Pt. Lookout, L.I., N.Y.	Found dead
38-670397	8-14-38	5-23-40	Tiverton, N.S.	Found dead
38-670527	8-3-38	4-20-40	Bluff Point, Virginia	Caught-fish net
38-670557	8-3-38	2-27-39	St. Bernard, La.	Found dead
38-670604	8-4-38	7-18-40	Kent Island, N.B.	Collected
38-670610	8-4-38	7-12-40	Kent Island, N.B.	Collected
38-670634	8-4-38	7-14-40	Kent Island, N.B.	Collected
38-670643	8-5-38	7-11-40	Kent Island, N.B.	Collected
38-670754	8-3-38	1-10-40	Avon, North Carolina	Founddead
38-670766	8-3-38	8-17-39	Bayridge, Rhode Island	Wounded-died
38-670772	8-3-38	7-14-40	Kent Island, N.B.	Found dead
38-670783	8-3-38	9-3-39	Searsport, Maine	Caught-released
38-670784	8-3-38	8-20-39	Jamaica Bay, N.Y.	Found dead
38-670792	8-3-38	7----39	Habana, Cuba	Found dead
38-670795	8-3-38	10-22-39	Wollaston, Mass.	Found dead
38-670908	8-4-38	4-11-39	West Norfolk, Virginia	Found dead
38-670926	8-4-38	12-13-38	Back Bay, Miss.	Found dead
38-670936	8-4-38	4-9-40	Salem, Mass.	Found dead
38-670058	7-16-38	6-5-39	Virginia Beach, Va.	Caught
38-671234	7-19-38	5-7-39	Virginia Point, Texas	Found dead
38-671327	7-19-38	11-21-38	Ft. Screven, Georgia	Found dead
38-671347	7-29-38	4-5-39	Sacrasota, Florida	Killed-auto
38-671495	7-20-38	9-24-39	Norfolk, Virginia	Found dead
38-671505	7-20-38	6-22-39	Meteghan River, N.S.	Found dead

Number	Banded	Recovered	Place of Recovery	How Recovered
38-671553	7-20-38	12-10-39	West St. John, N.B.	Found sick
38-671554	7-20-38	1-13-39	Freeport, Texas	Shot
38-671687	7-24-38	11-23-38	Silver Beach, Bronx, N.Y.	Found dead
38-671783	7-24-38	2-21-39	Point Pleasant, N.J.	Found dead
38-671798	7-24-38	1-7-39	Shell Island, Louisana	Found
38-671815	7-24-38	12-25-38	Pensacola, Florida	Found
38-671827	7-25-38	9-20-39	Jonesport, Maine	Found dead
38-671828	7-25-38	4-20-39	Ponte Verte, N.B.	Caught
38-671829	7-25-38	8-27-38	Shoal Cv. PlacentiaB. Nfld.	Found dead
38-671845	7-25-38	10---39	South Portland, Maine	Found dead
38-671897	7-25-38	7-19-39	West St. John, N.B.	Found dead
38-671903	7-25-38	11-25-39	Newport, R.I.	Found
38-671998	7-25-38	2-10-39	Winthrop, Mass.	Found dead
38-672004	8-5-38	4-14-39	Meteghan Centre, N.S.	Caught-released
38-672043	8-5-38	7-12-40	Kent Island, N.B.	Collected
38-672106	8-5-38	9---39	Campobello Id., N.B.	Found injured
38-672111	8-5-38	8-8-40	Kent Island, N.B.	Found dead
38-672135	8-10-38	7-27-39	Say Harbor, L.I., N.Y.	Found dead
38-672141	8-10-38	9-1-39	Campobello Id., N.B.	Found injured
38-672155	8-11-38	5-18-39	Grand Manan, N.B.	Shot
38-672181	8-12-38	8-22-40	Kent Island, N.B.	Collected
38-672197	7-27-38	8-21-40	Kent Island, N.B.	Collected
38-672276	7-27-38	12-12-38	Nantucket, Mass.	Found dead
38-672332	8-13-38	kk-18-38	Little Peconie B., L.I., N.Y.	Found dead
38-672352	8-27-38	4-3-39	Southport, Conn.	Found dead
38-672368	8-27-38	8-5-40	Kent Island, N.B.	Collected
38-672455	8-29-38	10-12-39	Gloucester H., Mass.	Captured
38-672500	8-31-38	1-23-39	New Point, Virginia	Found dead
38-672501	8-14-38	8-7-39	Eastham, Cape Cod, Mass.	Found dead
38-672534	8-14-38	7-17-40	Kent Island, N.B.	Collected
38-672538	8-15-38	4-1-40	Driver, Virginia	Dropped by Eagle
38-672570	8-31-38	5-11-40	S. Jamesport, New York	Killed
39-653094		10-9-39	Rockport, Mass.	Found dead
39-657242	7-15-39	11-15-39	Mobile Bay, Alabama	Caught-band removed
39-658661	7-17-39	12-1-39	North Wilkesboro, N.C.	Shot
39-658710	7-17-39	8-10-40	Kent Island, N.B.	Found dead
39-658767	7-19-39	3-20-40	Stamford, Conn.	Found dead
39-657789	7-4-39	3-20-40	Southport, N.C.	Captured
39-658870	7-17-39	6-14-40	Kent Island, N.B.	Found dead
39-658975	7-17-39	12-10-39	Henderson Point, Miss.	Found dead
39-658987	7-17-39	10-9-39	Parkertown, N.J.	No. Inf.
39-659071	7-18-39	11-15-39	Port St. Joe, Florida	Exhausted
39-659077	7-18-39	6-15-40	Kent Island, N.B.	Found dead
39-659111	7-18-39	6-18-40	Kent Island, N.B.	Found dead
39-659113	7-18-39	6-14-40	Kent Island, N.B.	Found dead
39-659115	7-18-39	6-18-40	Kent Island, N.B.	Found dead
39-659129	7-18-39	7-5-40	Race Pt. Lighthouse Everett, Mass.	Found dead
39-659164	7-18-39	7-4-40	Port Aransas, Texas	Found
39-659206	7-18-39	2-24-40	Cape Fear R., N.C.	Taken
39-659212	7-18-39	4-2-40	Swansboro, N.C.	Found dead
39-659228	7-18-39	6-15-40	Kent Island, N.B.	Found dead

Number	Banded	Recovered	Place of Recovery	How Recovered
39-659267	7-18-39	2-4-40	Bayou Lee Batre, Ala.	Found dead
39-659275	7-18-39	10-5-39	Prince Edward Id.	Found
39-659373	7-18-39	6-18-40	Kent Island, N.B.	Found dead
39-659391	7-18-39	12-12-39	Ft. Walton, Florida	Shot-wings broken
39-659393	7-18-39	6-14-40	Kent Island, N.B.	Found dead
39-659413	7-19-39	10----39	Addison, Maine	Found
39-659415	7-19-39	6-20-40	Kent Island, N.B.	Found dead
39-659473	7-19-39	10-19-40	Dennysville, Maine	Found dead
39-659570	7-21-39	5-7-40	Atlantic Beach, Florida	Found dead
39-659604	7-21-39	3-19-40	Milton, Mass.	shot
39-659653	7-21-39	10-5-39	Yarmouth, N.S.	Caught-fish net
39-659674	7-21-39	2-1-40	Gloucester Co., Virginia	Taken
39-659686	7-21-39	7-19-40	Lepreaux, N.B.	Found dead
39-659697	7-21-39	10-21-39	South Boston, Mass.	Shot
39-659779	7-1-39	6-14-40	Waynesboro, Mass.	Taken
39-659792	7-21-39	5-1-40	Hampton, Virginia	Found
39-659802	7-23-39	6-15-40	Kent Island, N.B.	Found dead
39-659823	7-23-39	9-19-39	Sampson Cove, N.S.	Found dead
39-659872	7-23-39	8- -39	Egg Rock, Maine	Found
39-659956	7-24-39	12-24-39	Pierce Id., Portsmouth, N.H.	Found dead
39-659976	7-24-39	6-8-40	Birch Point, Perry, Maine	Found dead
39-660091	7-26-39	2-27-40	Sea Island, Georgia	Found dead
39-660140	7-26-39	6-30-40	Winthrop, Mass.	Found dead
39-660152	7-26-39	6-14-40	Pembroke, Maine	Found dead
39-660161	7-26-39	11-18-39	Biloxi, Miss.	Caught-released
39-660243	7-27-39	9-18-39	Leonardville, Deer Id., N.B.	caught-release
39-660282	7-27-39	12-22-39	Ocean View, Virginia	Found dead
39-660317	7-27-39	39	W. Manteo, N.C.	Found dead
39-660327	7-27-39	11-8-39	Rappahannock R. Urbanna, Va.	Found dead
39-660357	7-27-39	11----39	St. Lawrence R., Pt. Sopin C, N.B.	Found d.
39-660380	7-27-39	10-6-39	Shag Harbor, N.S.	Found dead
39-660419	7-27-39	6-20-40	Kent Island, N.B.	Found dead
39-660442	7-27-39	12-20-39	Breton Island, La.	Found
39-660451	7-27-39	3-4-40	Fort Haycock, Beach, N.J.	Found dead
39-660453	7-27-39	7-21-40	Kent Island, N.B.	Collected
39-660479	7-27-39	12-5-39	Buctouche, N.B.	Found dead
39-660520	7-28-39	12-1-39	Jamaica Bay, New York	Founddead
39-660530	7-28-39	1-8-40	Port St. Joe, Florida	Found dying
39-660571	7-21-39	8-19-40	Squantum, Mass.	Killed by storm
39-660590	7-28-39	10-3-39	Riviere au Tonnerre, Q.	Prob. dead
39-660629	7-28-39	7----40	Tracadie, N.B.	Found
39-660652	7-28-39	12-28-39	Mouth St. John's R., Fla.	Found dead
39-660679	7-28-39	3-5-40	Beaufort, North Carolina	Caught
39-660710	7-29-39	6-18-40	Kent Island, N.B.	Found dead
39-660712	7-29-39	12-10-39	Pensacola, Florida	Found dead
39-660748	7-29-39	10-16-39	Pelham Bay, Bronx, N.Y.	Found dead
39-660807	7-29-39	6-15-40	Kent Island, N.B.	Found dead
39-660827	7-29-39	5-7-40	Reedville, Virginia	Caught-fish trap
39-660835	7-29-39	6-14-40	Kent Island, N.B.	Found dead
30660851	7-29-39	6-15-40	Kent Island, N.B.	Found dead
39-660981	7-30-39	5-22--40	Salisbury, Mass.	Found dead
39-661016	7-30-39	3-4-40	Seal Id., Matinicus, Me.	Found dead

Number	Banded	Recovered	Place of Recovery	How Recovered
39-661024	7-30-39	8-10-40	Kent Island, N.B.	Found dead
39-661025	7-30-39	1-29-40	Jamaica Bay, L.I., N.Y.	Frozen to death
39-661038	7-30-39	10-31-39	Urbanna, Virginia	Caught-fish trap
39-661129	7-30-39	1-28-40	San Luis Pass, Texas	Found dead
39-661130	7-30-39	6-18-40	Kent Island, N.B.	Found dead
39-661220	7-30-39	11-30-39	Hamden, Conn.	Found dead
39-661234	7-30-39	11-17-39	St. Louis, Mo.	Found dead in bay
39-661270	7-30-39	1-10-40	Poza Rica, Vera Cruz, Mex.	found dead
39-661317	7-31-39	11-15-39	Mobile Bay, Alabama	Caught-released
39-661321	7-31-39	7-24-40	Sands Pt. Beach, L.I., N.Y.	Found
39-661360	7-31-39	3-15-40	North Beach, Queens, L.I.	Killed by plane
39-661358	7-31-39	9-30-39	Port Maitland, N.S.	Shot
39-661366	7-31-39	7-25-40	Seabrook Beach, N.H.	Found dead
39-661375	7-31-39	3-20-40	Southport, N.C.	Captured-released
39-661397	7-31-39	3-3-40	Cut Off, Louisiana	Found
39-661462	7-31-39	5-30-40	Orchard Beach, L.I.Sd. Bronx, N.Y.	Dead
39-661532	8-8-39	7-19-40	Kent Island, N.B.	Collected
39-661534	8-8-39	7-14-40	Kent Island, N.B.	Collected
39-661558	8-24-39	5-5-40	Centreville, N.S.	Found dead
39-661559	8-25-39	8-12-40	Kent Island, N.B.	Collected
39-661600	8-26-39	7-19-40	Kent Island, N.B.	Collected

RADIO

(by C. [illegible]. Ruckstuhl, Jr., W1JZD)

The Bowdoin-Kent Island Radio Station, VE1IN, was completely rebuilt during the summer of 1939 with satisfactory results. The new station is capable of sixteen hundred watts input at a moderate efficiency rating of seventy-five per cent.

A new speech amplifier was built employing a high gain circuit for high fidelity crystal microphone inputs. High fidelity Kenyon type transformers were used to great advantage in driving the high powered modulator (type 805's) and maintaining the standard we had set out to achieve.

The transmitter was rebuilt to operate on all bands as the exciter unit was a tritet circuit capable of operation down to ten meters. The tubes in the final amplifier were the type T-200. Because of the generator limitations, and legal regulations, the input was limited to approximately four-hundred and fifty watts. At this reasonable input the transmitter should last many years.

Additions to the station were the speech amplifier, the tritet oscillator, and two sets of twenty meter poles two of which are erect and support a doublet antenna with a correctly spaced half wave reflector. This set of poles is so placed as to direct a borad, unidirectional twenty meter signal to Europe from Scandinavia to the Mediterranean. The other antenna has not been in operation, but is all ready to be erected. The holes have been dug and, when erected, the poles will support an antenna identical to the European beam, but directed toward South America. These antennae, in addition to the old seventy-five meter poles, constitute a very dependable and satisfactory array.

Contacts over the air were successful without exception. The combination of adequate power output and an apparently marvellous location from a transmitting standpoint resulted in excellent signal strength reports ninety seven per cent of which wereR9, the highest report possible. Such reports prove not so much that the transmitter was efficient, but that Kent Island with its surrounding waters is a most remarkable location for a radio transmitter.

A phenomenon caused by the characteristically efficient reflecting properties of the water was noticed where on twenty meters VE1IE at Castalia, G.M., a point within view, could not be heard when transmitting on the wavelength. The apparent absence of a ground wave substantiates the theory of almost perfect reflection resulting in the high signal strength of a relatively low powered transmitter as heard across the ocean, in Europe.

Verification cards from England were received at the end of the summer, stating that we, VE1IN, had a signal strength varying from a six to a nine out of a possible nine on seventy-five meters.

The large generator was overhauled and the small one used for such purposes as the centrifuge, the low powered transmitter (little "IN") in the Warden's house, and five meter operation.

Ultra high frequency work was carried on for the first time on five meters with the Gannet Rock lighthouse station, VE1MJ. A doublet antenna was used first with coaxial cable and then with twisted pair wire which was very much more efficient and satisfactory. Duplex operation was carried on across bands on five meters and seventy-five meters. Several interesting tests were made with the foghorn on the lighthouse which, incidentally, points its horn away from Kent Island toward the mouth of the bay. We would first hear the foghorn by the transmitted radio signal. The time for the sound to reach our ear by air was clocked and recorded. The sound impulse was found to take from twenty-three seconds to twenty-seven seconds, apparently depending upon the nature of the fog bank off of which the seabound blast would be reflected. Not enough data were obtained to make any final conclusions, but we look forward to further tests for definite deductions.

To the regular early morning weather transmissions with W1XOY, atop Mt. Washington, was added another evening schedule at 8:30 p.m., Atlantic Standard Time.

From the standpoint of the men of the radio station, W3GGS, Bob Cunningham, and W1JZD, the summer was indeed successful and enjoyable from the beginning to the end - from the time when the cold air would cause Nova Scotia to invert above the horizon in mirage fashion, to the time when on pleasant evenings a man entering the radio station would be greeted over his shoulder by "Hooty", the owl, perched atop one of the antenna masts, with an occasional foghorn or bellbuoy in the distance answering his friendly hoots.

(Since the outbreak of the war the Canadian Government has prohibited the operation of short wave radio stations. Therefore this very important part of the work of the station will be stopped until peace is declared.

The lack of radio transmitting facilities is keenly felt not only by those directly interested in radio communication and research but also by all members of the station who miss this convenient and quick method of communication with the mainland.) Ed. note.

TIDE OBSERVATIONS

(By Robert M. Cunningham, Massachusetts Institute of Technology)

In the summer of 1936 Mr. Shaw lent to the station an automatic tide gauge. During the summer of 1937 a twenty-five foot structure was built in Three Island Harbor. It was not until this summer, however, that sufficient data were collected to warrant an analysis. Almost complete tidal records were obtained from August 1 to September 8, 1939. These records were analyzed by the U.S. Coast and Geodetic Survey and compared with the long time records taken at Eastport. The results are as follows: (1) the tide turns at the Island eighteen minutes before it does at Eastport; (2) the mean tidal range is 14.4 feet; (3) the mean spring range is 16.4 feet; (4) the mean range is 3.8 feet less than at Eastport. The maximum range of 20.1 feet occurred on August 17.

Kent Island tidal data will appear, beginning with the 1941 edition, in the U.S. Tide Tables, under the heading of Three Islands.

Because of the uncertainty as to whether the tide gauge was working properly and because there were no proper leveling instruments available, no bench marks were established. As the records turned out to bevery consistent, it is hoped that next summer a bench mark can be established.

In conclusion, we should like to express our gratitude to Mr. Shaw and to the U.S. Coast and Geodetic Survey for their advice and co-operation.

METEOROLOGY

(By Robert M. Cunningham, Massachusetts Institute of Technology.)

An unbroken record of the weather was taken twice daily during 1939 at Kent Island. During the winter months Mr. Joy took careful observations, and during October Mr. Benson of Wood Island substituted for Mr. Joy. The number and times of observation were the same as in 1939.

A nickel screen was lent to the station by Professor H. G. Houghton of M.I.T. with which to collect fog water for later chemical analysis. Nineteen one-litre samples of fog water were collected. The tables include also the results of the analysis of seven fog water samples taken from the copper screen in use in 1938. The samples were brought back to Prof. Houghton's laboratory at M.I.T. and analyzed under his direction. The conductivity was measured in order to determine whether all the ionized substances were found. The measured conductivity when compared with the computed conductivity showed in most cases (of the 1939 series) an almost constant difference of 30×10^{-6}. This fact suggests that there is present some unknown salt in almost constant amount in the samples. We suspect that this salt is a very insoluble substance producing a saturated solution and therefore found in a constant amount in most of the samples. This substance, we believe, comes from the screen, and not from the fog. It is interesting to note that there is in all the samples a moderate amount of sulphate, in more than half the samples exceeding the amount of chloride. Moreover, the amount of chloride varies from sample to sample much more than does the amount of sulphate. These samples seem to indicate that sulphate compounds as condensation nuclei play as great a role as chlorides, if not a greater role, even as far out to sea as Kent Island. We hope that more fog water samples will be collected on the Island in the summer of 1940 in order that we may be able to throw further light on this problem.

Most of the standard weather instruments worked very satisfactorily during the year. A new and more substantial support was built for the anemometer and wind vane on top of the Administration Building. These instruments are now twenty-five feet above the ground.

Weather reports were sent from the Island to the Yankee Network Weather Service in Boston until the transmitter had to be dismantled at the outbreak of the war. These reports were sent in daily during March and April, but were received only occasionally in May on account of bad receiving conditions. During the summer the reports were relayed through Mt. Washington. Beginning with July, reports were sent twice daily for both the morning and evening programs.

OBSERVATIONS

The highest temperature of the summer was 78°, while Eastport, Me.; Yarmouth, N. S.; Nantucket; and Boston had maxima respectively of 91°, 82°, 84°, and 96°. The number of days with a maximum temperature of 70° or over during June, July, and August was 7; whereas Eastport, Nantucket, and Boston had respectively 41, 65, and 79 days. The summer was almost as foggy as 1938 but the character of the fog was quite different. There were no long periods of fog, and the fog was not as dense or as wet. The summer was also deficient in rainfall, in contrast to the very wet summer of 1938. This winter (1939 to 1940) is the first winter that a record of wind velocities in m.p.h. is being obtained. A one-minute velocity of 48 m.p.h. on Nov. 1 and 47 m.p.h. on December 20 were recorded.

SUMMARIES FOR THE YEAR 1939

The mean temperature for the year was 41.6°. The mean maximum was 47.7°, and the mean minimum 35.4°. The lowest temperature was 2 and occurred in January and March. The highest temperature 78° occurred in July. The total precipitation was 39.51 inches. There were 80 days on which dense fog or dense vapor fog occurred at one or more of the observation times, compared with 81 such days in 1938. Clear weather or scattered clouds occurred on 41.6% of the observations. Cloudy or overcast weather occurred on 37.8% of the observations; and on 20.6% of the observations there was either fog or vapor fog.

NOTES ON DATA

Certain scientific abbreviations may need explanation. Wind velocities are given through May in the Beaufort scale and in miles per hour (one minute velocities) thereafter. Sky and visibility abbreviations are according to international usage, with the addition of "V" for vapor fog. Observations were taken at 9 a.m. and 4 p.m. from January 1 to June 2; and from September 1 to December 31. From June 3 to August 31 they were also taken at 8:30 a.m. 2 p.m. and 8:30 p.m. These times are all Atlantic Standard (the sixtieth meridian).

Fog Water Samples - Summer 1938 and 1939

Date	Time	Wind				Sea	Cl_2^-	$SO_4^=$	Conductivity measured	Conductivity computed	pH
1938	(1)	(2)		(3)		(4)	(5)	(6)	(7)	(8)	
Aug 17-18	2055-0840	S	11	SE	12	M	12.1	8.4	133×10^{-6}	57×10^{-6}	
18-19	2030-0849	SE	9	SW	2	L	34.1	23.5	297	160	
22	1415-2115	S	11	0	0	L	6.5	5.2	58	32	
22-23	2115-0845	0	0	SW	5	L	1.9	4.5	34	16	
31- 1	2040-0845	SW	5	S	15	L	3.6	5.7	114	34	
Sep 1	1410-2118	S	13	N	10	M	392	79	1280	1330	
13	1430-2045	SW	13	N	5	R	370	60	1200	1128	
1939											
Jul 8	1907-2050	S	2	SW	15	M	19.0	-	166	-	7.0
15	1137-1400	SSE	10	S	6	M	34.8	13.3	161	137	7.3
15	1400-1710	S	6	S	5	M	8.7	8.1	76.1	48.0	7.3
15	1710-1945	S	5	WSW	3	LMS	3.6	7.1	58.6	27.5	7.3
15	1945-2220	WSW	3	WNW	4	LMS	4.4	6.2	55.8	27.7	7.3
16	0718-1120	S	3	SW	2	CMS	3.8	6.7	61.6	27.2	7.4
26	1824-2008	SW	10	SSW	11	L	2.3	6.4	53.8	22.0	7.2
26	2008-2155	SSW	11	SSW	10	L	0.3	3.7	37.0	10.0	7.2
27	0628-1125	SSW	10	S	10	L	6.2	5.2	65.3	31.2	7.2
27	2000-2125	S	10	SSW	10	L	1.5	4.6	40.0	15.3	7.3
28	0706-0952	SSE	10	SSE	10	L	7.7	7.1	74.2	40.1	7.2
28	0952-1140	SSE	10	SSE	11	L	17.7	9.0	105	75.5	7.2
Aug 4	0855-1122	SSE	12	SSE	12	M	4.9	8.1	65.8	34.0	7.4
4	1953-2048	SSE	13	SSE	14	M	11.5	6.2	62.3	49.4	7.2
5	2020-2147	N	4	N	9	LMS	1.5	4.7	38.9	15.5	7.1
8	1937-2120	S	10	SE	5	LMS	0.3	4.5	42.5	11.6	7.3
9	0726-1007	SSE	10	SSW	10	MMS	2.8	4.8	53.6	19.7	7.2
21	0659-0855	SE	10	SSE	14	L	0.8	6.7	49.6	18.5	7.1
Sep 2	1800-2135	S	8	S	8	L	4.4	4.0	42.6	22.8	7.1

(1) Atlantic standard 24 hour system
(2) At beginning of run Vel. in m.p.h.
(3) At end of run " " "
(4) C-calm, L-light, M-moderate, R-rough, MS-moderate swell.
(5) Parts per million
(6) " " "
(7) mhos per cm. cube
(8) " " " Assuming Cl_2^- and $SO_4^=$ are in the form of neutral salts.

MONTHLY METEOROLOGICAL SUMMARY FOR KENT ISLAND, N.B., CANADA

Month of January, 1939

Date	Temperature Max.	Min.	Mean	Range	Precip. In. 4p-4p	Wind Beaufort 8a	4p	Sky 8a-4p	Vis. 0-9 8a-4p
S 1	33	21	27	12	.16	N 5	N 6	bc-bc	7-8
M 2	44	34	39	10	.14	SE9	W 6	r-b	5-7
T 3	26	7	17	19	0	N 6	N 5	bV-c	7-8
W 4	18	10	14	8	0	N 5	N 5	bcV-b	3-8
T 5	29	16	24	15	0	N 5	NE4	bc-b	3-9
F 6	40	29	35	11	.04	SE6	S 6	o-o	3-7
S 7	42	36	39	6	1.04	N 4	NE4	c-o	3-8
S 8	41	37	39	4	.0	W 4	NW5	o-bc	7-8
M 9	40	21	31	19	.0	N 6	NW4	bc-b	9-9
T 10	45	36	40	9	.04	SW5	SW7	o-c	7-7
W 11	45	35	40	10	.05	N 4	N 6	bc-bc	9-8
T 12	38	17	27	21	.0	NW7	NW7	bc-bc	8-8
F 13	21	15	18	6	.0	NW7	NW7	bc-bc	8-8
S 14	22	10	16	12	.0	N 5	NE4	bcV-cV	7-7
S 15	23	12	18	11	.0	N 5	N 3	O-bc	7-8
M 16	29	16	22	13	.0	N 3	W 2	b-c	9-9
T 17	34	21	27	13	.0	NE2	NW2	bc-c	9-9
W 18	33	5	19	28	.0	N 5	NE2	bcV-bc	4-8
T 19	25	16	20	9	.0	NE4	NE4	o-s	7-7
F 20	27	19	23	8	T	NE4	NE4	c-o	8-7
S 21	30	26	28	4	.02	SE4	SW2	c-s	7-3
S 22	40	28	34	12	.38	SW6	S 7	c-r	7-3
M 23	39	4	22	35	.47	NW8	NW8	cV-bV	4-4
T 24	35	9	24	26	.05	SW5	SW4	c-c	7-7
W 25	39	28	34	11	.16	N 4	NW6	c-c	8-8
T 26	29	5	17	24	.0	NW7	NW5	bcV-b	3-8
F 27	19	2	10	17	.0	N 4	NW4	bcV-c	4-8
S 28	28	10	14	8	.0	N 4	SW6	bc-c	8-8
S 29	40	26	33	14	T	SW6	W 6	o-o	7-7
M 30	38	21	29	17	.01	NE5	NE7	c-o	8-7
T 31	25	14	20	11	.04	E 9	E 7	s-s	4-3
					(Total)				
Mean	32.8	18.9	25.9		2.60	5.3	5.0		

Highest Temperature 45 on the 10th
Lowest 2 on the 27th

Prevailing wind North. Percent obs.
Clear 34% Cloudy 52% Foggy 14%

Month of February, 1939

W 1	29	8	19	21	.0	NE4	N 4	oV-bc	3-8
T 2	19	9	14	10	.0	N 5	SW3	c-o	8-9
F 3	38	18	28	20	.05	S 4	NW1	o-o	8-8
S 4	35	28	31	7	.02	NE4	N 6	s-bc	3-8
S 5	32	11	22	21	.0	Nw5	NW 5	bc-bc	8-8

Date	Temperature Max.	Min.	Mean	Range	Precip. In. 4 P-4 P	Wind Beaufort 9 A	4 P	Sky 9 A 4 P	Vis. 0-9 9 A 4 P
M 6	31	25	28	6	.0	NE2	E 2	c-s	3-3
T 7	33	21	27	12	.03	E 6	NE5	o-bc	3-8
W 8	27	17	22	10	.0	N 4	NW 3	c-bc	8-9
T 9	38	24	31	14	.09	W 5	NW6	c-bc	7-7
F 10	36	12	24	24	.0	E 2	SE3	s-o	7-8
S 11	41	26	35	15	.21	W 5	NW5	rf-c	6-7
S 12	38	18	28	20	.0	NW5	W 6	b-c	8-7
M 13	36	15	26	21	.0	N 6	N 6	c-bc	7-8
T 14	38	14	26	24	.0	SE39	S 4	c-c	7-7
W 15	44	37	40	7	.49	S 2	S 6	f-frt	1-3
T 16	50	25	38	25	.21	NW6	Nw6	c-bc	7-8
F 17	31	5	18	26	.0	N 2	SW6	bc-sq	8-7
S 18	40	28	34	12	.01	SW5	SW7	c-bc	7-7
S 19	39	24	31	15	.0	N 4	NE1	bc-o	8-9
M 20	41	23	32	18	.06	E 5	E 3	mf-f	3-1
T 21	34	18	26	16	.05	NE5	NE4	c-c	8-8
W 22	30	17	24	13	.47	E 6	N 5	rs-sqV	5-3
T 23	18	10	14	8	.04	N 6	NW6	bc-bc	3-8
F 24	32	18	25	14	.04	SW4	SW 7	sq-sq	0-3
S 25	30	18	24	12	.07	N 5	NW4	b-bc	8-9
S 26	34	24	29	10	.07	S 2	SE2	o-d	8-7
M 27	43	33	38	10	.57	W 4	W 5	c-bc	7-7
T 28	40	24	32	16	.0	E 2	SW 4	bc-c	8-7
					(Total)				
Mean	34.9	19.[illegible]	27.3		2.48	4.2	4.5		

Highest Temperature 50 on the 16th
Lowest 5 on the 17th

Prevailing wind North. Clear 34% Cloudy 54%

Percent obs. Foggy 12%

Month of March, 1939

W 1	45	35	40	10	1.70	SW6	W 6	f-bc	2-7
T 2	43	22	33	21	.0	NW7	N 4	bc-b	8-8
F 3	25	12	19	13	.0	NE3	SW3	b-b	8-9
S 4	39	25	32	14	.0	SW5	S 6	c-c	7-7
S 5	40	30	38	4	.21	S 1	E 3	rf-f	3-3
M 6	39	33	36	6	.64	E 6	S 7	o-rf	7-3
T 7	41	27	34	14	.05	NW6	W 7	b-c	8-7
W 8	29	2	15	27	.0	N 6	NW6	bV-bc	8-8
T 9	18	12	15	6	.0	NW2	NE1	c-o	8-8
F 10	23	10	16	13	.0	NE2	N 3	c-bc	8-8
S 11	23	8	16	15	.0	N 5	N 2	bc-c	8-9
S 12	31	20	25	11	,0	E 2	E 4	bc-c	8-8
M 13	30	23	27	7	*	E 8	E10	s-s	0-0
T 14	31	18	24	13	2.47?	NE6	N 5	s-bc	3-8
W 15	35	23	29	12	.0	N 3	SW4	b-bc	9-9
T 16	40	33	37	7	.98	Se7	S 5	r-fr	6-3
F 17	41	19	30	22	.48	N 5	W 5	b-sq	8-6
S 18	33	24	28	9	T	N 2	NW4	bc-c	8-8
S 19	32	19	26	13	.0	N 5	W 5	b-b	8-9

Month of March, 1939

Date	Temperature F Max.	Min.	Mean	Range	Precip. In. 4 P-4 P	Wind Beaufort 9 A	4 P	Sky 9 A 4 P	Vis. 0-9 9 A 4 P
M 20	32	18	25	14	.04	SE4	SE6	c-o	9-7
T 21	35	31	33	4	.11	SW1	N 2	f-o	4-8
W 22	32	20	26	12	.05	N 5	N 3	b-c	8-9
T 23	30	19	24	11	.0	N 5	N 5	b-bc	8-9
F 24	33	20	27	13	.0	N 2	SW4	bc-c	9-8
S 25	31	22	26	9	.0	N 5	NW 3	c-bc	8-9
S 26	31	25	28	6	.10	SE5	S 5	c-[illegible]	8-5
M 27	39	31	35	8	.04	W 3	W 3	f-bc	1-8
T 28	41	26	34	15	.04	E 5	NE5	c-s	8-1
W 29	35	24	29	11	.05	N 2	N 5	b-b	9-9
T 30	36	29	33	7	.0	S 5	S 5	c-c	7-7
F 31	40	31	35	9	.17	NW 6	N 3	c-c	8-8
Mean	34.0	22.5	28.2		(Total 7.43	4.4	4.5		

Highest Temperature 44.8 on the 1st. Prevailing wind North. Percent
Lowest 2.0 on the 8th. of obs. Clear 40% Cloudy 47% Foggy 13%

Month of April, 1939

Date	Max.	Min.	Mean	Range	Precip.	9 A	4 P	Sky	Vis.
S 1	38	31	35	7	.03	E 4	E 3	o-c	7-8
S 2	37	31	34	6	.05	E 6	SE7	c-s	7-2
M 3	38	32	35	6	.15	W 7	SW6	c-bc	8-8
T 4	37	31	34	6	.0	N 1	W 3	o-c	8-8
W 5	41	31	36	10	.01	N 2	N 2	c-c	8-9
T 6	41	36	38	5	.0	N 1	SW 2	o-o	9-8
F 7	42	36	39	6	1.55	SE6	NW 6	fr-c	3-8
S 8	40	28	34	12	.0	NW5	SW4	c-o	8-8
S 9	35	27	31	8	.05	E 6	NE3	s-s	3-3
M 10	39	29	34	10	.01	N 5	SW 5	b-bc	9-8
T 11	38	31	35	7	.12	SE6	S 3	r-f	5-1
W 12	37	31	34	6	.77	E 7	NE4	r-c	7-7
T 13	44	30	37	14	.02	N 2	SW4	c-bc	7-8
F 14	43	32	38	11	.0	NW6	SW7	b-bc	8-8
S 15	41	33	37	8	.15	W 5	N 5	f-c	2-8
S 16	40	21	33	19	.0	N 6	NW 5	b-b	8-9
M 17	42	28	35	14	.0	NW2	W 4	b-bc	9-9
T 18	38	34	36	4	.17	S 3	SE4	c-c	8-6
W 19	43	35	39	8	.52	S 4	NE2	f-f	0-0
T 20	46	38	42	8	.52	SW6	W 7	f-bc	0-8
F 21	45	34	40	11	.0	W 2	SW 3	b-b	7-7
S 22	45	35	30	10	.04	SE4	S 5	bc-rq	7-5
S 23	47	35	41	12	.38	NW5	W 5	b-bc	8-8
M 24	47	35	41	12	.0	NW5	NW 5	b-c	9-9
T 25	44	32	38	12	.0	E 1	W 2	bc-c	9-9
W 26	46	34	40	12	.0	E 2	S 5	bc-c	9-8
T 27	43	35	39	8	.16	E 4	E 6	fr-d	4-7

Date	Temperature F Max.	Min.	Mean	Range	Precip. 4 P-4 P In.	Wind Beaufort 9 A	4 P	Sky 9 A-4 P	Vis. 0-9 9 A-4 P
F 28	48	36	42	12	.0	W 2	W	bc-c	8-9
S 29	46	33	39	13	.0	NE3	NE2	b-bc	9-9
S 30	47	35	41	12	.0	NE4	NE4	bc-c	8-9
Mean	41-9	32-3	37.1		(Total) 4.60	4.1	4.2		

Highest Temperature 47.8 on the 28th.
Lowest 20.8 on the 16th

Prevailing wind West. Percent obs. Clear 40% Cloudy 48% Foggy 12%

Month of May, 1939

Date	Max.	Min.	Mean	Range	Precip.	Wind 9 A	Wind 4 P	Sky	Vis.
M 1	46	33	39	13	.0	E 2	N 1	c-bc	9-9
T 2	44	33	39	11	.0	NE2	SW4	f-bc	4-8
W 3	50	34	42	16	.0	NW1	W 1	bc-bc	8-9
T 4	47	37	42	10	.47	NE6	NE6	rf-c	5-7
F 5	47	36	42	11	.03	N 4	SW 2	bc-bc	8-8
S 6	45	35	40	10	.0	E 2	SW1	bc-o	8-7
S 7	53	37	45	16	.18	SE1	E 5	f-bc	0-7
M 8	48	37	43	11	.0	S 5	S 6	o-o	6-7
T 9	50	36	43	14	.0	S 4	SW5	f-f	4-6
W 10	53	40	46	13	.12	SW4	SE3	f-b	0-8
T 11	55	39	47	16	.0	SW2	SW6	b-bc	7-7
F 12	55	39	47	16	.0	N 2	SE2	b-bc	9-9
S 13	54	33	43	21	.0	N 2	SW4	b-bc	9-9
S 14	48	34	42	14	.0	SW4	SW4	b-b	3-9
M 15	50	35	43	15	.0	SE1	SW4	b-b	9-9
T 16	49	36	42	13	.02	E 2	E 1	bc-bc	9-9
W 17	48	36	42	12	.02	E 1	NE3	f-c	0-8
T 18	52	37	45	15	.05	N 4	NW5	r-b	7-9
F 19	52	37	45	15	.0	W 5	SW5	bc-c	9-7
S 20	54	34	44	20	.07	N 3	W 4	bc-bc	9-8
S 21	54	40	47	14	.0	E 1	S 3	c-bc	9-9
M 22	52	39	45	13	.0	E 2	NE1	bc-o	9-9
T 23	50	41	45	9	.55	NE4	E 1	c-o	8-8
W 24	51	40	46	11	.03	NW2	S 2	bc-bc	8-9
T 25	53	41	47	12	.0	W 4	W 2	bc-b	7-7
F 26	49	42	46	7	.0	E 4	SE3	bc-bc	8-8
S 27	43	38	40	5	.0	S 3	S 4	f-f	0-2
S 28	51	39	45	12	.35	SW7	SW4	f-f	1-4
M 29	51	43	47	8	.54	NE4	NE4	c-r	7-6
T 30	47	41	44	6	.04	S 4	S 5	f-f	3-0
W 31	60	41	51	19	.15	N 5	W 4	bc-bc	9-9
Mean	50.4	37.6	44.0		(Total) 2.62	3.1	3.5		

Highest Temperature 60.4 on the 31st.
Lowest 33.0 on the 1st.

Prevailing wind South West Percent of obs. Clear 55% Cloudy 24% Foggy 21%

Month of June, 1939

Date		Temperature °F				Precip. In.	Wind m.p.h.			Sky	Vis. 0-9
T	1	64	40	52	24	.0	N 4B*	-	SW4B	bc----bc	9----9
F	2	61	48	54	13	.0	NW3B	-	SW3B	b---b	9----9
S	3	58	41	49	17	.0	SE2B	S 8	SW 8	bc-c-bc	9-9-8
S	4	53	41	47	12	.02	S 1B	SW19	SW4B	bc-c-f	9-8-1
M	5	52	39	45	13	.01	SW3B	SW5B	NW4B	bc-c-bc	7-7-7
T	6	57	42	50	15	.07	N 11	-	N 9	c---c	8---8
W	7	57	42	50	15	.0	NE14	7	SW 2	b-bc-bc	8-9-9
T	8	55	41	48	14	.0	NE 5	NE1B	SW 3	bc-c-bc	8-8-8
F	9	54	42	48	12	.0	SE 5	NW 8	SW 8	bc-c-c-	9-9-8
S	10	51	43	47	8	.01	SW12	SW10	SW 5	c-cf-cf	9-2-0
S	11	54	44	49	10	T	SE 4	SE1B	SE1B	cf-cf-cf	0-1-0
M	12	53	43	48	10	.01	SW12	SW16	SW 6	cf-cf-cf	0-1-7
T	13	58	44	51	14	.0	W 6	W 3B	W 9	bc-bc-bc	8-8-8
W	14	54	44	49	10	.91	SE12	SW13	W 6	cf-cf-cf	1-0-0
T	15	56	44	50	12	T	W 8	SW4B	W 7	bc-bc-bc	8-8-8
F	16	67	45	56	22	.17	SW 6	W 1B	NW 4	cf-c-bc	4-8-8
S	17	58	44	51	14	.0	W 5	W 6	W 2	o-b-b	9-9-9
S	18	63	43	53	20	.0	N 8	NW10	NW 7	b-b-bc	9-9-9
M	19	56	42	49	14	.0	W 6	SW 6	SW 6	bc-c-c	9-9-8
T	20	54	43	49	11	T	SW 7	SW14	SW12	bc-bc-o	7-6-6
W	21	69	45	57	24	.04	W 5	SW12	NW 7	f-c-b	2-7-9
T	22	65	46	56	19	.0	N 6	SW 7	SW 4	b-bc-c	9-9-8
F	23	57	45	51	12	.09	SE 9	SE 6	O 0	c-c-r	9-9-7
S	24	49	45	47	4	.19	E 2B	E 3B	NE3B	rf-fm-fm	6-4-3
S	25	51	46	48	5	.03	NE3B	NE2B	NE11	m-c-f	6-7-6
M	26	56	47	51	9	.06	NE10	NE 5	N 6	o-o-bc	7-88
T	27	59	45	51	14	.0	NE 5	NE 4	NE1B	o-bc-bc	8-8-8
W	28	63	48	56	15	.0	W 1B	W 2B	W 3	bc-bc-bc	9-9-9
T	29	59	44	54	15	.0	SW3B	SW 9	S 2B	fb-fb-f	1-3-1
F	30	57	46	52	11	.44	S 14	S 4B	S 18	cf-r-o	7-6-6
						(Total					
Mean		57.3	43.8	50.6		2.05	8.0	8.8	7.0		

Highest Temperature 69.2 on the 21st Prevailing Wind South West
Lowest 39.0 on the 5th Percent of obs. Clear 50%
*B designates vel. in beaufort scale Cloudy 23% Foggy 27%

Month of July, 1939

S	1	54	48	51	6	.82	S 18	S 10	S 7	mf-f-f-	2-1-1
S	2	58	44	51	14	.08	SW 1	SW10	W 13	f-bc-c	1-7-7
M	3	74	47	61	27	.13	NW 7	NW 9	W 5	bc-bc-bc	8-9-9
T	4	67	49	58	18	.0	SW 2	SE 2	SW 4	b-bc-bcz	8-8-8
W	5	59	48	54	11	.0	SW 7	SW3B		bcz-f-f	7-4-2
T	6	57	49	53	8	.0	SW 9	SW11	SW 5	bz-f-cz	6-5-6
F	7	60	49	55	11	T	SW 8	SW 6	SW 6	f-f-f	3-4-3
S	8	60	49	55	11	.0	SW 8	SW 7	SW12	f-f-f	1-3-3
S	9	75	48	62	27	T	SW 3	SE 4	SW 4	f-bc-bcz	3-9-7

Month of July, 1939

Date	Temperature °F Max.	Min.	Mean	Range	Precip. In. 8:30 A – 8:30 P	Wind m.p.h. 8:30 A	2 P	8:30 P	Sky 8:30 A – 2 P – 8:30 P	Vis. 0-9 8:30 A – 2 P – 8:30 P
M 10	65	49	57	16	.0	NE 7	SE 4	S 11	f-f-f	4-4-1
T 11	66	49	57	17	.0	W 3	SW 6	W 4	f-bc-bc	1-8-9
W 12	63	46	54	17	T	W 3	SW 8	SW 1	b-bc-c	7-7-7
T 13	58	51	55	7	.01	W 6	W 14	W 12	bc-bc-bc	8-9-8
F 14	57	48	52	9	.60	S 21	S 16	SW 15	o-f-f	7-5-3
S 15	55	50	52	5	.15	S 11	S 8	SW 6	fr-f-f	2-1-1
S 16	58	47	53	11	.01	W 4	SW 6	W 6	f-f-bc	1-1-3
M 17	61	47	54	14	.0	SW 7	SW 10	W 10	bcz-bcz-bcz	7-7-7
T 18	59	46	52	13	T	SW 6	SW13	W 16	bc-bc-rq	7-9-7
W 19	62	48	55	14	.03	SW 6	SW 6	SW 3	bc-bc-f	8-7-1
T 20	63	45	54	18	.0	NE 9	NE12	NE12	cz-bc-bcl	8-8-8
F 21	67	50	58	17	.0	N 8	W 4	W 10	c-bc-b	8-8-8
S 22	59	48	54	11	.0	SW 8	SW10	SW 7	f-f-bcz	1-3-6
S 23	65	47	56	18	.0	S 7	W 7	NW 5	cz-bc-c	7-8-8
M 24	61	51	56	10	.0	W 3	W 11	W 9	f-f-bc	3-3-8
T 25	78	50	64	28	.0	NW 4	SE 4	W 6	bc-cz-bcz	7-7-7
W 26	60	50	55	10	.0	SW 8	SW 8	SW 9	f-f-f	4-2-1
T 27	61	50	56	11	.0	S 7	S 14	SW 7	f-f-f	2-5-1
F 28	61	49	55	12	.0	S 10	S 13	S 13	f-f-f	1-2-1
S 29	63	51	57	12	.0	S 8	SW 6	SW 7	f-f-f	1-1-3
S 30	65	50	58	15	T	NE10	NE 9	NE 3	f-c-c-	3-8-8
M 31	64	52	58	12	T	S 4	S 10	S 9	f-f-f	2-2-1
					(Total)					
Mean	62.5	48.6	55.6		1.83	7.2	10.9	8.0		

Highest Temperature 78.0 on the 25th Prevailing wind South West
Lowest 45.0 on the 20th Precent of obs. Clear 36% Cloudy 16%
Foggy 48%

Month of August, 1939

Date	Max.	Min.	Mean	Range	Precip.	Wind 8:30 A	2 P	8:30 P	Sky	Vis.
T 1	66	50	58	16	T	W 10	W 8	W 13	bc-bc-b	7-8-8
W 2	64	51	57	13	.0	NW 12	SW 8	W 6	bc-bc-bc	9-9-8
T 3	63	48	56	15	.0	S 10	S 13	S 16	c-c-o	9-9-8
F 4	66	52	59	14	.0	S 13	S 12	S 12	f-f-f	1-2-1
S 5	64	52	58	12	.70	E 3	SW 3	W 4	f-f-f	2-3-1
S 6	66	47	57	19	.0	SW 4	SW 3	W 6	f-f-bc	0-4-6
M 7	69	49	59	20	.0	NE 3	NW 3	SW 3	f-o-bo	3-8-9
T 8	67	49	58	18	.0	SW 6	SW10	SE 5	bc-f-f	8-2-1
W 9	60	51	55	9	.04	S 10	S 12	S 20	f-oz-oz	2-7-7
T 10	65	52	58	13	.0	W 6	SW 9	W 6	f-bcz-bcz	1-7-7
F 11	66	53	59	13	.0	W 7	W 9	W 6	b-b-b	8-8-8
S 12	68	51	59	17	.0	E 5	SW10	SW 4	bc-bc-f	8-8-1
S 13	64	52	58	12	.0	SW16	SW17	SW14	f-f-f	2-2-3
M 14	66	54	60	12	T	W 10	SW10	W 6	f-bc-b	0-8-8
T 15	72	53	63	19	.0	NE 5	SW 3	SW 4	bc-bc-b	8-8-8
W 16	70	52	61	18	.0	S 8	S 10	SW 4	bz-bz-cz	7-9-7
T 17	63	51	57	12	.0	SE 9	SW 4	SE 3	f-f-f	1-3-1
F 18	63	51	57	12	.0	SE 3	SW 3	W 3B	f-f-f	3-4-1
S 19	65	49	52	6	.0	SW 4	SW 7	W 6	bz-f-bz	7-3-8
S 20	61	50	56	11	.0	SW 8	W 6	SE 6	f-f-f	1-4-2

Month of August, 1939

Date	Temperature Max.	Min.	mean	Range	Precip In. 8:30 A-8:30 P	Wind mph 8:30 A	2 P	8:30 P	Sky 8:30 A-2 P-8:30 P	Vis. 0-9 8:30 A-2 P-8:30 P
M 21	64	51	57	13	.02	SE10	SE15	S 10	f-f-f	1-3-1
T 22	68	54	61	14	.0	SE 7	S 15	S 10	f-f-f	1-3-1
W 23	69	52	60	17	.0	SE 1	E 4	[illegible] 7	f-f-f	1-3-1
T 24	66	49	57	17	.0	E 1	W 3	SW 2	f-f-f	2-4-1
F 25	63	50	56	13	.0	SE 5	W 9	SW 8	f-f-f	2-4-2
S 26	62	51	57	11	.28	[illegible] 4	SW 5	[illegible] 7	f-f-f	1-3-1
S 27	69	51	60	18	.0	N 8	NE10	N 10	bc-c-c-	8-9-9
M 28	70	56	63	14	.0	NE 6	E 4	NW 6	bc-c-c	9-9-8
T 29	67	52	60	15	.0	NE 5	NE 4	NE 1	c-c-b	8-9-8
W 30	73	55	64	18	.0	N 8	E 4	NE30	c-c-bc	9-9-8
T 31	63	55	59	8	.0	NE14	NE15	NE15	c-c-o	8-8-8
					(Total)					
Mean	66.0	51.4	58.7		1.04	7.1	7.7	8.4		

Highest Temperature 73.0 on the 30th. Prevailing wind West Percent of obs.
Lowest 47.0 on the 6th. Clear 34% Cloudy 16% Foggy 50%

Month of September, 1939

Date	Max.	Min.	mean	Range	Humidity % 9A	Humidity % 4 P	4P-4P	Wind 9 A	Wind 4 P	Sky 9 A-4 P	Vis. 9 A-4 P
F 1	63	55	59	8	93	88	T	[illegible]7	NW 5	o-bc	8-8
S 2	60	52	56	8	100	100	T	S8	S 8	fr-f	2-5
S 3	58	52	55	6	100	100	T	[illegible]4	NE 5	f-f	2-1
M 4	66	52	59	14	100	100	.02	S4	S 4	f-f	1-2
T 5	65	53	59	12	100	100	.16	SW 5	S 11	f-f	2-2
W 6	59	51	55	8	82	75	.01	W 16	W 8	c-c	8-8
T 7	61	49	55	12	75	87	.04	W 19	NW15	o-o	8-8
F 8	57	48	52	9	85	94	T	W 4	W 3	c-o	8-8
S 9	68	56	62	12	88	95	.01	NW 7	N 11	bc-bc	9-9
S 10	67	41	54	26	82	88	.0	W 3	S 8	bc-c	9-8
M 11	59	54	56	5	91	82	.50	W 18	W 16	o-bc	7-8
T 12	65	54	60	11	73	53	.0	NW16	NW13	b-bc	8-9
W 13	67	50	58	17	72	77	.0	NW 2	SW 3	b-b	9-9
T 14	60	46	53	14	88	85	T	W 18	SW26	bc-o	8-7
F 15	62	51	55	11	94	89	.15	W 5	SW 4	r-fr	5-6
S 16	68	51	59	17	89	83	.01	W 4	W 13	f-z	4-6
S 17	69	54	62	15	89	88	.06	W 4	N 10	f-c	5-7
M 18	60	44	52	16	61	43	.01	N 16	N 8	b-b	8-9
T 19	60	58	64	12	82	88	.0	" 10	SW17	b-b	9-8
W 20	59	50	54	9	94	77	.0	SW15	--16	bc-bc	8-8
T 21	61	51	56	10	71	71	.0	NE 8	W 8	b-bc	9-9
F 22	62	45	53	17	70	66	.0	N 7	--11	b-b	9-9
S 23	60	47	53	13	88	83	.0	S 16	SW23	f-z	8-7
S 24	58	43	51	15	86	82	.06	NW 6	SW 8	bc-b	8-9
M 25	58	45	51	13	73	88	T	E 17	S 22	c-oz	8-7
T 26	57	40	48	17	94	93	.80	SW19	N 12	f-fr	6-6
W 27	53	38	46	15	67	67	.16	E 10	NE 8	b-o	9-9

Month of September, 1939

Date	temperature °F Max.	Min.	Mean	Range	9 P	4 P	Precip. In. 4P-4P	Wind m.p.h. 9 A	4 P	Sky 9 A 4 P	Vis. 0-9 9 A 4 P
T 28	56	44	50	12	93	87	.60	NW 8	N 8	o-c	8-9
F 29	57	44	50	13	88	88	T	NE 3	NE 3	bc-bc	9-9
S 30	56	47	51	9	94	94	.02	S 13	SW13	f-f	2-1
Mean	60.7	48.8	54.8		86	84	2.61	9.6	11.0		

Highest Temperature 69 on the 17th
Lowest 38 on the 27th

Prevailing Wind West, Percent of Obs.
Clear 45% Cloudy 28%, Foggy 27%

Month of October, 1939

Date	Max.	Min.	Mean	Range	9 P	4 P	4P-4P	9 A	4 P	Sky	Vis.
S 1	59	52	56	7	94	100	1.03	W 22	N 6	fr-d	2-7
M 2	53	44	48	9	72	74	.01	N 12	NE10	o-o	8-8
T 3	54	49	51	5	75	84	.0	NE28	NE32	o-cz	8-7
W 4	53	48	50	5	93	88	.05	NE18	NE10	o-o	7-6
T 5	56	49	53	7	94	94	.01	SW 8	W 12	f-z	1-7
F 6	60	50	55	10	88	94	.0	N 9	SE10	z-f	7-1
S 7	60	49	55	11	100	88	.02	W 8	NW 8	f-c	1-8
S 8	60	49	55	11	94	88	.0	NW 5	W 5	b-bc	8-9
M 9	58	50	54	8	94	66	.05	SW16	SW 9	c-bc	8-7
T 10	60	50	55	10	88	100	T	W 3	Z 14	bc-r	8-6
W 11	65	52	58	13	94	60	.08	W 13	N 11	o-b	8-9
T 12	63	44	54	19	87	90	.0	NE 8	E 8	bc-o	9-9
F 13	56	47	51	9	89	88	.0	W 3	W 12	bc-b	9-9
S 14	55	46	50	9	94	94	.01	S 14	S 16	bc-c	8-7
S 15	49	37	43	12	56	47	.01	NW19	NW14	bc-b	8-9
M 16	53	35	44	18	67	75	.0	SW 7	SW21	b-bc	9-8
T 17	51	44	48	7	86	73	.0	NE10	N 11	c-c	8-8
W 18	49	29	39	20	81	54	.16	N 21	NW16	bc-bc	8-8
T 19	51	30	40	21	63	84	T	SW27	SW26	c-o	8-7
F 20	61	49	55	12	94	54	.0	W 11	E 3	bz-b	6-8
S 21	55	43	49	12	86	94	.0	SE12	S 16	bc-bc	8-7
S 22	58	49	53	9	94	99	.67	S 28	S 11	f-f	3-2
M 23	55	44	50	11	93	78	T	N 12	NW16	c-c	8-8
T 24	45	32	38	13	81	57	.0	NW38	W 28	c-c	8-8
W 25	45	33	39	12	64	93	.0	NW12	W 18	b-b	9-9
T 26	49	43	46	6	93	93	.26	E 4	NE24	o-r	7-6
F 27	48	44	46	4	93	93	1.01	NE14	N 2	o-oz	7-7
S 28	54	45	49	9	94	94	.65	W 16	SW22	fr-f	3-4
S 29	53	32	42	21	55	48	.02	NW35	NW11	bc-b	8-9
M 30	44	31	37	13	29	93	.0	S 10	S 6	bc-bc	9-9
T 31	50	40	45	10	86	-	.94	NE32	S 9	o-fr	7-3
Mean	54.3	43.3	48.8		83	81	4.98	15.3	13.5		

Highest Temperature 65.0 on the 11th
Lowest 28.6 on the 18th

Prevailing Wind West Percent of obs.
Clear 42% Cloudy 44%, Foggy 14%

Month of November, 1939

Date		Temperature Max.	Min.	Mean	Range	Hum. 9 A	4 P	Precip. In. 4P-4P	Wind m.p.h. 9 A	4 P	Sky 9 A 4 P	Vis. 0-9 9 A 4 P
W	1	57	44	50	13	79	86	.91	SW43	W 27	c-b	7-8
T	2	50	41	45	9	71	73	.0	NW 7	W 13	b-b	8-8
F	3	47	35	41	12	74	56	.0	NW13	NW19	b-b	9-9
S	4	44	30	37	14	64	60	.0	NE11	W 12	b-b	9-9
S	5	45	38	42	7	71	85	.0	W 4	SW 6	bc-o	9-9
M	6	52	41	47	11	86	86	1.56	SW26	W 23	c-o	7-7
T	7	47	39	43	8	71	65	T	W 23	NW28	c-bc	8-8
W	8	52	42	47	10	86	93	.0	W 22	SW25	o-o	7-7
T	9	50	34	42	16	68	72	.0	NW32	NW20	bc-c	8-8
F	10	37	27	32	10	76	57	.0	NW15	W 9	c-c	8-9
S	11	49	34	42	15	86	49	.06	SW32	NW38	rf-bc	6-8
S	12	44	31	37	13	69	46	.0	NW20	NW24	bc-bc	8-9
M	13	35	27	31	8	89	52	.0	N 11	NW10	bc-bc	9-9
T	14	34	21	27	13	72	76	.0	N 12	N 12	c-c	8-8
W	15	40	27	33	13	90	59	.0	N 14	N 17	b-bc	8-9
T	16	46	29	37	17	91	79	.0	SW11	SW16	bc-c	9-8
F	17	46	31	39	15	79	67	.0	NW25	N 20	bc-bc	8-8
S	18	49	31	40	18	81	69	.0	W 8	SW23	b-bc	9-9
S	19	43	29	36	14	67	31	.0	N 15	N 10	bc-bc	9-9
M	20	34	24	29	10	67	49	.0	NE 8	NE 7	bc-bc	9-9
T	21	38	29	33	9	71	58	.0	NE16	NE25	o-c	8-8
W	22	39	36	38	3	83	73	.40	E 36	E 35	o-r	7-6
T	23	37	32	34	5	70	70	.45	N 11	NW12	O-c	7-8
F	24	34	29	31	5	80	80	.0	NE21	NE25	bc-b	8-8
S	25	33	27	30	6	66	89	.0	NE37	NE32	o-bc	7-8
S	26	38	22	30	16	77	59	.0	N 10	N 9	b-b	9-9
M	27	40	33	37	7	63	62	.0	NE15	N 18	c-bc	8-9
T	28	38	30	34	8	55	78	.0	NW12	NW15	c-o	9-8
W	29	39	31	35	3	62	75	.0	N 6	W 12	bc-bc	9-8
T	30	49	37	43	12	77	66	.0	W 5	SW 8	c-bcz	8-7
								(Total)				
Mean		42.5	32.4	37.4		74	70	3.38	17.3	18.3		

Highest Temperature 57.0 on the 1st.
Lowest 21.0 On the 14th.

Prevailing wind North West
Percent of obs. Clear 58%
Cloudy 40% Foggy 2%

Month of December, 1939

Date		Max.	Min.	Mean	Range	9 A	4 P	Precip.	9 A	4 P	Sky	Vis.
F	1	50	40	45	10	85	85	.02	NW 2	SW 6	b-b	8-7
S	2	46	36	41	10	81	93	.04	S 17	S 26	oz-r	7-6
S	3	51	46	49	5	80	79	1.23	SW27	SW22	r-c	6-7
M	4	48	38	43	10	83	70	.13	W 36	W 30	r-bc	7-8
T	5	43	29	36	14	69	70	.0	NW14	NW10	c-o	8-8
W	6	34	26	30	8	76	79	.0	NW 9	NW12	o-bc	8-9
T	7	43	33	38	10	65	77	.0	SW26	SW31	c-c	9-7
F	8	45	29	37	16	75	66	.07	NW18	NW29	m-c	6-7

Month of December, 1939

Date	Temperature Max.	Min.	Mean	Range	Hum. 9 A	4 P	Precip. In. 4P-4P	Wind m.p.h. 9A	4 P	Sky 9 A 4 P	Vis. 0-9 9 A 4 P
S 9	30	17	23	13	69	51	.0	NW27	NW28	bc-c	8-9
S 10	33	24	28	9	66	71	.0	NE 9	E 12	o-o	9-9
M 11	39	30	34	9	60	78	.50	NE27	E 42	r-s	7-3
T 12	31	23	27	8	75	54	.15	NE38	NE29	o-o	7-8
W 13	33	23	28	10	87	100	.0	N 8	SW11	o-o	8-8
T 14	44	27	35	17	80	32	.18	N 15	N 14	o-c	8-8
F 15	28	16	22	12	66	75	.0	N 13	NW 9	b-b	9-9
S 16	40	24	32	16	74	83	.02	SW25	SW27	c-r	8-7
S 17	45	37	41	8	85	92	.12	S 5	SW 8	r-o	7-7
M 18	47	35	41	12	91	75	.14	N 9	NW10	c-c	7-8
T 19	39	28	34	11	55	49	.0	NW 9	N 8	b-bc	9-9
W 20	34	27	31	7	62	62	.04	E 12	E 12	o-r	8-7
T 21	50	32	41	18	84	75	1.03	W 30	NW27	c-bc	8-8
F 22	40	28	34	12	81	76	.03	W 8	NW13	s-c	6-8
S 23	28	20	24	8	46	74	.0	NW21	N 25	bc-bc	8-8
S 24	24	15	19	9	50	71	.0	NW30	NW17	c-bc	8-8
M 25	20	7	13	13	37	70	.0	N 15	N 13	bcv-bc	7-8
T 26	19	15	17	4	52	50	.0	NW27	N215	bc-c	8-8
W 27	16	5	11	11	26	66	.0	N 8	N 10	bv-v	7-9
T 28	23	8	16	15	37	59	.0	NW28	N 18	bcv-bc	9-9
F 29	30	17	23	13	55	55	.0	N 6	W 4	b-bc	9-9
S 30	30	24	27	6	51	39	.10	E 12	E 27	s-s	2-1
S 31	31	18	24	13	56	69	.09	N 8	SE10	b-o	9-8
							(Total) 3.89				
Mean	35.9	25.0	30.4		66	69		17.4	17.9		

Highest Temperature 51 on the 3rd
Lowest 5 on the 27th

Prevailing wind Northwest
Percent of obs. Clear 32%
Cloudy 63%, Foggy 5%

EFFECT OF FEMALE SEX HORMONE ON POST BREEDING GULL

(by Bruce Rundlette, Bowdoin '38)

Problem: To investigate the effect of estrogen, the female sex hormone, in the post-breeding Herring Gull (Larus Argentatus).

Introduction: The Problem of sexual dimorphism in the migratory bird has long been a problem of major interest. The seasonal changes in the gross anatomy, color, plumage, bill and sexual characteristics are apparent to the most casual observer. Morphologists have long been aware of these changes, but only in the last decade have we had a serious attempt at an explanation. Rowan (1931) followed by Benoit and Bissonette showed conclusively that the change in the primary and secondary sexual characteristics is initiated by the pituitary gland. An increase in the daylight hours stimulates the hypophysis to secrete the gonadotropic hormones. These hormones cause the gonads to hypertrophy and become functional. The gonads, in turn, secrete hormones which cause changes in the secondary sexual organs, plumage, color and bill. They also stimulate reproductive behavior. The hormone from the testes, androgen, is responsible for the brilliant male plumage and bill color and for morphological changes in the sex organs. Estrogen, from the ovary, causes increases in size and function of the oviduct and other sexual organs. Similarly, a decrease of daylight hours, from July to December, causes a sessation of the pitutary activity and a consequent reduction of gonadal function leading to atrophy of the sex organs and winter plumage. Even migration itself is thought to be controlled by the light-affect pituitary.

Iy was the purpose of this investigation to observe the effects of estrogen injection in the Gull about two months after the breeding period.

Method: Gulls, all adults, were captured August 6th of the summer of 1939 from the Gull colony on Kent Island at the Bowdoin-Kent Island Scientific Station. They were kept in large open-air cages near the laboratory. All birds were in apparently good health.

On August 10th, the Gulls, 3 male and 7 females, were each given daily injections of estrogen for ten days, thus:

Aug.	10	200	I.U.	Theelin (Squibb)
	11	"	"	"
	12	"	"	"
	13	"	"	"
	14	500	I.U.	Progynon-B (Shering)
	15	"	"	"
	16	"	"	"
	17	"	"	"
	18	"	"	"
	19	"	"	"
	20	"	"	"

The hormones were diluted in corn oil (Mazola).

On August 21st the birds were sacrificed and autopsy performed. The entire genital tract was put in formalin (10%) and preserved for subsequent examination in the fall. Normal animals from the colony served as controls.

Experimental Results: No change in the behavior was observed during the hormonal injections. Normal animals in the same cage were not attracted, sexually, to either the males or the females.

Examination of the genital tracts showed a general hypertrophy of the female organs and little or no change in the male. Microscopic examination revealed the following.

Experimental Female: hypertrophy of the entire genitalia and sexual organs as shown by follicular development in the ovary, enlargement of the oviduct and accessory organs.

Normal Female: atrophy of the sexual organs as evidenced by almost complete lack of follicles in the ovary and smallness of the oviduct.

Experimental males: no change could be detected though Juhn and Gustavson (1930) report that the oviducal vestiges in the cockerelresponded to estrogen.

Normal males: general atrophy is beginning to set in at this time of year.

Conclusions: The female Gull will show definite reaction to large quantities of estrogen when injected at the season of gonadal dysfunction. Evidence from other species tend to substantiate these results.

The fact that no behavioral changes were noticed is in part due to the lack of sexual vigor in the male at this time. Whether a female whose organs have been brought to a functional level would respond if a sexually active male were present remains to be seen. Ovariectomized rodents injected with estrogen or with estrogen followed by progestoerone (corpus luteum hormone) have shown sexual behavior and normal copulation. This is of course when placed with vigorous males. The problem of inducing sexual behavior in the bird by artificial means is a difficult one. Bissonette has had fertile matings in several species by increasing the light hours. Exploration with pituitary fractions alone or in combination with gonadal hormones is needed. The Gull colony at Kent Island should prove an excellent place for such investigations.

Summary: Gulls injected with large doses of estrogen in August, - that is, after the normal breeding period is well over, showed definite reactions. In the female, evidence of hypertrophy of the genitalia was seen. Large follicles were found in the ovary, and enlargement of the oviducts and other accessory organs was apparent. No change was found in the males receiving the same quantities of hormone.

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THE GULL AS A PSYCHOLOGICAL SUBJECT

R. Rundlette

Problem: To investigate the Herring Gull (Larus Argentatus) as the subject for psychological experiments. To explore the problems of motivation, learning and intelligence in the Gull. The large numbers of Gulls of all ages and of both sexes as found at the Bowdoin-Kent Island Station offer unexcelled opportunity to make use of this bird as a psychological subject. This experiment is intended to be preliminary in its scope and to lay the ground work for future experimentation, rather than to solve any major problems.

Method: The method employed in the experiment was that first introduced by Hamilton and later used by Yerkes and numerous other animals psychologists. It is the 'multiple choice' experiment. In it the animal is faced with several choices, four in this case, only one of which is correct. In successive trials the correct or positive choice is changed by the experimenter in random order. In order that the subject learn to pick the correct one each time, a single cue is placed in geometrical relation to the positive choice. Thus the animal must, by some method, learn that the single positive stimulus cue is related to the correct choice.

According to Hamilton the manner in which the subject learned the problem was of great significance. He made many experiments on everything from gophers to men and worked out a phylogenetic scale of intelligence. He divided the method of learning into five types.

1. The three choices tried once each, the previously positive choice being avoided. (Say 2 was positive in last trial; then try 1-3-4 or 3-4-1).
2. All four tried in irregular order, once each. (4-3-2-1 or 4-2-1-3)
3. All four tried in regular order from left to right or vice versa. (1-2-3-4 or 4-3-2-1)
4. More than one try at the same choice, with an intervening trial at some other choice. (1-2-3-1-4 or 4-3-4-3-2-1)
5. Several automatisms. (1-1-1-2-3-4-4-2 or 3-3-3-4-2-2-1)

We are not interested in debating the validity of Hamilton's work but it is apparent that there is a difference in the intelligence of the five types above ranging from reasoning to trial and error.

Apparatus: An adaptation of the original quadruple choice box of Hamilton was used. The Gull is introduced into the entrace and is faced by four possible doors. All but the positive door is closed by a chicken-wire mesh. The positive door is indicated by a rectangular piece of white cloth

(4 x 1 inches) which hangs over the entrance to the positive door. As previously stated, the positive door varies in each trial in random order.

Motivation: The common motivation for most experiments of this nature is that of hunger. Others are punishment as by electric shock and the like. Other basic drives are also used, hunger, thirst, sex, fear, etc.

The hunger drive was first tried on the Gull. This failed, however, as the Gull will not eat when a person is near. A Gull raised from a chick might be friendly enough, but not the wild adult. Fear seemed to be the best motivating agent. The mere presence of a person at the entrance of the apparatus is sufficient to drive the bird to escape from the enclosure. Since the bird is not injured at all and since the fear drive is very consistent it seemed expedient to use fear as the motivating principle.

Subjects: Two adult Herring Gulls trapped on the Island were the subjects. Both were in good health at the beginning of the experiment. One died, however, from an intestinal parasite before the termination of the trials.

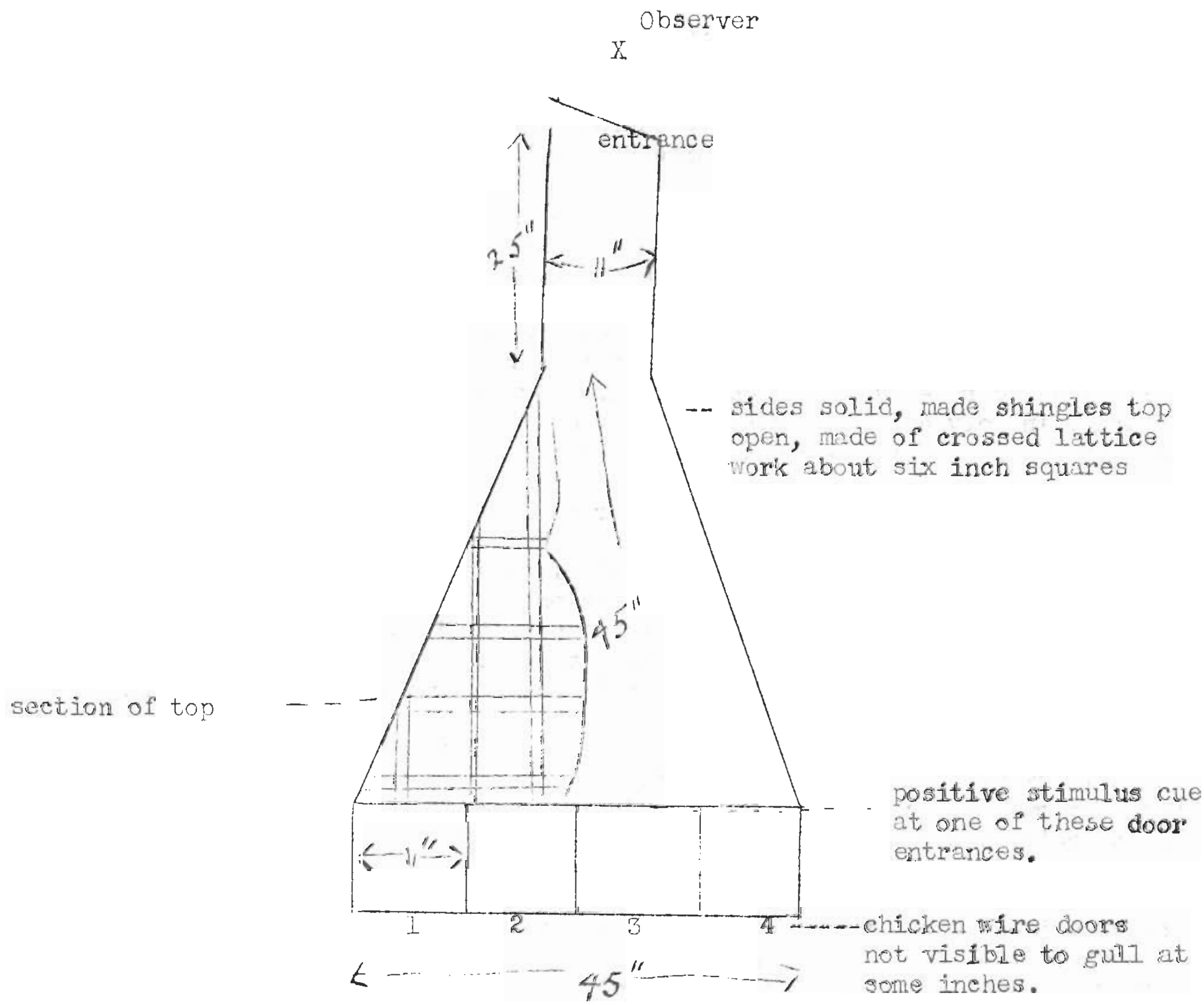
Experiments: Each animal was given ten trials at a time, once or twice a day. One of the animals died, the other animal learned the problem in 8 days, 160 trials in all. Without exception the bird solved the problem automatism-like trial and error (Hamilton's type 5). A typical trial was thus: 1-1-2-2-3-2-3-2-3-4. (1) Even when the bird was approaching a solution after some 140 trials, a failure would result in a retrogression to this type of trial and error behavior. Once learned, however, the bird was extremely accurate in solving the problem. (2) Even after a week's rest, he was able to perform with a high percent of correct responses.

Summary: The adult Herring Gull taken from the wild state makes an admirable subject for psychological investigation. The fear motive was found to be best, the mere presence of a person will elicit sufficient fear drive to make the animal escape from a problem enclosure such as the one used. Moreover, this motivation to escape a human being is consistent and persistent over a long period of time. Since it has these qualities and involves no actual harm to the bird, it is considered a fairly reliable motivating agent.

The Gull displays intelligent behavior of a low order when tested in the Hamilton multiple choice situation. Trial and error solution is used exclusively, and learning is slow. One might expect this from the cortical endowment of the bird.

The experiment was devised to explore the possibilities of the wild Gull as a psychological subject and no concerted effort was made to use large numbers of subjects or elaborate control. It is believed that the above results will provide the basis for further work. Much can be done to investigate learning, intelligence, the senses, and so on with these or similar methods. It is hoped that these results will be of some value to future investigations of this type.

Diagram for apparatus used in the experiment:



Positive stimulus cue, a white cloth (4 x 1 in.), is hung at the entrance of one of the doors (whichever is to be positive) so that it hangs about two inches off the floor and in the middle of the door entrance.

(1) August 1, 1939

1 1-2
2 3-4-3-4-4-4-2-2-2-2-4-3-3-2-1
3 2-2-2-1-3
4 4-3-2-1
5 2-2-2-1
6 1
7 1
8 2-3-3-4-4-3-2-1
9 2-3-4-3-2-3-4-4-1
10 2-2-1

(2) August 7, 1939

1 1-1-3
2 3
3 1-2
4 3-1
5 2
6 3
7 4
8 2
9 1
10 2-3-1
11 1
12 3
13 3
14 1
15 2
16 2
17 1
18 2
19 2
20 4

(3) August 14, 1939
(retention test)
No intermediate tests

2
3
2-2-3-2-1
2-1
4
2
3-2-1-4
3-1
3
1
1-4
4
2
3
3
1
3
3
1-2

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PHASES OF PHYSIOLOGICAL RESPONSE TO METEOROLOGICAL STIMULI*

Frederick Sargent, Massachusetts Institute of Technology
Thomas Ippolito, M.D., Metropolitan Hospital, New York

The existence of physiological phases of response to meteorological stimuli has been clearly demonstrated by the researches of Petersen and his associates.[1] Our studies made during the summer tend to amplify this previous work and possibly to cast new and additional light on the significance of body habitus. The summer studies offer a mute suggestion of the importance of changes in barometric pressure as the underlying stimulus in initiating the series of responses.

An examination of the data[2] collected reveals rather consistent and clear cut phases in the reaction of the three subjects used in this study to weather changes. We observed that in the wake of the barometric trough there were a rise in the blood pressure, increased urine pH, lowered urine acidity, diminished creatinine output, low CO_2 content in venous blood, and a relatively low white blood count. These reactions comprise what Petersen has called the ARS phase. The ARS phase is a period of anoxemia, anabolism, alkalinity, reduction, spasm, and a preponderance of the systoloic blood pressure. Within twenty-four to thirty-six hours after the ARS phase we find the COD phase. The COD phase is a period of catabolism, oxidation, dilation, and relative acidosis. Our data shows that in the wake of the ARS phase the blood pressure falls, the urine pH is lowered, the urine acidity and creatinine output are increased, the CO_2 content of the venous blood is raised, and the white blood count is raised. In Figure I we have attempted to correlate some of the physiological phases with meteorological situations. In this figure we have drawn curves of the morning (8:30 A.M.) barometric pressure, temperature, and dry cooling power values. The arrows on the barometric pressure curve mark frontal passages after which the pressure rose. The bar, the square, and the circle at the top of the figure represent the time when the ARS phase occurred in the leptosome, the mixed type, and the pyknic respectively. The reader will observe that in the wake of each barometic trough there is an ARS phase. He will also notice that in the wake of the long pressure rise between episode 5 and 6 there is a marked reaction on the part of all of the subjects. Coincident with this reaction the catarrhal condition of the mixed type became worse than it had been during the entire summer. The initiation of this prolonged pressure rise brought about little reaction except in the leptosome.

* A detailed account of this study will appear elsewhere at a later date.

1 Petersen W.F., "The Patient and the Weather", 4 vols, Edwards Bros. Ann Arbor, 1934-8.

2 The physiological data was collected by standard laboratory procedures. Our subjects were a peotosome, a mixed type, and a pyknic. All of our observations were made at nine A. M. immediately following breakfast. We feel that the observations are representative of nocturnal physiological activities.

Now the prolonged pressure rise is especially interesting from the point of view of acclimatization. Apparently a certain amount of adjustment of the human organism takes place during such extended periods of rising pressure, and as soon as the crest passes establishing a new environment, a physiological response occurs. It is evident that all of our episodes occur in the wake of a change in pressure tendency; most of them occur in the immediate wake of a trough, within 12 to 24 hours after the pressure has begun to rise. Such a reaction we would normally expect from an irritable organism.

The climate of Kent Island is peculiar in one particularly interesting respect. The cold front of the continental type rarely occurs there, in the summer months, at least. Following the pressure trough the pressure rises, but the temperature does not fall. It rises! This phenomenon is the result of a warm northwest wind from the large land areas of Maine and Canada. It is not until the wind becomes southerly that the temperature begins to fall. If the reader will examine especially episode 7 he will notice how the temperature rose following the frontal passage. This day, incidentally, was the warmest day of the summer. The temperature reached 78 degrees around ten in the morning, and then the wind shifted from north to south and the temperature fell. Now since we still observed that the initial rise of the pressure following the trough seemed to set off the ARS phase, we have been more or less forced to abandon the cold front of the continental type as the physical stimulus and place new significance on pressure changes even so small as occur between HIGHS and LOWS. In the high altitude studies these small pressure variations in which we are interested may bring about significant energy change which initiates the series of physiological responses: the ARS and the COD phases discussed above.

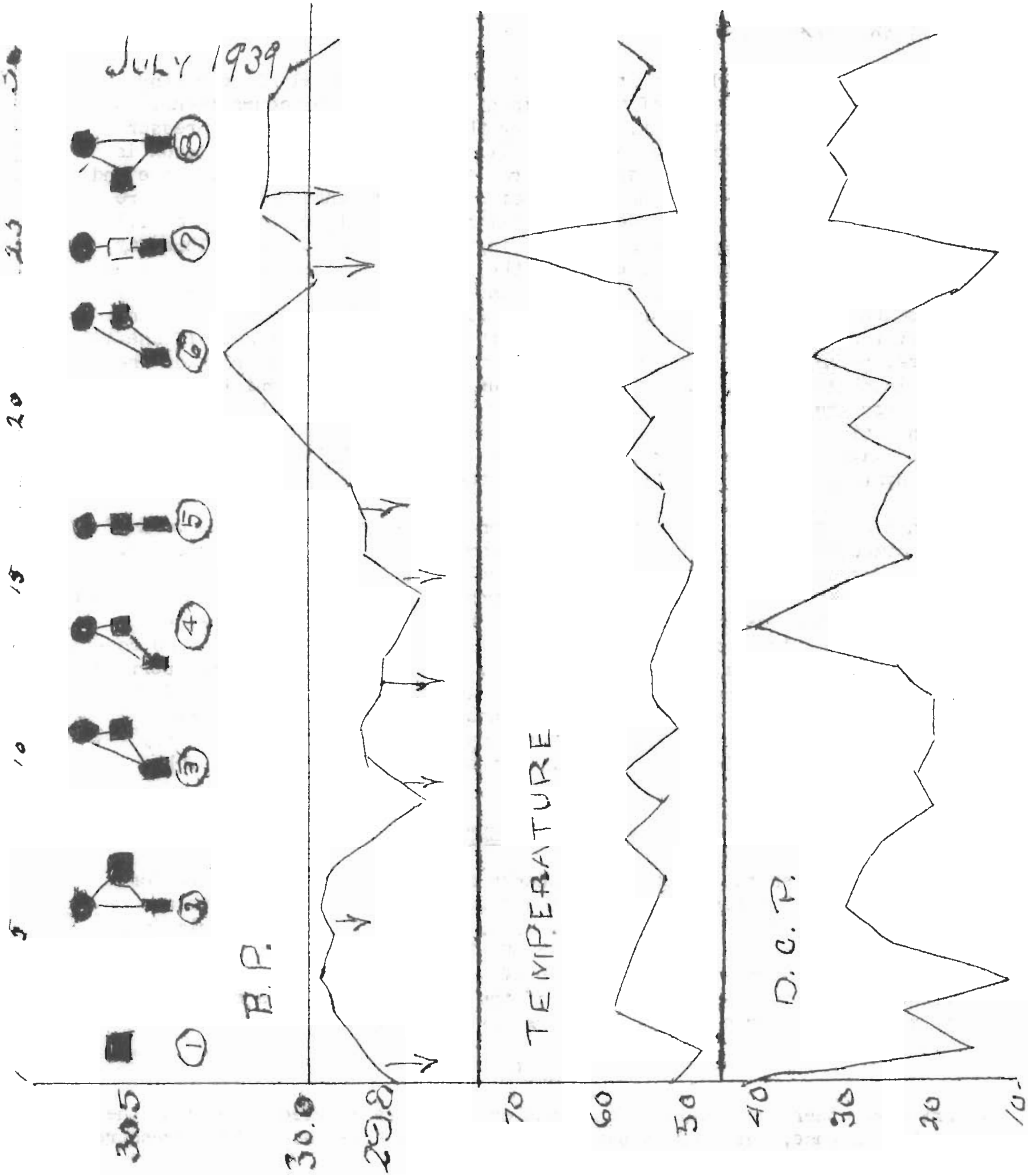
From the general notes which were kept on the daily condition and mood of the mixed type (subject F) we can draw some interesting generalizations. Headaches and periods of moodiness or irritability occurred during the ARS phase. Periods of restlessness and diarrhea took place during the COD phase. These observations are not contradictory to the observations of Petersen and others. Fluctuations in the catarrhal condition are not quite so consistent as would warrant generalizations. Yet a great many of the periods of nasal activity came either during the ARS phase or in the wake of it, and periods of ease came with the COD phase quite often. Doubtlessly these variations in the activity of the nasal disturbance are directly related to the physiological status, but sometimes they are masked by other factors.

ACKNOWLEDGEMENTS

The authors wish to express their thanks to Dr. William F. Petersen for the loan of the necessary equipment and supplies for conducting these studies. We wish also to thank Dr. E. D. Coleman, Coleman Electric Co., Maywood, Illinois, for the loan of a pH electrometer, and the Massachusetts Institute of Technology for the loan of a centifuge. And last but not least we want to thank the members of the staff who acted as subjects for this study. Their cooperation was really generous.

APPENDIX

Briefly, other meteorobiological studies that were carried out during the course of June, July and August were a record of three hour blood pressure, pulse, and urine pH variations between nine in the morning and nine at night on the mixed type, a study of intradiurnal and interdiurnal variations in the perception threshold of an electric current, and intra- and interdiurnal variations in the ability to match colors. Two experimental swims were made in the Bay of Fundy, and the blood pH of several gulls was made with little success.



GLAND FLUCTUATION THROUGH THE SEASONS
(J. Wallace Blunt, Jr., Bowdoin '40, Field Director)

My idea this last summer was to take weights and measurements on the thyroid glands of the Herring Gull to determine if there was any fluctuation in the size of the glands in accordance with the change of season. As the work progressed I enlarged the field to cover not only thyroids but parathyroids, spleen, gonads, and suprarenals. With Dave Wells as my chief assistant I weighed and measured the glands from eighty Herring Gulls between June 18 and August 31. The results of this work are scientifically incomplete, but they are sufficient to indicate definite trends; it is these trends that I want to set forth in this report. Plans are already in progress to carry this idea to completion thru this winter and next summer.

Through the first half of August the Gulls were shot, but later they were obtained by trapping. After weight, length, wing-spread, and wing length were taken, the glands were removed, the connective tissue cleaned away, and they were measured. The length of the gland was taken along the anterior-posterior axis and the width over the right-left axis. The weights were the most accurate measurements taken. I might mention that the paired suprarenals were fused so closely that we did not try to separate them but considered them as one organ.

A brief word about the season of the year will help clarify some of the variations that we found. For the first half of the summer the Gulls were shot on a portion of the island where "egging" was permitted; therefore, these birds were still in full breeding habits until the seventh of July. The food supply was normal thru the summer except for the last two weeks in July when the fishermen reported that the Herring and the Shrimp were staying in deep water.

In general we can say that in practically every case the male Gull is larger than the female. In external measurements we found that the average male weight was 1108 gram. as against 879 gm. for the females, male length 607 mm. to 562 mm. for the female, wing-tip to wing-tip measurement in males gave an average of 1432 mm. while 1344 mm. was the mean for females, and wing length favored the males 431 mm. to 404 mm. Internally we found that the males were out in the lead with larger thyroids, suprarenals, and spleens than the females.

As we examine the whole record we find that the weights of the Gulls show a steady increase thru July then a tapering off in August. There is no apparent reason for this unless it has some connection with the nesting season which ends about the first week of August when the young begin to fly.

The thyroid flands show little variation, but there is a slight trend from a large gland at the end of June to smaller one the last of luly, increasing again in August.

The parathyroids remain quite constant throughout the summer. The exception in this case is the left parathyroid of the female. In general the parathyroids of the two sexes are the same in size, but the left one on the female is definitely larger. This shows some fluctuation thru the summer, decreasing in size. This is probably connected in some way with the parathyroids' calcification function. The left gonad is the functional one in the female and the eggs have a thick calcarious shell. This may account for the enlargement in the early summer and the decrease in size as the season progresses with respect to the left parathyroid of the female Gull.

The size of the gonads in the male decreases sharply at the end of the breeding season, they taper slowly thru July, then as abrupt difference again to smaller glands thru August.

The size of the ovary remains large thru the first half of July then drops to a consistantly smaller gland thru the rest of the summer.

Of course these figures on the gonads are not adequate for set conclusions but the trends indicate that the male looses his sexual activity first while the female maintains her potency long after the breeding season ends. This was more strongly brought out by the presence of large ova on the ovaries well into August. More complete figures next breeding season may throw more light on this point.

The suprarenals of both sexes decline in size thru July, then swing upward again in August. When this problem has been followed thru more completely, I will be interested to see if there is any connection between this fluctuation and the migratory instinct of the Gull.

Measurements on the spleen give definite fluctuations, but they don't seem to be tied up with the seasons as much as with the food supply and with the age of the birds. Since we used banded Gulls as often as possible in our work, we have the approximate ages on some of them. The results show that the spleen of the younger bird tends to be larger than that of the older Gull. The few birds-of-the-year that we examined had very large spleens. The results also show that the spleens were smaller during the last two weeks of July, that period when the normal food source for Kent Island Gulls was scarce.

As I have said, the results obtained last summer are scanty and eighty birds does not seem adequate in my mind to establish any fixed trends or results. But I hope that the measurements made this winter and next summer will back up the indications of last summer's work.

I did a small amount of histological work on the glands of the Herring Gull, but not enough from which to draw any definite conclusions. Next summer, if all goes well a complete histological study will be made and the interesting structural variations in the thymus, spleen, and suprarenals will be studied in detail.

HERRING GULL CENSUS
(by Frederick H. Crystal)

In the past estimates varying from 10,000 to 50,000 were made of the numbers of Herring Gulls which comprised the colony located on Kent Island. A census of the gulls was desirable to provide more definite information concerning this, the largest gull colony in America.

It was impracticable to count the individuals but it was possible to ascertain the number of nests, and by assuming that there are two adults to every nest, thus arrive at a fairly accurate estimate of the gull population.

The breeding area, comprising about 60 acres, was roped off into quadrates of approximately equal size, on each of which the character of the vegetation and number of gull nests and their contents recorded.

The terrain was of varying nature. Parts of it was made up of scrubby trees and scrags. Other parts were swampy in character. Some of it was shore line and the remainder was open and hilly with some rapberry bushes intersperced her and there. The gulls seemed to prefer the shore line and exposed sections of the island. This seems reasonable when one considers the gull's great wing spread that makes it difficult to takeoff in cramped quarters. Quite a few of the gulls, however; made their nests in dense patches of raspberry bushes, providing there was a clearing adjacent to the nest.

Unlike the Eider, the Herring Gull does not attempt to conceal its nest. Occasionally the nests are nothing but slight depressions in the ground with little or no nesting material. In a few cases the birds lay their eggs directly on the bare wave-washed rocks. A few of the nests were placed below the sea wall, even below the extreme high water mark. In general the Herring Gull is not particular in the choice of its nesting site.

The nests are about six to eight inches in diameter and lined with a few sticks, twigs or moss. They do not compare favorably with the Eider's nest which is deeper, more concave and always well lined with down. The gulls have the utmost respect for each others territory and rarely are the nests cramped together.

Of the nests containing eggs, 34.1 per cent contained one egg, 38.6 per cent contained two eggs and 27.3 per cent contained three eggs. In two nests there were four eggs. In several cases there were eider eggs with the gulls eggs in a gull's nest.

The census revealed the existance of 11,672 nests on the southern end of the island. In spite of the care used in the counts it is obvious that many of the nests were overlooked. In one area the vegetation consisting of dense scrags and raspberry bushes was so impenetrable that the nests could not be counted. A conservative estimate placed the number of nests in that area at about 250. In all about 3,000 nests were not counted which brings the total number of nests on the southern end of the island to 15,000 or approximately 30,000 birds. No census was made at the northern end where it is estimated at least 2,000 gulls breed.

I would strongly recommend that another census be taken much earlier in the season before the rapidly growing vegetation so thoroughly conceals many of the nests. A census taken the latter part of June would probably reveal even a greater number of nests than shown by the present count taken later in the season.

MARINE INVERTEBRATES OF KENT ISLAND

(By Thomas J. Sheehy, Jr. Bowdoin '41)

The extreme tides of the Bay of Fundy in New Brunswick, Canada, afford those interested, an excellent opportunity to study Marine Invertebrate Life. Grand Manan Island and the small islands associated with it provide a goodlocation for examining this type of life. Kent Island, the largest of a group known as "Three Islands", (about three miles off the southeastern tip of Grand Manan) is the present site of the Bowdoin College Scientific Station. Here, during the summer of 1940 from June to September, I collected specimens of invertebrate life.

Although the tide change at Kent Island is not as great as at other parts of the bay; it is greater than is ordinarily found along the Atlantic Coast. At Kent Island, according to R. M. Cunningham's report, the mean tide is about 14.4 feet(See page 15 of this report). This change provides a very large area in which to search for material.

This report is supplementary to work by E. Stevens, Jr. and N. Gillett during the summer of 1933. Although they included life found in water down to twelve fathoms; my collections were made entirely in the littoral zone.

It is interesting to note similarities and differences in the terrain of Kent Island and Grand Manan. In the three summer months of 1852 Wm. Stimpson(1. see footnote) compended " a nearly complete" catalogue of marine fauna of Grand Manan Island. He collected his material by dredging. Stimpson believed that the abundance of pelagic animals was due to the proximity of deep water.

The north, south, and west sides of Grand Manan are precipitous and abruptly drop off into 100 fathoms or more of water. The eastern shore does not drop off so abruptly. On the southeastern shore particularly, there is a great shallow shelving. Opposite this shore are small islands. The waters between them and Grand Manan are shallow while a short distance seaward the water becomes as deep as on the western side. Kent Island being in one of these small groups, has a low shelving northern and western shore while the eastern and southern shores drop off into deep water.

While Grand Manan is exposed on all sides except the southeastern, Kent Island is only exposed along its entire eastern and southern sides. The same conditions then, of shallow and abrupt shores, which interested Stimpson in 1852 interested us in 1940.

In addition to the conditions affecting marine fauna already mentioned, there are certain situations peculiar to Kent Island. On both shores, the eastern and western, there is a great deal of fresh water seepage from springs on the island. This is not present on the northern and southern shores. The northern shore is sheltered by Hay Island. The western shore

1. Stimpson, William, 1854. Marine Invertebrata of Grand Manan Smithsonian Contributions to Knowledge. vol. 6, pp. 1-66.

is sheltered by Sheep Island. The southern shore is exposed to the full force of the waters of the Bay of Fundy as is the eastern shore. On the ebb tide there is a very strong current running around the southern point. According to estimates by local fishermen it is a seven knot current.

Despite these conditions there is a great deal of variety of invertebrate life on all sides of the Island except the mid-eastern side and the southern point. Here the inhabitants are limited to molluscs and boring sponges. Although there are more tidal pools on the southern point than at any other place on the island, the pools contain very little marine life. I think this must be due to the lack of seaweed and the excessive pounding of the sea.

In direct contrast to this area is the northeastern shore. Here is again a rugged coast dropping abruptly to deep water. There is a great deal of seaweed covering these rocks. At low tide great quantities of rock pools covered by seaweed have revealed many varieties of inhabitants. This might account for the presence of life not ordinarily found so close to the shore. Strong seas wash in animals which are able to find sheltered locations in the crevices of seaweed covered rocks.

From the northern point to the south western shore there extends a large "clam flat". This ground is very sandy (as exposed at low tide) at the northern side becoming more rocky as one proceeds southward. Many varieties of animals are found in the sand. On the mid-western side of the island is a large tidal pool. Here in a large area of water about three feet deep in the middle, with a sandy bottom, are numerous patches of kelp. The kelp holdfasts were excellent locations for animals. On one such holdfast I found fourteen different species.

Although fresh water in any quantity seems to stun ioslated marine invertebrates; fresh water flowing into salt water does not appear to affect the inhabitants. There is a fresh water stream flowing through the basin (inner harbor). This is the only water in the basin for four hours out of every six, i.e. the basin empties its salt water two hours after high water. Yet, in the sand on the bottom of the fresh water channel there were animals typical of any shallow sandy bottom along the North Atlantic coast.

On the northeast side there is a great deal of fresh water seepage. This doesn't reach the shore in any great quantity. It apparently has little effect upon the marine fauna present. It is interesting to note, however, one peculiarity of this section. On the full of the moon the tides are flood tides, i.e. higher than average. (Record tide 20.1 feet) In June these tides left many tidal pools usually lacking in plant life. The seepage diluted these pools. They became stagnant and brackish. During July there were many forms of insect life observed. Approximately twenty three species were collected. These have not yet been identified.

The preceding conditions may explain the presence of marine invertebrates found in the littoral zone of Kent Island which ordinarily would be found in deeper water. I think the combination of a wide tide range, constant surf, and the proximity to deep water accounts for the great variety of animals found in this location.

My collecting equipment consisted of a pair of tweezers, a supply of glass vials, and hip-boots enabling me to wade through the frigid coastal waters of the Bay of Fundy. The temperature of the water for the summer months ranges between 40°F and 50° F. For the killing of delicate animals such as Sea Anemones and Nudibranchs I first placed the specimens in salt water to which I added $MgSO_4$ until the animals was insensitive to fairly severe shocks. Then I placed it quickly into 70% alcohol and, after a few minutes, preserved the specimen in a mixture of one half 50% alcohol and one half 3% formalin. This process produced the most satisfactory results I was able to obtain. The specimens are to be filed permanently with the collections of the Bowdoin College Scientific Station at Kent Island. They consist of briefly:

Porifera	9	species
Coelenterata	48	"
Plathelminthes	5	"
Nemertea	13	"
Nemathelminthes	1	"
Bryozoa	8	"
Phoronidea	2	"
Arthropoda	31	"
Annelida	27	"
Mollusca	46	"
Urochorda	10	"
Total	200	"

In addition there are approximately 23 unidentified species of Insecta.

I wish to thank Dr. Gross, James Blunt, and Robert Wait for their assistance. I spent the best summer I have ever had at Kent Island. There, far from the noise and dirt of the city, was an excellent opportunity to observe nature without the many worldly interuptions the younger generation is subject to ordinarily. After helping with the duties of bachelor quarters, I was free to spend my entire daylight hours looking for the inhabitants of the sea.

Vial No.	Specimen	Location
	Porifera (Sponges)	
1	Cliona celata (Sulfur sponge)	Found on kelp holdfast
2	Halichondria panicea (Bread-crumb sponge)	"
3	Stylotella heliophila	Found in tidal pool-rocky
5	Polymastia robusta	"
6	Grantia ciliata	"
11	Subertes compacta	Low tide in tidal pool
13	Grantia canadensis	"
352	Leucoselenia botryoides	"
353	Grantessa thomsoni	"
	Coelenterata-Hydrozoa (Hydroids)	
16	Tubularia indivisa	"
18	Coryne mirabilis	"
	Hydractinia echinata	"
19	Sertularella gayi	Low tide, under seaweed
20	Obelia geniculata	Low tide, tidal pool, rocky
	Campanularia hinksi	

Vial No.	Specimen	Location
22	Bougainvillia carolinensis	Flood tide, rock pool
23	Clava leptostyla	"
	Plumarian	
24	Laodicea calcarata	"
25	Clytia poterium	Low tide, "
26	Hydrocorallina	" "
29	Sertularia pumila	" "
31	Rhizogeton fusiformis	" under seaweed
34	Sertularella rugosa	" "
	Bougainvillia superciliaris	" "
35	Obelia dichotoma	" "
36	Clytia bicophora	" "
37	Campanularia amphora	" "
38	Dipurena strangulata	" "
42	Eudendrium ramosum	" "
47	Thuiaria thuja	" "
49	Antennularia antennina	" rock tidal pool
	Pennaria tiarella	" "
50	Campanularia flexuosa	" "
51	Gonothyrea loveni	" "
53	Tubularia tenella	" "
54	Campanularia volubilis	" "
60	Sertularia cupressina	
	-Scyphozoa (Jelly fishes and other coelenterates	
62	Aequorea tenuis	Found on beach at high tide
17	Haliclystus auricula	At low tide in rock pool
	-Actinozoa (Sea anemones and others)	
63	Paractis rapiformis	At low tide in rock pool
64	Sagartia luciae	"
65	Eloactis producta	"
66	Epizoanthus americanus	"
67	Metridium dianthus	"
69	Halcampa farinacea	"
70	Sagartia modesta	"
71	Sagartia leucolena	At low tide on kelp holdfast
72	Bunodes stella	At low tide in rock pool
73	Tealia-species	"
74	Tealia-another species	"
75	Edwardsia elegans	"
76	Metridium-species	"
77	Zoanthus-species	"
80	Bunodes-species	"
81	Tealia crassicornis	"
	Tealia-species	
	Plathelminthes (Flatworms) -Turbellaria	
92	Planocera inquilina	"
93	Leptoplana folium	"
97	Stylochus ellipticus	"
106	Leptoplana variabilis	"

	Nemertea (Nemerteans	
88	Nemertes socialis	At low tide on kelp holdfast
94	Paleonemertean	"
104	Lineus bicolor	At low tide in rock pool
109	Tetrastemma candidum	"
95	Amphiporous ochraceus	At low tide in clam flats
113	Lineus	At low tide in rock pool
119	Lineus ruber	"
121	Zygonemertes virescens	"
126	Emplectonema gracile	"
128	Cephalothrix spiralis	At high tide under stones
	Nemathelminthes (Roundworms)-Nematomorpha	
150	Nectonemma agile	At low tide on kelp holdfast
	Bryozoa (minute colonial animals)	
155	Alcyonidium hirsutum	At low tide in rock pool
159	Membranipora pilosa	"
164	Mucronella immersia	"
347	Cellepora pumicosa	"
349	Smittina trispinosa	"
	Phoronidea (Sessile marine worms living in chitonous tubes)	
99	Phoronis	At low tide in rock pool
107	Another species of Phoronis	"
	Annelida (Segmented worms-Polychaeta	
86	Cirratulida	At low tide on kelp holdfast
	Nemertean-Oerstedia dorsalis	"
87	A Poluchaet	At low tide in a rock pool
89	Polycirrus eximius	"
90	Clymenella torquata	At low tide on kelp holdfast
91	Cirratulus grandis	At low tide in a rock pool
95	Amphitrite ornata	In sand on clam flats
101	Stauronereis pallidus	At low tide in rock pool
105	A Polychaet	"
108	Another Polychaet	"
112	Arabella opalina	"
114	Parasabella	"
115	Species of Polychaet	"
116	Another species of Polychaet	"
120	Ammotrypane fibriata	"
124	Myxicola steenstrupi	"
125	Spio setosa	"
126	Nemertean-Tetrastemma vermiculum	"
129	Spirobis borealis	At low tide on seaweed
130	Nereis virens	At low tide in the sand
131	Lepidonotus sublevis	At low tide on kelp holdfast
132	Lepidonotus squamata	"
133	Enoplobranchus sanguineus	"
134	Ampharete setosa	"
135	Autolytus cornutus	"
137	Nereis limbata	At low tide in rock pool
139	Nemertean-Tubulanus pellucidus	At low tide on kelp holdfast

145 Flatworm-Bdelloura candida	At low tide in rock pool
148 Maldane urceolata	At low tide in the sand
154 Filograna implexa	At low tide in rock pool
Bryozoa	
159 Flustrella hispida	"
156 Membranipora lineata	"
160 Alcyonidium polyoum	"
Arthropoda-Crustacea	
178 Erichsonella filiformis	"
183 Calliopus laeviusculus	"
184 Tanystylum obiculare	"
185 Carinogemmarus mucronatus	At low tide on kelp holdfast
187 Oniscus asellus	High tide under a stone
189 Edotea triloba	Half tide under a stone
190 Idothea baltica	Low tide on a kelp holdfast
191 Chiridotea caeca	Half tide under a stone
192 Orchestia agilis	Low tide on a kelp holdfast
193 Aeginella longicornus	"
194 Tanystylum obiculare	"
195 Anoplodactylus lentus	Low tide in a rock pool
196 Lithobius multidentatus	High tide under a stone
199 Idothea rectilinea	Low tide on a kelp holdfast
203 Jaera marina	Low tide in a rock pool
211 Pyconogonum littorale	"
212 Elasmopus picillimanus	"
213 Nymphon stromi	"
Nymphon longitarse	"
214 Amphithoe valida	"
219 Idothea phosphorea	"
221 Gammarus locusta	Low tide in the sand
225 Corophium cylindricum	Low tide in a rock pool
228 Cancer irroratus	"
229 Cancer borealis	"
230 Balanus balanoides	"
231 Balanus eburneus	"
232-236 Species of Balanus	"
Mollusca-Amphineura (Chitons)	
286 Trachydermon albus	Low tide in a rock pool
287 Trachydermon ruber	"
-Gastropoda (Snails, etc.)	
240 Trophon clathratus	"
Purpura lapillus	"
242 Mytilus edulis	Low tide on a kelp holdfast
244 Pectin islandicus (Scallop)	Low tide in a rock pool
246 Mytilus pellucidus	"
250 Tellina tenera	"
251 Acmea alvea	"
253 Crucibulum striatum	"
255 Acmoeca testudinalis	"
258 Margaritia helicina	"

259 Margaritia rendulata	Low tide in rock pool
Margaritia cinerea	"
262 Nassa obsoleta	"
239 Bussinum undatum	"
Urosalpinx cinereus	"
Thais lima	"
Thais lapillus	"
Polynices heros	"
Littorina palliata	"
Littorina planaxis	"
264 Nassa trivittata	"
265 Polynices triseriata	Low tide in the sand
269 Lucana vincta	"
274 Calliostoma occidentale	"
277 Natica clausa	Low tide in a rock pool
281 Columbella (Astyria) lunata	"
284 Velutina loevigata	"
-Nudibranchs (Sea slugs)	
288 Dendronotus aborescens	"
290 Doris bilamellata	"
291 Eolis picta	"
292 Eolis farinacea	"
293 Ancula sulfurea	"
297 Eolis salmonacea	"
301 Doris grisea	"
302 Doris planulata	"
309 Doris diademata	"
312 Doris coronata	"
315 Doris tenella	"
316 Doris bifida	"
-Pelecypoda-(Bivalves)	
239 Mya arenaria (Common clam)	low tide in the sand
Modiola modiolis (Great horse mussel)	Low tide in rock pool
Modiola nigra (Common mussel)	"
273 Tagelus gibbus (Small razor clam)	"

Chordata

Urochorda-Tunicata-(Sea squirts)

317 Ciona intestinalis	"
318 Glandula mollis	"
319 Molgula manhattensis	"
320 Molgula pellucida	"
322 Velutinida zonata-Gastropod	"
323 Molgula arenata	"
325 Bostrichobranchus pilularis	"
326 Botryllus schlosseri	"
327 Ascidia amphora	"
328 Cynthia hirsuta	"
330 Ascidia psammophora	"

In addition to this report there is a series of specimens of both Arthropods and Insects which I have been unable to identify.

CONTRIBUTIONS

In additional to the annual reports of the Bowdoin-Kent Island Scientific Station the following contributions have been published.

1. Gross, William A.O.
   1935 The Life History Cycle of Leach's Petrel (Oceanodroma leucorhoa leucorhoa) on the Outer Sea Islands of the Bay of Fundy. Auk, vol. 52, no. 4, pp. 382-399. Illus. 4 plates, 11 fig. and 8 tables.

   1936 Kent Island-Outpost of Science. Natural History Magazine, vol. 37, no. 4, pp. 195-210. Illus. 22 photographs

2. Gross, Thomas A. W1JZA, VE1IN
   1937 Designing the First Stage of the Speech Amplifier. Q.S.T. vol. 21, no. 12, pp. 33-100. Illus. 1 plate, 1 fig.

3. Gross, Alfred O.
   1938 Eider Ducks of Kent Island. Auk vol. 55, no. 3, pp. 387-400 Illus. 3 plates, 6 fig.

4. Gross, Thomas A. W1JZA, VE1IN
   1938 Operation of Zero-bias Modulators. Radio, no. 230 pp. 21-33. Illus. 7 fig.

5. Pettingill, Olin S., Jr.
   1939 The Bird Life of the Grand Manan Archipelago. Proc. Nova Scotia Institute of Science. vol. 19, pt. 4, pp. 293-372. Illus. 3 plates, 3 fig.

6. Griffin, Donald R.
   1940 Homing Experiments with Leach's Petrels. Auk, vol 57, no. 1 pp. 61-74. Illus. 7 text fig.

7. Gross, Alfred O.
   1940 The Migration of Kent Island Herring Gulls. Bird Banding, vol. 11, no. 4, pp. 129-155. Illus. 1 photograph, 2 maps, 3 charts.

A number of copies of the above publications are still available for distribution and can be secured by writing to the Director of the station.