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AN ECOLOGICAL SURVEY, AS A MEANS OF OBTAINING A BACKGROUND FOR CERTAIN MORPHOLOGICAL PROBLEMS

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The dissection of a specimen in the laboratory needs to be supplemented by a stimulating and enriching background gained in the field. Structure is to a greater or less degree associated with function, and, disregarding the disputed effect of environment upon heredity, changes in environment can modify the functioning of somatic structures in the lifetime of a single individual. Furthermore, a morphologist, who supplements his laboratory work with ecological observation, has the pleasure of seeing in action the structures with which he works, gains the perspective which his problem should have with other problems, and discovers further channels for research in his chosen field.

With the idea of gaining such a background for morphological research on the protractile apparatus of the mouth of the perch and the pumpkinseed sunfish, this ecological survey was made at Iowa Lakeside Laboratory on West Lake Okoboji in the summer of 1924, with Dr. F. A. Stromsten, Prof. B. Shimek, and Mr. George Potter of the State University of Iowa and Prof. A. P. Larrabee of Yankton College coöperating. In order to avoid the overwhelming number of forms and limitless areas of the mainland, the sand spit projecting out into Miller's Bay in front of the Laboratory was selected.

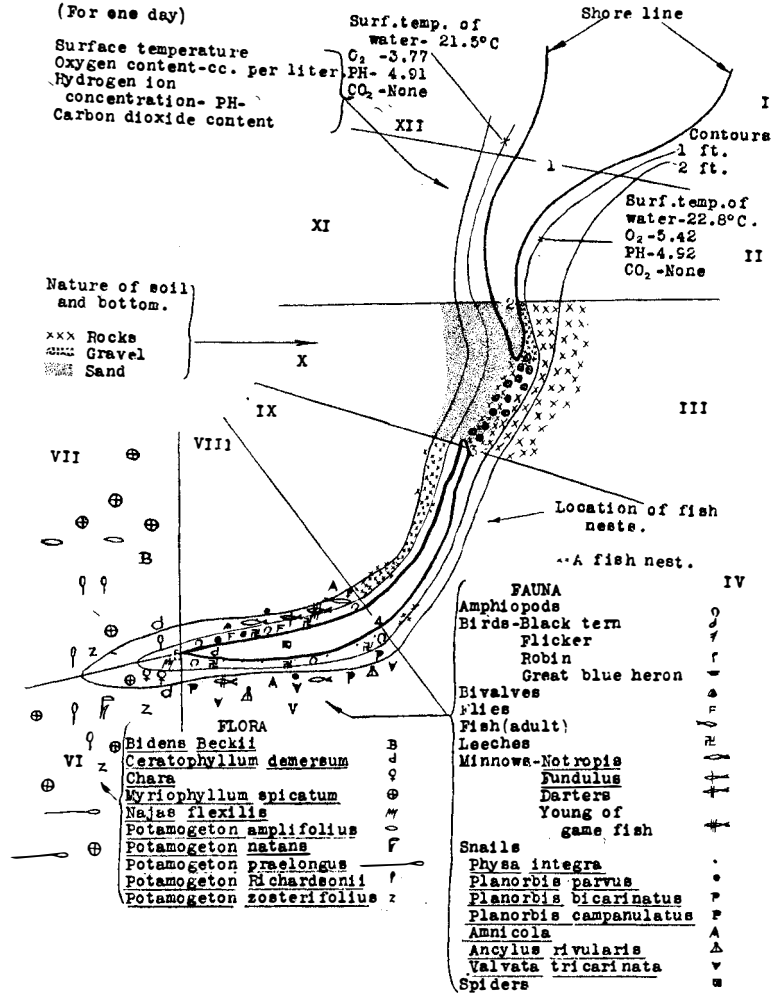
The preparatory work consisted of pacing off distances and plotting the tract. Contour lines at a depth of one foot and two feet were measured off. Certain terrestrial and aquatic zones were then laid off from permanent landmarks. The former were each designated by two Arabic numerals corresponding to the two landmarks between which each was situated. The latter were designated in order by Roman numerals. Each zone was considered to have a proximal, middle, and distal portion (designated P, M, and D respectively) with reference to the mainland. Location of plants and animals was then listed in the field according to zone — portion of zone — and (in the case of aquatic zones) depth, as,

Zone V

Date_____

Ceratophyllum demersum V-D-1 leaf

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Ranunculus aquatilis V-D-(1-2) leaf
 Snail (*Planorbis bicarinatus*) V-M-2.

In the final report these lists were worked over and tabulated according to species, as,

Bidens Beckii

Aug. 19, 1924 III-P-1½ flower

Aug. 7, 1924 VII-P-4 flower — first to bloom in this region

Aug. 18, 1924 XI-D-(3-4) flower

Both floral and faunal lists were thus made. From these, maps were made on which each kind of plant or animal was represented by a different symbol. Investigation of the soil in different terrestrial zones both at the surface and at varying depths was made. In aquatic zones the nature of the bottom was noted.

Temperature, hydrogen-ion concentration, and oxygen and carbon dioxide content of the water at different points were considered in relation to height of sun and direction of wind, although this portion of the work was not carried far enough to reach many general conclusions. The chemical calculations were made by Miss Josephine Bockwoldt and Miss Elizabeth Conard. Theories as to the origin of the sand spit were formulated in light of the known facts concerning the material making up the spit, wind action, and other factors.

Sunfish nests were plotted, habits of sunfish observed, and attempts were made to find out the relation of animals to one another, the relation between animals and certain plants, and the relation of both to material washed up along the shore by the waves (mostly broken stems of *Myriophyllum*). This drift material was found to serve as a means of support for the establishment of *Lemma* and such snails as *Lymnaca* and certain Succineas. It offered protection from the birds for frog tadpoles, minnows, and many water beetles. Some work on the kind of snails eaten by the sunfish of this region, had a direct bearing on the morphological problem of protractile jaws of fish, but the background of animal and plant forms and relationships gained by this survey, made it well worth the time and effort involved.

This ecological survey was made between July 28 and August 21, 1924, in a much shorter time than would have been possible had not the staff of the Lakeside Laboratory so kindly assisted. A complete copy of the survey is being added to the library of Iowa Lakeside Laboratory.

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EXPLANATION OF PLATE I

Fig. 1. The sand spit as seen from just south of Iowa Lakeside Laboratory.

Fig. 2. The sand spit as seen from Zone (1-2).

2, 3, 4, and 5. Points 2, 3, 4, and 5 from which zones were laid out.

m. Bed of *Myriophyllum etc.*

f. Floete's residence.

b. Boathouse—Iowa Lakeside Laboratory.

l. Laboratory building—Iowa Lakeside Laboratory.



Fig. 1.



Fig. 2.

A MODEL SHOWING THE PROTRACTILE APPARATUS
OF THE MOUTH OF THE PUMPKINSEED SUN-
FISH, *EUPOMOTIS GIBBOSUS* L.

(A demonstration)

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EXPLANATION OF PLATE I

Fig. 1. Side view showing jaws retracted.

Fig. 2. Side view showing jaws protracted.

- am. Adductor mandibulae (muscle).
- fm. Fronto-maxillaris (muscle).
- g. Geniohyoideus (muscle).
- h. Bones of the head.
- i. Intermandibularis (muscle).
- l. Lower jaw.
- m. Maxilla (bone).
- p. Premaxilla (bone).
- p.p. Pedicle of the premaxillae (bone).

PLATE I

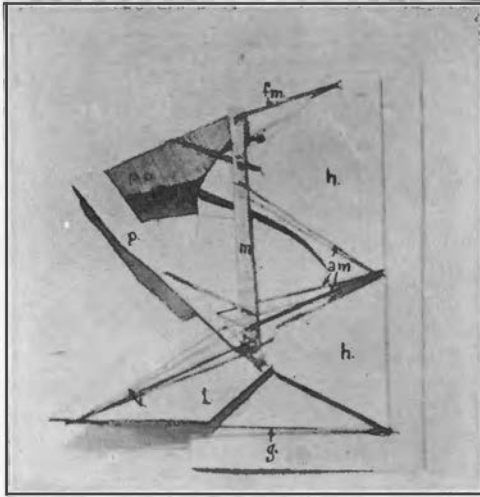


Fig. 1.

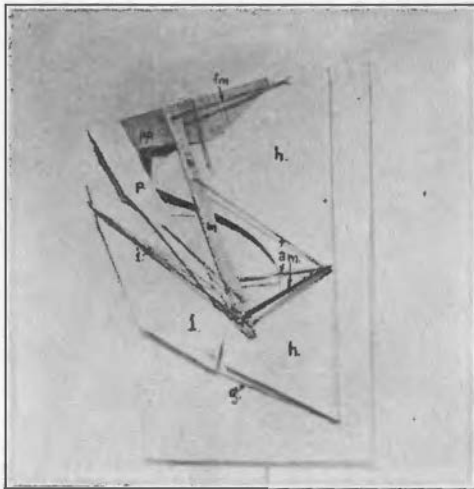


Fig. 2.