THE PHYSIOLOGICAL AGREEMENT AMONG THE ANIMALS OF ANIMAL COMMUNITIES

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All the animals occupying a relatively uniform habitat constitute an animal community. A physiological agreement exists among the animals of communities. The object of this investigation was to determine the extent and character of such agreement with particular reference to the rapids community of a large creek. Considering the community as a whole there is

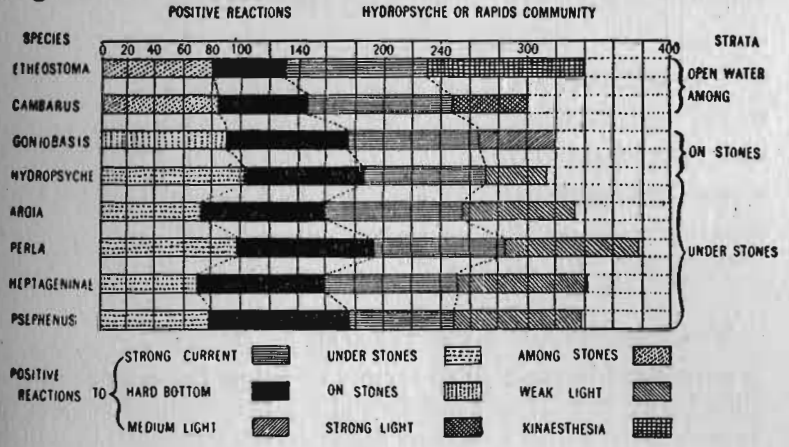

Figure 8
Biol. Bull. Vol.. XXVI, p. 313. Fig. 40.

(1) a *general agreement* in reactions to certain factors; (2) *disagreement in respect* to factors differing in intensity vertically, and (2) *a sharp difference* between *the rapids community* and other communities.

Figures 8 and 9 are introduced to show the character of the agreement and disagreement in a rapids community, and the fact that the pool community is different but remains unsolved. Noting first figure 8, we note a noteworthy agreement in reaction to bottom and to current. The preference for hard bottom in these experiments means the avoidance of sand as sand and hard bottom were present in the experiment. Animals living under stones were under stones in darkness in the experiment. The snail (*Goniobasis*) which lives on stones was found on stones in the experiment. The darter (*Etheostoma*) and the crayfish (*Cambarus*) which live among stones were found among stones in the experiment. Thus the different animals differ in their reactions to bottom and are in disagreement with reference to their vertical distribution in nature. Turning to reactions to light we find a comparable difference.

Animals living beneath stones show a preference for weak light, those living on stones, medium light, those among stones, strong light. If we were to study the community in full we would find that reactions to many other factors are of importance.. Associative memory no doubt plays a role. Thus there

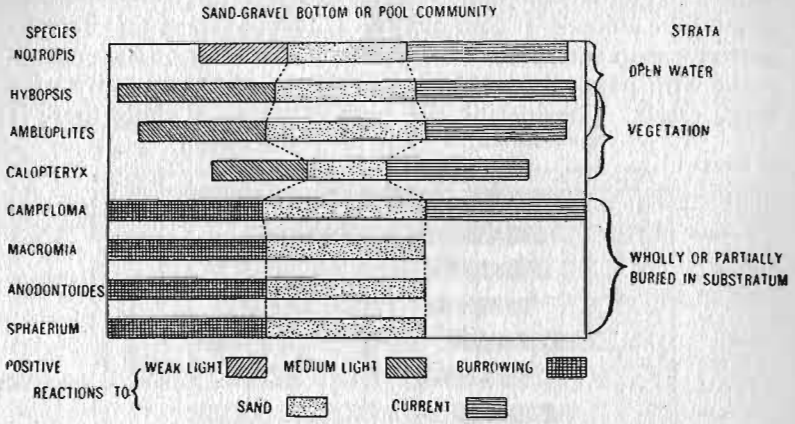

Figure 9
Biol. Bull. Vol. XXVI, Fig. 4, p. 314.

is agreement in reaction to factors of prime importance in the community habitat as a whole and disagreement in respect to factors differing strikingly in the different situations in which the animals live within the community habitat.

The diagram of the pool community, Fig. 9, is introduced to show how strikingly it differs from that of the rapids community. Though agreement is not indicated here on account of the incomplete character of the experiments, our experience with the reactions of pool fishes and invertebrates to chemical differences in water, suggests that such differences may be of much importance to all the species. The difference between the two communities is emphasized by the presence of a strong preference for sand bottom and by the presence of the burrowing habit, both of which are wanting among the animals of the rapids community. The non-burrowing pool species are positive to current; the burrowing species do not respond within ordinary lengths of time. The reactions to light show much more sharp negativeness than in the case of darters and crayfishes of the pool community. The community is clearly unsolved and a large amount of experimentation would be necessary to determine suitable tests for these animals and then all the animals of both communities should be put through all the tests, new and old. A series of new tests must be added for each new aquatic community and all the old tests must be

so modified as to secure responses from all the animals. Thus the labor involved in comparing a number of communities is great.

DESCRIPTION OF FIGURES

Figure 8, showing the agreement and disagreement of the reactions of the animals of the rapids community. Note agreement of reaction to bottom and current and disagreement in two other reactions related to the level at which the animals live. These results were obtained by placing the animals under experimental conditions in which they had a choice between different kinds of bottom, different strengths of light, and in which their behavior in a water current was noted. In the case of water current the percentage of animals headed up stream is given. When headed up stream animals are said to be positive to current. In the case of the other stimuli the percentage of animals in the kind of conditions available was noted and the animals are said to be positive to the conditions in which the greatest number are found. Thus we note that the darter (*Etheostoma*) was 80 per cent among the stones and is said to be positive to this kind of situation. It will be noted that if the animals had been 100 per cent positive to the various stimuli the entire 400 units should be occupied in the diagram. This could be true only if there were no other factors entering into the reactions of the animals. The common names of the animals are as follows: *Etheostoma,* darter; *Cambarus,* crayfish; *Goniobasis,* snail; *Hydropsyche,* Caddis worm; *Argia,* damsel fly; *Perla,* stone fly; *Heptageninae,* may fly; *Psephenus,* water penny.

Fig. 9. Suggestions as to the probable agreement and disagreement in the reactions of the animals of the unsolved pool community on the basis of a total of 300 per cent. The common names of the animals are as follows: *Notropis,* shiner; *Hybopsis,* river chub; *Ambloplites,* rock bass; *Calopteryx,* damsel fly; *Campeloma,* snail; *Macromia,* dragon fly; *Anodontoides,* mussel; *Sphaerium,* small bivalve.