

Research Reports: 1956

has the added advantage of ready availability at inland laboratories and in all seasons.

Unlike the sea urchin eggs, yeast took up dye nearly as completely from acid media as from alkaline. We speculated that dye cations formed in the acid medium might adsorb to the negative outer cell wall which has been described by Rothstein. Addition of 100 mM KCl (or for that matter, of NaCl) prevented fixation of the dye from acid media by competing with the dye cation for adsorption sites on the yeast.

External potassium competitively inhibits fixation of dye from media of fixed acidity over the range 6 to 100 mM KCl. Yeast, in media with K held at 100 mM, takes up hardly any dye between pH 2.3 and 3.0, while between 3.0 and 7.0 uptake increases progressively to equal that at 7.0 with no K at all. Further work is needed to exclude other possible mechanisms for the effect of external K.

Studies On Bird Semantics

Hubert and Mable Frings and René-Guy et Marie-Claire Busnel
Pennsylvania State University and Institut National de la
Recherche Agronomique

In the United States, Eastern Crows (*Corvus b. brachyrhynchos*) emit an assembly call which, when recorded and broadcast in nature, causes crows to approach the sound source. An alarm call, when broadcast similarly, causes the birds to fly away.

In France, three "crows" (*C. monedula*, *C. frugilegus* and *C. c. corone*) roost and feed together in winter. Broadcasts of recorded distress calls, emitted when the birds are restrained, cause the birds to approach the sound source at first and afterwards to disperse.

Using exchanged recordings, the distress calls of the French "crows" were broadcast to crows in the U. S. There were no observable reactions in Maine during the summer and in Pennsylvania during the winter. In early summer in Pennsylvania, but not in Maine, the distress call of *C. monedula* induced crows to behave as the French "crows" did. In France, the "crows" did not respond to the recorded alarm of the American species, but reacted to the assembly call as they did to their own distress calls.

In the U. S. Herring Gulls (*Larus argentatus*) responded to their food-finding call, when recorded and broadcast, by approaching the sound source and to broadcasts of their alarm call by dispersal. In France, with the same species, the calls elicited no responses.

These observations suggest that birds develop communication signals within each species having features in common with those of related species, but with regional variations within the species. In cases in which individuals are exposed only to the signals of their own group, they may

Research Reports: 1956

become quite specific in reaction; in cases in which they mingle with other groups of their own or with other species, they may learn to respond to the signals of these.

Further Experiments on Locations of Contact Chemoreceptors in Insects

Hubert and Mable Frings
assisted by Carl Frings
Pennsylvania State University

Continuing attempts to locate the contact chemoreceptors involved in feeding reactions of insects, adults of the following species were studied. The loci of the receptors which were found are given with each.

TRICHOPTERA (Caddis-flies)

Polycentropus interruptus -- all tarsi, palpal tips, haustellum

Agrypnia vestita -- same as *P. interruptus*

Limnephilus ornatus -- same as *P. interruptus*

LEPIDOPTERA

Cercyonis pegala (Wood nymph butterfly) -- tarsi of middle and hind legs (fore legs are rudimentary), tip of proboscis, antennal tips.

COLEOPTERA

Brachyrhinus sulcatus (Strawberry root weevil -- palpal tips, antennal tips.

DIPTERA

Tipulidae (Crane flies) of eight species, mainly *Tipula* spp. — tarsi of all legs, palpi, labella.

Of these, the weevil is remarkable in having the receptors on the antennae. Usually mandibulate species lack antennal receptors. This seems to be related to the fact that the mouth-parts are inside the "snout" when the insect is not feeding, thus producing a situation like that of haustellate insects with retractible mouth-parts. The discovery that the butterfly has receptors on the antennae was made only after removal of most of the tarsal receptors, supporting our earlier findings with two species of moths. These findings necessitate a reinvestigation of the situation in all haustellate insects.