Reactions of Arthropods to Artificial and Recorded Sounds

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The reactions of adults of the following insects to "pure" tones at many frequencies between 50 and 40,000 cps and intensities of 80 - 125 db were studied:

LEPIDOPTERA

Cercyonis pegala (Wood nymph butterfly)
Ctenucha virginica (Virginian Ctenucha moth)
Scepsis fulvicollis (Yellow collared scape moth)
Apantesis spp. (Tiger moths)

HYMENOPTERA

Apis mellifera (Honey bee)

All were found to respond with characteristic reactions. In the moths, which have specialized sound-receptors, the reactions differed with frequency, higher frequencies stimulating the tympana, lower frequencies stimulating more generalized receptors.

An attempt was made to attract or repel mosquitoes (*Aedes stimulans* and *A. vexans*) by broadcasting to them recorded wing sounds of females attracted to food or being injured. No attraction or repulsion were found under field or laboratory conditions.

The reactions of a spider, probably *Araneus cavaticus*, to "pure" tones were studied. A characteristic extension of the anterior legs occurred at frequencies between 400 and 2000 cps and intensities of 80 - 125 db. Earlier workers almost all attributed reactions of web-spinning spiders to vibration of the webs. By measurements of intensity thresholds needed to induce the responses with various mutilations of the webs, it was found that resonance of the webs was not involved. Spiders were removed from the webs and either were allowed to suspend themselves from strands of silk or were fastened alive onto wax blocks and were tested with the same sounds. The thresholds were similar to those when the spiders were in the webs. Thus, the sounds were received independently of the webs. The receptors are probably generally distributed tactile receptors or proprioceptors.

The Role of Cell Deaths in Morphogenesis of the Limbs in the Chick

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The limb buds arise in the chick as flat, paddle-shaped protrusions from the body wall. By means of carbon-mapping experiments on the 3 - to

4 - day embryo, it has been shown that the prospective skeletal parts of the wing (Saunders, '48) and leg (Plouff, '51; Hampé, '56) arise in proximo - distal sequence with the future long axes in essentially their definitive orientation (i. e., femur and humerus adducted; forearm and shank flexed).

An earlier study (Saunders, '53) showed that the contours of the posterior side of the upper arm and elbow are shaped by a furrow which proceeds antero-medially from the posterior junction of wing bud and body wall. The presence of degenerating cells in this area suggested that cell deaths may be a major factor in the shaping of the limb. Accordingly, an extensive study of the spatial distribution of degenerating cells has been made in wing and leg buds of embryos of stages 22 to 32 (3½ to 8 days), employing chiefly three-dimensional glass-plate reconstructions of the limbs, and supravital straining with Nile Blue, a dye which is selectively taken up by the degenerating cells.

Study of the reconstructions and of the stained embryos discloses that the anterior and posterior contours of wing and leg buds, and to a lesser extent the dorsal and ventral sides, are carved out by a wave of cellular degeneration which passes distally along the borders of the limb. The most striking effects are noted in connection with the formation of the elbow and knee. This process is essentially complete by stage 32, or shortly thereafter, when separation of the toes is accomplished by degeneration of the intervening tissues.

These results reveal a hitherto undisclosed role of cell deaths in the morphogenesis of the limb. Furthermore, because of the favorable nature of the material, excellent opportunity is offered for the causal analysis of this phenomenon.

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Notes on the In Vitro Procedure Used For The Study of Cellular Transport Kinetics In Isolated Renal Tubules Of The Flounder, Pseudopleuronectes americanus.

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Current procedures were generally the same as those described earlier (Forster, '48, Science, 108:65) except that chlorphenol red was used instead of phenol red in control experiments. The bluish-red color of the former is more readily perceived, and its color stability within the range of pH encountered in these preparations is also a distinct advantage. Of the various fishes tested for these *in vitro* studies the readily available