

XVI. NEUROPHYSIOLOGY*

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1. The variety of inhibition between dorsal roots reported in the Journal of Neurophysiology in January 1955 met with the criticism that it was "unphysiological," that is, that it depended on synchronous volleys in channels ordinarily not excited together. The objection seems irrelevant, but it was offered by sufficiently many readers to make us feel compelled to answer it. Accordingly, we set up these stringent conditions: that the test volley be a synchronized one obtained from electrical stimulation of the dorsal root; that the conditioning stimulus be a pinch to the toes of a hind leg. It is pleasant to report that the pinched toes caused quite as good an inhibition as an electric shock to the nerve.

2. Mr. Andrew, working on the superior colliculus of the frog, has been attempting to discover which parameters of vision can be found coded in single units. The fibers of the optic nerve project to this structure in such a way that the visual field is mapped roughly along its surface. Now, single optic nerve fibers respond with bursts of impulses to the turning on or off of a light, and usually respond more violently to off. These responses are mirrored in the discharges of single cells in the colliculus after one or more relays, and serve to locate that point of the visual field most strongly connected to a particular cell. That point having been located, a light moved away from it causes discharge — toward it, causes none. This asymmetry of response to movement is extremely striking, and occurs with light intensities so small that no on-off response can be elicited at all. Furthermore, it occurs with extremely small increments of movement along a radius from that point to over half a radian away. It is impossible to say yet whether this sort of response occurs in the retina or is developed in the colliculus mechanism itself. It is of interest, since it represents the coding of a definable abstraction in the perception of movement.

3. This laboratory has cooperated with Tufts University in the examination of chemoreception in houseflies. The problem was to record the signals generated by hairs of taste without destroying the minute apparatus. Fortunately, these hairs are constructed of chitin, a reasonably good dielectric, perforated down the center by nerve fibers which communicate at one end with the tasting device at the tip of the hairs, at the other with the interior of the head of the fly. Thus, a reference electrode mounted anywhere in the head could be pitted against an electrode containing the solution to be tasted and touched to the tip of a hair. The method, devised here, worked extremely

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(XVI. NEUROPHYSIOLOGY)

well and is described in a forthcoming paper together with the results of experiments on the coding of different concentrations of sugar and salt. A high input impedance head stage has been developed to handle even more delicate systems, such as those involved in smell.

We are collating those of our circuit diagrams that we think will be useful to the rest of the physiological profession, and expect to issue them in a separate report.