agricultural science in bringing about more efficient exchange of research publications.

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AUDITORY ACTION CURRENTS

IN a recent issue of SCIENCE and in subsequent publications[1], Wever and Bray have reported that action currents which were led off from the acoustic nerve and amplified were heard in a telephone as tones of the same pitch as the stimuli, a result obviously of great importance for auditory theory. Since then Adrian, and Davis and Saul have in brief notes reported the repetition of the results, although Adrian has not agreed in attributing the currents to the auditory nerve. We, too, have repeated these experiments under conditions which Wever and Bray specify as adequate, but when certain sources of error are excluded we have obtained only negative results.

In most of our experiments we have used a 5 stage amplifier, 3 stages resistance-capacity coupled and 2 power stages, transformer coupled. Tests showed that changes 20 μ V in the input circuit could be distinctly heard in the telephone. (One should like to know whether the amplification figures given by Wever and Bray for their apparatus refer to voltage or power amplification, and whether they represent the theoretical or measured amplification.) In our experiments we have used both metal hooks and cotton thread electrodes; have led off from auditory nerve, brain stem, inner auditory meatus and round window; have connected electrodes to amplifier over transformer and at other times directly to grid and filament; have used both decerebrated and undecerebrated cats—but always with negative results.

Our experiments demonstrated, however, the possibility of certain purely physical causes for Wever and Bray's results which seem not to have been excluded by their checks. They report having set up a telephone line between operating room and observation room and that, for purposes of comparison, the sound stimuli were introduced alternately into the transmitter and into the cat's ear. If this is done, unless the transmitter circuit is definitely broken when sounds are introduced into the cat's ear, it is obvious that the currents in the transmitter circuit can induce upon the input circuit of the amplifying system, as in the familiar cross talk between telephone lines. Wever and Bray's steps to exclude induction as a source of error refer only to the induction possible between the sources of sound stimuli and the electrodes, but not to the type just mentioned. The mere provision of screening does not assure the exclusion of all electric and magnetic induction effects. Screening might in some cases favor a coupling of the telephone and amplifying systems instead of hindering it.

Nor is the possibility of such sources of error necessarily excluded by the physiological checks performed by Wever and Bray. The primary, input circuit of their amplifier consists in part of the animal tissues between the electrodes. Changes in the electrical properties of the tissues as a result of various physiological changes, such as the restriction of the blood supply, death of the animal and destructions of various sorts, would also change the receptivity of the circuit for induced currents. So, for example, if the induced currents in the input circuit fall beneath a certain minimum as a result of increased impedance of the animal tissues, then these currents can not be transmitted over the transformer for amplification, and the sound signals would no longer be heard in the telephone.

Induction effects of the sort mentioned are not dependent upon the presence of a transmitter system as used by Wever and Bray. Other electrical instruments in which the sound stimuli can occasion currents or modifications of current which can in turn induce upon the amplifying system may also cause such errors. In many commercial and house telephone systems, the receiver circuit is closed, even when the transmitter is hung up. The telephone receiver, because of the magnetic field always present, can of course act as a transmitter and produce variations of current that may induce corresponding variations in the amplifier. Similar effects might be produced even by a loud-speaker or mirror galvanometer that happened to be standing nearby.

We believe that the possibility of such sources of error must be definitely excluded before the Wever and Bray effect can be conclusively attributed to action currents of the acoustic nerve.

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[1] E. G. Wever and C. W. Bray, "The Nature of Acoustic Response," *J. Exper. Psychol.*, 13, 373–387, 1930; E. G. Wever, "Impulses from the Acoustic Nerve of the Guinea Pig, Rabbit and Rat," *Amer. J. Psychol.*, 43, 457–462, 1931; SCIENCE, 71, 215, 1930.

THALLIUM POISONING AND SOIL FERTILITY

THALLIUM sulfate has potential destructive effects on vegetation which have not received adequate attention from those advocating its use in vermin control. It probably is not the intention of the Bureau of Biological Survey and other agencies practicing vermin