authors' abstracts with all biological publications, Dr. Lamson takes up the question of obtaining the cooperation of editors of biological journals and of their contributors. At first glance it would seem that so simple and reasonable a plan would obtain the immediate support of all editors. On investigation, however, a reason, and probably the only one, for hesitation on the part of some of them becomes obvious. Many journals are dependent on their subscribers for their existence. They must, therefore, obtain as many interesting papers as they can, and some of them hesitate to make any special demands on possible contributors, that might lead the contributors to offer their papers elsewhere. This difficulty, as Dr. Lamson points out, will diminish as the requirement of authors' abstracts becomes more general with the stronger, more independent publications and as authors awaken to the reasonableness and advantage of preparing abstracts of their own papers. When the expense in cash, in wasted time, and in the duplication of researches through ignorance of what has gone before (of which there are some astounding examples) is considered, it would undoubtedly be to the economic advantage, not only of science but of the community in general, to promote the preparation of authors' abstracts by a subsidy to those journals which require them of their contributors. However, time, good sense and fair-mindedness will undoubtedly bring about the same result.

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THE DISTRIBUTION OF STATE AGRICULTURAL EXPERIMENT STATION BULLETINS TO FOREIGN COUNTRIES[1]

IT is recognized generally that the character of the work of the state agricultural experiment stations has undergone a gradual change during the past twenty-five or thirty years. In recent years a much larger proportion of the bulletins published are technical in nature. Many of them constitute distinct contributions to science and are of interest to agricultural workers throughout the world. If these bulletins are to justify the labor and expense involved in producing them they must be so distributed that they will be readily available to investigators in the field of agricultural science in all countries. A personal inspection of the libraries of a considerable number of European institutions of agricultural research led one of the writers to suspect that such adequate distribution was not being accomplished. A further investigation of the extent of the distribution of bulletins to foreign libraries was made by sending a questionnaire to fifty state agricultural experiment stations. The earlier suspicion was thoroughly confirmed. The agencies for distribution have not kept pace with the change in the nature of bulletins to be distributed. Distribution to libraries in the United States is adequate, but only a few states have built up a mailing list of foreign institutions of any appreciable size. Many of the foreign mailing lists consist largely of the names of individuals who have requested that their names be placed on the mailing list. Bulletins so distributed into the hands of individual workers doubtless serve a useful purpose, but it is obvious that the first responsibility of distribution is to see that a copy of the bulletin is deposited in the library of those institutions where agricultural research or teaching is in progress.

The task of securing adequate distribution of these bulletins need not be done entirely with altruistic motives. Many people familiar with the lavish way in which agricultural experiment station bulletins are distributed within the United States do not realize that nearly all research institutions in European countries make a charge for their publications and do not send them gratuitously, even to other institutions, unless exchange relations have been established. Most foreign institutions are glad to exchange publications with our state experiment stations, but are generally quite careful to see that a real exchange basis is reached. If our state experiment stations wish to receive the research publications of foreign institutions, it behooves them to see that these institutions receive their bulletins.

With help from various sources the writers have prepared for the Minnesota Agricultural Experiment Station a classified list of libraries of foreign agricultural institutions. Approximately eleven hundred libraries are included. About six hundred of these will receive all bulletins published by the experiment station. The remaining addresses are classified according to subject-matter interest and will receive those bulletins in which they are interested. The list is by no means perfect, but considerable time has been spent in an effort to make it complete, at the same time weeding out those institutions with only a superficial interest in agricultural research. It is realized that constant revision of such a list will be necessary if it is to function to the best advantage.

Attention is called to this list and to the present inadequate distribution of bulletins to foreign institutions in the hope that other states may take steps to secure better distribution of their bulletins. It is the opinion of the writers that some central agency, by proper cooperation with all the various state experiment stations, could render a distinct service to

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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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BERLIN, GERMANY,
OCTOBER 13, 1931

[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