

## OPEN AIR HAS BETTER ACOUSTICS THAN BEST AUDITORIUM

A speaker may be heard more clearly and accurately in the open air than in any auditorium. This conclusion, following elaborate experimentation by Dr. Vern O. Knudsen, physicist in the University of California, Southern Branch, is a contradiction of the widespread idea that a properly constructed auditorium reinforces and improves audibility. The walls of such a room may increase the general loudness of speech sounds, but the interference of reverberation more than counteracts the presumed advantage. In one test of an auditor's accuracy in understanding speech it was found that a listener 100 feet from a speaker in the open-air Hollywood Bowl made a better record than he could even in the best Los Angeles auditorium available.

More precise tests were carried on with the aid of an oscillating amplifier - the equivalent of a "howling" radio set. This device yielded a sound electrically controlled and maintained at a set value just 1000 times the amplitude of a barely audible sound. The "howl", suddenly interrupted, reverberated for five seconds in a test room with a cement floor and no furniture. When a set of meaningless speech sounds was spoken in this room, the auditor got only 50 per cent. of them correctly.

The room was now gradually padded more and more completely, as time went on, with a one-inch layer of hair-felt. Reverberation was steadily shortened. Finally with maximum padding, 92 per cent, accuracy in speech understanding was attained, while the reverberation time had shrunk to six-tenths of a second. This is considered the limit in acoustic clearness indoors; but when the experimenters moved outdoors the accuracy rose to 95.7 per cent. exceeding the best record of a padded room and much ahead of any regular auditorium. Higher accuracy than 95.7 is improbable, as the auditors make a few mistakes in any case. These occur with end consonants, especially "th" and "ng", and not with vowel sounds.

Concave sounding boards located back of a rostrum are considered by Dr. Knudson of appreciable acoustic value, but are generally architectural misfits. Auditorium walls in any common position are simply a necessary nuisance. Music halls, where clearness of speech articulation is of minor concern, are not directly considered in the work described; nor is any account taken of peculiar halls where a rear-seat auditor can hear a pin drop on the stage. Such a stunt may have no relation to the value of the auditorium for continuous speech.

The moral of all this to the architect seems to be - break the rules of scientific acoustics if you have to in order to avoid spoiling an artistic design; then spend some money on padding. In view of the expense and other disadvantages of hair-felt, the field is now open for a porous, spongy wallplaster which may absorb more of the stray sound than common hard plaster, and thus prevent reverberation.

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## TABLOID BOOK REVIEW

THE GOSPEL OF EVOLUTION. By J. Arthur Thomson. New York: G.P. Putnam's Sons. 1926

The word "Gospel", Greek scholars tell us, translates literally into the English word "news", but with the connotation that it is good news. The original doctrine of the mild and tentative Darwin was seized upon and Prussianized during the latter part of the nineteenth century by a lot of fierce North Germans, so that it is not remarkable that timid and not too well-informed souls like the late Mr. Bryan should have

become convinced that it was bad news. Much is being done now to undo the disservice of evolution's earlier camp-followers, and of the new commentators on the true gospel one of the worthiest is J. Arthur Thomson. His already well-known gifts of lucidity in popular presentation of scientific facts and genial humanism in commenting on them are sufficient bush for the wine of this now book.

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OUTLINE OF CHRISTIANITY. The Story of Our Civilization. In five volumes. Volumes 1, 2 and 3 published. New York: Dodd, Mead and Company.

This is an age of "outlines", that is of comprehensive surveys that aim to bring together the results of the highly specialized researches of previous decades in history and science. In no field is such a synthesis more needed than in religion where diversity of aspects and sectarian distinctions conceal the inner unity and course of development.

This stupendous work has been carried out under the auspices of editorial and advisory boards numbering over a hundred, and including scholars in all fields and representatives of all the branches of Christian faith. Yet the management of many minds has not resulted in nullification of opinion or tameness of style.

The narrative sticks close to the facts of history as revealed by modern scholarship, and varying views on vexed questions are presented fairly and treated tolerantly. It is informative rather than polemical, and constructive rather than critical. Its scholarly substructure is skilfully concealed, and in most of the chapters the style runs smoothly. It is handsomely illustrated. The first volume deals with the life of Christ and with his followers of the first century. The second describes the growth of the Catholic Church and its external and internal antagonists during fifteen hundred years. The third deals with the Reformation and the various denominations arising out of it. The fourth volume will discuss the relation of Christianity to science and other forms of modern thought, and the fifth will show how Christianity aims to solve the vital problems of today and tomorrow.

It is useless to say that this "Outline of Christianity" is the best book of its kind, because it is the only book of its kind. It summarizes the information that every thoughtful person needs to know, whatever may be his personal religious faith.

EDWIN E. SLOSSON

MANUAL OF INJURIOUS INSECTS. By Glenn W. Herrick. New York: Henry Holt and Company. 1926. \$4.50.

Students of agriculture and horticulture and workers in the experiment stations will find this a most useful volume to have about; it is, indeed, excellently adapted as a text for some courses. The treatment is concise and straightforward, and the illustrations accurate and very well done. In addition to the main discussion of crop and orchard pests, there are also adequate treatments of household pests, methods of insect control, and insects useful to man.

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