plained, but how did they come to their present habitat? Are we to assume that they represent a strain whose isolation dates back to glaciation, say, 10,000 years? If so, here is live material for the geneticist. Certainly a detailed study of their life history is merited.

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HEARING WITHOUT COCHLEA?

"THUS, even deaf persons whose eardrums no longer function properly, *but whose nerve centers are intact,* can hear radio."

By the distressed mother of a deafened child my attention was called to the above quotation from an article by Dr. Gustav Eichhorn in *Radio-Craft,* January, 1930, p. 330. "Thus" there means by the use of a patented device being essentially a membrane with one metal surface and one dielectric surface, which is held with its dielectric side close to the head. A telephone current passes to the metallized side of the membrane as to one condenser plate and to the human body (at any point) as if the body were the other condenser plate. The mother wanted to give her child this aid in hearing. There are many mothers like her.

The same matter is also described by the same author in the German periodical *Funk,* July 12, 1929, and still earlier in Jahrbuch f. drahtlose T. u. T., January, 1929. Since the eardrum, mentioned by the author, is no essential part of the auditory organ, I corresponded with him in order to know why he mentioned as the *exclusive* condition that "the nerve centers be intact." He was kind enough to reply that he had no definite opinion. Such a frequency of muscle function (6,000 and more per second) acting on the cochlea seemed to me unbelievable, and I felt inclined, therefore, to assume that we had here indeed a case of direct stimulation of the auditory nerve, especially since the author speaks of auditory perception of modulated currents by "Gehörlose," that is, the absolutely deaf. Those who can hear their muscle contractions are of course not Gehörlose.

If the auditory nerve could be used directly for hearing, that is, without the necessity of a mechanical function of the cochlea, this would be of tremendous importance for all those deaf people whose cochlea might be destroyed, but whose auditory nerve might be essentially intact. Dr. Eichhorn's description seemed to hint in this direction when it said that the electrical contact had to be made "gegen das Ohr oder an anderen Partien des Kopfes in der Nähe des akustischen Gehörzentrums," that is, "on the head in the neighborhood of the auditory braincenter."

I could not induce the author to send me one of his patented membranous devices. So I decided to experiment as well as I could. I used as source partly an oscillating electric system furnishing frequencies continuously between 50 and 20,000; partly amplified pick-ups of constant pitch phonograph tones of various frequencies. I removed the loud speaker, took one of the metal wires firmly in one hand, grasped the other wire end by its insulation and with its metal touched myself within the auditory meatus or behind the auricle; and to my astonishment in either case I heard faintly but clearly the very tone a moment ago produced acoustically by the loud speaker. After some experimentation I learned how to train others, many others, to perform the experiment with equal success, so that all possibility of "mere imagination" was excluded. It seemed to be true, then, that a new era of hope for the deaf had arrived, that the auditory nerve could be directly stimulated electrically and in agreement with the electrical frequency.

But after still more prolonged experimentation I now reject that hopeful conclusion. I shall mention three reasons why we must conclude that the hearing in question is due neither to direct action on the nerve nor to muscle contractions, but simply to a vibration of the horny skin surface caused by its electrostatic charge.

First, one does not hear anything when one touches the head with the wire end firmly. That is, there must be no electric conduction between the metal and the head. Nevertheless the metal must be held *close* to the skin for the sake of the electrostatic effect. This condition is realized by *gently rubbing* the wire over the skin, because then there is no real electric contact. As soon as one ceases to move the wire over the skin, the tone is gone, although that condition ought to be best for stimulating the nerve. I first thought that one might have to distinguish between an electrostatic and an electrokinetic stimulation of the nerve. But what would be the real difference?

Second, one hears more often the higher octave (that is, double frequency) than the actual cycle frequency. This is exactly what one should expect if the skin, statically charged by the neighboring wire end, is attracted and repulsed by the charge of the latter. A slight stretching of the skin is naturally advantageous.

Third, I succeeded in hearing the same tone when I rubbed the wire end gently over the slightly stretched skin of my wrist, holding the latter near enough, but not touching, one of my ears, nor touching any point of my head. The circuit then goes from one hand to the other hand by way of shoulder to shoulder. But there is no auditory nerve center

between the shoulders. Should one for an explanation fall back upon the distributed capacity of the whole body of which the nerve center is of course a part? This explanation is unlikely.

Thus the curious phenomenon of listening to the telephone wires without the telephone receiver resolves itself into nothing but a method of using the slightly stretched horny skin as an unusual kind of telephone receiver, an electrostatic receiver, a condenser receiver. One condenser plate is the skin, the other the wire end or still better wire loop; and the two acoustically vibrate toward each other. The cochlea still seems to be requisite for hearing. It's a pity so far as hope for the deaf is in question.

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COCCIDIOIDAL GRANULOMA

COCCIDIOIDAL granuloma is a disease of man and beast caused by Coccidioides immitis (Oidium coccidioides). The lesions may be in the skin, lungs and bones, and consist of granulomas and cold abscesses. The skin lesions are characterized by nodules and papulo-pustular eruptions. At times the lesion may resemble cutaneous tuberculosis; at other times syphilis or blastomycosis. The diagnosis is made by demonstration of the double contoured, endosporulating cells in the pus from the lesion, or in the stained sections of the tissue excised for this purpose. This should be further confirmed by cultural methods and by guinea-pig inoculation.

Cummins, Smith and Halliday,[1] in an epidemiologic survey of coccidioidal disease, collected 182 cases, the majority of which originated in California. East of the Mississippi River one case was collected from each of the following states: Illinois, South Carolina and Pennsylvania.

Recently the writer found this malady in a Negro, aged 36, a plasterer, with lesions on the right forearm and the right anal fold. This case originated, probably, in Tennessee.

It is probable that coccidioidal granuloma is widespread in this country.

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QUOTATIONS

BRITISH OPTICAL INSTRUMENTS

AN encouraging account of progress in the British optical instrument industry during the last five years is given in a memorandum prepared by the council of the British Optical Instrument Manufacturers' Association.

In the essential quality of transparency, British optical glass has always been superior to any made abroad. This superiority, it is stated, has been further increased in the last few years. Between 1885 and 1914 great advances were made in Germany in the production of glasses with new optical qualities, but the British remained superior in the manufacture of the finest quality of glass in large-sized disks, which present the greatest difficulty in manufacture. The Germans were pre-eminent only in the mass production of the smaller sizes, and in a larger range of kinds of glass. By 1928 the British manufacturers had extended their range of glasses, and in consequence of further advances since every durable and trustworthy kind of glass can now be obtained here. At the same time the ability to produce the very largest disks has been retained and even increased. Before the war the supply of spectacle lenses throughout the British Empire markets had very largely fallen into American hands. In recording gratifying advances in this field, the memorandum notes that of one particular make of spectacles developed and patented in this country 80 per cent. of the total production goes to the United States.

The memorandum states that the majority of cinema films, even in the United States, are made with lenses of British design made in Great Britain, and are also projected on the screen through British lenses. A range of instruments invented, patented, and made in this country was installed some years ago at the National Physical Laboratory for the testing of every kind of optical instrument, making it possible to state the results in numerical terms. Such tests, the memorandum points out, have established the superiority of the best British photographic lenses over the best made anywhere else. Part of this superiority is attributed to the new apparatus for testing. The two foremost manufacturers of photographic lenses in the United States and Germany, respectively, have recently purchased from the British inventor the right of using these test methods. Of prism binoculars it is reported that two of the highest class have been put on the market by a British manufacturer.

In the class of special surveying instruments, such as those used in the erection and maintenance of bridges, an instrument designed and made in Great Britain received, three years ago, the first prize offered by the German State Railways in a competition for

[1] W. T. Cummins, J. K. Smith, and C. H. Halliday, *Jour. Am. Med. Ass.*, 93: 1046, 1929.