

tympani. In passing along the canalis centralis cochleæ, the sound wave excites, through the organ of Corti, a nervous impulse in the auditory nerve, by which it is transmitted to the cerebrum in the first temporal convolution of which is the *auditory centre*.

Such is, briefly, the means by which auditory sensations are excited, the physical agent inducing them being simply the increase and diminution of pressure characteristic of the waves of sound.

The functions of each part of the auditory apparatus require to be considered *seriatim*.

The *external ear* serves to collect and conduct the sound waves to the membrana tympani. In the lower animals the pinna is so shaped as to collect the sonorous vibrations, but in man its shape and folds are but rudimentary, and it so little serves its purpose that its loss is unattended with inconvenience.

The *membrana tympani*, unlike ordinary stretched membranes, is capable of vibrating equally to all sounds; indeed, the range of tones to which it can vibrate passes through seven octaves.

The *ossicles* communicate the vibrations from the membrane to the labyrinth, and also act as dampers to the membrane. Their axis of rotation is an antero-posterior line passing between the attachment of the malleus by its anterior ligament to the attachment of the incus by its short process posteriorly. The ossicles vibrate as one, the articulations supplying "give" and tending to prevent fractures.

By the ossicular oscillations the amplitude of movement of the tympanic membrane is reduced two-thirds.

The intra-tympanic muscles act as follows:—

The *Tensor Tympani* increases the tension of the membrane, thereby possibly accommodating it to differences of pitch.

The *Stapedius* tilts the stapes backwards. Its influence upon sound transmission is not at present understood.

*Rumbold's Theory*.—Rumbold, of St. Louis, believes that the function of the intratympanic muscles is to "select and amplify such sounds as the listener desires to hear most distinctly," just as the ciliary muscle similarly accommodates in vision.

By the *Eustachian Tube* the balance of atmospheric pressure upon both sides of the drum-head is kept up. It is not continuously patent, but is opened during the act of swallowing.

#### NERVE FORCE.

Dr. J. Emmet O'Brien, in the *Pennsylvania Medical Journal*, traces some analogies between nervous and electrical mechanism. He says that nerves are constructed like electric cables, and are insulated, distributed and arranged like fine electric conductors.

Their purpose and use are the same as the purpose and use of electric conductors, namely, communication from point to point.

They convey some form of force.

It is probably electricity—

Because electricity is always present when they act.

Because electricity is the form of force that would do the work required.

Because it is the form of force that would work with such construction.

Because the terminal and central mechanisms connected with the nerves correspond to the terminal and central mechanisms connected with electric system of communication, and do similar work in sending, receiving, relaying, switching, transforming, accumulating, retarding, discharging, concentrating, distributing and translating impressions.

Finally, because electricity is the only form of force that we know of that would do all the work required with such construction of conductors, and of terminal mechanisms.

He, therefore, concludes that nerve force is electricity; that it is produced in the nervous system by chemical processes analogous to those which produce heat in the general tissues, *i.e.*, oxidation.

#### THE BACTERIOLOGY OF INFLUENZA.

The *Bacillus influenza*, discovered by Pfeiffer in 1892, appears as an extremely small, slender, non-motile bacillus, whose length scarcely exceeds its breadth by two or three times. The bacilli may be stained by any of the basic aniline dyes, which they take up rather feebly and irregularly; the poles are usually more deeply coloured than the middle parts, often giving the appearance of diplococci. Outside the body it is very susceptible to injurious influences, and, from many observations, it has been generally assumed that the extra-corporeal existence of the influenza bacillus must be very short, and that infection probably takes place by means of the freshly contaminated secretions. Within certain limits an early diagnosis may often be made by a mere microscopical examination without resorting to cultures.

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