a great deal more attention; they should be sorted out and sifted out from other cases. When you eliminate all the cases that can be classed as influenza, or that depend upon an exanthem or pneumonia, the remainder of cases of acute rhinitis are probably of infectious origin. All those things have a direct influence on the ear. If that part of the nasopharynx to which the Eustachian-tube leads is involved, and the lumen of the tube is partially or entirely closed the ears suffer, or the secretion from the nose or naso-pharynx may be carried to the middle ear by forcible blowing, or the ears may be infected by the extension of the inflammation by continuity of tissue. These patients would probably get well if it were not for more or less constant reinfection.

DR. F. J. QUINLAN, New York City.—The question of prophylaxis of disease is one we should always consider. Many colds depend upon bodily fatigue and faulty assimilation. A man is exposed to some influence of cold and receives the germs of disease. The phagocytic action of the leucocytes is insufficient and the germs enter into the system rapidly. There is lymphatic stasis and there is no better or more accessible vestibule for the invasion of germs than the nose, which is constantly connected with the outside atmosphere. Therefore, if a man's system is lowered, the turbinates at once become congested and unable to empty themselves. The question of prophylaxis is largely in the individual. A celebrated pediatrician a few years ago tried to eliminate postnasal growths by dropping salt water through the nares, and someone told him that he would do much more good if he gave the child full length baths of salt water. Often the system is loaded down with non-assimilated products. The subjects of the papers are not properly emphasized. Water applied to the skin causes the greatest tonic effect in its vivifying influence. The rich can use it, but the poor are deprived of its use and hence we see the greatest number of these cases among the poor. We should let the people know of the good effects of water used both inside and out. The Doctor has spoken of clothing, but I think the question of beef is most important. These colds and conditions of congestion weaken the individual and start a train of ills that involves the nose and throat and every part of the mucous membrane.

DR. S. F. SNOW, Syracuse, N. Y.—I will answer Dr. Cobb's question as to whether I include the cases with fixation of the stapes. I do not. But how many do we have come to us that are or really get in that condition later on? Cases of fixation of the stapes do occur, but I doubt whether they occur often enough to warrant us in giving an unfavorable prognosis by the wholesale. One of the gentlemen has disagreed with me as to the advisability of such frequent local treatments. I wish to place myself before this Section, and the world if necessary, as willing to stand by the position I have taken. There are cases in which daily application might be harmful, for they are not yet in that improved physical state where local ear treatments can be effectively employed. But if we get other things out of the way, and secure a functional equilibrium so that the skin reaction is good, the liver normal, and if they are careful of their habits, we will find a time when they will tolerate the vapors and improve very markedly under their use. The more chronic the case the more often we have to treat them. I do not advocate treating these cases daily year after year, but very often I do for three consecutive months, the treatment to be repeated when unfavorable symptoms appear. As regards tests, my patients are rarely tested, except at the end of a course of treatments. I assure them first that we must clear out the nasal passage, and I accomplish that whether it takes one month or two or three. I do not encourage them to have the vapor used until they have had bad constitutional states corrected. I will not let them have treatment until they are ready for it. When the constitution is fit and they are willing to follow my directions, I am ready to treat them, and successfully. I am glad the paper has been so thoroughly discussed, and I can not convey the depth of my feeling regarding the importance of these cases. We must, as aurists, do something for them.

DIAGNOSIS AND PROGNOSIS OF EAR DISEASE.*

B. ALEX. RANDALL, M.A., M.D.,
PHILADELPHIA.

It is probable that most medical men, if asked as to the instrumental aids to the diagnosis of ear diseases, would think first and perhaps only of a speculum. Too many would try to excuse their failure to study a case by their lack of such an instrument; and yet many would undertake its treatment upon some fancied basis without knowing anything as to what was really before them or having the means and skill to treat it if they knew. The foundation of such foolhardiness is a total ignorance of the methods of aural diagnosis and skepticism as to the ability of any one to do more than guess in the matter. Yet it is axiomatic that diagnosis is essential to prognosis and both of these are requisites for any rational treatment. Even among men practiced in otological matters there is a woful failure to understand and employ diagnostic measures, with many consequent mistakes and much futile if not harmful work. Hence the need of discussing so trite and elementary a phase of our specialty as that which I have chosen.

To the patient, if not to the surgeon, prognosis is of vital importance. Upon the etiology and pathology of the various affections must depend the questions as to the urgency and the promise of treatment; and of these we can speak only from the standpoint of correct recognition of the nature, phase and complications presented in the case before us. So the life-history of disease, general and special, must be known to the specialist, as well as the details of the clinical picture met, and he must figuratively see through the ear if he is to make a good application of his special knowledge and skill.

Almost every diagnosis is based, here as elsewhere, upon the anatomy and physiology of the parts. Leaving aside the former subject, I will ask you to consider here only some of the physiological aspects which we ought to study as to the normal and diseased ear. We may premise that for the external ear sight and touch are principally available; for the middle ear with its air cavities, pneumatic measures; and for the internal ear, acoustic means.

It seems superfluous to insist upon the importance of unaided as well as aided sight and touch in our study, yet the numberless instances where their use has been neglected and gross blunders of diagnosis made because the practitioner refused to use his senses and yet undertook treatment on the strength of his imagination, compels reiteration of this trite matter. Many cases can be studied by the natural light falling past the examiner's head into the straightened ear-canal, to the recognition of furuncles, foreign bodies or the presence of a normal drumhead. Remember that Wilde did most of his work with nothing but a speculum, and often did not need that; yet many a modern aurist with a full armamentarium could learn much from Wilde's writings. Specula can be improvised of letter-paper or other material; any piece of mirror can be brought into use, especially with sunlight or other strong illumination, and a hair-pin or other bit of wire can be made into an admirable probe; but it is the eye and hand behind these or other instrumental aids which are the real means of diagnosis, and "special" training is by no means essential if a true physician, with gentle hand

* Presented to the Section on Laryngology and Otology, at the Fifty-first Annual Meeting of the American Medical Association, held at Atlantic City, N. J., June 5-8, 1900.

and observing eye, undertakes these studies. Even in palpation there are many ways of failing to learn. A swollen mastoid may seem tender and fluctuating to a careless hand, and a trephining be advised when carefully placed index fingers would prove the swelling a mere edema and the pain not due to deep bone-lesion, but to the motion imparted to an inflamed canal. One may recognize blindfolded the indurated rigidity of an eczematous canal in which a keen eye may discern no surface signs of the affection, and by proper prognosis avoid imminent distress for the patient and humiliation of himself. Touch must aid sight in many tympanic conditions before we can know what are the real features of the picture presented, by sweeping away the seeming landmarks and proving them to be but pus, epithelium or other foreign matters lying in front of the real structures.

Yet even when the diagnosis thus made is clear and positive it may be only superficial and partial. The manifest lesion may conceal something beneath which is far more important. A trivial furuncle of the canal may mask a serious tympanic inflammation and we must often remain in doubt as to the conditions beyond. Here the pneumatic methods of tympanic study may aid us greatly, but still oftener the acoustic measures which investigate the percipient apparatus and its adnexa.

Of inflation measures and pneumatic massage much might here be said, for more can be done with these and more mistakes avoided than is at all sufficiently realized. I feel need of calling attention to Löwenberg's simple test of inflating chloroform vapor, which by feeling cold to a sclerotic ear, instead of hot as to all others, may give us early a very important prognostic sign. Yet the acoustic tests are still less fairly understood and practiced, and it is upon these I would prefer to lay my main stress.

Almost every expert is on record as to the small value of the watch as a test, and Politzer's acoumeter, although well conceived, has not much better met the requirements. Still less have some of the haphazard substitutes which have been put forward for railway and school tests any claim to be accepted as having standard or comparable value.

The voice-tests in faint and loud whisper, spoken with the "reserve air" which can be forced out after ordinary tidal respiration and calling for repetition by the patient of the well-chosen test-words, are far more precise as well as practical. But all these are quantitative rather than qualitative measurements of loss, not helps to recovery. We must have a "tone series," in form permitting comparison of conduction by bone and by air, before we can learn some of the most elementary and fundamental data.

It may be too much to expect that the general practitioner should in preparation for his few ear-cases equip himself with a series of tuning-forks, and even the specialist must draw the line at some of the numberless implements urged by enthusiast or instrument-maker upon his attention, yet lack of a well-selected complement must seriously impede if it does not vitiate his diagnostic work.

When we hear a man say that he puts little confidence in the results of the tuning-fork, we may be fairly sure that he has but a single fork and makes poor use of that. One fork is competent to give us but a part of the information needed in many cases, although it can be very valuable within its field, and I would place a fork of some 200 double vibrations per second as the first

choice in the series (A-213). It should be of a good size, so as to have 80 to 100 seconds' duration of sounding after a moderate blow, such as that of falling its own height upon the knee or a rubber block, but some of those offered are far too heavy and, with their clamps, needlessly expensive. Some means of suppressing the over-tones is requisite, but a bit of rubber-tubing drawn over the ends is at times better than the clamps. A fork of some 500 vibrations (c-512) is more generally recommended and can be purchased for 25 cents, in small size, at most music stores. Another of two or three octaves higher pitch, 2-4000, has occasional usefulness, but one two octaves lower than our first choice is much more valuable (A-53). The octave below this is of doubtful audibility, while this tone ought to be heard by any normal ear, and it is so early lost in cases of obstructive lesion that it forms almost a premonitory indication of commencing catarrhal deafness. The higher tones already mentioned better serve to test the percipient apparatus, but are surpassed in this by the

THE GALTON WHISTLE.
APPROXIMATE PITCH IN DOUBLE
VIBRATIONS PER SECOND.

5=	52,000
10=	40,000
12=	35,000
18=	30,000
21=	25,000
24=	20,000
28=	15,000
35=	12,000
48=	10,000
60=	7,000
70=	6,000
84=	5,000
105=	4,000

Galton whistle or the König rods with their far higher range. A cheap and handy substitute, of real though of limited value, is furnished by the little bent-wire "serpentine screwdriver" sold in most of the bicycle stores, all of those tested having had tone of fair purity of about 35,000 double vibrations per second.

The Galton whistle, however, is of wider value as originally made, and may be more precise yet in König's and Edelmann's improved forms. I must warn, however, against most of those offered for sale, since they are generally travesties upon Galton's instrument, and of no more value than a boy's willow whistle. Even some coming from Meyer & Meltzer, in London, have not conformed to the original apparatus, and I know of but one maker in Philadelphia and perhaps one in Boston from whom standard whistles have been obtained. The square-cut opening, the proper caliber of the tube, correct pitch of the screw, and accurate zero-point are one or all absent in many of the alleged Galton whistles offered; yet all of these characteristics must be demanded if any standard is to be maintained. Some of the published results from tests are to me inexplicable, if genu-

ine Galton whistles were employed, so utterly discrepant are they with my findings. A tube length of 10 mm. ought to give a note of about 21,000 double vibrations per second, and one of 1 mm., corresponding to one full turn of my instrument, a tone of 42,000. A higher note than this is audible to most of my patients as well as to myself, and I would set the normal limit for young ears above 50,000, as I have no difficulty in hearing Appun's 49,000 fork or the Galton whistle at less than one turn.

Qualitatively, then, we ought to determine for all our cases whether they hear tones as low as 50 and as high as 40,000, and between these moderate limits make fuller test with two or more forks, while in those giving evidence of nerve lesion a wide range should be tested by the whole scale of the Galton (4000 to 40,000) and a number of lower tones.

In addition to these studies of the hearing by air-conduction, we need direct and comparative tests of the bone-conduction, remembering that there is a senile loss of the conducting power of the cranial bones aside wholly from faulty perceptions, and that the palpable vibrations which are as notable on the patella as on the mastoid, must not be confounded with the audible. Weber's test of the lateralization of the vibration to one ear from the middle line of the head had better be preceded by Rinne's test, since it is hard for many patients to believe their own senses when the tone seems louder in the worse ear, which they have perhaps long regarded as totally deaf. While the Schwabach method of timing the duration of the tone by air and by bone is eminently valuable, the simplification made by Roosa and Emerson is even more practical, consuming less time and securing better responses from most patients. If the fork, not too strongly vibrating, is held close before the ear and then its handle rested upon the mastoid, with the question, "Is it better front or back—back or front?" suiting the action to the word, few have difficulty in answering correctly; and as the loudness and the duration are comparable, we learn whether the normal preponderance of air-conduction exists or not, and can easily move the fork to our own ears for quantitative comparison. As the ordinary A fork (213) should be heard on moderate stroke only about 45 seconds by bone, as against 100 by air, the preponderance, as often found in tympanic cases, marks a decided impediment to the due penetration of the aural sound-waves through the affected conducting apparatus. It is easily demonstrated that this same obstacle shuts in, so that the fork vibrating upon the head is heard louder and longer than normal—perhaps for 50 or 55 seconds. This is best shown by the simple test of Gardiner Brown, which consists in holding the handle of the slightly vibrating fork upon the bridge of the nose and noting how much greater or less time the patient can hear it than the examiner's fingers can feel the vibrations. Cessation should seem simultaneous to each, and in spite of personal equations one second of discrepancy can generally be noted by this means, and secondary involvement of the percipient apparatus thus detected. The Weber test then used, by resting the vibrating tuning-fork, not on one, but a series of points in the middle line of the head, will generally obtain a correct answer and be lateralized to the worse ear in obstructive, to the better ear in perceptive, lesions. Results which are doubtful with a fork of 200 or of 500 vibrations per second, will often be unmistakable if those of higher or lower tones are employed, and due care be exercised to set aside any preconceptions

of the patient and to elicit answers not as to what they *think* but as to what they *hear*.

Far too little employed is the valuable test of Politzer as to the permeability of the Eustachian tubes in the act of swallowing, for the tuning-fork vibrating before the nostrils should be heard much louder at the moment that the tube opens in deglutition. This tells of its physiological action as contrasted with its more passive distensibility on inflation, gives clear contrast as to the two ears and often tells more as to the stage and prognosis than any other test at our command. Bing's test also proves at times valuable, in that the tuning-fork vibrating on the mastoid can be made again audible after it had ceased to be heard, by stopping the canal with a finger; and as this secondary perception should have a measurable length in cases of nerve-lesion we may recognize the coexistence of slight conduction impediment by its subnormal duration.

While the complaint of the patient and some of the details of his history should always form a part of our record, more valuable facts of the history will often be gained by our objective study and due correction made in his statements.

The objective findings should then be noted as to hearing for conversational or whispered speech; for the 50, the 200, the 500 and the 2000 v. s. tuning-forks and the Galton whistle by air, and for the 200 fork by bone-conduction from the mastoid and from the nose; for the Politzer's test of Eustachian patulency and for the lateralization from the middle line. Add the findings of the otoscopic examination, of anterior and posterior rhinoscopy and the response to inflation and pneumatic massage. These, added to the name, age and occupation, form a record concise, quickly obtained and pregnant with meaning for correct diagnosis and prognosis.

DISCUSSION.

DR. J. HOLINGER, Chicago.—The Doctor showed us his series of tuning screw-drivers. They are undoubtedly irregular in their intervals and the time they keep on ringing is too short. To overcome these two cardinal points was the effort of Bezold and Edelmann for over ten years. Why did he not use those beautiful sets of tuning-forks of Bezold-Edelmann? They contain from sixteen vibrations up to the highest, without interruption. The number of vibrations is given on each tuning-fork. They are mathematically correct. It would be impossible to compare the Doctor's records of cases with the sounding screw-drivers with the records obtained by anyone else. Then as to the square opening in the Galton whistle, it has long been proven irrational and the oval opening has been found much more sharp in its results. Edelmann had to provide for an opening that could be made smaller or larger. If the opening is unchangeable the oval opening is preferable, and its results are not worse, as I can prove with Koenig-Schwendt's dust-figures.

DR. EDWIN PYNCHON, Chicago.—The paper has been very instructive. Two months ago I heard a similar one read before the Western Otolaryngologic Society, at St. Louis, and I then called attention to a little procedure which has been of assistance to me when the patient is in doubt about the Weber test. Supposing the left ear is affected and the patient claims to hear the test best with the right ear. I then stop up first the right ear and then the left, repeating the test. Afterwards, without stopping either ear, I again place the tuning-fork upon the top of the head, when the patient correctly tells in which ear the test is best heard.

DR. E. AMBERG, Detroit, Mich.—We know that Politzer's instruments are in general use, but I have heard on good authority that they do not compare accurately one with another. I thought I could overcome this difficulty by having an apparatus constructed on a different principle. There came to my mind the apparatus which is used for the measurement of the depth of sleep in the psychophysical laboratory. I had such an apparatus constructed in Berlin, and I think that these instruments may compare more favorably one with another. However, I do not know whether those fine points are of such

great value in our daily work. At any rate, we should make it a matter of principle to try to be as exact and correct as we can. Therefore, I would take exception, at least for the use of the specialist, to this little instrument which is intended to replace a tuning-fork, shown to-day. Professor Loeb, in a conversation, if my memory serves me right, told me that experiments had been carried out under his direction, years ago, with the aid of an instrument similar to the one I have mentioned. If I am not mistaken, the experiments to which Professor Loeb referred were intended to establish facts as to the acuteness of hearing under various conditions. It is important, I think, to consider conditions under which hearing tests are made. I remember that one time when I had overworked myself I thought I heard the clock at 11 p.m. strike twenty-seven times. It was, if I remember correctly, after I was fatigued through study. The time of the day and the other conditions of the patient, I think, should be taken into consideration when a hearing test is made.

DR. B. A. RANDALL, Philadelphia—I have the Edelmann tuning-forks and they are very nice, very useful and pretty, and as specious as any that are made, for, like the Politzer acoumeter, they are apt to differ in tone and loudness and other essentials, so that in a dozen you could hardly find two that do not differ. I have not tried to split hairs, but only to get at the diagnostic points that are of value in treatment. So I have not tried to lay down just what should be the precise limits as to time and distance that the fork should be heard. As to the Galton whistle, I have brought that forward because the prime essential lies in the fact that we are dealing with a closed pipe and must have a definite length and that length can not be defined if the opening is not rectilinear. Edelmann's new whistle may be as specious in many respects as the set of rods I have, which he said he had made for Koenig's rods; but they were inaccurate, arbitrarily numbered and what they stood for he could not tell. I have much respect for the good work done on the other side of the water, but the very bad work I have seen emanating from Edelmann and other men has made me favor the work done on this side of the Atlantic.

EFFECT OF ALCOHOL ON THE NERVOUS SYSTEM, THE MIND AND HEREDITY.*

ALBERT E. STERNE, A.M., M.D.

Professor of Nervous and Mental Diseases, College of Physicians and Surgeons; Neurologist to the City Hospital, Etc.

INDIANAPOLIS, IND.

Alcohol has a twofold effect on the nervous system, a direct or primary, and an indirect or secondary. Either of these may act physiologically, i. e., functionally, or pathologically, i. e., structurally. Either may and does unfold its force upon every part of the nervous system, brain, cord, and peripheral nerves; in fact on every organ and tissue of the body, notably upon the blood-vessels, particularly of the brain, the kidneys and the liver. The subject is too large to render justice to it within the limits of a paper like this, and I shall, therefore, be forced to confine my remarks to a narrow domain.

Upon the nerve tissues alcohol has an acute influence. This can best be studied by experiments on animals, and by the effects shown in fatal poisoning with large amounts of alcohol in persons unused to its influence. Of the ordinary state of acute intoxication, I need not speak. That picture is familiar to all of us.

In a very able paper, Dehio,¹ some years ago, demonstrated changes in the ganglion cells of the cerebellum produced by acute alcohol poisoning. A year later, Stewart² confirmed and extended the observations of Dehio, which consisted in the diminution of the chromo-

phile granules of the nerve cells of the cerebral cortex, the Purkinje cells of the cerebellum, and the large multipolar cells of the spinal gray matter. The importance of these changes is vastly increased in the light of the theory that the ganglionic cells possess certain powers of mobility of an ameboid nature, which permits them to extend and to retract their cell-prolongation to a slight degree, producing normally a contiguity of structure *without* continuity. I believe in this theory, for it is the only one which explains to me the phenomena of life, both in rest and in activity. Into that, however, I can not enter further at present.

I have in mind a unique, unpublished case which may bear a close relation to the observations of Dehio and Stewart. It is that of a young man who, about one year ago, was referred to me. The patient presented a most curious complex of symptoms, which I have nowhere found described, and which I herewith take the opportunity to record.

F. W., white, a farmer, aged 19 years, had up to about seven months previous to my seeing him been quite well, and constantly engaged at work on his father's farm. During a period of perhaps a year before any symptoms had become manifest he had been drinking somewhat, but had never indulged to intoxication. Gradually a general lack of nutrition set in, he began to lose weight and strength, and almost imperceptibly, at first, peculiar spasmodic seizures supervened. These attacks were wholly motor in character, occurring, as the malady developed, more and more frequently until, when he came to my sanatorium, they were almost constant, recurring at the actual rate of about once every two minutes, day and night. During the entire period of the affection the appetite was excellent, no symptoms were shown by any of the internal organs, no sensory changes were manifest, nor were the secretions altered, save that the urine was somewhat scant and perspiration slight. In fact, all symptoms related to the motor nerve sphere, though at no time was there the slightest degree of paralysis noted. The seizures were characterized as follows:

Every few moments the muscles became tense and rigid, apparently all over the body—trunk and limbs—face neck, eyes, tongue, larynx, esophagus, etc. During the attack, he could usually make voluntary movements, but he could walk, talk, breathe and swallow with difficulty. The facial muscles and masticatory muscles became "set" and the neck stiff. There never was any inclination to opisthotonus, nor the slightest loss of consciousness. No vasomotor signs were present, the cutaneous and pupillary reflexes were normal, but the deep tendon reflexes were somewhat increased. He suffered no pain whatever, but some muscular soreness existed, doubtless due to the muscular contractions.

At the first examination, I declined to give a positive opinion of his case, but expressed the conviction that the malady would not remain stationary, that it would either prove rapidly fatal, or he would recover under proper treatment within a few weeks, advising careful observation and treatment at the sanatorium. At that time I felt sure I could bar out an hysterical affection of which no symptom was shown. My advice was followed, and the patient remained under my immediate care for nine weeks. During this period he steadily improved under static electricity, massage and the use of tincture of gelsemium, ten drops thrice daily, until complete recovery occurred. The seizures gradually decreased in frequency and intensity until they ceased altogether. I would perhaps not have mentioned this

* Presented to the Section on Nervous and Mental Diseases, at the Fifty-first Annual Meeting of the American Medical Association, held at Atlantic City, N. J., June 5-8, 1900.

1. Heinrich Dehio: Experimentelle Untersuchungen über die Veränderungen der Ganglienzellen bei der acuten Alkoholvergiftung; *Centralbl. f. Nervenhelkunde und Psychiatrie*, 1895, N. F. 6-113.

2. Colin C. Stewart: Influence of Acute Alcohol Poisoning on Nerve Cells; *Jour. of Experimental Medicine*, vol. i, 1896, p. 623.