conduction, and the acoumeter was heard at 5 inches. Since then he has shown no advance and has discontinued treatment, which consisted in the main of catheterization and probe massage of the short process of the hammer.

The *Index Medicus* furnishes one case of iodism of the middle ear. It was published in an East Indian journal. The aural symptoms followed small doses of the drug and consisted of conduction deafness. The tympanum was filled with exudate and incision of the drum head resulted in a gradual recovery which, unlike my case, was perfect. The defective resolution in the case I report has, no doubt, resulted from the organization of an exudate in the fossula ovalis—a point of selection which is prognostically unfortunate and not uncommon.

This case, rare as it may be, should sound a warning against the reckless administration of iodid of potash. While its benefits elsewhere may not be decried, it is too often prescribed in aural disease from an *ipse dixit* reason rather than from the results of personal experience. I confess to very little gain from its use in aural affections. The tertiary manifestations of syphilis are more apt to come under our aspect and iodid of potash is prescribed because it is *secundum artem*. The discouraging results of its administration should make us all the more careful, since an idiosyncrasy on the part of the patient is hard to predetermine. The history of iodism shows us that the untoward effects are more apt to appear in nephritics and in the two extremes of age, and the size of the provocative dose is generally small. Finger has pointed out that, experimentally, potassium iodid produces dilatation of the cerebral vessels with retardation of the circulation, and it should be given carefully, therefore, in intracranial lesions. Paralysis and retinal hemorrhage have followed its use.

RHEUMATIC (?) OTALGIA—SALICYLATE OF SODA. EAR.

History.—A young woman, aged 17, was referred to me on account of a pain in the right ear. The pain was not constant, but was occasionally severe. It seemed to be more often present toward night. At the same time she complained of pain in the metatarso-phalangeal joint of the big toe. On examination, the pain was referred to the interior of the ear and did not radiate. The canal, drum, temporomaxillary joint and audition were normal. The teeth had been examined by a good dentist. The family practitioner prescribed salicylate of soda for the joint affection, which disappeared with the aural pain after a few days.

The connection of the two pains is purely conjectural, yet the case admits of a speculative opinion as to the value of salicylate of soda in aural pain in persons of the rheumatic dyscrasia. The action of salicylate of soda in deep-seated affections of the eye is a fitting analogue. Whether it is simply by reason of its action on the circulation or by its specific power, further experience may demonstrate.

ERGOT IN AURAL FIBROSIS.

History.—Mr. E., aged 36, a musician, presented himself on March 17, 1906, with the following history: During the previous summer, while abroad, he contracted pleurisy. He recovered very slowly, and began to suffer from a chronic nasopharyngitis. His hearing, very acute and trained by his musical profession, began to depreciate rather suddenly in the right ear; the left was unimpaired. He was much annoyed by a diplacusis. He immediately consulted a prominent aurist, who diagnosed his trouble as tubal stenosis. He received every possible form of treatment, catheterization, massage, bougieing, etc. The nasal stenosis was relieved, but his ear did not show any improvement in function.

Examination.—When I examined him both drumheads showed marked retraction. The right was decidedly sclerotic. He heard the acoumeter on the right side at 3 inches. There was some mucus in the right tube. Inflation did not augment the hearing. The tuning forks were not heard by air conduction. All except C⁴ were heard by bone conduction.

Treatment and Subsequent History.—On April 11, the tube was patent and free. The reaction to the forks was practically the same. The acoumeter was heard up to 4 inches. He was taught to catheterize his ear and on account of the catarrhal condition, which persisted, he was advised to go to the mountains of North Carolina. He came back with the ear trouble unchanged, but with his catarrh and general condition somewhat better. Shortly after his return he began to have symptoms in the left ear similar to the initial symptoms of the attack in the right ear. The tube became somewhat stenosed. He lost the power of differentiating low-pitched instruments and the hearing in the left ear became less acute. He felt the similarity of the two attacks and became very much depressed. He received nasopharyngeal treatment and inflation, but the ear was not in such good condition as before. Feeling that his fear of deafness despite treatment was perhaps well founded, and that perhaps some constitutional cause was in operation, I referred him to Dr. Heinrich Stern for examination. Dr. Stern found nothing organically wrong, but thought that the local condition was a vasomotor disturbance back of the fibrosis, not manifested generally as yet. After careful examination, it seemed best to Dr. Stern to put the patient on ergot. The man had very little local treatment after this, but came to me from time to time for tests. He recovered entirely from the tubal catarrh and nasopharyngitis, and on his last visit showed a normal left ear. The right ear had not materially changed, and he still kept up catheterization of that ear. It is rather premature to predict any benefit from ergot in this type of fibrosis of the ear, but the results of some trials justify the hope that the drug may have some effect in the arrest of the progressive deterioration of sclerosis.

A CASE OF BRAIN ABSCESS SHOWING THE PNEUMOCOCCUS.*

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In THE JOURNAL of the American Medical Association for Jan. 6, 1906, Drs. E. E. Southard and C. W. Keene reported a series of "twelve cases of human brain infection with the pneumococcus, together with the results of inoculation of the pneumococcus in the brains of guinea-pigs." The following is a report of another similar case, showing some points of especial interest, with an abstract of previously reported cases of pneumococcic cerebral infection collected from the literature.

Drs. G. L. Walton and G. K. Sabine have kindly furnished clinical notes on the case. Dr. P. A. Lewis made the bacteriologic cultures. The autopsy was done by Dr. E. E. Southard.

History.—Patient was an unmarried woman, 35 years old. Had had measles, scarlet fever and whooping cough in childhood. On Feb. 5, 1905, after riding in a trolley car, patient noticed a tingling in the right foot, followed by numbness extending to the entire right side, headache and gradual onset of right-sided motor paralysis, with dragging of the toe and difficulty in using the pen, slight aphasia and dulness of intellect. There was gradual improvement until March 5, 1905, when headache returned with aphasia, slight stiffness of the neck and temperature of 101 F., pulse of 70. At this time patient was seen in consultation by Dr. F. C. Shattuck, whose examination was negative otherwise than as concerned the paralysis. Her condition grew worse, with occasional vomiting and moderate leucocytosis. Seen in consultation by Dr.

* From the Pathological Laboratory of the Harvard University Medical School.

G. L. Walton on March 12, 1905, she had a normal fundus and no hemianopsia. She had rigidity of the neck, none of the back, and a suggestion of Kernig's sign on both sides. She talked freely and in a rambling manner, suggesting a low form of delirium. She showed paraphasia and could not name the days of the week or months of the year. She grew steadily worse and died April 11, 1905, with moderately high temperature toward the end.

Clinical Summary.—Gradual onset of right-sided sensory and motor disturbance, with headache, slight aphasia and mental dulness. Slow course of disease with very marked remissions. After four weeks, onset of meningeal symptoms, with vomiting, fever and leucocytosis, progressing to death nine weeks and two days after first attack.

Anatomic Findings.—Fairly developed, poorly nourished woman with dark hair. Extremities rigid. Postmortem lividity of dependent parts. No edema. The walls and fluid of the peritoneal cavity were normal. Appendix normal and the mesenteric lymph nodes normal. The pleural cavities were normal, except for slight, easily separable bands at the apices. In the pericardial cavity were found several hundred c.c. of clear fluid without fibrin. The auricular cavities of the heart were distended with crural clot. Heart walls, endocardium, valves, and coronary arteries normal. Both apices of the lungs, behind and below, showed small areas, less than 1.5 cm. square, of yellowish-brown fibrosis without caseation. Lung substance in general normal. Lower lobes behind were blood-filled and here and there showed ill-defined areas of lighter color and increased consistence. The bronchi were clear and the bronchial lymph nodes normal. The capsule of the spleen was fairly tense, the substance a trifle pulpy, the Malpighian bodies distinct and the trabeculae normal. In the gastroenteric tract no lesion was found. The liver border was sharp and its consistence normal. Its color was slightly yellower than normal. The gall bladder and pancreas were normal. The kidneys stripped well, their blood content was high and substance normal. The ureters were normal. The adrenals showed central brown softening (postmortem). The aorta was normal.

The scalp and cranium were normal. Dural sinuses contained crural clot. The dura was tense and the dural veins full. The arachnoidal villi were moderately developed. Subdural space was almost dry. The pia mater was congested, more over left hemisphere than over right. Convolutions were flattened, slightly more on right side. The basal pia mater was filled with slightly viscid, greenish, serous pus, which ran up along the Sylvian vessels a few centimeters. The under surfaces of the pons and medulla were bathed in pus. The velum interpositum and especially the sheath of the left anterior chorioidal artery were soaked in pus. The pituitary body was soft. There was no great amount of exudate about the optic nerves. On section the brain substance was everywhere moist and fairly firm. *Puncta cruenta* distinct. Both ventricles contained pus in the posterior cornua. The ependyma was moist and over the lenticular nuclei of a salt-sprinkled appearance. The right ventricle contained more pus than the left. On section of the ganglia an abscess, 2 cm. in average diameter, was found in the left optic thalamus, communicating with the body of the lateral ventricle, but not with the third ventricle. The cavity was filled with pus similar to the pus in the basal cisternae. The wall of the abscess was irregular and injected. There was a zone of reaction about it, 2 or 3 mm. in diameter, of a firm, opaque, pinkish-gray, injected tissue. The middle-ear cavities were both clean.

Anatomic Diagnosis.—Abscess of left optic thalamus and wall of lateral ventricle. Pyocephalus and ependymitis. Basal leptomenigitis. Early bronchopneumonia. Healed tuberculosis of apices.

Bacteriologic Finding.—Pneumococci were recovered from the abscess, but died on the first subculture.

Anatomic Summary.—A pneumococcic abscess of the left optic thalamus, with secondary pyocephalus, ependymitis, basal leptomenigitis and bronchopneumonia. Source and port of entry of infection not discoverable.

Microscopic Findings.—There were slight chronic interstitial myocarditis, slight arteriosclerosis of spleen and pancreas,

moderate fatty infiltration of the liver, and in the kidneys slight general increase of interstitial connective tissue and cloudy swelling of the tubular epithelium. The lung showed focal areas of pneumonic consolidation, the exudate contained little fibrin, but consisted chiefly of polymorphonuclear neutrophils, with a few large mononuclear basophiles and an occasional red blood corpuscle and large phagocytic cell. Within the latter, and scattered here and there in the exudate, were a few lanceolate diplococci. There were also large masses of staphylococci. The cerebral meninges were somewhat thickened and edematous, with some increase of connective tissue, but without exudate. They were, however, slightly infiltrated with polymorphonuclear and lymphoid cells. The subpial layer of neuroglia was neither wider nor denser than normal. The cortex showed slight edema and a few wandering polymorphonuclear and large mononuclear leucocytes. The subcortical tissues showed considerable general and perivascular infiltration with plasma and lymphoid cells and foci of more marked infiltration in which a differential count of the white cells showed the proportion: Lymphocytes, 66 per cent.; plasma cells, 20 per cent.; polymorphonuclear neutrophils, 10 per cent.; large mononuclear cells, 4 per cent. There was also a considerable increase of connective tissue through this region, both interstitially and about the blood vessels. Gram-staining, capsulated, lanceolate diplococci were to be found freely in the infiltrated areas. The walls of the lateral ventricles showed slight general edema. There was scattering infiltration of the tissues with wandering individual leucocytes, and here and there, especially in the perivascular spaces, large areas and smaller foci of cellular aggregation, which gave average differential counts of lymphocytes 40 per cent., plasma cells 36 per cent., polymorphonuclear neutrophils 20 per cent., large mononuclear cells 4 per cent. Among these cells were observed many lanceolate diplococci. There was considerable thickening of the subependymal layer of neuroglia. The ependymal cells appeared normal, but an occasional leucocyte could be seen pushing its way between them toward the ventricular lumen. In the ventricular cavity was a richly cellular exudate composed of polymorphonuclear neutrophils 75 per cent., lymphocytes 15 per cent., large mononuclear cells 10 per cent.

The abscess was surrounded by a fairly thick and definite wall of fibrous connective tissue. In the adjacent areas there was diffuse cellular infiltration, particularly in the adventitia of the larger arteries, giving a differential count of lymphocytes 63 per cent., plasma cells 30 per cent., polymorphonuclear neutrophils 5 per cent., phagocytes 2 per cent. Lanceolate diplococci were seen everywhere. The contents of the abscess consisted of necrotic material, pneumococci, and cells, the latter in the proportions of polymorphonuclear neutrophils 65 per cent., lymphocytes 30 per cent., large mononuclear leucocytes 5 per cent.

The chorioid plexus showed granular coagulum and leucocytes caught in the villi. Lining cells were occasionally swollen, as a rule normal and supplied with large vacuoles. The perivascular tissues showed great numbers of plasma cells, some with two nuclei. In the same locus were cells with basophilic cytoplasm caught in mitosis. The cerebellum was normal in every respect.

In the medulla, the meninges were overlaid by an exudate consisting of considerable fibrin, with cells in the percentages, lymphocytes 83 per cent., large mononuclear cells 15 per cent., polymorphonuclear neutrophils 2 per cent. The meningeal vessels were densely surrounded by similar cell aggregations. The spinal accessory nerves were not invaded by leucocytes. There was no neuroglial hyperplasia. There was slight sclerosis of the meningeal arteries. Pneumococci were present in them and in the exudate. The adjacent tissues of the medulla were but slightly infiltrated. In the olivary nuclei were many large ganglionic cells, some showing the axonal reaction.

In the cervical cord, the meninges were much thickened, with an exudate composed of lymphocytes 60 per cent., plasma cells 12 per cent., large mononuclear leucocytes 20 per cent., and polymorphonuclear neutrophils 8 per cent., with very little fibrin. There was comparatively little increase of connective tissue, and little infiltration of the cord except in an

area immediately surrounding the central canal, where there was also considerable increase in thickness and density of neuroglia. The ependyma was normal. There were no changes in the motor cells of the anterior horns.

Microscopic Summary.—Slight arteriosclerosis. General perivascular lymphocytic infiltration of nerve tissue. Walled-off abscess with contents of the usual cellular composition.

GENERAL SUMMARY AND REMARKS.

The case was characterized by cerebral symptoms and signs from the outset, subacute for the first four weeks, then increasingly acute till death after a total duration of nine weeks and two days. The points of especial interest in connection with it are two: First, the cellular proportions in the meningeal exudate and in the perivascular and general infiltration; second, the absence of determinable source or port of entry for the infection.

As is shown by the figures in the foregoing paragraphs, there was a marked predominance of lymphocytes and plasma cells in the infiltration of cortical tissue and ventricular walls and in the meningeal exudate, whereas in the abscess cavity, in the ventricular lumen, and in the pulmonary exudate, polymorphonuclear leucocytes prevailed. In this respect this case resembles numbers 1, 4, 7 and 16 in the series of Drs. Southard and Keene described in the article referred to above, but the preponderance of mononuclear forms was much greater than in any of them. There was distinct subpial and subependymal gliosis. Lanceolate diplococci were found freely in all the affected tissues, showing a generalized infection.

In each case of the Southard-Keene series some source for the infection is determinable: otitis media, trauma, acute or chronic pulmonary conditions, septicemia. In this case no such source could be found. The onset of symptoms was gradual, there was no antecedent injury or infection elsewhere. The pneumonic process in the lung was evidently terminal and secondary to the brain infection, which must be concluded to have been primary and coming either from the general blood stream or possibly through the nose.

With a view to comparing this case with others, and for the sake of completeness, I have attempted to collect from the literature all previously reported cases of pneumococcic cerebral abscess.

After careful and thorough search I have found reported only eight cases of cerebral abscess, in which the presence of the pneumococcus of Fränkel in the pus from the brain was demonstrated by bacteriologic examination. I have thrown out a number of cases of cerebral abscess following pneumonia, in which the presence of the diplococcus lanceolatus was not thus demonstrated but in some of which it doubtless was an etiologic factor in the production of the abscess. Following are the references and brief summaries of the eight cases in question:

1. MACEWEN:¹ An otitic cerebellar abscess of the left side, with a subdural abscess of large size situated above the tentorium, involving the posterior third of the two upper temporal convolutions, the angular gyrus, and a considerable portion of the adjacent occipital lobe. Both abscesses were opened and drained, with complete recovery. Pus from the subdural abscess contained pneumococci and staphylococci pyogenes aurei.

2. SAHLI:² An abscess of the occipital lobe, with hemiopia, following an influenza otitis. Pus from the abscess and from the ear showed Fränkel's pneumococcus. The patient died, a

few weeks after operation, of purulent meningitis proceeding from a small secondary abscess near the almost healed original focus.

3. SIRON and JOSUÉ:³ Multiple cerebral abscesses following influenza with bronchopneumonia. At the autopsy was found a subarachnoid abscess, communicating through the left temporal lobe with the ventricles, which were full of pus. There was also an abscess of the frontal lobe, one of the lenticular nucleus, one of each occipital lobe, and one of the lung. In all these the pneumococcus was found. The ears and sinuses were normal.

4. BOINET:⁴ In this case there was onset of cerebral symptoms six weeks after recovery from influenza with bronchopneumonia. Death occurred five weeks later. At autopsy an abscess was found in the left temporal lobe, ruptured into the ventricle, with three subcortical diverticula. There was incipient meningitis. Pneumococci and streptococci were present in the pus. There had been destruction of the corpus striatum and part of the corona radiata. The middle ears were normal.

5. BOINET:⁵ Five days after the sudden onset of cerebral and meningeal symptoms death occurred. At autopsy a purulent meningitis was found, especially at the base, and a small abscess in the corona radiata of the parietal lobe, pus from which contained pneumococci, staphylococci and streptococci. In the lungs there was hepatization at the base.

6. LANDRIEUX:⁶ Death occurred on the fifth day from a lobar pneumonia, two days after the onset of cerebral symptoms with complete left hemiplegia. An abscess was found in the right hemisphere, occupying partly the lenticular nucleus, partly the anterior segment of the posterior arm of the internal capsule. It contained pneumococci in pure culture.

7. APERT and DELILLE:⁷ After a fortnight's illness, there was sudden onset of meningeal symptoms, and death three days later. The patient, a girl of 14, had had bronchitis two years before, followed by a persistent cough. At autopsy was found dilatation of the bronchi, a pulmonary abscess, and multiple cerebral abscesses, one in the right prefrontal region, one in the left temporo-occipital, one in the left parietal lobe, and one in the right occipital lobe. All the abscesses contained pneumococci.

8. GRUENING:⁸ A pneumococcus infection through the nose produced orbital cellulitis. At the first operation the orbit and the empyematous ethmoid cells and frontal sinus were drained. Cerebral symptoms ensued. A second operation exposed a large abscess of the frontal lobe, with a number of pockets, pus from which showed pneumococci. Pneumonia and pneumococcemia followed, with death in five days.

To these may be added the one case of the Southard-Keene series which showed an abscess.

9. SOUTHARD-KEENE:⁹ Man of 25, with obscure history of previous head injury, had headache for four days and was unconscious two days. Death occurred six days later, ten days from onset of symptoms of meningitis. Autopsy showed cerebrospinal meningitis, with small focal abscess in the white matter opposite the left frontal cortex, encephalitis and pycephalus. Cultures from heart's blood and brain gave pneumococcus.

These nine cases, then, with the one now reported, make a series of ten in which the pneumococcus is definitely determined as the infecting organism. Of these two (Cases 1 and 2) were secondary to otitis media, three (3, 4 and 6) to pneumonia, one (7) to chronic pulmonary condition, one (8) to nasal infection, one (9) to trauma, and two (5 and 10) to infection through undiscoverable sources. Case 5 was probably one of fulminating septicemia, leaving the present case (Case 10) as the only one of slow onset without demonstrable port

3. Presse méd., 1895, p. 235.

4. Marseilles méd., xxxvii, p. 641.

5. Rev. de Méd., vol. xxi, p. 113.

6. Jour. des Practic., 1903, xvii, No. 9, p. 129.

7. Bull. de la Soc. anatom. de Paris, 1904, vi, p. 631.

8. Méd. Record, lxx, p. 215.

9. THE JOURNAL A. M. A., 1906, xlv, p. 16.

1. Pyogenic Infectious Diseases of the Brain and Spinal Cord, Glasgow, 1893.

2. Volkmann's Sammlung klinischen Vorträge, July, 1891, xxlii, p. 293.

of entrance for the infection. In this respect, and in the relative proportions of the cells in the exudate and infiltration, it is believed to be unique.

Attention is especially drawn, moreover, to the occurrence of lymphocytes and plasma cells in the various nervous tissues. The occurrence of such cells has been made the basis of extravagant claims by several German writers of the virtual specificity of the plasma cells in the meninges and perivascular tissues in general paresis of the insane. Those who maintain the virtual specificity of the plasma cell in parietic tissue charily admit, of course, that luetic and tuberculous tissues likewise exhibit local collections of lymphocytes and plasma cells. The same cells occur in the present case of pneumococcic abscess.

A NEW INTRAGASTRIC ELECTRODE.

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The electrode herein described, in addition to the essential features necessary in such an instrument, possesses the added advantages of being easily and quickly introduced into the stomach or esophagus, of being comfortably borne by the patient during the treatment, and is practical in its strength of construction rather than a toy.

Intra-gastric Electrode.

The intra-gastric electrodes now in use may be divided into two classes: those which have a narrow conducting cable (the Einhorn, and Ewald's and Lockwood's modification of it), and those which depend on a thick stiff tubing (like a stomach tube) around the wires to give the cable firmness so that the end piece can be easily pushed into the stomach (Boas', Stockton's and others). The first class comprises the best instruments for practical use, for the latter only magnify such objectionable features as may be found in most of the first group. The matter of irrigation during the time of the passage of the constant currents (possible in some of the electrodes of the second class) is not of much practical value in intra-gastric work, excepting in a few isolated instances.

The main objection to the deglutable electrode of Einhorn is the fact that it must be swallowed for its introduction. This is often a discouraging performance to patients, is time consuming and is not devoid of dangers to the physician (infections and abrasions from the teeth incident to placing the olive far back into the mouth of the patient). I have had patients who could not swallow or would vomit up the end piece even when the utmost care had been exercised in its introduction. Furthermore, as Lockwood has pointed out, the trailing string of this instrument is a disadvantage, although

in my hands not so much of a one as the first mentioned. Therefore, the deglutable feature is a decided drawback rather than an advantage in the constant use of this otherwise good instrument.

When a stiff straight wire (Ewald) or a spiral one (Lockwood) has been incorporated in the cable the valuable migratory feature of the Einhorn electrode is done away with, and the instrument is rendered uncomfortable for the patient to bear in the pharynx during the course of a treatment sufficient in length of time to obtain results.

Another objectionable feature to the American made Einhorn electrode is the thinness of the insulated rubber tubing about the wire. In practice, this rubber is constantly breaking down from wear and tear of use and the teeth of the patient. This objection is minimized to a degree by the thicker tubing to the electrode here shown, a modification now carried into effect in the German makes of the deglutable electrode. This thicker cable makes no practical difference in the comfort to the patient.

This new electrode consists of two separate parts, the electrode proper and the introducer. The end capsule of the electrode (13 mm. in diameter) is a hard rubber perforated case inclosing a metal ball of steel in which the conducting cable is held. The introducer is the main feature of the instrument. It consists of a spiral

wire covered with rubber tubing on which is marked the usual distance from the incisors to the stomach. At one end of the introducer is a stem, flattened on one side, which fits into the metal ball. The flat surface prevents the ball from turning when the instrument is assembled for use. On the off end of the introducer is a round metal ball of no significance.

TECHNIC OF INTRODUCTION.

The patient is first made to drink a tumblerful or more of water; this is essential as a conductor of the current from the metal ball in the end piece to the external electrode. The introducer is lubricated with glycerin, then the electrode (which has been immersed in water) is mounted by slipping the spherical end on to the stem of the introducer after which one turn of the cable is made around the end of the introducer shaft. The entire instrument is inserted into the patient in the same way as is a stomach tube. At the desired point in the esophagus, or better in the stomach, the electrode is freed by making one or two short in and out movement of the introducer, the cable being free from the hand. The introducer is then withdrawn, leaving the electrode within the patient. It is my custom at this time to have the patient take another swallow or two of water. Care must be taken not to have more than one turn of the cable about the end of the introducer, and it is advisable to free the cable from the hand after the capsule has been delivered below the laryngopharyngeal junction.

WITHDRAWAL OF THE INSTRUMENT.

At the end of the treatment the electrode is withdrawn in the same way as is the simple deglutable instrument; that is, the string is drawn on until the ball end is held at the back of the larynx, then with an effort