mental faculty. Acquired aphasia in children sometimes follows neurosis, such as hysteria, chorea, or epilepsy, and sometimes it comes after fevers. Dr. Treitel observes that the prognosis is more favourable in aphasia following cerebral affections in children than in grown-up people, as the vicarious action of the right hemisphere comes in more easily at an early age. This is, perhaps, the reason why uncomplicated aphasia is so extremely rare in young children. I have never seen a case of mutism in children in which the intelligence was intact.

Stupidity through Obstruction of the Nasal Passages.

Dr. Victor Lange, of Copenhagen ("Centralblatt für Nervenheilkunde," März, 1893), has observed cases in which the mental capacities of children have been much checked by adenoid growths in the nasal passages. The principal symptoms of this affection are imperfect respiration through the nostrils, causing the child to breathe with the mouth open, a thick pronunciation, and dulness of hearing. Children thus affected have a stupid face, a vacant expression, and a wandering gaze. Sometimes in addition to these symptoms there is a feeling of tightness across the forehead, headache, earache, giddiness, or bleedings at the nose; sometimes there is a deficient capacity to collect the thoughts, as has been indicated by Prof. Gay, of Amsterdam, in the affection which he calls *aprosexia nasalis*. The removal of these adenoid growths has sometimes a wonderful effect; from being apathetic and of backward growth both in body and mind, the child becomes awakened to a new life, and the bodily and mental development take a fresh start.

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3. *Pathological Retrospect.*

By Edwin Goodall, M.D., West Riding Asylum, Wakefield.

Nissl's Staining Method.

This is a method to which considerable importance has been and is attached in Germany. Nissl's original description appeared in 1885, and in this magenta is recommended as the staining agent. In 1890 he described a modification which has superseded the older process. In this country but little seems to be known of the method, of which the following is a brief description:— Have ready (1) a 0·5 % aq. sol. methylene blue (methylenblau patent B, from C. Buchner and Sohn, Fabrik pharmaceut. chem. Producte, Munich); (2) a mixture of anilin oil 20, alcohol 96 % 200 parts (this must not be too old); (3) origanum oil; (4) benzine; (5) a balsam made by dissolving colophonium in benzine, and of the consistence of ordinary chloroform-balsam. Portions of tissue as fresh as possible, in size 1-2 ccm., are placed for

fixation and hardening in alcohol 96-98 %, for 24 hours. Remove, fix on cork by gum (caused to set by placing the whole in methylated spirit), and cut sections by the sliding microtome into spirit. The sections are placed, from pure alcohol or distilled water, in the methylene-blue solution, and this is heated until bubbles form—"until the crackle of bursting bubbles is heard." After cooling, transfer the sections to the anilin-alcohol, and agitate them about until no more clouds of colour are given off. An appreciable differentiation takes place. Transfer a section to a slide, dry it well with filter-paper by pressure, apply a few drops of origanum oil (which is quickly allowed to run off), dry again with filter-paper. Run some benzine over the section to drive off the remains of the origanum, and place a drop of the colophonium solution on the section. The slide is now drawn through the flame of a spirit-lamp and the benzine set alight. When it has all been burnt off adjust the cover-slip. Warm the under surface of the slide, pressing down the cover gently; the colophonium is rendered fluid. Allow to cool.

It is claimed for this method that it affords far more information concerning the structure of the nerve-cell than is obtainable by the ordinary methods of chrome-hardening followed by carmine or anilin staining. The granulations of the cell-body are the structures especially brought out. The nucleus is unstained, in healthy tissues the nucleolus stains deeply. Connective-tissue nuclei and those of vessel-walls are also well shown. By this method Nissl showed the alterations undergone by the cell-granules in the case of the ganglion-cells of the facial nucleus of a rabbit in which the corresponding facial nerve had been torn away. The changes commenced on the first day and progressed daily. They consisted in a gradual breaking-up of the granules until the normal appearance of the cell protoplasm was quite lost; the cell appeared as if dusted over with fine particles of colouring matter. This *débris* of granules was only faintly stained. *Pari passû* with the above changes the cell-body became swollen and rounded, and the nucleus and cell-processes disappeared. All the cells of the nucleus were not equally affected at the same time, stages of degeneration being exhibited, so that cells apparently completely broken down were adjacent to others seemingly healthy.

The value of Nissl's method is emphasized by Rehm ("München. Medizin. Wochenschr.," March 29th, 1892) and Alzheimer ("Archiv. f. Psych.," xxiii. B., 2 H.). Rehm has introduced certain modifications into the technique whereby the method is simplified. For these see the paper quoted. Alzheimer observes that the cell-granules are shown by Nissl's process far better than by any other. Neither in fresh sections stained by anilin blue-black nor in chrome-hardened ones can these structures be properly seen. According to Alzheimer pathological changes often

show themselves earliest in the cell-granules, and therefore nerve-cells can be recognized as diseased by this method which by any other would appear healthy. Thus he was able by it to find changes in almost all the ganglion-cells of the "central nervous organ" in a case of "mania gravis." These did not appear in chrome sections. The staining of the nucleus may be taken to indicate disease of that structure.

Recently Schaffer ("Neurolog. Centralbl.," December 15th, 1893) has found that Nissl's method affords a means—in addition to other methods, such as the Golgi-Cajal—of discriminating between the axis-cylinder and the protoplasmic processes of the nerve-cell. Whereas the latter with this method show spindle-shaped chromatin bodies, stained by the methylene blue, the axis-cylinder is quite free from such, being homogeneous. Nissl sections are best studied directly after preparation. The stain begins to fade rather quickly (in a few days); this, at least, is the writer's experience, and Alzheimer makes the same statement. The granules can be shown in preparations 24 hours after death, but nevertheless pieces should be as fresh as possible. The writer has had the opportunity of examining sections prepared after Nissl in the laboratory of this asylum by Dr. Cook, of the St. Lawrence State Hospital for the Insane, New York. The sections were from the brains of general paralysis, chronic mania, and dementia. Without trespassing on Dr. Cook's work, it may be said that many of the degenerate appearances described by Nissl in the case of the rabbit are to be seen in these specimens. It seems most desirable that this method should be employed on a large scale in the examination of the brains of persons dying insane, and that sections from such brains should be compared with healthy sections, so that the proper value of the method may be ascertained. The case referred to by Alzheimer is a strong argument for its adoption. In such cases examination by the ordinary methods may fail altogether to show any lesion of the nerve-cell.

Etiology and Pathology of Acute Delirium (Acute Delirious Mania).

Rasori makes the following communication to the "Centralbl. f. Bakteriologie," xiv. B., No. 16. A patient, æt. 45, was admitted into the asylum in a state of acute delirious mania. The attack began six days before admission simply with obstinate headache. Inquiry into the personal and family history failed to throw light upon the cause of the disorder. The patient died within eight days, having exhibited, in addition to the ordinary symptoms, opisthotonos, clonic spasm of the facial muscles, and difficulty in swallowing, due apparently to spasmodic action of the muscles of deglutition. The necropsy revealed great congestion of the cerebral meninges, on the under surface of which were numerous small blood extravasations; also congestion and œdema of the brain.

The cortex was softened in the right temporo-spheroidal lobe. Tubes of broth and agar were inoculated with fluid obtained from the subdural space, and kept in the incubator at 35°C. Both media gave pure cultures of one and the same organism—a small bacillus with rounded ends, about three times as long as it was broad. This occurred singly and in short chains. It could be stained by the ordinary anilin dyes, also by carbol or by alkaline methylene blue, but not by Gram. The organism grew rapidly in all the ordinary media, alike at the temperature of the body and of the room. The mode of growth was not specially characteristic. Rabbits were inoculated with the pure culture in different situations—beneath dura mater, skin, and nasal mucous membrane. When the first-named site was selected death ensued in two days; in the other cases in 4-6 days. In all cases there was a marked rise of temperature, and signs of illness were manifested. Post-mortem examination showed in each instance great congestion of the cerebral meninges, with hæmorrhage on the under surface of the pia; also congestion and œdema of the brain. Microscopical preparations and cultures made from the subarachnoid fluid and blood showed the same bacillus as that inoculated, and this was also found in sections of the brain, lying in numbers between the nerve-elements. Rasori promises a more detailed account of the microscopical examination of these sections.

In Vol. i. of the "Edinburgh Hospital Reports," 1893, Dr. Batty Tuke records briefly certain microscopical appearances in a case (æt. 25) of dementia with delusions. These he regards as indicative of a leucocytal action on cortical cells. The upper end of the left ascending parietal gyrus was examined by the fresh (ether-freezing) method. In the third and fifth layers, especially the former, a large proportion of the nerve-cells was affected as follows:– "The body of the cell was highly reticulated and slightly coloured by a yellow amorphous material; the nucleus was enlarged in some instances, and vacuolated. Around the cells leucocytes were found in large quantities, eating into the body as far as the nucleus in some cases, in others occupying the whole area of the cell. Between the cells of both layers leucocytes, enlarged neuroglia cells, and naked nerve nuclei were found scattered in large numbers. In no instance was a giant-cell (fourth layer) found affected." Dr. Batty Tuke thinks it possible that the action of phagocytes on degenerated cells (as illustrated in this case) has been overlooked, or that the appearances have been misinterpreted. Bevan Lewis, in his chapter on the pathology of chronic alcoholism ("Text Book of Mental Diseases"), speaks of the cells of the lowest layer of the cortex (spindle-cell formation; that is, the "fifth layer" referred to by Dr. Tuke) as being covered by heaps of "nuclear proliferations," which often conceal them from view. The cells also frequently show pigmentary change. These appearances can readily be seen. The third layer,

however, does not present them. It is a matter of conjecture whether the condition seen in the case of the chronic alcoholics is identical with that described by Dr. Tuke. A cardinal point, however, is that Bevan Lewis ascribes the phagocytic action, whereby degenerate cells are removed, not to the pericellular elements (be they nuclei or leucocytes), but to the neighbouring "scavenger corpuscles," which are quite different structures, whatever their mode of origin. In Dr. Tuke's case there were, in addition to leucocytes, "enlarged neuroglia cells" between the nerve-cells of both layers. To these, however, no importance is attached. Supposing the pericellular elements described by Dr. Tuke to have been leucocytes, and supposing, further, that they were exercising a phagocytic function, our conceptions upon phagocytosis as it relates to the brain must undergo notable modification. The *rôle* of phagocytes is, in fact, claimed for two classes of cell—certain cells of the neuroglia and leucocytes. Morphologically these differ widely, even if we admit that they have the same origin. In a recent study of the cortex cerebri of the rabbit in states of inflammation experimentally produced, the writer was unable to convince himself of the phagocytic action of the extravasated leucocytes.

The Neuroglia Elements in the Human Brain.

Andriezen ("Brit. Med. Journal," July 29, 1893, and "Internat. Monatschr. f. Anat. u. Phys.," 1893, B. x., H. 11) proposes to classify these as follows:—(i.) Neuroglia fibre-cells; (ii.) Protoplasmic glia-cells. Between these two classes of cell there are well-marked distinctions. There are two species of neuroglia fibre cell—(*a*) that situated in the first layer of the cortex, the caudate cell; (*b*) that situated in the medullary substance, the stellate fibre cell. The caudate cells are imbedded in the outermost layer of the cortex, with their bases towards the pia. From the apex of each cell fibres stream tuft-like into the deeper layers of the cortex. From the base tangential fibres are given off. The individual fibres are long, smooth-contoured, of uniform thickness, unbranched, and slightly wavy. In the stellate fibre cell a distinct cell-body is hard to recognize; its characteristic is the enormous number of fibres which it gives off. These closely resemble the fibres of the caudate cells. The protoplasmic glia-cells, in contradistinction to the neuroglia fibre-cells, occur abundantly throughout the grey matter in all layers of the cortex, and are correspondingly rare in the medullary substance. These cells present a distinct cell-body, their processes are of moderate length only, vary greatly in calibre, and are dendritic. Further, the protoplasmic glia-cells are attached to the perivascular sheaths by one or more processes. Andriezen gives reasons for believing that these cells, with their processes, are surrounded by lymph-spaces which

are continuous with the perivascular lymph-space. The neuroglia fibre-cells exhibit no such lymph-space. In addition to the distinctions already drawn between the two classes of cell, it can be shown that the protoplasmic glia-cells with vascular connection are mesoblastic in origin, whilst the neuroglia fibre-cells are epiblastic. The function of the latter seems to be to provide "a passive supporting feltwork" in the brain, whilst the protoplasmic glia-cells play an "active *rôle* in the circulatory and lymphatic economy of the brain." The cells last mentioned are really the elements which hypertrophy and fibrillate in pathological states, such as alcoholism and general paralysis. A further noteworthy point is that the fibre-cells form a perivascular feltwork ensheathing the cerebral blood-vessels, constituting "a distinct and well-organized fourth coating." The cells are arranged mainly with the long axis parallel or transverse to that of the vessels. Being imbedded in the ground-substance they have no continuity with the adventitial sheaths of the vessel, which lies outside that substance. Besides the cells mentioned, the ordinary 'stellate glia-cells contribute a few fibres to the perivascular feltwork. As to the physiological significance of this sheath, Andriezen points out that it opposes a considerable resistance to undue expansion of the blood-vessels, thus in a measure compensating for the weakness of the muscular coat, and the absence of a tough adventitial coat in the cerebral blood-vessel. Further, its texture and porosity are such as to allow of the free passage of lymph and products of metabolism, thus permitting interchange between the cerebral tissue and the perivascular lymph-spaces. In this investigation the Golgi-Cajal method, with slight modifications based on the author's experience, was employed.

In a paper entitled "Dei Limiti Precisi tra il Nevroglio e gli Elementi Nervosi del Midollo Spinale" ("Boll. d. R. Accad. Med. di Roma," anno xix., Fasc. ii.) Paladino states the relationship existing between the neuroglia and the nervous elements in the spinal cord (of man, ox, and cat), as shown by his method of staining by iodide of palladium after the removal of the medullary substance. This process brings out contemporaneously the nerve-cells and the neuroglia elements. Amongst other points it shows that the medullated sheath of nerves is formed upon a framework or skeleton of neuroglia-tissue, directly continuous with the interstitial neuroglia. This intra-medullary neuroglia has also its cells, with irregular outline. The neuroglia network about the nerve-cells is well shown by this method; on the one hand it is continuous with the interstitial neuroglia, on the other delicate fibres can be seen to pass on to the nerve-cells. Further, the method shows the continuation of the neuroglia fibres into the pia mater.