of these apparently contradictory conditions, I would say that the condition of the stomach, particularly of its glandular apparatus, causing a deficiency of gastric juice, prevented the conversion of the albuminous portion of the food into the condition requisite for sanguification; whereas the functions of the liver and pancreas, not being interfered with, the conversion of the starchy and saccharine elements of the food into fat, by admixture with the bile and pancreatic fluid, went on as usual in the duodenum. Again, there was no great waste of fat for purposes of combustion and keeping up animal heat.

As far as I know, pathology does not throw much light on the case. Rokitsansky refers to gelatinous softening, described by Cruveilhier, which presents appearances somewhat such as those described above, but there are characteristic differences in the symptoms. Cruveilhier describes it as a "lesion of innervation" from cerebral causes, none of which existed in this. Dr. Brinton says that "atrophy of the stomach, except as incidental to other maladies of the stomach and in a subordinate form, can scarcely be accorded the nosological rank of a substantial and independent malady". He says: "A marked degree of atrophy, chiefly or exclusively involving this organ, is one of the *very rarest lesions* met with in the human body."

Drs. Jones and Sieveking remark "that a not uncommon change in the condition of the stomach is infiltration of low fibrous tissue loaded with nuclei among tubes which themselves undergo atrophy, so that the tubular character is lost. Dr. Bristowe admits that degenerative changes play an important part in the various chronic affections of the stomach; but that at present the symptoms referable to these forms do not admit of identification.

I hope I may be excused for giving at length the details of a case somewhat without history, and certainly without definite or tangible symptoms; but the absence of any such symptoms, and the fact of any attempt at diagnosis being necessarily worked out by a process of exclusion, I think, contribute to its interest, while its rarity is evident by the absence of literary information on the subject.

ON THE MORBID HISTOLOGY OF THE SPINAL CORD IN FIVE CASES OF INSANITY.*

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[Continued from page 99 of last number.]

CASE IV.—W. J., male, aged 38, was admitted on December 3rd, 1876, suffering from general paretic dementia. The patient, a Welshman and a pensioner, had served ten years in the army, and subsequently acted as servant to a gentleman. He had never been in the tropics, and had been last employed as a "pointsman" on the Great Southern and Western Railway at Mallow. His present illness, stated to be of eight months' duration, was attributed to a fright he received while on the line, an accident causing the death of an official, which he witnessed. His wife stated that he was always a steady temperate man, but of a silent nervous temperament. He had several healthy children. Some time after receiving the mental shock, he became moody and sullen, and then suspicious of his wife's faithfulness, followed by imaginary fears, but never developing any extravagant or optimistic delusions. For several months past, he had gradually become worse, and as suicide, it was stated, was feared, he was sent to the asylum. On admission, there was no mental exaltation, the reverse rather being the case. He was confused and undecided in his manner and actions, and very feeble-minded, with an expression of abstraction and indecision. There was considerable loss of memory, and he could give no coherent account of himself. At times, there was considerable excitement and general restlessness, with visual hallucinations. When placed opposite the windows, he used to fancy he saw the train coming, and would then loudly declare that he had to go away in it, and tried to act accordingly. The diagnosis of paretic dementia was based on the physical condition. There was marked impairment of the power of articulation; he spoke in an uncertain hesitating manner, dropping some syllables and sometimes pronouncing the word entirely, and there was a twitching of the lips and zygomatic muscles. The tongue was protruded in a spasmodic manner, its movement being apparently with difficulty controlled, and it was marked by fibrillary twitchings. The pupils are irregular, the left being considerably larger than the right; both were equally motile. His gait betrayed no paralysis; but there was a noticeable degree of unsteadiness and irregularity. The manual grasp

was fairly powerful, and equal in both hands. The tactile sensibility was not at all acute, but it was difficult to ascertain anything accurately as regarded the condition of the sensory system. His muscular development was poor; skin sallow; hair and eyes dark.

Abbreviating the history, it will be sufficient to say that, during his residence in the asylum, the mental and physical symptoms became progressively worse. Every function gradually deteriorated; his memory failed, so that he did not recognise his wife, and the visual hallucination faded. The power of articulation became more and more impaired, and the muscular unsteadiness and twitchings increased. He was now quite helpless, and unable to move without assistance. When lying down, however, he had still the power of flexing and extending the lower limbs and of using the arms and hands. He was dirty in his habits, passing urine and faeces involuntarily. During the night of April 28th, he became unconscious, though there was no perceptible fit. He lay with the eyelids closed, the eyes fixed and insensible to the touch; pupils equal and fixed, and diminished in size. The arms were flexed across the chest, and, when raised, were rigid and difficult to extend. The lower limbs were, to a less extent, in the same condition. Tactile sensibility was almost lost; he made no outward manifestation when sharply pricked with a pointed probe. Reflex excitability appeared to be increased; when the soles were tickled, the feet moved convulsively. Breathing was unaffected; but, when a deep inspiration was taken, there was some puffing of the cheeks on expiration. On the following day, the comatose condition had passed away, and, with the exception of being now quite incapable of articulating and more sunken in appearance, he was much as before the attack. On the next day (May 2nd), the right hand and arm, while in a state of tonic rigidity, were perfectly paretic, falling helpless when released from the grasp. The fingers were rigidly flexed, being difficult to straighten, returning to the same position when again let go. On the back of the ball of the thumb, and on the posterior aspect of the second phalanges of the fore-middle and third fingers, were large blebs of brownish serum, which formed in twenty-four hours. When the mouth was forcibly opened, the tongue could be seen lying in the buccal cavity, occasionally being moved about, the organ being atrophied, red, and glazed. Reflex excitability was now very greatly diminished, especially in the right leg. Faradomuscular contractility was weakened in the lower limbs; it was still persistent in the upper limbs and face, where its sensibility was still felt. Across the junction of the sacrum and buttocks, a large eschar was forming, surrounded by an erythematous zone. He could only swallow a little liquid food. No further symptoms presented themselves, and he died on May 5th.

Necropsy thirty hours after death.—Rigor mortis marked; body generally emaciated. Over the lower portion of the sacrum, and extending across the left buttock, was a black eschar about five inches long, surrounded by a zone of congestion; the remains of the bullæ existed on the backs of the fingers and the ball of the thumb. The scalp was thin, and considerable force had to be exercised in stripping it from the bone. The cranial outline was asymmetrical, the right hemisphere being prominent and bulging, the fronto-parietal region of the left flattened and sloping. The bone was of normal consistence, its inner surface being of a slaty-blue colour. On the external surface of the left frontal eminence was a scar, like the remains of an old fracture; the scalp was firmly adherent to this; there was no corresponding mark on the inner surface. On opening into the cavity of the skull, a quantity of non-sanguinolent sero-purulent fluid escaped. The dura mater was covered laterally by a thin layer of gelatinous material, easily scraped off with a scalpel, and it was adherent to the arachnoid along the great vertical cleft. On removing the membrane, its visceral surface and the corresponding surface of the arachnoid over the left hemisphere only were found covered by clear gelatinous material easily removed. It was from this region the fluid above mentioned came. This coating extended over the three tiers of the frontal convolutions, and reached posteriorly, covering the ascending frontal and parietal as far as the anterior borders of the superior and inferior parietal lobules, involving also the three tiers of temporo-sphenoidal convolutions. The pia mater was thickened over the regions specified and adherent to the cortex; the hemisphere was subsequently prepared in nitric acid solution, and the exact localisation of these adhesions determined the result I have described in another paper on that subject (BRITISH MEDICAL JOURNAL, May 11th, 1878). The convolutions were wasted and flattened. The arteries at the base of the brain were delicate-looking and nowhere atheromatous. The basal ganglia were small, but, with the exception of some diminution in consistence of the crura cerebri, were unaffected. The entire brain, previously to draining, weighed 1,555.209 grammes; the cerebellum, pons, and medulla 138.8 grammes. The hemispheres were carefully

* Read in the Section of Psychology at the Annual Meeting of the British Medical Association in Manchester, August 1877. Drawings of the appearances described were exhibited.

divided into equal halves; the left weighed 641.5 grammes, the right 684.2 grammes, giving a difference of 42.2 grammes in favour of the right hemisphere. The central ganglia were normal in appearance. The spinal cord was removed from the cervical enlargement to its caudal termination; it was of firm consistence throughout, and presented no gross lesions. It was divided into segments, and, with portions of the right hemisphere of the brain, the pons and medulla, was hardened in iodised spirit and bichromate of potash. On carefully removing the membranes from the pons and medulla, the right olivary body was found to have lost its plumpness and fulness, the difference between it and its fellow being well marked. As can be seen in this cast of the organ, the furrow dividing it from the anterior pyramid has disappeared, and the position of the body is marked by a few longitudinal striae. On cutting the organ across at the lowest level of the corpora olivaria, the nucleus of the right was seen to be reduced to an oval mass, while that of the left preserved its convolutions, as is depicted in this drawing. This may be simply due to the left nucleus extending farther down than the right, and thus the section would have passed higher in the former than in the latter, and consequently have shown more of the left.

Microscopical Examination.—(a) *Pia Mater.* The surface of the membrane and vessels was covered with densely crowded nuclei; in some instances so closely packed as to obscure the coats of the latter. Where the coats of the vessels could be distinguished, the muscular layer was apparently unaffected. Scattered also over the surface of the membrane and on the vessels were aggregations of clear disc-like bodies, slightly or not at all tinted by carmine and quite transparent, varying in size from a minute dot to a disc as large again as a red blood-corpuscle, and forming rosettes or irregular groups. These bodies appear to me to be free from globules of fat or oil, and only in one other case have I met with anything like them. (b) *Brain.* Teased preparations of the fresh tissue revealed the larger pyramidal cells rounded at their basal angles, deprived of the processes springing therefrom, and for the most part loaded with granules. Groups of discs quite similar to those in the pia mater were observed here also, and a compressed section in the fresh condition showed the same appearances. In several specimens taken from the apices of the ascending frontal and parietal convolutions, isolated examples of giant-cells, closely resembling those of the anterior horn of the spinal cord, were visible; these, however, I could not demonstrate in prepared sections from the same region. In the latter, the arterioles were seen to be varicose, surrounded with connective tissue closely covered with nuclei, and surrounded with particles of yellow hæmatoidin. In transverse sections, the perivascular spaces were somewhat dilated, and contained many nuclei, which formed a bead-like ring around the vessel within. The ganglion-cells had partially lost their regular arrangement, and were in various stages of pigmentary degeneration, and here also the fat-globules were found. The superficial layers of the neuroglia were loose and reticulated; the deeper finer and closer, containing numerous minute nuclei. The capillary vessels were either more numerous or more distinctly seen than is normally the case. (c) *Spinal Cord, including the Medulla Oblongata.* A transverse section of the medulla, at its junction with the pons, showed the nucleus of the left olivary body to have extended higher than that of the right. Numerous sections through the different parts of this organ from above downwards showed the vessels generally to be thickened and covered with free nuclei, as in the pia mater and brain. The cells of the hypoglossal nuclei bilaterally were diminished in number, many of those remaining being in various stages of degeneration, some being pigmented so as to resemble those of the *locus cæruleus* of the crus cerebri. In one section through the right nucleus, a large vessel was seen containing several thrombi, completely filling its canal and passing into small branches proceeding from it (specimen exhibited). The cells of the nucleus of the vagus and glosso-pharyngeal were relatively less affected than those of the hypoglossal nucleus. The cells of the corpus dentatum of the olivary bodies were throughout slightly pigmented and surrounded in parts by clear spaces. The superficial layer of grey matter on the floor of the fourth ventricle contained masses of nuclei, which, in some sections, had passed deeper. The anterior and external bundles of nerve-fibres did not appear much affected. The central canal, for a short distance below its opening in the fourth ventricle, was patent; lower down, it was obliterated by proliferated nuclei. In the cervical region of the cord, the pia mater, where present in the sections, was, like that on the brain, excessively nucleated, the vessels being similarly affected. The perivascular spaces surrounding those in the neighbourhood of the central canal were widely dilated and eroded at their edges; the latter was, as above, obliterated, and this condition prevailed throughout the entire cord. Scattered in and around the anterior and posterior grey cornua, being especially located

in the anterior horns, were numerous spots of yellow exudation, apparently infiltrating the tissues in which they were placed and blending with the latter. These islets of exudation were most numerous in the grey matter, but also occurred in the white columns. They were entirely unaffected by either carmine or aniline blue-black, and were either structureless or finely granular, and could be seen encroaching on and destroying the ganglion-cells (specimens exhibited). These spots somewhat resembled miliary sclerosis, but were of a more decided yellow colour, not so distinctly separated from the surrounding tissue, and did not possess the lustrous pearly appearance seen in the latter. In the lateral columns in the dorsal region, they were very numerous, being situated externally to the posterior cornua in their vicinity. Several vessels were also observed apparently affected with this exudation, which surrounded and partially obscured them, giving rise to a gap in the equable colouration by carmine (specimen exhibited). The ganglion-cells of the anterior cornua were selectively affected with pigmentary degeneration and atrophy, those in the upper and middle dorsal, lower lumbar, and sacral regions being most extensively affected. None of the affected cells were reduced to masses of brown granules, being rather rounded, destitute of processes, surrounded entirely by clear circular spaces, clouded, and often finely granular in their interior, with yellow edges. In several instances, the body of the cell appeared to have quite degenerated, the outline remaining from which the origin of the processes could be traced (specimen exhibited). The posterior cornua were deeply coloured, especially the substantia gelatinosa, the nerve-roots beyond this being much less so. Numerous minute nuclei were scattered through them. In some parts, the perivascular canals were so dilated, as to almost separate the anterior from the posterior cornua. The white columns were affected almost equally throughout the entire cord, and generally in the different segments of the section. In the peripheral layers, the axis-cylinders of the nerve-fibres were crowded together, the circular outlines of the medullary sheaths having in great part disappeared. The connective tissue was closer, and more finely molecular than in the former cases, and dotted with nuclei. In the deeper layers, the normal appearance was more preserved, the anterior columns, at each side of the anterior fissure (columns of Türk), being, however, exceptions to this, the deep portions in front of the grey columns being coarse and reticulated (specimen exhibited). In none of the sections of the spinal cord were there seen any of the groups of globules noticed in the pia mater and brain. Transverse sections of some of the nerves running in the sheath of pia mater showed the axis-cylinders of the fibres to have entirely disappeared; the circular outlines presented normally by the cut ends of the different nerve-strands were irregular in outline and size, some being large, others very small and crowded together; the supporting structure was coarse, in some parts more densely coloured and fibroid than in others, while the investing sheath was thickened and nucleated.

Summary.—Fibrosis of vessels, with nuclear proliferation on and in their coats; overgrowth and granular condition of the connective tissue; atrophy of nerve-fibres; atrophy and degeneration of ganglion-cells of nuclei of hypoglossal and, to a less extent, of the vagi and glosso-pharyngeal in the medulla and of the anterior cornua in the spinal cord, those in the dorsal region being most affected; obliteration of the central canal, and marked dilatation throughout of the perivascular spaces; atrophy of the spinal nerve-fibres.

[To be concluded.]

THE THEORY OF DISINFECTION.

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In a paper on "The Chemical Theory of Contagium compared with the Corpuscular Theory", which appears in last week's JOURNAL, Dr. Notter makes some comments on my "Report on an Experimental Study of Certain Disinfectants", which was published in 1875. It is not my intention to enter into any controversy on the very interesting subject to which Dr. Notter's paper is devoted; but, as he appears to have altogether misapprehended my meaning in some rather important particulars, and as his paper will doubtless be read by many who have never heard of mine, I trust that room will be afforded me for an explanation.

In the first place, I did not, as Dr. Notter seems to imply, advance the statement that the "infective principle is neither soluble nor diffusible" on my own authority. It is a legitimate, nay, an unavoidable, deduction from the well-known experiments of Professor Chauveau and Dr. Burdon Sanderson on the contagia of small-pox, cow-pox, glanders, and ovine variola. It is, of course, open to any one to urge