befall a cell or tissue unit, or again recovery might be perfect if the zymogen were left intact. Numerous and varying degrees of injury as the result of accident or disease may thus occur, leading to more or less premature senility in a tissue. Physiological senility is probably the slow and gradual diminution of certain of the tissue ferments, and is in accord with the fact that all metabolic changes become slower with advancing age, and so less food can be dealt with in a given time. The peptonizing of nutrient foods may replace the natural process of digestion, but assimilation requires ferments just as much as digestion, and at present this deficiency cannot be made good.

I have spoken of a unit of living matter. If these remarks had applied only to yeast, possibly the word "cell" would have sufficed, but so often the unit is obviously not the cell. In a plasmodium for instance, there are no cells, while in nucleated cells, not even the nucleus in one sense is a unit, for it is not structureless; in another sense not less than the whole organism is a unit, whether it consists of one cell or many. Even in the latter sense and in the highest organisms at one period of life a single cell is the unit, namely, the fertilized ovum, which must contain the parent substances of all the ferments of the fully-developed individual. From the positive results obtained in the direction of artificial parthenogenesis, it seems likely that the female reproductive cell, and perhaps also the male, contain these independently, and yet not in the best proportion until they are averaged by the process of fertilization. Variation amongst the off-spring is to be explained by small variations in the proportions of ferments in the germ-cells, which are characters impressed on these cells and their descendants. In development of the individual, differentiation of the cells takes place from difference in position and surroundings, whereby an "impressed character" is received, and a cell on division always divides into two cells identical with the parent cell, thus are tissues derived (Hertwig.) It is here suggested that the "impressed character," acquired by position or surroundings, is to be explained as a modification of the cell-ferments in number or in proportion. How, then, does reversion to a former type occur? It has been suggested above that variation is due to the modification of ferments in the germ-cells or their descendants and it has also been suggested that complete destruction of a ferment may be recovered from if the zymogen be left; similar recovery would be possible if the zymogen were also destroyed but the pro-zymogen left and so on to the *n*th degree. Reversion may be due to some such recovery from an impressed character at some period of the individual's life-history.

The cells of more embryonic type, that is, cells that have received fewest impressed characters, if included in situations that are not normal to the individual, are a source of danger, as they are at too much advantage for undergoing growth and reproduction as compared with their neighbours, and they often form tumours. Malignancy in neoplasms may be determined to some extent by the two following factors, a comparative freedom from impressed characters on the part of the cells which multiply and form the growth, and a comparative senility on the part of the invaded tissue. But the latter factor often seems very small. It has been suggested that irritation, which sometimes seems a factor in epithelial cancer, may act by injuring the neighbouring tissue or limiting membrane; but perhaps the change is in the first cancer-cell and consists in the introduction or development of a necessary ferment, is in fact the removal of an impressed character. All that is urged on the matter here is that a comparison of the intracellular ferments of a cancerous growth with those of the normal tissues of the type from which such a growth started might lead to useful results.

It is not intended to discuss fully the pathology of those forms of disease that have been mentioned in the foregoing remarks, but merely to indicate the points of contact with my own conclusions based on the special experimental work I have described.

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THE Russian Gynaecological Society will hold its first meeting in St. Petersburg at the beginning of January, 1904.

CASE OF TUBERCULOUS MENINGITIS IN AN ADULT, WITH UNUSUAL SYMPTOMS.

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THE following case is of interest on account of the unusual and misleading nature of the symptoms, together with the fact that the disease ran a very acute course in a patient in whom there was no reason to suspect any primary tuberculous lesion.

CASE.—The patient was a married woman, aged 40, who since 1897 had been under treatment for pelvic trouble, for which she was operated on in November last by Mr. Morse, and an abscess in connexion with the left ovary and tube dissected out. The cause of the pelvic abscess, apparently of old standing, was not obvious, but at the time of the operation there was no reason to suspect a tuberculous origin. The patient's family history was excellent; she herself had nothing about her suggesting either a tuberculous taint or any active or latent tuberculous process. After the operation she put on weight and seemed in excellent health. Mr. Morse was called to see her on January 1st, 1903, and found her suffering from sickness and diarrhoea, ascribed to an error in diet. She quite recovered from this in a day or two, and remained in very good health till January 20th, when Mr. Morse again saw her for severe headache and sickness. The headache was very intense and was not referred to any particular part of the head, at times seeming most severe in the left occipital region, at others referred to the root of the nose as well, and sometimes to the vertex. The sickness occurred about three or four times a day, with no relation to food. This condition remained for a week, during which time the pain in the head became very severe, once waking her thirteen times in one night, and it became necessary to give morphine in order to relieve it. Her pulse during this time was nearly always 64, her normal rate being 70, and her temperature as a rule 97.8°, never rising above normal. Her mind was perfectly clear; she had no paralysis anywhere; the pupils were equal and active, and the knee-jerks normal.

On January 27th it was noticed that she constantly misused and misplaced words, being aware of the fact, as she complained of "being muddled this morning." Thus she ordered her bed to be put on the dressing table, and instead of "be in the end bedroom," she said "be in the bendend-room."

It was thought that possibly the disordered speech might be the result of the morphine, and that a decayed tooth might account for the headache. Gas and ether, which she had had twice previously, was accordingly administered and two teeth removed. Just before taking the anaesthetic she complained of seeing double. After the removal of the teeth she walked back to bed and was quite rational for about an hour, when she suddenly became restless, noisy, her speech was quite incoherent, and she recognized no one.

On January 28th we saw her for the first time in consultation. She was lying curled up in bed on her left side, away from the light, with both hands on her forehead as if in pain, constantly moving about and muttering to herself, unable to recognize any one or understand anything, though she would open her eyes and look at any one when loudly roused. There was no deviation of the eyes, no squint, pupils rather small, equal and active, no paralysis or weakness anywhere; reflexes normal; Kernig's sign absent. Just below each mastoid process she was very tender to pressure. The optic discs were quite normal, and the membrana tympani normal on both sides. There was no discharge from the nose or mouth. Her temperature had risen a degree since the day before, and was now 98.4° in the axilla. Heart and lungs normal.

Dr. Newton Pitt, of Guy's Hospital, saw her in consultation on the evening of January 28th, and agreed that the most probable diagnosis was one of cerebral abscess. He thought she still had some degree of sensory aphasia, for, although it was very difficult to get her to respond to any commands, she would occasionally put out her tongue when told to open her eyes. This, with the fact that she had continually misplaced words on the previous day, made it possible that the seat of the lesion was in the neighbourhood of the left auditory word centre or of the tract connecting it with the frontal lobe, but the localization was too indefinite to warrant an exploratory operation.

On January 29th she remained in much the same condition,

except that she was quieter, and her temperature rose to 100° . On January 30th she was much better, recognized people, and talked a little quite sensibly, but had no recollection of the last few days' illness. Temperature subnormal.

At 2 a.m. on January 31st she became drowsy, recognized no one, and would not respond to any questions. Her eyes were deviated to the right and upwards, axes parallel; she could look in any direction, and there was no oculo-motor paralysis or nystagmus, but when at rest the eyes assumed the position just noted. The discs were normal. We saw her again in consultation the same afternoon, and noticed that the frontalis muscle over the right eyebrow was more contracted than on the left side. Whilst remarking on this, she repeatedly and rapidly put her right hand to her mouth, then suddenly pursed up her lips, and the right angle of the mouth was drawn strongly outwards. Next the right side of the face became contracted by clonic spasms, and the convulsion spread to the right arm and then to the whole of the body, the eyes were turned to the left and upwards, she frothed at the mouth and became a little cyanosed. She soon recovered from the fit, and was found to have no weakness or paralysis anywhere. The right knee-jerk was absent and the left normal; no plantar reflex on either side. We thought that the occurrence of this Jacksonian convulsion supported the opinion originally formed of a gross lesion, probably an abscess, being present just below the termination of the Rolandic fissure. The severe symptoms with slight rise of temperature, which occurred after the extraction of the teeth, might have been caused by a little meningitis over such a lesion, while the fit was an indication of the process spreading upwards. We therefore advised an operation as holding out the only chance of recovery, but this was refused by the patient's friends.

On February 1st at midday she was much worse, respirations 40, and of the Cheyne-Stokes rhythm, pulse rapid and weak, temperature 98.4° .

On February 2nd she was much the same except that the eyes were divergent, both being turned outwards. She gradually sank and died on February 3rd without regaining consciousness or having any more fits.

Necropsy.—At the necropsy, which was limited to the brain, the substance of the organ on section looked quite normal everywhere. The convolutions on both sides seemed a little flattened, but there was no distension of the ventricles. The pia arachnoid at the base of the brain in front of the optic chiasma was injected and studded with small tubercles, especially along the Sylvian fissure on the left side; there was no lymph exuded, no matting, and no excess of fluid.

The only symptom in this case which did not fit in with our diagnosis of cerebral abscess on the left side was the conjugate deviation of the eyes. If there had been such a lesion the eyes during the convulsion should have been turned to the right instead of to the left, while when at rest they should have looked to the left. The symptoms certainly seemed to warrant the diagnosis of a cerebral abscess in a situation that could easily be reached by an operation, but fortunately, as it turned out, the decision of the patient's friends saved us from a procedure which would have been quite useless.

SOME OBSERVATIONS ON THE MORPHOLOGY OF THE TRYPANOSOMA FOUND IN SLEEPING SICKNESS.

By DR. ALDO CASTELLANI.

IN my preliminary note read at the Royal Society on May 14th, 1903, and in a more complete paper of mine published in the *Journal of Tropical Medicine*,¹ June 1st, 1903, I stated that in sleeping sickness I had found very frequently a trypanosoma which I thought to be the probable cause of the disease. I found the trypanosoma in the cerebro-spinal fluid taken during life by lumbar puncture in 70 per cent. of the cases. The trypanosoma may be found also in the blood, and I actually found it there in a case as far back as December, 1902, as can be seen from the tables attached to my preliminary note. In this note I propose to give briefly a few details on the morphology of the parasite observed in fresh and stained preparations.

Fresh Preparations.

The parasite has the usual general outline of the other trypanosomes. It has a worm-like shape; one end terminates with a flagellum, the other is more or less bluntly conical; there is an undulating membrane and a vacuole. The proto-

plasm does not appear to have quite a uniform structure, but rather an alveolar one, as described by Bradford and Plimmer in trypanosoma brucei, although apparently far from being so well marked. At first the parasite moves fairly actively in a screw-like fashion, as described in the other species of trypanosomes. On observing the preparation for some time with the microscope one sees that the movements become more sluggish, until they stop altogether. Frequently the trypanosome stops near a leucocyte, which by degrees engulfs it. On several occasions I have observed trypanosomes with apparently two well-marked flagella; the parasites were probably in a stage of longitudinal division.

Stained Specimens.—Leishman's modification of the Romanowsky's method gives very good results. Staining the trypanosome in this way the macro-nucleus, micro-nucleus, and flagellum appear red, the protoplasm blue, while the undulant membrane remains almost unstained. The nucleus is generally large and of variable shape; it is as a rule situated in the posterior half of the parasite. The micro-nucleus (Plimmer and Bradford) or centrosoma (Laveran and Mesnil) does not show any apparent structure. It stains red, but of a much more vivid colour than the nucleus. It is situated very near the posterior end of the parasite, and generally outside the vacuole. The vacuole is oval and of rather large dimensions; it is situated anterior to the micro-nucleus.

The flagellum takes origin apparently from the micro-nucleus; then, following the external edge of the undulating membrane, reaches the anterior end, where it becomes free. The free portion of the flagellum is apparently longer than in other trypanosomes.

The protoplasm does not stain evenly, nor very deeply; it does not show many chromatic granules. The total length of the parasite is from 18μ to 26μ . The width is from 2μ to 2.5μ .

Photograph of the trypanosoma found in the cerebro-spinal fluid of a case of sleeping sickness. $\times 1,000$.

Developmental Forms of the Parasite (?).

In the blood taken from the finger, especially during the last stages of the disease, in the blood of the heart, as well as in the cerebro-spinal fluid, I have seen frequently large roundish bodies 14μ to 16μ in diameter with one or more vacuoles, which on superficial observation might be taken for amoebae if it had not been that they did not emit pseudopodia. These bodies stained by the Romanowsky-Leishman method showed two or more points where the chromatin collects. I am inclined to consider these bodies as developmental stages of the trypanosome. Something similar has been described by Kempner and Rabinowitch in trypanosoma lewisi.

Identification of the Parasite.

The only species of trypanosoma so far known in man is trypanosoma gambiense (Dutton). Though others may have seen it before (Nepveu, Forde) there is no doubt that Dutton was the first observer to describe it scientifically. Dutton and Forde were the first to draw attention to its relation with a specific fever which principally attacks Europeans in the tropics. This species of trypanosome has hitherto been found in the blood only. No trypanosome of any sort had ever been found in sleeping sickness.

As regards general shape and size the trypanosoma gambiense and the one I have found in sleeping sickness do not differ much, but according to my experience differences may exist in the position of the micro-nucleus, the vacuole, and the flagellum. In the trypanosome of sleeping sickness the micro-nucleus is generally much nearer the extremity, and as a rule outside the vacuole; the vacuole is generally larger. The flagellum takes origin apparently from the micro-nucleus; the free portion of the flagellum is longer.

These morphological differences, according to my experience, are frequent, though far from being constant. Although I have not yet performed inoculation experiments in the lower