tion that the views of the Lyons school are correct, or as a typhoid bacillus *sensu stricto*, the characters of which have undergone alteration as the result of a changed environment. That environment can and does alter the biological characters of micro-organisms is indubitable, and this very case affords a striking example of the fact. It will have been noted that the 9-drop Parietti tube remained sterile, although inoculated with typhoid-containing water. A trace of the slightly turbid contents of the 6-drop tube was introduced, and the tube set aside for twenty-four hours at 37°. The next day it was found to be turbid throughout, and plating out yielded a result identical with that above described in the case of the other tubes. Organisms of the colon group are highly flexible in this way. In connection with other water analyses in which they were present, I have pushed the dosage of acid and phenol (as Parietti's solution) to more than 1 c.c. in 10 of the broth, and still obtained growth, but only by gradual acclimatisation. Other organisms may sometimes share in this tolerance; for example, a 15-drop Parietti tube inoculated with sewage proved after incubation at 37° to contain only an enormous coccus, the biology of which I followed no further. For the above reason the requirements of those who insist upon absolute biological and morphological coincidence between the typhoid bacillus of Eberth, described as it has been from the study of cultures made direct from the bodies of typhoid patients, and the typhoid bacillus after many generations spent in such widely different surroundings as the contents of the privy or water pipe, seem to me based upon fallacy.

Dr. Morris has been good enough to furnish me with the following details about the outbreak: "The village contains ten houses with a population of about fifty. The houses are surrounded in each case by farm out-offices, with the inevitable manure-heap in the yard. The pump is surrounded with manure-heaps on every side. During the autumn and early winter it was dry. At Christmas it began to work again, and in order to facilitate matters, it was the custom to procure a bucketful of slush from the nearest pool and pour it down the pump. The first cases occurred during the second week in January, and nearly simultaneously in three houses. There were 18 cases in all, 2 of which died. I had 12 in my practice without a death. My cases were all connected with two houses. In one the entire family—father, mother, son, three daughters were all attacked; in the other a man, his wife and sister, two old women (aged about 70), and a little girl who came to nurse. Eight cases I would count as mild, namely, the two old women and the six young people (aged from 10 to 20). The others I would class as fairly severe, and in each case the severity was due to pneumonia. The pneumonia was right-sided in each case and the lung was long in resolving. Typhoid spots in 9 cases; constipation in 4; no hæmorrhage. Violent early delirium in one case. The diarrhoea generally lasted ten days. Marked temporary deafness in 9 cases..... The two old women and the little girl referred to went to their homes in different villages. I have not heard of any case occurring since then in their locality. I wonder if the typhoid bacillus is contained in butter..... All these parties were making butter and using the water."

The reply to Dr. Morris's very natural question would appear on *a priori* grounds to be decidedly in the affirmative. An experimental investigation of the matter has been published by Laser,⁶ who found that typhoid bacilli preserved their vitality in butter for six days.

In the above observations I have avoided, as far as possible, going into the extensive Continental literature of this subject. I have chiefly aimed at giving a narrative of facts, and have been prompted to do so by the important rôle which may, on the strength of such cases as this, be justly claimed for the bacteriological analysis of drinking water. The accumulation of such results may shortly begin to influence public opinion to so great an extent that chemical results will in no distant future be regarded by public boards as insufficient unless accompanied by the information obtained as the result of careful bacteriological analysis. Every credit is due to practitioners who, alive like Dr. Morris to modern scientific acquisitions, are instrumental in calling attention to such cases as that which I have just reported.

⁶ *Zeitschr. f. Hygiene*, Bd. x, 513.

THE EFFECTS OF COMPRESSION OF THE COMMON CAROTID ARTERY.

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SCHIFF¹ recorded many years ago that the results of temporary occlusion of one common carotid artery were formication and tingling over the opposite side of the body, followed by anæsthesia if the compression was maintained for a longer time. The symptoms began with sensations in the face on the same side, and darkening of vision of the eye on the same side. From this observation, Schiff argued in favour of the crossing of the sensory tracts. In one experiment on himself, Schiff was seized with twitchings of the opposite hand; and in one other experiment in the presence of a doctor, he fell to the opposite anæsthetic side, and was seized with convulsions of the opposite extremities. Schiff notes that the sensations grew most intense in the opposite hand. He attempted to compress both carotids on himself, but his arms fell powerless. In some individuals no result was obtainable, and this was due to free anastomosis, as shown by the continuation of weak pulsation in the external maxillary artery after compression of the carotid.

Mr. Spencer and Professor Horsley,² in a recent most interesting research on the control of hæmorrhage from the middle cerebral artery by compression of the common carotid, found that, on applying the pressure in monkeys, "all pulsation of the middle cerebral immediately ceased." The cortex became paler, and the excitability to electrical stimulation of the so-called motor areas was lost. The compression had no effect in diminishing the blood supply of any other part of the cortex than that supplied by the middle cerebral. Two hours after ligature of the common carotid in the monkey, the excitability and the circulation were again fully established through the anastomosis of the circle of Willis. These results depended on the anatomical arrangement of the middle cerebral, which is a direct continuation of the line of the internal carotid.

Neither in these experiments nor in the surgical cases on record of ligature of the carotid artery has there been any manifestation of spasm or motor discharge resulting from the sudden cortical anæmia. It is very possible that this may be due to the lessened cortical excitability produced by the anæsthetics employed. Temporary paralysis³ with aphonia and anæsthesia has been observed in surgical cases of ligature several times.

On coming across the observation of Schiff several months back, one of us (H.) tried the experiment of compressing the left common carotid, and at once obtained the sensations of formication and tingling spreading down the right side of the body and accompanied with feelings of vertigo. On January 5th, 1894, H. again tried the experiment, and was astounded by the immediate result of half a dozen clonic spasms of the right hand, which at the time lay upon the arm of a chair. The hand felt passively moved as if by some external agent, and consciousness of the spasms arose only from the peripheral sensations produced by the movement. The experiment was followed by vertigo and nausea lasting for some minutes.

On January 12th H. repeated the experiment with the purpose of observing the effects more closely. On compressing the left carotid against the spine, an undefinable sensation, which may be called numbness and pricking, arose in the left eye; this was followed by a distinct and rapid march of formication and numbness down the right arm, right leg, and then up the left leg. At this point the compression was withdrawn; the sensations, however, grew in intensity in the right hand, drew the attention to that

¹ Schiff, *Lehrbuch d. Physiol.*, 1858-59, p. 108.

² "The Control of Hæmorrhage from the Middle Cerebral Artery and its Branches by Compression of the Common Carotid," *BRITISH MEDICAL JOURNAL*, vol. i, 1889, p. 457.

³ A complete history of these cases is to be found in the above paper of Spencer and Horsley.

part, and then the hand was felt to be passively twitched as by some external agent three or four times. Nausea and vertigo followed and lasted for some minutes, and an acute feeling of dread of touching the region of the carotid again lasted for some days.

On January 15th, M., while observed by H., attempted to occlude the right common carotid. M. experienced difficulty at first in compressing the artery, and the first symptom produced was a succession of inspiratory spasms, which very probably were caused by stimulation of the vagus. Sensations in the eye on the same side followed, and then three or four flexions of the left hand and fingers, which were lying at the time on M.'s knee. At the same time there were pallor and sweating of the face. M. felt the hand to be passively moved by some external agent, and consciousness of the movement arose entirely from peripheral sensations. Vertigo and nausea followed.

The interest of these observations, which are too unpleasant to be willingly repeated, lies, first, in the realisation of the intensely sensory side of consciousness. In all three experiments and in both observers consciousness of the movement arose entirely from the centripetal sensory impressions which had origin in the moving part. The central motor discharge was absolutely unaccompanied by any simultaneous consciousness of that discharge. The sensory part of the sensori-motor process was alone accompanied by consciousness. Consciousness of peripheral sensations arose first of all as an illusion from the central stimulation due to the sudden anæmia; and, secondly, from the real peripheral sensations due to the "passive movements" of the arm.

Secondly, the experiment impressed vividly upon the observers the sensori-motor functions of the regions supplied by the middle cerebral artery, and the justness of the views of Munk, and in this country of Mott, as to the nature of the results arising from ablation of this area.

Thirdly, the observers were enabled to feel the full force of the teachings, long ago formulated, of Hughlings Jackson as to the origin of spasm in man from pathological changes in this region of the cortex. For it can scarcely be urged with any probability that the above results, with the exception of the inspiratory spasm, could have been induced by any stimulation of the vagus or sympathetic nerves.

THE CASE OF THE "HUMAN OSTRICH."

By FREDERIC EVE, F.R.C.S.,
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O.W., aged 43, general labourer, was sent from an infirmary to the London Hospital early on the morning of April 24th. He was suffering from peritonitis and intestinal obstruction. Although questioned closely he gave no clue to the cause of the obstruction; he stated that four days previously an attack of severe pain in the abdomen, referred to the umbilicus, came on, and from that time he had passed neither flatus nor fæces. Vomiting had only commenced on the previous evening, when he was admitted to the infirmary. I saw him at 9 A.M.; the abdomen was much distended and tympanitic; the respiration rapid and difficult; his pulse thready, rapid, and feeble. He had typical *facies abdominalis*; temperature 100° ; the skin covered with cold perspiration. Peritonitis associated with some form of acute obstruction was diagnosed, and the patient was taken at once to the theatre. He seemed so exceedingly ill that I resolved to content myself with opening the abdomen and tapping and evacuating any distended coil of intestine which might present itself, after the method advocated by Mr. Greig-Smith, and, as his respiration was extremely embarrassed and the heart action also failing, I resolved to employ cocaine as a local anæsthetic instead of ether or chloroform.

About 30 minims of a $2\frac{1}{2}$ per cent. solution of cocaine were injected both superficially and deeply into the abdominal wall between the umbilicus and pubes. The patient experienced absolutely no pain during the incision through the parietes of the abdomen until the peritoneum was reached, when he gave slight evidences of discomfort. The abdomen contained a large quantity of fluid fæces, the intestines were deeply

injected, and in places matted together with recent lymph. A coil of distended intestine was followed, and a perforation of the ileum containing a square piece of tin the size of a threepenny piece was soon found. Less than an inch beyond this was another perforation, each opening being the size of a halfpenny piece; protruding from the second perforation was a metal hook so bent upon itself as to clamp the intestinal wall; it could not be freed until bent open with a pair of pliers. Attached to this hook, and extending along the intestine in the direction of the ileo-cæcal valve was a narrow strip of leather; this was firmly pulled upon but could not be detached. Its opposite end was evidently firmly fixed in some portion of the bowel lower down.

Immediately below the point where the hook had penetrated the intestinal wall the bowel was folded or "concentric" together, and at one point an intussusception of about an inch to an inch and a-half in length had occurred, the proximal end of the intestine being invaginated, as usual, into the distal. The condition of this portion of the bowel was thought to have been brought about by the hook becoming attached to the intestinal wall, while the piece of leather had been driven onwards by the peristaltic action of the bowel; on freeing the hook, the folded intestine was easily drawn out, together with the intussusception. About two or three feet further down than the perforations, the gut was firmly attached in the right flank, and, on introducing the hand, a portion extending obliquely upwards in the direction of the liver was felt to be distended and closely packed with some hard substances, feeling like coins. The necessary manipulation in the abdomen and separation of adherent lymph or adherent coils had caused the patient considerable pain. His pulse and general condition became worse; his abdomen was therefore washed out with weak carbolic acid solution, the two neighbouring perforations were united by an incision, and the opening attached to the incision in the abdominal walls. In the meantime injections of brandy and of strychnine, gr. $\frac{1}{6}$, had been given subcutaneously. He rallied somewhat from the operation, and his pulse responded to injections of strychnine, but he finally died at 5 P.M. the same evening, having remained conscious to the last.

After the operation he was questioned closely as to his habits, and he confessed that to gain a livelihood he would swallow "penny pieces, halfpence, pieces of tin, paper, cork, swivels, watch chains, keys, tacks, nails, pieces of india-rubber, and sovereign purses, etc.," but "scores came back," meaning *per rectum*. He was evidently under the impression that he had long since passed all of these articles.

At the *post-mortem* examination next day all the organs were practically healthy except the apex of one lung, in which there were some caseous nodules and also pleuritic adhesions. The stomach was empty, and the lining membrane healthy except at the cardiac end, where it was considerably ecchymosed, and at the pyloric end, where it was stained black, suggestive of considerable delay in the metals passing through the pylorus; the latter admitted two fingers. The stomach and œsophagus were not dilated. The upper end of the small intestine was much distended, and the whole ecchymosed. Toward the end of the ileum the bowel was coated with shreds of lymph, and the whole of the abdomen contained turbid yellowish fluid. The lymph on the intestine readily peeled off. Nothing except fluid appeared in the intestines till about five feet from the ileo-cæcal valve, where the artificial anus existed, and about a foot further on an ulcer with a tiny perforation was detected. For a distance of eighteen inches the bowel was completely blocked with foreign bodies. These were variously mixed with clogs of newspaper on which the print could still be detected, and consisted of the following remarkable collection:

- Forty pieces of cork (cut bottle corks).
- Thirty pieces of doubled tinfoil.
- Nine pennies.
- One iron ring (size of a penny).
- Ten or twelve pieces of clay-pipe stems.
- A leaden bullet.
- A rubber ring from a lemonade bottle.
- Three pieces of leather an inch square, string, cotton, newspaper.
- A piece of leather, nine inches long, with a stout hook at each end (one of these hooks had been found in perforation).
- A piece of string about a foot long, with tinfoil and corks attached.
- A few other smaller things.