had severe recurrent attacks of headache which had kept him away from business for days together. I found well-marked hypertrophic rhinitis. The thickened mucous membrane was removed by the cold snare and the galvano-cautery. In a few days there was marked improvement and in from two to three weeks the patient felt perfectly well.

CASE 2.—In April, 1889, I was seen by a man who during the previous six or seven months had had a discharge from the left nostril, accompanied by severe intermittent pain in the cheek and forehead. For days together he would be nearly free from pain, but for two or three days in the week the pain in the head was so severe that he had to stay away from business or even to remain in bed. He was told that he was suffering from "nervous headache." I explored the maxillary antrum and found offensive pus. The antrum was then thoroughly opened and drained, and there was no return of the pain.

CASE 3.—A man, aged 45 years, had had severe pain in the head behind the eyes for 18 months. There was always a feeling of fulness in the head and every few days severe neuralgic pains set in which lasted for several hours. The slightest movement of the head aggravated the pain. There was often a copious purulent discharge from the nose, generally during or after an attack of pain. I found a few nasal polypi. These polypi and part of the enlarged middle turbinated bone were removed, the sphenoidal sinus was opened and scraped and complete cure followed in a few weeks. This case also had been diagnosed as one of "nervous headache."

CASE 4.—On Jan. 14th, 1899, I was seen by a man who had suffered from nasal discharge and frontal pain for some years. During the last few months the pain had been more marked. There was always a dull aching pain in the forehead and nearly every morning after breakfast severe neuralgic pains set in which lasted for an hour or more. The region of the frontal sinus was distinctly painful on pressure. I found numerous nasal polypi growing from the upper turbinated bone. These were removed on several occasions. In May, 1900, I scraped the upper turbinate and opened up the anterior ethmoidal cells. The pains disappeared and have not returned since.

CASE 5.—A young woman, aged 18 years, saw me in 1897. For the previous few years she had suffered from severe headaches, chiefly unilateral, which came on every few days and which lasted for from one hour to three or four hours. The face became red and congested, the head felt as if it were going to burst, and she was obliged to lie down. The lower turbinate of the right side was distinctly enlarged and the mucous membrane was thickened. All kinds of drugs had been tried in vain. In June I applied the galvano-cautery, after which there was slight improvement for a few weeks. In September I removed the lower turbinate under chloroform. The improvement was at once marked, and in a few weeks the headaches ceased altogether.

Diseases of the nose and nasal accessory cavities are extremely common in Yorkshire; in fact, so common that they are often looked upon as a necessary or incurable evil.

Bradford.

EXCESS OF SALT IN THE DIET A PROBABLE FACTOR IN THE CAUSATION OF CANCER.[1]

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THE nineteenth century, great and fertile as it was in scientific discoveries, could not read the riddle of the cause of cancer and has handed the question down to us still unsolved. The essay, of which this paper is a brief abstract, is an attempt to answer this question by finding some factor common to all cases and circumstances of the disease. Such a factor must exist unless the causes of cancer are multiple. In order to be brief I will at once give the theory which I have formed and afterwards explain and support it by evidence. It is this: 1. That excess of salt in the diet is one of four factors which originate the disease. This is the essential factor, but it is inoperative without at least one, and probably two, of the others. Excess of salt may arise from individual taste, or from much salt meat, or from too much ordinary meat, which of course involves much salt. The other factors are these. 2. An over-nourished condition of body from more food, and especially more meat, than is required. This condition is rarely met with amongst out-of-door manual workers. 3. An impure condition of body owing to non-use and non-oxidation of the food which has been taken. The amount may have been moderate or even small. The cells of the body in this condition are loaded with effete material. It obtains in old age; in persons who lead indolent, easy, and indoor lives; and locally in organs the active functions of which have ceased. 4. A fourth factor is some local irritant or stimulant, such as friction from the stem of a pipe or irritation from some micro-organism of which no one is actually specific, or ovarian stimulation in the case of the breast. Of these the first must always be present, and probably in some form the fourth and also in all either the second or the third, but not both of them. These factors being in existence the disease may be started in perhaps one epithelial cell or in a mass of cells which grow individually larger and change the nature of their protoplasm, for a cancer cell will not stain with congo red, whilst an epithelial cell takes the stain deeply. The cell becomes a different being with often more than one nucleus. It is itself the parasite, living and growing at the expense of the tissues around it, and contributing nothing to the common good.

This idea was originated in the mind of the writer by his noticing that cancer of the uterus was seldom or never met with amongst the numerous Jewesses attending the gynæcological out-patient department of the Leeds General Infirmary (only one case in 10 years). The experience of the London Hospital, where there is a special Hebrew department, is the same (only one case in five years, against 178 amongst Gentile women). Dr. Abraham Cohen, physician for Jewish out-patients at the Metropolitan Hospital, writes that his experience is the same; and Dr. A. C. Tunstall, medical officer until recently to the Jewish Hospital for Incurables, writes that he has never seen a case of cancer amongst the Jews. If this comparative immunity is correct the only explanations possible are—(1) difference of race, and (2) difference in diet. The latter is far more probable than the former, although there may be something in race.

Another curious fact which may be compared with this is that in the vomit of cancer of the stomach there is no hydrochloric acid, whereas in all other forms of vomit the acid is present. On this point Mr. D'Arcy Power writes: "Your point about the diminution of salt is a good one, but it must not be held to prove too much, for it only shows that a rapid multiplication of cells is taking place in the body. Does not the same diminution take place in pneumonia?" There is a curious observation by Moraczewski in Virchow's *Archiv*[2] that the blood of persons suffering from cancerous anæmia contains a relative increase in chlorides and a diminution in phosphates. This contradicts Mr. Power's explanation of the absence of hydrochloric acid in the vomit of cancer of the stomach.

The difference in diet between Jews and Gentiles consists mainly in the absence of bacon and ham from the diet of the Jews; and as, according to Professor J. McFadyean, Principal of the Royal Veterinary College, the pig is the only domestic animal in which no case of cancer has been met with, it must be the salt and not the flesh of the animal which is to blame; but the Jews also eat less butcher's meat and more fowl and fish than we do. These points all tend to the conclusion that salt is the active factor, but they are not advanced as scientific proofs of the truth of the theory. There is some doubt about the accuracy of the observation about Jewesses, as Mr. M. Umanski of Leeds tells me that he has met with many cases; but if Mr. Umanski is correct, why do we not see them at the Leeds General Infirmary, where Jewesses in my time (1885 to 1899) attended in large numbers, or at the London Hospital, or at the Metropolitan Hospital, or at the Jewish Hospital for Incurables?

There can be no doubt that salt is a powerful stimulant to cell metabolism. Vort[3] published an article upon this subject in 1862, showing that it increases capillary circulation and the oxidation of albumin, and through this the

[1] Abstract of a paper read before the Leeds and West Riding Medico-Chirurgical Society on Nov. 1st, 1901.

[2] Virchow's Archiv, vol. cxxxix., p. 385.

[3] British and Foreign Medico-Chirurgical Review, vol. ii., 1862, p. 235.

quantity of urea excreted. Breeders of cattle and of horses are well aware of the effect of salt. If it is given to sheep suffering from disease such as sheep-rot it will give vigour and help the tissues to resist the effect of wet. It is absolutely necessary to the growth of minute animal organisms, such as infusoria, which will not grow in distilled water but will grow if half a grain of salt to the pint is added to the water. What, however, may be good in moderation may be bad if taken in excess or if continued too long.

The idea that salt is the essential factor may be arrived at in another way. There is marked in Mr. A. Haviland's cancer map of England, the extensive "cancer field" of Malton and Pickering. I have been to Marishes-road, the worst spot in this field, to examine the conditions there, and came to the conclusion that the only explanations possible are: (1) the regular flooding of the land every winter; (2) the possibility that the thin layer of mud deposited may contain some bacterium, for it is said that if cattle eat the herbage before the mud is washed off by rain they are killed by it; and (3) the very large amount of meat and bacon eaten by the people—viz., three heavy meals a day. Compare this "cancer field" with that of Wetherby, where there are no floods and where the land is high and dry and principally limestone. From this it is evident that the explanation of the Pickering mortality cannot be the flooding of the land or the deposit of mud. The only thing common to the two districts is the diet, which at Wetherby is good, being meat and bacon two or three times a day amongst the farming class and good living amongst the wealthy residential class, and of course much meat means much salt Dr. J. A. Hargreaves, the medical officer of health, believes that the poorer classes are comparatively exempt and that cancer is a disease of class. He is working at this point as illustrated by his own district.

Nothing can be clearer about cancer than the fact that its incidence is connected with diet; and if our various pieces of knowledge bearing upon diet are compared it will be found that the only constantly present thing is salt. It does not matter what the rest of the food may be, salt must be present, and in excess considering the patient's occupation and mode of life. If salt is absent, cancer is absent. Savages, so far as is known, are exempt from cancer,[4] and they get no salt. All domestic animals except the pig are subject to cancer, and salt is given to sheep, to cows, and to horses, but never to pigs. Sarcoma has been known to occur in the pig, in the testis, but no true case of cancer. Professor McFadyean, has never met with a case. Wild carnivora, with, of course, a pure meat diet, are exempt. No authenticated case has ever been met with amongst them.[5] Of course, they get no salt except in rare instances, as in the case of the buffaloes' "salt licks." On the other hand, when confined in zoological gardens they are given salt and they become subject to cancer. An African hippopotamus has recently died from cancer at the Zoological Gardens in London, and salt had been given to it. I can find no instance of true cancer in any animal which has not had access to salt, but Mr. Roger Williams mentions two cases of sarcoma, one in a plover and the other in a marsupial. Sarcoma, however, is a different disease to true cancer. It might be supposed that the rice-eating natives of India would be exempt from the disease, but they are not. "All natives of India are keen on salt," writes Dr. Andrew Duncan of the School of Tropical Medicine. The rice-eaters are not quite strict vegetarians, as they take fish when they can get it. They eat much food of the pea tribe which contains much nitrogen. Sailors may live for weeks on salt junk and breathe a salt-laden atmosphere, but it does them no great harm because conditions (2) and (3) are absent—i.e., they work hard in the open air. Their mortality from cancer is, however, very high—viz., 44·5 per 100,000, contrasting with that of miners (14·5) and of ironworkers (12·2). The mortality from cancer in London is extremely high in the whole of the district west of a line drawn from Newington-green through London-bridge to Sydenham. This embraces the parts inhabited by the wealthy who take much meat and, of course, with it a corresponding amount of salt. On the other hand, the poor parts, such as Bermondsey, Rotherhithe, the Isle of Dogs, Old Ford, Bow, and Bethnal Green, have a low mortality. It may be replied to this that the average age of the population in the wealthy parts is higher, but the Registrar-General has published tables for the principal English counties corrected for age and sex, and it is found that the relative mortality from cancer is by this not impugned but only altered a little.

Cancer houses are probably merely houses where there is accommodation to keep a pig and where the diet consists of a good deal of bacon or where a good deal of butchers' meat is consumed, and with it, of course, salt; or where the inhabitants are old but their appetites are still good; or where they are women and live well, but lead indoor lives so that the food is not oxidised. An instance of this was given in which three successive deaths had occurred. The great increase in cancer recently is chiefly amongst men, and is in the stomach and abdominal organs. If there has been a great increase in the consumption of salt, as I believe there has, in consequence of and with a great increase in the consumption of meat, this would explain it, or might do so.

Lyon[6] publishes the result of a research into the distribution and statistics of cancer in Buffalo for the period 1880–1899. The material analysed consisted of the mortality records of the City Board of Health, and in estimating the distribution the patients in 2005 cases whose residence was known were assigned to their proper quarters. A marked concentration was found in the German wards, and no other relation than that of race could be determined to exist between this area of concentration and local conditions. Tables constructed to show racial prevalence demonstrated that cancer was much more frequent among the foreign-born population—and particularly the Germans—than among the native-born inhabitants. A low cancer-rate was found in the Italian quarter, and a correspondingly low position was occupied by the Italians in the race table. The Germans and Poles exhibited two other peculiarities in that the rate among males closely approximated the rates among females, whereas among other classes the females were almost double the males. These two nationalities were also distinguished by the very large number of cases of cancer of the stomach and the comparatively small number of cases of cancer of the uterus and breast. Lyon considers that the figures support the idea that the peculiar diet of the Germans is responsible for the high rate amongst them. The statistics show a general increase in the cancer-rate of from 32 to 52 per 100,000 of population. What the peculiar diet of the Germans is, is not stated, but we may pretty correctly guess it. This theory is not opposed to the idea that a micro-organism is an exciting cause of cancer; in fact, it requires or presupposes some local irritant. But for this purpose one organism would do as well as another, and none would be actually specific.

The interesting discoveries of Plimmer carry conviction to my mind that a parasite is present in the active growing cells of most cancerous tumours. Mr. H. G. Plimmer found these parasites in 1130 cases out of 1220. There were reasons why they were not found in 90 cases and 58 cases remain in which they could not be found. These parasites, however, may follow the commencing stage of the tumour instead of preceding it. If they precede it, which they must do if they cause it, they ought to be found apart from the disease. Moreover, micro-organisms as the sole cause of cancer do not harmonise with most of the facts about the disease. They would not account for the comparative immunity of Jewesses or for the undoubted fact that prosperity and high living increase the tendency to the disease. These ought to act the other way. If it were a parasite surely the damp, water-logged Isle of Dogs should be a paradise for it, whereas that district is comparatively healthy; while Hampstead, which lies high and dry and is covered with excellent houses standing in their own grounds, has a high mortality.

In conclusion, I do not assert that I have produced absolutely conclusive proof of the truth of the theory advanced I consider that in its present stage the theory is more a suggestion than anything else—merely a new idea for consideration. At the same time I would ask, Has not nature, and have not some observers, made scientific experiments for us? Have not the good people of Malton and Pickering kindly fed themselves with beef and bacon three times a day for our instruction? and have we not the result

[4] W. Roger Williams THE LANCET, Nov. 4th, 1899, p. 1258.
[5] Ibid.

[6] American Journal of the Medical Sciences, June, 1901.

before us? This is as scientific an experiment as can be made, and the same applies to most of the other facts. Whilst writing this an old woman, aged 72 years, has applied for advice with cancer of the breast. She has bacon for breakfast and bacon for dinner. She lives in an ancient toll-bar house on an unfrequented road, she seldom goes out, and she can get no other food. Has not this woman, in a certain sense, made herself the subject of a scientific experiment? If this theory should turn out to be true its use would be chiefly in prevention, for it is not likely that deprivation of salt would cure an already established disease, although it might check its advance. It may, however, be tried, and also tried along with any other mode of treatment, as with a view to prevent recurrence after surgical operations, or with oöphorectomy and thyroid in cancer of the breast, as has been so ably advocated by Dr. G. T. Beatson and Mr. G. E. Herman, to whom, and especially to Mr. Roger Williams and Mr. Haviland, I tender my thanks for the many interesting papers from which I have taken most of my facts.

Leeds.

A CASE OF ASTHENIC BULBAR PARALYSIS (MYASTHENIA GRAVIS).

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THE classification of the various forms of bulbar paralysis has always been a subject of much interest to the neurologist, but with the exception of the so-called "asthenic" variety their pathology seems now to be fairly well understood and to be no longer a matter of serious debate. With "asthenic" bulbar paralysis, however, it is different, for here no lesion has yet been found; and, indeed, it is a question if this disease should still be classified as a bulbar paralysis, and should not rather be considered as a general myasthenia in which the muscles supplied from the bulb are more specially affected than those receiving their enervation from other parts of the nervous system. But it is, perhaps, premature to discuss the pathogenesis of asthenic bulbar paralysis, for we have so few data to go upon. The disease, however, is very rare, not more than some 12 cases having been recorded in this country; and though there seems to have been a larger number than this abroad, I feel that I need have no hesitation in reporting a case which recently came under observation in the Glasgow Royal Infirmary, especially as I have made a somewhat careful microscopical examination of such parts of the nervous system as I have been able to obtain possession of.

A man, aged 58 years, was admitted to the Glasgow Royal Infirmary under the care of Dr. J. L. Steven on Nov. 17th, 1899, with a complaint of difficulty in speaking and swallowing and of an intermittent weakness in the extensor muscles of the neck. These symptoms had set in some two or three months before admission, and the patient thought that they were partly the result of his having carried on his head, on two successive days, a heavy load of books, for on the second day he was quite exhausted and felt very "nervous." Since this time his head had tended to droop forwards on to the chest. This was specially marked if he had been walking for a while, for then the head would fall forwards, usually towards the left, necessitating his lifting it up again with his hands. This symptom gradually got worse and sometimes the head could not be kept upright unless held up in that position. The defect in speech would only come on after he had been talking for some time, and after a rest the speaking was always more fluent and distinct. The difficulty in swallowing was also intermittent, and when present consisted in what the patient called a "spluttering and coughing" over his food. At such times the liquids would come back through the nose. Three weeks before admission there was some slight weakness noticed in both arms, especially the left, and occasionally there was a flexor contraction in the second, third, and fourth fingers of the right hand. The patient had been a soldier for 21 years and a good deal of this time was spent in India. He had had several attacks of ague and with one of these he was in hospital for 10 months. He had scarlet fever and measles in childhood, but could not remember having had rheumatism. He had suffered from hæmorrhoids almost all his life and from time to time lost a considerable amount of blood. He had been a total abstainer since 1877. The family history was of no importance; it showed no evidence of nervous ailment among any of his relatives.

On admission the patient was noted to be pale and anæmic and he had quite the appearance of one suffering from a more or less profound anæmia. There was no evidence of paralysis in any of the muscles of the face. The tongue could be protruded without much difficulty, but on examining the fauces it was noted that there was a firm adhesion between the left tonsil and the postero-lateral part of the dorsum of the tongue (this, the patient said, had dated from the attack of scarlet fever when he was six years old, but all the time he was in the army and performing the duties of a non-commissioned officer it in no way affected his power of speech.) The speech varied greatly in distinctness from time to time. Sometimes it was very suggestive of the articulation of bulbar paralysis; at other times there was just a slight nasal quality in the words. As the patient talked his articulation got worse but after a period of rest it was greatly improved. During the first few days in the hospital he at times complained that he could not swallow his food, and if he tried to do so there was usually a good deal of coughing and the fluids would return through the nose. But this was by no means constant, and frequently he would swallow both solids and liquids with no apparent difficulty. The most striking physical sign, however, was what at first looked like a spasmodic contraction of the flexors of the neck, causing the head to fall forwards and towards one or other side on to the chest. The patient would prevent this by supporting the forehead with his fingers; or, again, he would clasp his hands behind his neck, this seeming as if it supported some weakness in the extensors of the neck, for he complained of a sense of weakness in that region. When he began to walk he would hold himself fairly erect, but after a few steps the head would fall forwards on to the chest, and it was quite evident that when walking there was even a greater difficulty in holding the head erect than when he was sitting still. Careful examination of the neck at these times could elicit no appearance of spasm in the sterno-mastoids or in any other muscles of the neck, and it was quite evident that the fault lay in the trapezius and possibly in the erector spinæ muscles. There seemed, too, to be a certain amount of wasting in the upper fibres of the trapezius. There was complaint of a sense of weakness in the left hand, but no definite paralysis could be made out. The left hand registered 19 kilogrammes and the right 30 kilogrammes. At times there was a distinct spasmodic flexion at the metacarpo-phalangeal joints of the second, third, and fourth fingers of the right hand, and when this was so it was with difficulty that the spasm could be overcome by passive movement. There was no loss of power in the legs and the patient seemed to walk without any apparent trouble. The patellar reflexes were unduly active, but there was neither knee clonus nor ankle clonus. There was no defect of sensation in the arms or legs. Examination of the eyes showed the visual acuity to be fairly normal and there was no contraction of the fields of vision. The pupils were equal and responded readily to light, but rather sluggishly to accommodation. There was some slight paralysis of the right internal rectus, for when the patient looked towards the left the right eyeball lagged behind the left, and there was crossed diplopia beginning at the mid line and increasing as the image passed to the left. Examination of the heart, lungs, and kidneys proved these organs to be healthy.

From the time of admission onwards the progress of the case was slow, but always for the worse. From Dec. 20th the head was almost constantly lying down on the chest and the weakness in the hands and arms was so marked that the patient had difficulty in giving the head the support necessary to raise it up. At this date the right hand registered 20 kilogrammes and the left 14 kilogrammes. Articulation, it is noted, varied, but at times it was so bad that it was impossible to understand what the patient was talking about. The difficulty in swallowing had now become an urgent symptom and some days later it was necessary to give food by means of a stomach tube. On Jan. 8th, 1900, an attack of urgent dyspnœa lasting 10 minutes set in. The distress was extreme, though the patient complained of no actual pain. He was quite conscious throughout and there was no cyanosis. On the 21st and 22nd there were again similar