Table Giving the Lactation History of Eight Rats Fed on an Exclusive Ox Flesh Dietary.

Number of Days on Meat before Parturition.	Weight of Animal at Death.	Weight of Mammae.	Per Cent.	Time of Lactation when Killed.	Number of Young.	Weight of Young.
	Grams.	Grams.				Grams.
30	180	13.0	7.2	1st day	10	50
9	140	8.5	6.0	1st day	10	43
27	230	19.5	8.4	1st day	—	—
25	150	13.0	8.6	7th day	5	48
12	115	10.5	9.1	20th day	6	120
15	130	12.0	9.2	21st day	7	185
21	110	10.1	9.1	21st day	6	11
24	140	11.5	8.2	22nd day	4	82

Average percentage = 8.2.

the table it will be seen that there are wide individual variations in this percentage among the bread and milk fed animals. This is explained by the different times during the course of lactation at which the animals were killed, and also by the varying numbers of young which they suckled. Thus there is a fairly uniform rise in the percentage from the first up to the twenty-first day, after which there is again a fall; and taking animals killed at the same lactation period the percentage is higher in those which nursed the larger number of young. We may therefore take it that the mammary gland in the rat is most actively functioning about the twenty-first day of lactation, and that after this, as the young begin to feed themselves it undergoes atrophy.

It will be seen that the average percentage weight of the mammae of all the animals fed on bread and milk was 9.6, while that of the meat fed ones was only 8.2. This difference would in all probability have been greater but for the fact that the average number of young suckled by the bread and milk fed animals was only 4.6, by the meat fed animals 6.3.

As before stated, the longest period before the birth of the young during which the mother had been on a meat diet was 30 days. Taking this into consideration the difference is sufficiently marked to point to the conclusion that the result of a meat diet is to diminish the amount of mammary tissue in nursing mothers.

The effect of this relatively poor mammary development on the young of the meat fed rats is shown by a comparison of their weights with those of the young of the control animals towards the end of the lactation period. Thus the average weight of each of the young of the rats fed on meat at the twentieth to the twenty-first day was 21.6 grams, in contrast to 29.4 grams, the average weight of each of the young of the bread and milk fed rats. It is thus evident that the young of the animals fed on meat suffered in general nutrition and growth as compared with those whose mothers are on a bread and milk diet.

Whether this is due to a mere deficiency in the amount of milk available for their use or to some alteration in its constituents has not been determined, but the probability is that the former plays a large part.

No marked differences were observed on microscopical examination in the histological characters of the mammary tissues. The character of the glandular tissue varies according as the acini are full of secretion or empty; and while the mammae of the meat fed animals showed a preponderance of closely-packed empty lobules, this may only have been due to the fact that the mother had been killed shortly after the gland had been emptied by suckling.

There can thus be no doubt that a meat diet in rats affects prejudicially their powers of reproduction and lactation, and these results suggest to me that the increasing consumption of animal food in this country may be an important factor in the causation of the decrease in the birth-rate and the diminished powers of lactation. At any

rate, the results are suggestive, and call for more extended observations along similar lines.

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THE FOOD FACTOR IN THE TWENTIETH CENTURY.*

By GEORGE J. SEALY, M.D.,
WEYBRIDGE.

THOUGH it is universally recognized that man should know how to feed himself rationally to preserve his youth and his strength, and though it is also expected that the physician should know how to prescribe for him the most efficacious diet if he falls ill, yet no method of treating disease is generally used with less confidence and precision than dietetics. This is doubtless largely due to the lack of any proper system of instruction in the subject in medical schools. It seems to me the time has fully come when we, as practitioners of medicine and guardians of the public health, are called upon to give to the question of dietetics the same precision and care that we give to the ordering of drugs. There can be little doubt that the future of medicine lies in the direction of hygiene rather than of therapeutics.

Most of us are employed in the ordering of patients' lives from the cradle to the grave, and in so doing have greater opportunities for following such a subject out and forming correct conclusions than usually fall to the lot of many more conspicuously placed. We are in a better position for dealing with what is called the personal factor, more often than not itself an outcome of defective methods of nutrition, individual or hereditary.

One cannot be in close observation of, in many instances, the same people for thirty years and more, as I have been, without getting a considerable insight into the influences at work in connexion with their fitness in health and their resisting and recuperative powers when assailed by disease. When one indulges in anything in the nature of a professional retrospect, the first thing that strikes one is the increased frequency and seriousness of abdominal troubles in the present day; appendicitis, perityphlitis, gouty colitis appear to have taken the place of flatulent colic and troubles of similar calibre with which we were prone to be occupied thirty years ago.

The simpler ailments of the earlier period were due apparently to simple causes, whilst those of the later period are traceable to microbic influences and are of more serious import. I vividly remember cases of appendix trouble with which I had to deal in the early period; but they were few, and occurred in subjects in whom this rudimentary structure was sufficiently patent to admit a cherry-stone or some similar foreign substance. Nowadays undue patency is not necessary.

In looking about for a cause for such changes we naturally consider the food factor, and we see that great facilities have been afforded for augmenting the carnivorous tendencies of the English people. The importation into this country of large consignments of live, frozen, and tinned meat has aggravated the tendency, which seems to have existed from a very early period in the English people, to regard the butcher's shop as the source of all real nourishment, and of all the most highly appreciated flavours. In the last quarter of a century the consumption of meat per head of population has, I believe, quadrupled. Doubtless this national failing is largely conducted to by our climate. Our raw and oftentimes sunless atmospheres, favour the consumption of stimulants, and that meat is much more of a stimulant than is generally supposed should be strongly insisted upon. Stimulants necessarily demand frequent repetition, and one stimulant begets another, consequently the best friend of the publican and tea merchant is the butcher.

The fact that the people who eat the most meat are those who want the most meals, though not in accordance with most persons' ideas, is absolutely correct. The stimulating property of meat is largely responsible for the fact that those who have for a length of time abandoned the use of meat at breakfast and luncheon, confining their

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indulgence in it to once in the day, find that what they were disposed to regard as a mere apology for a meal, sustains them better and for a longer time than what they wrongly thought was the more substantial and valuable material. Such people seldom fail to remark that they have no desire to anticipate the luncheon hour, and have no keenness for afternoon tea. What to them, however, was the greatest discovery was the fact that after they had to this extent given up the use of articles of food hitherto most prized they found more enjoyment in their meals than previously, the explanation being that under a simple dietary the palate acquires a new sensitiveness. People who commit evident excesses and are known to their friends as "good trenchermen" are expected to pay the penalty, but in my opinion very undesirable excesses are committed by the great majority of well-to-do people in a less conspicuous way, and the practice fails to attract the attention it deserves because it is so universal. Cookery in this country, though still at a very low ebb, has altered to this extent, that solid foods are made mechanically more digestible—not an unmixed gain, perhaps, as excesses are simplified and the indiscreet indulgers are not warned by the epigastric storm signals which formerly brought them to book.

Certain classes of the community, of course, find their dietaries restricted by pecuniary reasons, but amongst those who are not so restrained taste and internal capacity appear to be the only guides. What is spoken of as an appetite is the outcome of habit, and is in no sense an index of the body's needs.

Most people's breakfast contains considerable nitrogenous elements. At luncheon these figure still more largely, and reach a climax when what to many is the event of the day is arrived at.

Unfortunately the data laid down by physiologists long ago, and still relied upon by most people who discuss dietaries in this country, appear to have been founded on human instinct and custom rather than on scientific investigation. Most of us learn before we have been many years in practice, from the number of extraordinary things that find their way down the throats of young children, that instinct at an early age is not to be trusted, and when we come to more advanced years we find that adults are all creatures of habit, whose palates are apt to be pleasantly tickled by animal foods with their high proteid contents. When we take into consideration also the prevalent opinion that all bodily ills and weaknesses are to be met and combated by an increased intake of foods, it is easy to see that our dietetic habits are more likely to be based on these grounds than upon scientific reasoning or true physiological needs. There is a constant temptation to increase the daily ration, and there is almost universal belief in the efficacy of a rich and abundant diet to strengthen the body and to increase bodily and mental vigour.

Having come to the conclusion that the daily food of most of us was in excess of what is either necessary or desirable, I, though always a very moderate consumer, seven years ago reduced my intake of proteid food to one-third of the quantity I had been in the habit of taking, and subsequently induced a few other people to adopt a similar alteration. The system aimed at curtailment rather than prohibition, and practically resolved itself into taking meat only once a day, simplicity being regarded as the other essential. The publication last year of Chittenden's researches afforded me very lively satisfaction, for the conclusions I had arrived at by ordinary clinical observation were thoroughly borne out and confirmed by his careful and elaborate physiological investigations. That his data will be fully substantiated in the future there can, I think, be no doubt whatever.

Time will not allow me to describe the great general benefits which accrued to all, irrespective of age, sex, or occupation, as a result of the change of living, but I will pass on to the more important developments in connexion with the circulation and the nervous system. I say without hesitation that the change produced in the circulation of the blood by an altered diet, was the most astonishing revelation I have ever encountered in medicine. The effects are most noticeable in connexion with the peripheral circulation, and find expression in the feeling of increased warmth of body, and sense of general well-being.

In this way the important part played by the capillaries, through which the interchange of nutritive pabulum

takes place between the blood and the tissues, is brought home to one very forcibly, and one recognizes that their condition may be regarded as furnishing most valuable information respecting the state of the secretions, and the well-being of the economy generally. As a result of these observations I am able to endorse the remark made by Sir James Barr in his excellent address in medicine at Toronto, "that the man who only studies the circulation with the aid of a stethoscope is a positive danger to society."

In connexion with the nervous system, the results have sufficed to convince me that the much-bewailed nerves of the twentieth century, and the restless excitability so largely displayed, are outcomes of the dietaries in vogue, and are not caused by the strenuous lives the people of the present day are supposed to lead. I see persons in the course of most mornings whose nerve force has been utterly used up by fruitless efforts to assimilate material which Nature did not want. They yawn constantly, are excessively tremulous, and exhibit an amount of fatigue which might reasonably have resulted from a walk of several miles, when, as a matter of fact, they have scarcely moved from their chairs. Very often the symptoms of delayed digestion displayed by these subjects are mistaken for indications of exhaustion, so that their anxious belongings ply them with beef-tea or some other equally mischievous concoction. A large amount of energy is used up in passing on nitrogenous waste products from organ to organ, or from tissue to tissue, on the way to elimination, and that liver and kidneys ultimately rebel at the excessive labour is not to be wondered at, and when the products that result from the breaking down of nitrogenous waste fail to go through the processes in the hepatic cells and elsewhere that Nature intended, very serious symptoms inevitably result.

I see these conditions constantly in a very marked form in men who have ceased to be harassed by business cares, but who continue "to do themselves well" as the saying is, though they have relinquished most of the muscular exercise that formerly conduced to their well-being. I see it less often in younger men leading what ought to be ideal lives as country gentlemen. They are often unable to follow up their favourite sports for want of "nerve"; though they imbibe little alcohol their condition is almost suggestive of it. I am convinced that the preservation of what is called "nerve" is very largely dependent on the adaptation of food to the requirements of individual nutrition.

For many years I have regarded the large bowel as the fountain head of the mischief, but it was difficult to account for much with which one was familiar till the bacteriologists came to our aid. To Professor Metchnikoff in his very interesting work on the *Nature of Man*, and his more recent Harben Lectures, I have been much indebted. He tells us that in the intestinal canal no less than 28 billions of bacteria are formed daily, and that the greater portion inhabit the large bowel. Being anaërobic they are able to dispense with free oxygen, and all their wants are met by the decomposing material with which that portion of the body is so largely furnished in the present day. This bacterial flora constitutes one-third part of the human excreta.

Man was intended to draw on both the animal and vegetable kingdoms for his sustenance, but was not intended to be the carnivorous animal he has become. Excess of proteid or carbohydrate material beyond the physiological needs of the organism must be detrimental to it. Superabundance of the latter is attended with very evident disadvantages, the more obvious of which are dilatation, fermentation, and the sequelae thereof. Too much of the former entails still more serious and far-reaching consequences. When the large bowel is not entirely devoted to the purposes of a cesspool, and encumbered with the putrefactive debris which an excessive importation of proteid material entails, it is much more capable of dealing with cellulose, and vegetable constituents generally. This is the explanation of the fact so often forced on one's notice, that the dejecta of patients on a small proteid diet, combined with what would be considered a large quantity of fruit and vegetable, including, *inter alia*, six or eight apples a day, will be 50 per cent. smaller in volume than that of patients partaking of the ordinary proteid fare, with little or no vegetable element.

Metchnikoff, after pointing out that man, in common with mammals, appears to have acquired the convenience to be derived from a large bowel as a retainer of dejecta at a risk to health, and at the expense of longevity, goes on to propose that, in the interests of its owner, it should be removed by surgical operation. As it is not at all likely that such a step as this will be generally adopted in the immediate future, it behoves us to take care that it shall not be allowed to be habitually overcharged with dangerous material. Such a prolific originating centre must otherwise be productive of a great variety of bodily ills. My experience has convinced me that it has to do with most of the diseases in the Registrar-General's category, organic and functional.

When it becomes the seat of malignant disease (in 1895-6 out of 1,148 cases of cancer in the German hospitals, 89 per cent. affected the large bowel) the part it plays is recognized; or when reabsorption of the intestinal contents takes place on a large scale, there is not much doubt felt as to what is going on. But when the state of affairs in that region originates a general malaise, a catarrh of one or other portion of the mucous lining, a heightened temperature, or a great deal of the so-called influenza; when we fail, in spite of the exhortations of our friends, "to keep our hair on," or when it insists on changing its colour prematurely, all kinds of causes are suggested and sought after, when too frequently the true cause, the state of the large bowel and its flora, is lost sight of.

Each of the conditions just named is, of course, the direct outcome of its particular bacterium, and these various bacteria are not likely to be annihilated however considerable the manufacture and use of antiseptics may be. Safety can only be attained by taking the utmost care that suitable media are not furnished more largely than can be helped. Bacteriology leaves us in no doubt as to the completeness of the vicious circle. From this source the quality of the blood of the individual becomes impaired, and in consequence its circulation is impeded. Then the macrophages go forth to bring about the destruction of the higher elements of the organism, or, more properly speaking, to accomplish the removal of these elements after the vitality of the tissues has become impaired or destroyed in consequence of this failure in the blood supply just alluded to. It is in this way that arterio-sclerosis, which is accountable for more deaths in people over 50 than any other disease, is brought about.

MULTIPLE MYELOMA.

BY

J. R. CHARLES, and H. H. SANGUINETTI,
M.A., M.D., M.R.C.P., M.A., M.B., Oxon.,
ASSISTANT PHYSICIAN, ROYAL INFIRMARY, BRISTOL. MINNEHEAD.

THE following case of multiple myeloma which recently came under our observation appears to us to be worthy of record on account of the rarity of the complaint. The disease occurred at a very advanced age, and although the symptoms and signs were very similar to those which have been described in other cases, no myelopathic albumosuria was present on the occasions when the urine was examined for this purpose. Possibly, however, it existed earlier in the course of the disease at a time when the precise nature of the complaint was not suspected, for during that period certain symptoms arose which might bear this interpretation.

The patient was a man, aged 72. He had always been of a particularly nervous disposition, subject to frequent nervous breakdowns necessitating prolonged rests and change of air. This point is mentioned because at first the vague pains from which he complained in his terminal illness were regarded as symptoms of his neurotic disposition, especially as no organic lesion could be discovered to account for them. A few years previously he is said to have suffered from some form of "sunstroke."

In September, 1905, he was ordered Fellows' syrup and strychnine, which had improved his health in previous attacks of depression, for at this time he was very much inclined to weep without any obvious cause. No

abnormal physical signs could be detected. On December 29th, 1905, he complained of pains in the sides of his chest. There were no signs of pleurisy or disease of the lungs, and the pains were attributed to intercostal rheumatism.

In February, 1906, he developed an attack of what was regarded as "cystitis," without any obvious cause. He was away from home the greater part of the time, and the attack subsided in about three weeks. The symptoms of this attack were painful and frequent micturition, with the passage of turbid urine. No further note could be obtained as to the condition of the urine at this time, but subsequent events threw much suspicion on the exact nature of this attack. It may have been a true cystitis, it may have been an attack of phosphaturia, or it may possibly have been an example of precipitation of the Bence Jones proteid within the bladder associated with painful and frequent micturition, for it is known that this proteid may be deposited in an insoluble form. In a few similar cases attacks of painful and frequent micturition have occurred in which the urine was acid, and the turbidity was shown to be due to the albumose, and not to phosphaturia in connexion with the bone disease. Whether or not it was so in this case, unfortunately, was not recorded.

During March, 1906, he suffered a good deal from dyspepsia, with coated tongue, but towards the end of the month he was able to get about and go out. On April 8th he had a febrile attack, with pains in his sides and limbs, which was regarded as influenza. A febrile state continued throughout the month, with intercostal pains so severe as to make movement in bed, to which he was confined, difficult, and indeed almost impossible without help; when at complete rest he had little or no pain.

Up to the end of June he continued to suffer from a good deal of pain, which was variable in position, and to account for which no organic disease could be detected. At this time he was massaged daily with beneficial results, in the opinion of all connected with him. Lateral curvature of the dorsal spine was noticed, but it was said by his relatives to have been of very long duration. At this time, while under the care of a nurse and practically in the absence of relatives, he seemed to improve, putting on weight slightly. On the arrival of his family at the end of July he again lost ground; he became very feeble; when rising from a chair would climb up his legs (in the same way as a patient suffering from pseudo-hypertrophic paralysis); he could not feed himself, and finally had such difficulty in masticating solids that he would keep food in his mouth five minutes or more, and then perhaps have to spit it out. He complained of much pain in his sides and legs, and became extremely emaciated. He very much objected to being moved about. Towards the end of August he was kept in bed, his pulse became unequal, and he was much worried by a cough.

In the middle of September slight enlargements were noted at the costo chondral junctions of the upper three ribs. It was noticed also that the ribs on the right side were less resistant to pressure than those on the left, and on further examination one of them was felt to snap under the examining fingers, without, however, causing apparently any extra pain. The three ribs below the angle of the right scapula were slightly, but distinctly, enlarged and very tender on pressure. The tips of the fingers at this spot could not be inserted between the individual ribs as on the other side. In the spinal column two slight lateral curvatures were noted, while in the lower dorsal region there was a distinct prominence with a considerable amount of rigidity, but as all movements were carried out with considerable pain and difficulty it was quite impossible accurately to determine its amount. There was no enlargement or tenderness of the bones of the arms or legs. No sign of any other organic disease could be detected in any of the viscera. There was no glandular enlargement. The disease, therefore, appeared to be limited to the vertebrae, ribs, and costal cartilages, and since caries, osteomalacia, secondary carcinomatous deposits, spondylitis deformans, osteitis deformans, all appeared to be out of court, the diagnosis of probable multiple myeloma was made. The urine was therefore carefully examined, but no albumose, albumen, or sugar was found. A differential count of the white cells of the blood yielded: