in the pigmented peoples as due to some racial factor. Des Ligneris (1940) has shown that extracts from the cancerous and non-cancerous livers of Africans are capable of producing neoplasms of the skin when painted on the backs of mice. The extracts from normal Europeans are said to be less potent in this respect. A similar experience has been reported by Hieger (1940).

Effect of African Diet on Rats

Malnutrition among the Africans is widespread in South Africa. The overwhelming majority feed on a diet consisting largely of maize meal (mealie pap) and sour milk. This forms the staple from the time of weaning throughout life. Before invoking a racial or a genetic factor in modifying the incidence of disease it seemed highly desirable to ascertain the effect of the African diet on normal animals. Accordingly 125 rats weighing from 40 to 50 g. were fed exclusively on mealie-meal porridge and sour milk. The mealie-meal porridge was concentrated to form a solid mass, while the sour milk was prepared from fresh milk allowed to ferment in a warm room. The animals received liberal amounts of this food. Apart from thinning of the hair over the abdomen and hind legs and roughening of the tail, no obvious signs of acute avitaminosis were recognized.

After 14 months 12 rats were killed and a full post-mortem examination was performed. The others are being studied biochemically. In all of those killed some degree of liver pathology was evident macroscopically. This varied from diffuse enlargement of the whole liver with obvious fatty change to a widespread nodular cirrhosis, the latter usually involving the left side of the liver. In one case there was complete atrophy of the left lobe, with enormous compensatory hypertrophy of the right lobe—so much so that the enlarged lobe extended almost into the pelvis. In this instance the remains of the left lobe could be seen as two small appendages of cirrhotic tissue.

In this series of rats it seemed that the liver first enlarged and underwent fatty changes and later cirrhosis supervened, or else complete atrophy of the affected lobes occurred, with corresponding enlargement of the right side. The heart was grossly enlarged, and in 9 cases one or both lungs showed recent or old-standing inflammatory lesions with areas of bronchiectasis or abscess formation. The fat in the mesentery, retroperitoneal, or subcutaneous regions was abundant. The skull was very much thickened, especially in the occipital region. The suture lines could be readily identified by the zones of great vascularity. The upper incisor teeth were particularly affected; many of them were broken, some fused, and others loose. The pituitary was enlarged, the thyroids were atrophied, and the suprarenals were small and of greyish colour. In four cases the lymph glands of the peri-oesophageal region and above the lesser curvature of the stomach or above the abdominal aorta were of dark-brown colour, due to the presence of haemosiderin. The jejunum in those cases of advanced cirrhosis contained a dark viscid material which gave the reaction of blood. It is noteworthy that although many thousands of rats were examined post mortem over a number of years no lesions in the liver of the kind described above were ever observed.

Comment

The significant features of this feeding experiment in rats are the gross pathology in the liver, the frequency of lung lesions, the enlarged heart, the abundance of adipose tissue, the thickened skull, and the dental affections, all of which occurred without any recognizable manifestations of acute vitamin deficiency.

The production of liver damage by means of a diet which forms the staple of the overwhelming number of Africans in South Africa is not without its sociological implications. It may also have repercussions in other parts of the world where economically impoverished individuals are forced to live on a diet similar to that of the African in the Union of South Africa.

This investigation was carried out in the Department of Anatomy, and all facilities were generously provided by the University of the Witwatersrand, Johannesburg. This and subsequent aspects of the problem represent, and will represent, the collaborative efforts

especially of Dr. Leon Golberg of the South African Institute for Medical Research, and of Christine Gilbert, Dr. Theodore Gillman, Joyce de Bruijne, Marianne Cassirer, and Joel Mandelstam of the Department of Anatomy. The work is proceeding actively to discover the factors responsible for the lesions produced experimentally in the rat.

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Medical Memoranda

Periarteritis Nodosa diagnosed Clinically

Following on the annotation on periarteritis nodosa published in the *British Medical Journal* of May 15, 1943 (p. 608), this case record may be of interest.

CASE HISTORY

A woman aged 34 was admitted to the Meath Hospital under my care in June, 1942, complaining of "asthma" for the past week. Previous to this attack she had never suffered from asthma or bronchitis or from any other serious illness. On admission her temperature was normal and her pulse rate 118. There was evidence of acute bronchitis, but otherwise physical examination revealed nothing abnormal. A chest radiograph was negative. The urine contained some albumin on admission, but no casts at any time. Investigation for protein sensitivity to foods, flowers, and animal emanations was negative. During her stay in hospital her temperature was occasionally slightly elevated, and her pulse rate after the first week settled down to 80. After a period of five weeks in hospital, during which time she was treated on general lines, the patient went home feeling fairly well.

In Sept., 1942, she began to have further attacks of asthma, for which she was treated with a stock vaccine by her general practitioner, who stated, however, that even a small dose of the vaccine often gave her quite a severe general reaction; and finally the treatment had to be abandoned. Shortly after this she got a thrombosis of the right long saphenous vein, which gave rise to fever at night-time. She recovered completely from the thrombosis, but in Nov., 1942, started to complain of extreme general weakness and malaise and a raised evening temperature. A blood culture done at this time was reported to contain *B. proteus*, but this was considered to be a skin infection. Owing to the presence of petechial haemorrhages on the chest and back, a blood examination was also carried out, with the following results: R.B.C., 4,100,000 per c.mm.; W.B.C., 26,000 per c.mm.; Hb, 65%; colour index, 0.8; platelets, 110,000 per c.mm. Differential count: polymorphonuclear leucocytes 85%, lymphocytes 12%, large mononuclears 3%. Prothrombin clotting time, 35 seconds.

The patient was readmitted to hospital with a temperature of 99° and a pulse rate of 96. On examination this time, in addition to her chest condition she had a very loud grating to-and-fro pericardial friction rub, heard all over the praecordium, but the heart sounds underneath did not appear to be altered. There was abundant albumin in her urine, and a catheter specimen revealed pus, red cells, and granular and hyaline casts. Her blood urea was 36 mg. per 100 c.cm. She was put on a nephritic diet. During the first week her temperature rose until it touched 103°, and her pulse rate became elevated to 120. At this stage she was treated with sulphathiazole (0.5 g. q.q.h.), but this gave rise to severe vomiting within the first 24 hours, and was discontinued. A second blood culture done a week after admission grew a staphylococcus—possibly also a skin infection—but the patient was started immediately on large doses of sulphadiazine, and during the next three weeks she received two courses each consisting of 25 g. Repeated white cell counts were done to check sulphonamide treatment; in the course of these a leucocytosis of 42,000 per c.mm. was recorded, with an eosinophilia of 9%. A fortnight or so after admission all signs of pericarditis had gradually disappeared. During her second period in hospital the patient had several attacks of asthma. At times also transitory painful lumps of about the size of a grain of rice appeared on her scalp and eyelids, and remained for about three days. In the middle of December she developed an angioneurotic oedema of the right arm. A little later there was a definite ulnar neuritis of this arm. Throughout her stay her urine was loaded with albumin, and casts were always present—granular, hyaline, and fatty. Her blood urea at all times remained within normal limits. She was discharged at the end of February at her own request.

Shortly after her return home she developed oedema of the legs, which gradually became a generalized oedema associated with ascites. During this time her urine on boiling became almost solid with albumin. In April, 1943, she had painful subcuticular lumps of about the size of a rice grain on the anterior surface of her forearms. Bullae then developed around each lump, and after from four to five days these burst, leaving punched-out crater-like ulcers with bluish-purple margins. At the same time the fingers, especially those corresponding to the ulnar distribution of the right hand, became blue, and dry gangrene ensued. The toes also became blue, but to a less degree. The patient's condition thereafter deteriorated rapidly until, about three weeks before death, the ulcers had coalesced to

form deep gangrenous excavations between the bones of the forearm, in which muscular aponeuroses could be seen. She required a great deal of omnopon during the terminal stage of her illness to combat pain. On May 18, 1943, she died.

A post-mortem examination was unfortunately out of the question, and pathological confirmation is therefore lacking, but from the clinical course of the disease I think there is little doubt as to its true nature. Alternative diagnoses of rheumatic pericarditis, acute nephritis, septicaemia, and subacute bacterial endocarditis were all considered in turn as various signs arose, but none appeared entirely to satisfy the symptomatology. The appearance of nodules and the extensive patches of gangrene on the arms, together with the obvious signs of a vascular lesion of the extremities, suggested the true diagnosis.

I am grateful to many for their help in this case, but particularly to Dr. W. O'Donnell, Prof. W. J. E. Jessop, and the late Prof. W. Boxwell, as well as to my house-physicians.

Dublin.

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Tetanus following Appendicectomy

The following case seems to be worth reporting because it developed after an operation and was successfully treated without opening up the wound.

The patient was a well-built man aged 29, employed in the N.F.S. For two weeks before admission to hospital he had been complaining of pain and paraesthesia in the finger-tips of the right hand. A diagnosis of brachial neuritis had been made by a consultant physician.

He was admitted to hospital on June 6, 1943, with a typical history of acute appendicitis of 12 hours' duration. Operation was immediately performed, and an acutely inflamed appendix was revealed. The appendix was unobstructed and not perforated, and there was but little local peritonitis. A routine appendicectomy was performed without any unusual soiling of the peritoneum or abdominal wall with the contents of the appendix, the abdomen being closed without drainage. The operation was followed by an uneventful recovery until the ninth day, except for slight pain in the hand due to the brachial neuritis. On that day the patient complained of an aching pain in the lumbar region. Examination revealed tenderness of the lumbar muscles, but no spasm. Further questioning disclosed that the ache had been present in a mild form on the sixth day. A diagnosis of lumbago was made.

On the tenth day after operation there was slight stiffness of the jaw, and examination of the lumbar muscles showed a slight but definite spasm. A tentative diagnosis of tetanus was made, and this was substantiated later in the day by the development of difficulty in swallowing. The patient also complained of the sensation of being periodically kicked in the back. This was presumably due to the onset of localized tetanic spasms. 180,000 i.u. of A.T.S. was immediately given intravenously, and chloral and potassium bromide, 20 gr. of each, were administered four-hourly.

The patient's condition deteriorated for the next two days, and he complained of tightness of the chest. Marked opisthotonos, abdominal rigidity, and trismus developed, but the bromide and chloral sufficed to keep the spasms local and infrequent. On the third day however, paraldehyde, 4 dr. twice a day per rectum, was required to control the spasms. Later the paraldehyde had to be given six-hourly in doses of 6 dr. to produce the required effect. Tribromethol was not used because of the increased liability to respiratory complications, and pethidine and chloretone were found to be less efficacious than paraldehyde.

The fifth day, when several generalized spasms were experienced, was probably the worst day. Then improvement began with disappearance of the rigidity of the abdominal wall. On the seventh day 100,000 i.u. of A.T.S. was given. As the condition improved less-sedative drugs were needed. Nutrition was maintained at a fairly adequate level throughout with glucose and milky fluids, without having to resort to a stomach tube. It was very important to feed the patient rapidly and efficiently just before the next dose of sedative was due. Then he was just conscious enough to feed, and yet the trismus was reduced and swallowing did not provoke the onset of generalized spasms.

A bacteriological diagnosis of tetanus was not made. There was a slight purulent discharge from the wound, swabs from which revealed no evidence of tetanus bacilli. Their absence was probably due to the fact that a specimen could be obtained only from the superficial part of the wound. The wound was not explored.

There was no history of any injury, and the appendicectomy wound was the only possible focus for the growth of the tetanus bacilli. The catgut used at the operation was made by a reputable firm of manufacturers. When the tetanus became manifest it was not possible to trace the batch of catgut which was used and so test it for the presence of spores. Present-day catgut is an unlikely source of tetanus spores. It seems likely that the wound was contaminated by spores from the bowel lumen. It is stated by many authorities that tetanus spores are occasionally found in the lumen of the human bowel.

I wish to thank Mr. A. H. Southam for permission to publish this case and for his helpful criticism.

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Reviews

MENTAL GROWTH OF CHILDREN

The Mental Growth of Children from 2 to 14 Years. A Study of the Predictive Value of the Minnesota Preschool Scales. By Florence L. Goodenough and Katharine M. Maurer. (Pp. 130. \$2.50 or 15s. 6d.) Minneapolis: University of Minnesota Press; London: Oxford University Press.

This is No. 19 of the series of monographs from the Institute of Child Welfare of the University of Minnesota. In it the results of repeated tests of the intelligence of the same children over a substantial period of time are described. The tests used are the Minnesota pre-school scales, revisions of the Stanford Binet and the Arthur performance scale, and the Minnesota College ability tests. At all ages the tests proved of predictive value. It was found that there is a good deal of inconstancy in the results of tests, especially in the early years, so that single tests are apt to be misleading and the longitudinal method here advocated would seem to be much more reliable. It proved difficult to follow many children through the whole 12-year period, but others of corresponding status were brought into the series, and the authors consider that their results are statistically valid.

Details of method and of results are given, and it would appear that individual mental growth does not always proceed at a fixed and uniform rate, though in the majority of cases constancy rather than inconstancy is the rule. Irregularity is most noticeable at early ages; there may be early precocity which does not last or early slowness with subsequent acceleration. Such irregularities are not necessarily due to external causes only. The old pre-school tests have not proved to be reliable, and new tests have been and still need to be worked out. The present study has shown that trustworthy indications of special abilities and differences of mental patterns can be detected at a much earlier age than was supposed. There is a suggestion that there may be a sex difference in the age at which mental tests begin to have a predictive value for future intellectual standing. It would appear that there is an initial feminine precocity which may be reversed later on. Further work is required and will be undertaken to amplify and confirm the findings.

This is a well-documented book with a useful bibliography at the end, and it will prove interesting and valuable to all who are concerned with the mental development of the child. The authors make it clear that there are many unsolved problems in the field of mental testing and that much work still remains to be done.

THE HUMAN FOOT

The Foot. By Norman C. Lake, M.D., M.S., D.Sc., F.R.C.S. Third edition. (Pp. 432; illustrated. 15s.) London: Baillière, Tindall and Cox. 1943.

Mr. Lake's book has not undergone any drastic changes during his preparation of a third edition. The most significant changes are the closer attention given to those foot conditions which are seen more frequently in wartime, such as those associated with cold, damp, or excessive strains.

True frost-bite is stated to be a much rarer condition than trench foot, but with the present tendency to rapid movement in military tactics, compared with the more static methods in the last war, the incidence of trench foot is likely to fall. On the other hand, true frost-bite has become more common as the number of high-flying airmen increase. The reference to foot strain in industry and military service is important. Long hours of standing on a concrete floor bring many industrial workers to their doctors or to hospital, where this general excessive strain on a static foot is found to be a frequent cause of disability, though aggravated in many cases by more obvious deformities such as flat-foot. The soldier who complains of pain in the foot with no obvious cause may well respond to a more gradual introduction to "foot-slogging" than is customary.

Without doubt this is an exceedingly useful book for the doctor in general practice and the orthopaedic house-surgeon, and it should help the regimental medical officer to keep the Army soundly on its feet.