

institute comparisons between *Sinanthropus* and *Pithecanthropus* in this respect.

One of the most interesting features of the specimen found in 1929, a feature which Dr. Davidson Black inferred from the nature of the wear of the teeth long before the skull was found, is the fact that the condyloid fossa for articulation with the mandible presents a very close resemblance to the condition found in modern man, in size, depth, and direction. This fact is all the more remarkable because in other extinct members of the human family, in particular Rhodesian man and Neanderthal man, there are much more profound differences in the under-surface of the temporal bone. The attainment of the condition which became a permanent factor in *Homo sapiens* suggests that *Sinanthropus* is a primitive generalised type, and that modern man has retained many of these primitive characters.

Looking at the skull as a whole, one can say that its general form is intermediate between the conditions found in *Pithecanthropus* and *Eoanthropus*. It enables us to unite into a solid foundation the characters of the three most primitive members of the human family at present known. In giving coherence to this knowledge it also enables us to picture the nature of the common ancestor of all three, the as yet hypothetical Pliocene man.

The suggestion has been made that the Peking

man's distinctive features are not sufficiently pronounced to exclude him from the genus *Pithecanthropus*. The whole configuration of the skull, the texture of the cranial bones, the morphology of the frontal, parietal, and occipital bones, as well as the distinctive features of the teeth and mandible, clearly differentiate Peking man from the ape-man of Java, and present a contrast which is so profound as to compel us to accord it generic distinction. In many respects it differs from *Pithecanthropus* and resembles *Eoanthropus*, but the contrast to the latter is even more obtrusive. It occupies an intermediate position between the two, but is more primitive and generalised than either.

It is a very significant phenomenon that at Chou Kou Tien, in spite of the most careful search in the caves during the last three years, no trace whatever of implements of any sort has been found. It must not be forgotten, however, that Dr. Andersson in 1921 found pieces of quartz in association with the fossil bones, and that in the later stages of the excavation Mr. Pei found further examples of this alien material. Those who have been searching in vain for evidence of human craftsmanship on this site are being forced to the conclusion that the Peking man was in such an early phase of development as not yet to have begun to shape implements of stone for the ordinary needs of his daily life.

## Vitamin B.

### DISTRIBUTION AND PHYSIOLOGY.

THE general distribution of vitamin B is now fairly well defined, but the adequacy of different food substances in this respect for different species and the distribution of the various factors in the B complex are still subjects for investigation. R. H. A. Plimmer, with W. H. Raymond, J. Lowndes, and J. L. Rosedale, has examined the comparative vitamin B value of cereals, pulses, and nuts (*Biochem. Jour.*, vol. 21, p. 1141, 1927; vol. 23, p. 545; 1929). The preventive method was employed, using pigeons, and the criterion was maintenance for at least 26 weeks. All the vitamins required by the pigeon were therefore included in the estimation; symptoms of deficiency were paralysis and loss of weight. The diets used contained 5 per cent fish meal, white flour or white rice, and the substance under test in varying proportions. Dried yeast contained most vitamin: of the other foodstuffs, wheat germ was about half as good as the yeast, whole wheat, bran, and middlings contained about a tenth of the amount present in yeast, and other cereals about a twentieth. The majority of the pulses and nuts examined contained between a fifth and a tenth of the quantity present in yeast. More vitamin B is required for hatching and rearing young than for maintenance. Chickens require half as much again as pigeons, rats only about half; the requirements of human beings may be intermediate between those of the pigeon and the rat.

A. L. Bacharach and E. Allohorne (*ibid.*, vol. 22, p. 313; 1928) found that the vitamin B content of

malted flour was the same as that of the original unmalted flour, but that the malt extract appeared to contain more: the experiments were carried out on rats and the effect is attributed to the improvement in appetite brought about by the extract.

The content of vitamin B in seeds has been shown to be markedly influenced by the manure applied to the plant, by M. J. Rowlands and B. Wilkinson (*ibid.*, vol. 24, p. 199; 1930). Two similar plots of grass and clover were manured with an artificial manure and pigs' dung respectively: the pigs were fed on barley meal, middlings, and a small amount of a mixture of meat meal, rye and wheat embryo, bone meal, and cod liver oil. The manured patch produced a heavier crop, containing more clover, but the growth on the dunged patch was bigger. By preventive and curative growth tests on rats, it was shown that the vitamin B content of the seeds from the manured patch was much less than that of those from the dunged patch. In further experiments vitamin B was extracted from pigs' dung by means of alcohol.

There is evidence that lower organisms can synthesise vitamin B or similar growth factors, and that this synthesis may occur also in the intestinal tract in higher animals. Thus, Reader has found that the meningococcus can synthesise a growth factor for a streptothrix, all the vitamin B<sub>1</sub> being previously removed from the medium; and G. L. Peskett (*ibid.*, vol. 21, p. 1102; 1927) has shown that yeast can synthesise vitamin B<sub>1</sub>. Intra-

intestinal synthesis may be the explanation of 'refection' which has been described by L. S. Fridericia and H. Chick and M. H. Roscoe (see *Lancet*, vol. 1, p. 37; 1928). In this condition rats maintained on a vitamin B free diet containing uncooked rice starch passed bulky white faeces, and at the same time were cured of their symptoms and put on weight. The faeces contained abundant vitamin. The condition appeared to depend on the presence of uncooked starch in the diet and a virus in the intestine.

W. R. Aykroyd and M. H. Roscoe (*Biochem. Jour.*, vol. 23, p. 483; 1929) have investigated the distribution of vitamin B<sub>2</sub>. Wheat and maize were poor sources: the germ and bran of wheat contained more than the endosperm, but maize germ contained less than wheat germ: dried peas also contained little. Dried yeast and ox liver and fresh milk were excellent sources, and egg-yolk and dried meat good. It was possible to cure rats suffering from the dermatitis of vitamin B<sub>2</sub> deficiency, as well as to stimulate their growth.

The physiological functions of the vitamin B complex are incompletely understood: in its absence the metabolic processes of the tissues are imperfectly performed, and investigations have thrown some light upon the details of the defects. Thus the vitamin is related to both protein and carbohydrate metabolism. G. A. Hartwell has found that young rats die, with engorgement of the kidneys, when the synthetic diet contains 20 per cent edestin and 5 per cent yeast extract, although older animals thrived on the diet even with a lower allowance of yeast (*Biochem. Jour.*, vol. 22, p. 1212; 1928). Increasing the amount of yeast extract permitted normal growth: the factor responsible was found to be thermostable. Caseinogen and egg-albumin required less yeast extract than edestin for normal metabolism.

H. W. Kinnnersley and R. A. Peters have investigated the relation between the lactic acid content of the brain and the symptoms of head retraction in pigeons fed on a diet of polished rice (*ibid.*, vol. 23, p. 1126; 1929; vol. 24, p. 711; 1930). Using a special technique, it could be demonstrated that birds showing opisthotonos had more lactic acid in their brains than normal birds, and that this increase was most marked in the parts below the mid-brain and occurred here first at a time when symptoms were threatening. The increase was not observed after cure by a dose of vitamin B<sub>1</sub> concentrate. The symptoms appear to be due to this accumulation of lactic acid, and the fact that it is localised indicates that vitamin B<sub>1</sub> is intimately concerned in the intermediary metabolism of carbohydrates, apparently with the oxidative removal of lactic acid. In this connexion it might be remarked that H. Yaoi found that muscle from polyneuritic pigeons reduced methylene blue more feebly than normal muscle, but that there was no difference in the glutathione contents (*Proc. Imp. Acad. Tokyo*, vol. 4, p. 233; 1928). Peters in his Harben Lectures has adduced some evidence that vitamin B<sub>2</sub> may be concerned with the mobilisation of water, and that in its absence together with that of vitamin B<sub>1</sub>

oedema accompanies the polyneuritis in its terminal stages.

C. W. Carter and A. N. Drury have examined the nature of the slowing of the heart beat in rice-fed pigeons (*Jour. Physiol.*, vol. 68, *Proc.*, p. i., 1929): it appears to be due to an overaction of the vagal centres producing a heart block. The condition is cured by whole wheat, so that the factor responsible may be that described by Williams and Waterman.

G. F. Marrian, L. C. Baker, J. C. Drummond, and H. Woollard (*Biochem. Jour.*, vol. 21, p. 1336; 1927) noticed changes in the adrenal glands of pigeons starved or fed on rice only, and Marrian has investigated these alterations in more detail (*ibid.*, vol. 22, p. 836; 1928). Hypertrophy was found in inanition, even though vitamin B<sub>1</sub> was given, and in vitamin B deficiency, whether accompanied or not by inanition: oedema accounted for half the hypertrophy in inanition. The adrenaline content was increased in the latter condition, but was relatively low in vitamin B deficiency. It appeared that the hypertrophy in inanition affected chiefly the medulla, and in vitamin B deficiency, the cortex of the gland.

It is now well known that vitamin B deficiency is associated with loss of appetite. B. Sure has made a detailed study of the anorexia in the rat and found that it is promptly cured by the administration of a vitamin B concentrate (*Jour. Nutrition*, vol. 1, p. 49; 1928). The loss of appetite may be associated with the failure of the gut to empty itself, and a decrease in the digestive secretions. J. L. Rose-dale and C. J. Oliveiro (*Biochem. Jour.*, vol. 22, p. 1362; 1928) found that in pigeons suffering from beri-beri the pancreas failed to form the enzymes required to digest protein and fat.

It might be expected that animals suffering from vitamin B deficiency would show derangements of the sexual function. H. M. Evans, however, found that in male rats, provided vitamin E was supplied, fertility was unaffected and sex interest was decreased only a few days before death (*Jour. Nutrition*, vol. 1, p. 1; 1928). In the female rat the oestrous cycle stopped abruptly after about four weeks on the deficient diet; loss of weight followed immediately (A. S. Parkes, *Quart. Jour. Exp. Physiol.*, vol. 18, p. 397; 1928). Injections of oestrin produced the signs of oestrus during the anoestrus, but without stimulating the ovaries, which had become much atrophied.

W. Nakahara and E. Sanekawa have found that chicken sarcoma and rat sarcoma and carcinoma do not apparently require vitamin B<sub>1</sub>, and contain little of it (*Proc. Imp. Acad. Tokyo*, vol. 5, p. 55; 1929; vol. 6, p. 116; 1930; *Scient. Pap. Instit. Physic. and Chem. Res.*, vol. 10, p. 211; 1929). In the first set of experiments, chickens were fed on polished rice and a salt mixture; the livers from healthy birds, and those carrying growths of the Rous sarcoma, were found to contain equal amounts of vitamin B by test on rats, indicating that the tumour did not deplete the birds' store of vitamin. In the second set, the rat tumours were fed to pigeons and rats maintained on vitamin B free diets: only minimal amounts of the vitamin were found to be present.