

lected in the Cape and demonstrated methods of preparing them. Mr. G. D. Laing gave an account of Strandlooper skulls from Zitzikama, showing transition from a short face with light zygomatics to a long face with prominent zygomatics. Prof. R. A. Dart gave a paper on the Rooiberg cranium, which is probably not that of an ancient miner, but of a man who used the old mine as a dwelling. Prof. A. Radcliffe Brown gave details of the position of the mother's brother among the Bantu, a proper understanding of which is very necessary in dealing with native peoples. Prof. W. A. Norton and Mr. H. Velaphe presented sixty-eight Sesuto riddles with translations of the same. The science of tonetics and its application to Bantu languages was discussed by Dr. D. M. Beach.

In Section F, Advocate G. T. Morice discussed psycho-analysis and criminals, criticising various methods and certain new books. He considers Freudian psycho-analysis of little use, as it concentrates on the sexual and ignores other instincts. Prof. S. F. Gie gave an account of the economic development of South Africa from 1652 to 1795. Prof. R. D. Nauta gave a reasoned résumé of the moral value of Molière's works. The conception of intelligence was dealt with by Prof. R. W. Wilcocks.

Much interest attached to a paper by Mr. C. S. Richards on the monetary history of South Africa since union, in which the currency problem and inflation of currency were dealt with, and a return to the gold standard advocated. Of much historic interest also was Miss M. L. Hodgson's paper on the Hottentot question in South Africa down to 1828. Prof. E. H. Brookes discussed the changes in native economic life in South Africa due to European influence and changes in Europeans due to native influences. He advocates economic differentiation and native development in agriculture and native industries, with no detachment of their natural leaders from the bulk of the Bantu. Mrs. Mabel Palmer gave an account of a South African Whitley Council as shown in the organisation of the printing industry. Rev. R. Balmforth pleaded for a more fully representative international authority than the present League of Nations.

As a result of Dr. Fantham's paper, the Eugenics and Genetics Committee of the Association has renewed its activities.

The next annual meeting of the Association will be held at Oudtshoorn, under the presidency of General J. C. Smuts, in July 1925.

H. B. FANTHAM.

Sex Determination.

MANKIND has always been intrigued by the problem of what are the factors that determine sex, but it is only comparatively recently that a real light has been thrown upon this subject. The influence of the sex glands upon certain characteristics of the body has, it is true, been known for many centuries, as witnessed by the effects of castration, but the mechanism by which these changes are produced was obscure. With the discovery by Oliver and Schäfer in 1894 of the effects of suprarenal extracts upon blood pressure, a mechanism by which one part of the body may influence another (other than that involved in the intervention of the nervous system) was suggested, and experiments have shown that the action which the sex glands exert upon the body generally must be due to a substance or substances—"hormones" in fact, or chemical messengers—circulating in the blood stream. Thus removal of the testes or ovaries from their normal position to another part of the body produces no alteration of bodily appearance, although all nervous connexions must necessarily have been severed. Complete extirpation of both glands, however, leads to disappearance of those characters which are correlated with sex and are known as the secondary sex characteristics.

It is interesting to note that these characters vary considerably according to the species: thus the antlers in certain species of deer are present in the male sex only; the combs and spurs of cocks are peculiar to the male; in male frogs in the breeding season a clasping pad is developed on the thumbs. The external differences, however, between the sexes are especially well marked in birds, where the two sexes usually possess a very different plumage. For this reason, perhaps, those rare cases in which the creature during its lifetime changes its sex have been more frequently described in birds: these "freaks" have always excited much curiosity. In a recent paper in *Science Progress* (October 1924) F. W. Rogers Brambell describes some examples of this transformation. The change is always of a female into a male, and *post mortem* examination discloses the presence of testicular tissue as well as or without ovarian tissue: at times the latter is mostly degenerated. The change is therefore due to the development of a sex gland of the opposite sex; but the transforma-

tion is usually incomplete, some of the female characteristics remaining unchanged.

Now after simple removal of the sex glands from an animal the characteristics of the opposite sex do *not* usually develop; the change in appearance is towards a neutral type which, according to the species, may be either nearer to the male as in birds or to the female as in mammals. It is, however, certain that the actual appearance of the opposite sex depends on the development of the appropriate sex gland. Does this imply that every organism in species with separate sexes contains within itself the factors upon which the sexes ultimately depend? Probably this does not occur normally, the sex of the individual being determined at conception, possibly by the particular arrangement of the chromosomes in the ovum and spermatozoon which unite in fertilisation. The sex-determining chromosomes pass into the sex glands and thus influence the development of the somatic cells along the lines of the particular sex involved. In certain rare cases, however, of hermaphroditism or sex reversal the sex chromosomes of *both* sexes must be present, and the result is either a mixture of the two, or one predominates either completely or for a time.

This view is borne out also by the fact mentioned above that simple removal of the sex glands does not produce the characters of the opposite sex: on the other hand, the somatic cells are capable of being influenced by the secretions of *either* gland, and after removal of the normal glands, grafting of the glands of the opposite sex from an animal of the same species leads to the development of the characteristics of the grafted sex. The factors which produce any particular arrangement of the chromosomes in the ovum or spermatozoon and so lead to the appearance of the corresponding sex are not yet completely elucidated: it is, however, suggestive that in pigeons and doves, Riddle found a predominance of males amongst the offspring when the parents were the most vigorous, early in the breeding season. One factor which influences the constitution of the spermatozoon or ovum is therefore the general metabolic condition of the parent. Research along these lines may lead in the future to knowledge which will enable mankind so to arrange the conditions as to produce, with a fair amount of certainty, an offspring of the sex desired.