2

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It was recognised some 12 or 15 years ago in the Department of Medicine of the University of Cape Town that nature had provided a unique natural experiment in the co-existence in a small geographical area of several different population groups differing widely in their genetic background and representing respectively on the whole the upper, middle and lower strata of socio-economic organisation. The European (White), Cape Coloured and African groups show respectively low, intermediate and high prevalence of «social diseases» such as pulmonary tuberculosis and infantile gastroenteritis. They also show respectively high, intermediate and low prevalence of diseases such as ischaemic heart disease, which appear to be linked with Western privileged culture. In the case of cirrhosis and primary carcinoma of the liver one racial group (the african) show as high a prevalence as any population in the world while there is no prima facie evidence that the other two groups differ in their prevalence from each other or from the experience of Western nations in general. It was decided therefore that the Department had both an opportunity and a responsibility to exploit this natural experiment in the interest of the advancement of medical science.

On request, the Council for Scientific and Industrial Research of South Africa set up in the Department of Medicine of the University of Cape Town a Research Unit which at first was named the C.S.I.R. / U.C.T. Social Medicine Research Unit. After the first few years of compilation of existing knowledge and definition of objectives, it was decided that the main clinical and laboratory emphasis of the Unit would be on problems of human nutrition. The Unit was therefore renamed the C.S.I.R./U.C.T. Clinical Nutrition Research Unit but in its constitution it was laid down that the study of clinical nutrition would be pursued against the background of other genetic and environmental factors likely to control human morbidity and mortality — in other words within the wide horizons of social medicine and geographical pathology. The information already obtained from this approach has justified this definition of objectives. By comparison of the genetic and environmental pattern of the different racial groups with the morbidity and mortality of these groups in respect of a considerable variety of diseases valuable clues have been obtained which have become the basis for intensive clinical and laboratory study.

This is the general background against which interracial studies in cirrhosis and primary carcinoma of the liver have been carried out in the South Western districts of the Cape Province of the Union of South Africa. Before proceeding to define and describe the racial groups of this area their background in the rest of the African Continent will be discussed. The World Health

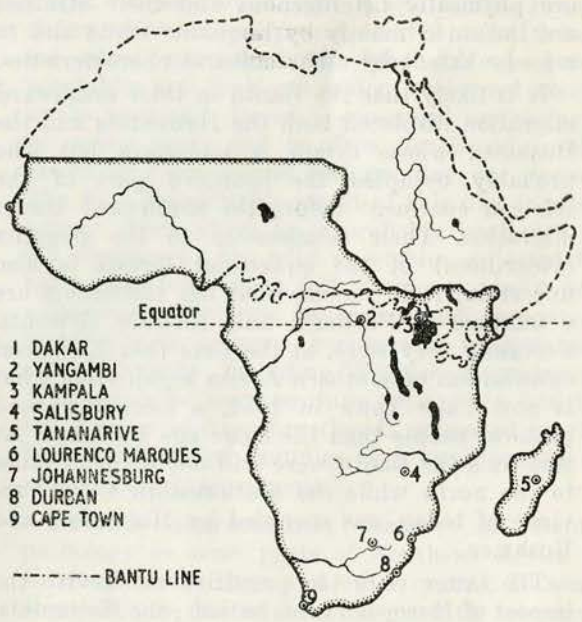

Fig. 4/1.

Organisation region « Africa South of the Sahara » is demarcated by the solid black line in Fig. 4/1. Within this area there are two main indigenous population groups from the numerical point of view, namely Negro and Bantu, demarcated geographically by the wavy Bantu line in Fig. 4/1. Apart from Caucasian settlers during the last 300 years the peoples of Africa are described (7) as deriving from three principal stocks, Bushmen, Negro and Hamite. The Hamites are represented mostly north of the Sahara but the so-called Eastern Hamites probably invaded Africa in successive waves from Southern Arabia. The Bantu group arose from modification of a predominantly Negro race by the Hamitic influence. They spread westward and mainly southward. The Bantu line (Fig. 4/1) which is never very far from the Equator demarcates their northern limits. The term Bantu is mainly linguistic in its significance but is associated with certain cultural traits of Hamitic origin. Hamitic influence is absent or slight in the Negro migrations north of the equator which peopled West Africa and from which presumably the Negro people of the United States derived.

The Bantu or Hamiticised Negroes may be further sub-divided into Eastern, Western and Southern Bantu (10), and each of the sub-groups consist of a large number of tribal units including Shona, Ndebele, Xhosa, Zulu, Swazi, Shangaan, Fingo, Sotho (« Basuto »), Herero, etc. etc. The Bantu of whom there are about 60 million (7) are physically heterogenous and their afinities are indicated mainly by linguistic traits and to a lesser extent by other cultural characteristics.

It is likely that the Bantu in their southward migration displaced both the Hottentots and the Bushmen whose origin is uncertain but who probably occupied the southern part of the African continent before the southward Bantu migration. Their relationship to the pygmies (Negrilloes) of the equatorial forests is also uncertain. It is possible that the Hottentots are a mixture of Bushmen and Hamitic elements. Certainly they were, at the time that European colonisation of southern Africa began from what is now Cape Town in 1652, a more advanced pastoral people than the stone age Bushmen. At this time the Bantu were still 500 or more miles to the north while the southwestern Cape Province of today was occupied by Hottentots and Bushmen.

The latter were too primitive to survive the impact of European colonisation ; the Hottentots, however, were in part subdued and as a result of miscegenation eventually merged with Indonesian and Malayan slaves who were brought to the Cape Colony about 250 years ago to form the Cape Coloured people of today. Considerable mixture with the White race has occurred continuously but it is only very recently that there has been any substantial admixture of Bantu blood. Accordingly, the Cape Coloured people may be regarded as genetically distinct from the Bantu, while their cultural pattern is more that of a European than of an African type (2).

Finally there are the permanent White populations who are of European origin and some of whom have lived in Africa for over 300 years. They are concentrated mainly in the Union of South Africa, with smaller and much more recent numbers in Southern Rhodesia and the « White Highlands » of Kenya. They are socially the « privileged » people of Africa and their mode of living does not differ significantly from that of people of privileged Western European descent living elsewhere.

The White people of the Western Cape Province are derived from Western Europe over the last 300 years. The Dutch East Indies Company started a settlement for the supply of fresh food, particularly for the relief of scurvy, among the sailors of their fleets travelling between Holland and the Far East. During the period 1652 to 1805 the only considerable addition to this original stock was a group of French Huguenot refugees whose names are now very prevalent in the area. After 1805 when the Cape became a British Colony the principal immigrants have been from the British Isles with some further European influence particularly from Holland and Germany. From the point of view of geographical pathology they are hardly distinguishable in appearance or mode of life from what may be called the Western European type. In particular it should be emphasised that the Western Cape Province has a temperate climate of Mediterranean type and that tropical diseases are not encountered within a radius of 400 miles of Cape Town. The morbidity and mortality trends of the Whites of the Western Cape Province are closely comparable with those of Western Europe.

Throughout the three hundred years of the history of this area the Cape Coloured people have been evolving as a homogenous group with a culture modelled on that of the European. They have developed a pride of community and their own traditions and cultural characteristics. Some

distinctive aspects appear to have been derived from the Malayan and Javanese slaves and political exiles who were brought to the Cape between 1652 and 1825 and who still survive as a sub-group known as the Cape Malays within the Cape Coloured group. This sub-group is distinguished principally by its Mahommedan faith and customs. It should be emphasised however that the Cape Coloured people as a whole have tended to follow very closely the White pattern of civilisation. They have tended, with some notable exceptions, to represent the lower middle class strata of the community. A few have achieved professional status, a considerable group have become skilled artisans but the majority are still unskilled or semi-skilled labourers. Their socio-economic status and pattern of morbidity and mortality have been described in detail by Brock (2).

During approximately the last fifty years there has been a considerable movement of Bantu people to the Western Cape Province as migrant heavy labourers and domestic servants. The rural homes of the majority of these people are still more than 500 miles to the east and north of Cape Town. There they still follow the pattern of the Bantu people of Southern Africa with comparatively little modification by European influence. Agricultural work is done largely by the women and the staple cereal is maize or sorghum. Before the advent of the Whites the activity of the men was largely directed into war, tribal affrays and cattle raids. Now the men herd the cattle and do the heavy labour when not on migration to urban employment. Cattle have an almost mystic significance as the measure of a man's standing within his tribe and as the bride price (Lobola). They are killed only on special occasions and, since the stock is poor and the pasture sparse, they tend to have a very low milk yield ; nevertheless fermented milk has been the principal source of animal protein in the Bantu diet since wild game became scarce. Goats and fowls are kept in small numbers and used for meat and eggs. Originally wild game must have added considerably to the variety and animal protein content of the diet, but in the last century this has made a steadily decreasing and now almost negligible contribution. Weeds and wild vegetables are gathered by the women folk and incorporated in stews and cooked foods. Green vegetables and fruit are hardly cultivated at all. The result of these traditions and their modification by contact with civilisation has been a diet in which vegetable protein and, particularly the unbalanced protein of maize has been predominant in the diet. Maize is still the principal cereal in rural districts although wheat is increasingly preferred if available in the stores. The result of this « protein malnutrition » is seen in the higher incidence of kwashiorkor during the postweaning phase of life. In how far it has been a contributing factor to the high prevalence of fibrosis, cirrhosis and primary carcinoma of the liver has been carefully examined by Brock (4) and by Higginson et al.)8). A more general speculation on the possible role of malnutrition in the aetiology of a variety of diseases with high prevalence in the tropical and underprivileged regions of the world has also been published (3). Two significant examples are unexplained kerato-conjunctivitis and myocardial failure. This type of speculation must however be regarded as constituting a case for investigation rather than a conviction about aetiology.

A rural Bantu who migrates temporarily to a city such as Cape Town has in the past usually done so for periods of one to three years, separated by periods of return to the reserves. His aim is to save money to take home to supplement the meagre resources in the reserves. He usually comes without his women folk and has to fend entirely for his cooking. Three to four such migrants commonly band together for common catering and cooking. Maize in a variety of forms, including a lightly fermented mush, is the backbone of his diet, supplemented by coffee, sugar, bread and dried beans. Bread, either white or brown and aerated sweet drinks are often purchased for lunch. Meat, green vegetables and fruit are seldom consumed except in the week-end. Bread is consumed increasingly in recent years and is often purchased to the extent of a one pound loaf per day per person. The first recognisable result of this diet is often scurvy, from which he is probably protected in the reserves by the wild vegetables collected by his women-folk. Some fall victims to cheap and « doctored » alcoholic beverages and present at hospital with pellagra, beri-beri or unexplained encephalopathy, including Wernicke's syndrome. The remainder may continue apparently healthy but lability of liver function is suggested by the high incidence of jaundice as a complication of pneumococcal pneumonia.

Another characteristic feature of Bantu pathology in some parts of Southern Africa is siderosis of the liver and other organs. In some areas this is due at least in part to increased iron consumption of the order of 100 to 200

mgms. daily, compared with the conventional European intake of 10 to 20 mg (12). The high consumption is thought to be due to the use of iron pots when cooking and particularly in the brewing of fermented porridge and liquors. Iron pots are however steadily being replaced. Siderosis of the liver may be due also in part to abnormal metabolism of the hepatic cells (cytosiderosis ; GILLMAN and GILLMAN) (5).

The complex mechanisms underlying this possibility have been reviewed by GILLMAN (6). According to him the cytosiderosis and the siderosis generally may result in part from disturbances of cell enzymes in the liver, the gastrointestinal tract and generally in the body; these in turn may result from dietary malnutrition. In other words the siderosis of dietary iron overload may be « conditioned » by malnutrition. The further relationship of siderosis and cytosiderosis to fibrosis and cirrhosis of the liver is complex (8, 1, 9). There is for example, a close relationship between siderosis and fibrosis in Johannesburg but not in Kampala, Uganda. The interracial distribution in Cape Town has been recorded by UYS et al. (11). (See also Chapter V).

The Cape Peninsula has been a convenient place in which to differentiate the effects of tropical parasitism from those of malnutrition. In many parts of tropical Africa the ova of schistosomes are found scattered through the cirrhotic livers and some workers have until quite recently regarded schistosomiasis as an important factor in the aetiology of Bantu cirrhosis and primary carcinoma of the liver. Parallel studies in the non-endemic areas of Southern Africa have, however, shown the same type of cirrhosis without schistosome ova and occurring in people who have never been exposed to the common tropical parasites. It is therefore reasonable to speculate as to whether non-parasitic factors such as malnutrition and the consumption of toxic contaminants in food may not play the dominant role in the causation of many other diseases widely prevalent in tropical areas (4). There are few, if any, areas of the world where tropical parasitism is not complicated by malnutrition. On the other hand, in the Cape Peninsula it is possible to study, by interracial comparison, the effects of long-continued malnutrition on people who have never been exposed to tropical parasites. Many clues have become apparent during the last decade from such studies, but final conclusions on many of the difficult issues involved need more positive confirmation.

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SUMMARY

The geographic, genetic, dietary and cultural background is described of the three important racial groups of the Cape Peninsula in the south-west top of Africa. Such characterisation is the starting point for interracial studies designed to define the striking differences between Europeans (Whites), Cape Coloureds and Bantu in morbidity and mortality.

RÉSUMÉ

Les conditions géographiques, génétiques, diététiques et culturelles des trois grands groupes raciaux de la Péninsule du Cap à la pointe sud-ouest de l'Afrique sont décrites. La nature de ces caractéristiques constitue une base de travail pour les études interraciales cherchant à déterminer les différences frappantes existant entre la mortalité et la morbidité chez les européens (blancs), les gens de couleur du Cap et les Bantous.

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