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NUTRITION IN COLONIAL TERRITORIES

Chairman, Colonel W. ELLIOT

Colonel W. Elliot (17 Lord North Street, London, S.W.1): We have a large field to cover in discussing a subject which comes closely home to all of us, namely that of nutrition. We are concerned today primarily with the problem of the territories under British control, the Colonies, and it is unnecessary to stress the enormous size, great populations, and variety of climates and conditions of those territories. It is, for all that, worth remembering that British colonial territories vary from the Falkland Islands with its population of two thousand men, and six hundred thousand sheep, to Nigeria with twenty million people. The Colonial Office covers all these territories in its sweep, together with such countries as Cyprus, the birth place of Venus, not to say Transjordan, the death place of Moses.

It may be remembered also that it is not necessarily true that the whole earth is the natural habitat of man. Man has spread himself very widely into a great number of habitats, some of which are not suited to him, and we may, by examining the human race under different conditions, learn many things of interest and importance to the populations of colonial territories, which may be of great interest and use to the populations also of our own island. Long ago when I was interested in this problem from the administrative point of view, one of the researches with which I asked certain experts to deal was the problem of milk in schools. It involved the examination of the diets of two East African tribes, the Masai and the Kikuyu. That was the famous report of Orr and Gilks (1931), which is still, I think, a classic. The results of this work were of the utmost importance in Great Britain.

Another interesting example of this interdependence is contained in a letter I recently received from the officer in charge of No. 34 General Hospital, Freetown, Sierra Leone. He pointed out that, although tuberculosis in the African was different from that in the European, it was very interesting to note what had happened to two African divisions moved out to Burma and Indonesia; they were kept there under conditions similar climatically to those to which they had been accustomed, but their

dietary conditions were totally different, indeed they were much the same as the European dietary conditions, and this had produced, even in two or three years, a resistance to tuberculosis which was very striking and which he considered significant.

Nutrition, from the point of view of colonial territories, must take into account the two enormous questions of quantity and quality. When the problem of nutrition was discussed at a League of Nations conference, the Chinese representative said that all Chinese were undernourished all of the time. Well, that was a sweeping statement which might be incapable of support statistically, but it was probably essentially true. Both these problems of quantity and quality are very serious for the inhabitants of most of these territories. They are probably connected with many of the difficulties which administrators find in the Colonial Empire. The violent reaction against twins, for instance, in certain West African tribes is probably due to the fact that it is not possible for a woman there to nourish two children and, if Mary Kingsley had taken round a quantity of milk instead of a legislative code, she might have made more rapid progress than she actually did.

It is a fascinating problem, for it is probable that man himself, even in his philosophy as well as habit, is more closely connected than he likes to think with the problem of ingestion. I think we are going to have a considerable amount of light thrown upon the subject. In particular, Dr. Platt is going to speak on its problems and the principles underlying their solution.

REFERENCE

Orr, J. B. and Gilks, J. L. (1931). *Spec. Rep. Ser. med. Res. Coun., Lond.*, no. 155.

A Ministry of Information film entitled "Today and Tomorrow" was then shown.

The Colonial Nutrition Problem

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Some of the features of the colonial nutrition problem are outlined in this paper and the lines along which the problem may be solved are considered. The film, "Today and Tomorrow", a record of the work of the Middle East Supply Centre, serves far better than any words to illustrate the nature and magnitude of the tasks which have to be undertaken in most colonial territories. This record is one also of achievement, and should encourage us to look for success in our efforts to improve the lot of the colonial peoples.

The size and diversity of the problem can be judged from the numbers and distribution of the colonial peoples. The total population is over 66 millions, and is widely scattered in the 44 territories occupying an area of 2,200,058 square miles. The populations range from 3000 in the Falkland Islands to over 20 millions in Nigeria. The Economic Advisory Council's Committee on Nutrition in the Colonial Empire (1939, 1) found the "variety of conditions fascinating but bewildering". They emphasized, for example, the contrast between Hong Kong, with its dense

population and dependence on imported foodstuffs, and some of the sparsely populated African territories, with their subsistence agriculture, and again, between either of these and the small community of the Falkland Islands, entirely of European origin, engaged in sheep farming.

The existence of a nutrition problem can be determined (a) from a knowledge of the state of health of the people, and (b) from data on foods consumed.

Evidence of a Nutritional Problem from Medical Data

The clinical evidences may be of frank deficiency disease or of starvation. In Part 2 of the Report on Nutrition in the Colonial Empire, the occurrence of frank deficiency disease in various colonial territories was reviewed by the Economic Advisory Council's Committee on Nutrition in the Colonial Empire (1939, 2), and there is no reason to believe that qualitatively there has been any important change in recent years. For the most part, except in exceptional circumstances, the prevalence of frank deficiency disease and gross under-nutrition is not great. When, however, isolated cases of deficiency disease, unexplained by individual idiosyncrasies of diet, do occur, it is usual to find numerous examples of less obvious manifestations of insufficiency of the nutrient or nutrients concerned (Platt, 1944, 1). The existence of these minor manifestations can be established by clinical examination; some of the signs may exist in as much as one-half to two-thirds of a sample of the population surveyed (Platt, 1946).

Aside from these direct evidences of malnutrition or under-nutrition, indirect evidence of poor nutrition may be obtained from infant and maternal mortality rates, and from the occurrence and prevalence of certain diseases involving zymotic factors, for example tuberculosis and tropical ulcer, which may, in part, at any rate, be attributable to impaired nutrition.

Infant Mortality

The best available data on infant mortality rates are assembled in Table 1, and an analysis (Smith, 1943) of a sample of 500 autopsies per-

TABLE 1
INFANT MORTALITY RATES IN THE COLONIAL EMPIRE

Colony	Year	Mortality per 1000 births	Notes
EAST AFRICA			
Kenya	No figures	available	A very rough estimate for European population (18,745 of total 1,387,134)
Uganda	1944	116	
Tanganyika	1935-40 av.	243	
N. Rhodesia	1943	32	
Nyasaland } Somaliland } Zanzibar	No figures	available	
	1944	295	Probably greater than this

TABLE 1—*continued*

Colony	Year	Mortality per 1000 births	Notes
WEST AFRICA			
Gambia	1944	130	For Bathurst only
Gold Coast	1943	129	For Colony only
Nigeria	1936	250	Approximate figure for whole country
Sierra Leone	1944	113	For Lagos only
St. Helena	1943	167	For Freetown only
1940	63		
HIGH COMMISSION TERRITORIES			
Basutoland }	No figures available		
Bechuanaland }			
Swaziland }			
EASTERN			
Ceylon	1944	135	
Hong Kong	1940	327	
Malaya and Straits Settlements	1939	134	
Borneo and Sarawak	No figures available		
Mauritius	1942	163	
Seychelles	1936	55	
Aden	1937	196	
MEDITERRANEAN			
Cyprus	1944	81	
Gibraltar	1941	104	
Malta	1943	210	
Palestine	1938	112	
WEST INDIES			
Bahamas	1942	118	
Barbados	1943	164	
Bermuda	1944	68	
British Guiana	1943	141	
British Honduras	1943	130	
Jamaica	1942	98	
Leeward Is.	1943	93	
Antigua	1943	99	
Montserrat	1943	88	
St. Kitts-Nevis	1943	76	
Virgin Is.	1943	65	
Trinidad	1941	108	
Windward Is.			
Dominica	1944	117	
Grenada	1944	113	
St. Lucia	1943	80	
St. Vincent	1944	106	
WESTERN PACIFIC			
Fiji	1943	63	
Gilbert and Ellice Is.	1936	245	
New Hebrides }	No figures available		
Solomon Is. }			
Tonga	1937	100	

formed in Lagos on children up to 3 years old, during the period 1937-40, is set out in Table 2. This analysis shows a low percentage of deaths

TABLE 2

AGE DISTRIBUTION, MORTALITY AND CAUSES OF DEATH OF 500 CHILDREN, 259 BOYS AND 241 GIRLS, WHO DIED WITHOUT SEEING A DOCTOR IN LAGOS, NIGERIA (Smith, 1943)

Age	No. of deaths	No of deaths as percentage of total
0 to 6 months	181	36.2
7 to 12 months	112	22.4
13 months to 2 years ..	137	27.4
25 months to 3 years ..	70	14.0

ANALYSIS OF CAUSES OF DEATH

Cause of death	No. of deaths	No. of deaths as percentage of total	Remarks
Respiratory disease	343	68.6	Pulmonary tuberculosis 32 cases, of which 22 were very emaciated
Malaria	72	14.4	
Diseases of alimentary tract ..	20	4.0	Colitis 9 cases, <i>cancerum oris</i> 4 cases, amoebic dysentery 3 cases
Malnutrition (faulty diet) and/or starvation ..	14	2.8	Due to vitamin deficiency 4 cases, all boys, aged 5 months, 10 months, 1 year and 2 years
Meningitis, anaemia, congenital and miscellaneous diseases	51	10.2	

attributed directly to malnutrition, but it may well be that malnutrition was a factor in the deaths from other diseases particularly those from respiratory infection.

In an attempt to collect available data on medical evidences of malnutrition in the colonial territories during the past ten years, difficulties have been encountered, due to differences in nomenclature, unevenness of recognition of the effects of malnutrition, and lack of uniformity in diagnosis. An attempt is being made to standardize nomenclature; to this end, a glossary of terms employed in describing malnutrition and under-nutrition is being prepared, along the lines laid down in a recent paper on cutaneous manifestations of deficiency disease (Platt, 1945, 1).

Evidence of a Nutritional Problem from Data on Food Supplies

Data on supplies of food available for peoples in colonial territories are scanty. So far, reasonably satisfactory data have been obtained for Malaya and for Trinidad, Barbados and Jamaica (Platt, 1946). At best, the information obtained is approximate and is reasonably satisfactory only for territories largely dependent on imported foods or for those which have more highly developed economies and well staffed departments of agriculture.

Data on food consumption for samples of colonial populations are available for several territories, though many of these are of doubtful value. This is especially the case in surveys made among populations on subsistence agriculture, when fluctuations in food intake at various times of the year have not been investigated. Evidence of the importance of these fluctuations was obtained in a summary of the calorie intake of foods in three villages surveyed in Nyasaland during 1938-39. Some of the data obtained are shown in Table 3, from which it will be seen that

TABLE 3
COMPARISON OF CALORIE INTAKE WITH ESTIMATED REQUIREMENTS IN THREE
NYASALAND VILLAGES DEC. 1938 TO SEPT. 1939

	Hill village	Foothill village	Lakeshore village
Person days	1510	3219	2748
Requirements, thousand Calories ..	2933	5741	5089
Intake " " ..	2611	6435	4400
Difference " " ..	-322	+694	-689
Percentage deficit or excess ..	-11.0	+12.1	-13.5

Estimated daily Calorie requirements of individuals:	males	Heavy work	Light work
		2450 to 3125	2145 to 2550
Estimated daily Calorie requirements of individuals:	females	2340 to 2825	2070 to 2550

Extreme limits of seasonal variation in calorie intake expressed as percentage of estimated requirements for samples of the three village populations:

+63.2 per cent.	foothill village, July 1939
-37.5 " "	lakeshore village, June 1939

in terms of calories the differences between the intakes and the estimated requirements, over the period of survey, are not remarkable and, even for these differences, there is a reasonable explanation; yet, for two extreme examples, in two months of the year, the differences between estimated requirements and intake are considerable.

At the first session of the Food and Agriculture Conference of the United Nations at Quebec (Secretary of State for Foreign Affairs, 1945) it was suggested that among the more urgent problems requiring immediate study was the development and standardization of methods of dietary survey and of evaluation of results. A manual dealing with the technique for conducting surveys in colonial territories is being prepared for publication. As a first step towards securing uniformity of evaluation of the data from dietary surveys, tables of representative values for the composition of tropical foods have been prepared (Platt, 1945, 2). There still remains a good deal of work to be done, not so much in analysing individual foodstuffs as in investigating the effects of native methods of preparing, processing and cooking on the nutritive value of foods.

Satisfactory correlation can be obtained between the results of evaluation of data on foods consumed and the prevalence of signs of nutritional ill health in a community, as was shown, for example, in recent investigations in the West Indies (Platt, 1946).

Planning for Improvement in Nutrition

Successive measures in over-all planning on a territorial basis have been summarized recently as follows (Platt, 1944, 2):

- (1) Determination of the population's needs for health in terms of the more important nutrients; this includes knowledge of population distribution in respect of infants, children, pregnant and nursing women, and occupational groups, with selection of appropriate nutrient allowances. From these data the value for the needs per person of the population can be calculated.
- (2) Translation of the nutritional requirements into terms of foods, with due regard to the customary foods of the people and the approximate amounts which are eaten.
- (3) Estimation of existing food supplies from both home production and imports. It may be necessary also at this stage to consider potential as well as actual home production, including its cost in terms of land and labour, and alternative sources of imports considered in relation to such circumstances as length of haul, together with losses occurring in the handling and processing of foods, and the extent to which these might be reduced.
- (4) Comparison of the aggregate supply with the estimates of requirements based on nutritional needs, in order to detect and measure the gaps between the two and to determine how they should be filled.
- (5) Arrangements for ensuring equitable distribution of the supplies of food available. In addition to an appreciation of the nutrition problem in terms of state of health, and to knowledge of food habits and customs and agricultural practices, a full understanding of the methods of distribution will be necessary as a basis for formulating nutritional policy in such a way as to secure the co-operation of the people, thereby strengthening the community socially as well as physically.

The first step is to state an immediate objective in terms of nutrients. Table 4 gives the values recommended on a per head basis for a population of mixed age and sex groups in colonial territories. Notes on these values will be found in appendix 3 of the report on Nutrition in the British West Indies (Platt, 1946).

TABLE 4
AMOUNTS OF NUTRIENTS PER HEAD DAILY RECOMMENDED AS AN
IMMEDIATE OBJECTIVE IN COLONIAL TERRITORIES

Item	Amount
Calories	2500
Protein	60 g.
Calcium	800 mg.
Iron	20 "
Vitamin A (as β -carotene)	5000 I.U.
Vitamin B ₁	1.5 mg.
Riboflavin	1.8 "
Nicotinic acid	12 "
Vitamin C	30 "

In order to assist in the next step, the translation of nutritional requirements into terms of foods, dietaries can be prepared by using a system of food categories, which are set out in Table 5.

TABLE 5

CATEGORIES OF FOODS AND REPLACEMENT EQUIVALENTS AS A GUIDE TO THE CONSTRUCTION OF DIETARIES

Categories and examples	Replacement values in weight units,* edible portion	Dietary adjustments required in units	Remarks
A. CEREALS AND SUBSTITUTES			
Grains: rice, wheat, maize, millets	1 of cereals (whole or lightly milled) or cereal flours (high extraction) or par-boiled rice		The supplement of pulses is required to offset the lowered content of protein and B vitamins in the dietary when the foods indicated are used to replace whole grain or high extraction cereals. Replacement should not be carried to the stage where the diet becomes overloaded with pulses
Starchy roots and fruits: cassava, potatoes, yams, plantains, bread fruit	2½ of cassava (gross weight)	Add beans ½	
Starch flours: sago, corn-flour, arrowroot	4½ of plantains (unpeeled, no stalk)	" " ½	
	3½ of other starchy roots and fruits (gross weight)	" " ½	
	½ of low extraction cereal flours or highly milled rice	" " ½	
	½ of starch flours or meal from starch roots and fruits	" " ½	
B. PULSES AND OILSEEDS			
Peas, beans, dhal, gram, groundnuts, soya beans	1 of peas, beans, dhal, gram 1 of soya beans 1 of groundnuts	Subtract fat ½ " " ½	The fat or oil in the dietary should not be entirely replaced because of its use in cooking
C. ANIMAL PRODUCTS EXCEPT FATS			
Meat, fish, eggs, milk and milk products	1 of fresh meat or fresh fatty fish, <i>e.g.</i> , herring 1 of white fish, <i>e.g.</i> , cod 1½ of pork (fresh) ½ of dried meat (biltong) or dried fish ½ of dried meat powder or fish meal 5 of fresh milk 1 of condensed milk 1½ of eggs in shell ½ of dried eggs ½ of food yeast	Add fat 1 Subtract fat ½ Subtract fat ½ " " ½	Not more than 7 g. (¼ oz.) of food yeast daily
D. FRUIT AND VEGETABLES OTHER THAN THOSE IN CATEGORIES A AND B ABOVE			
Green leaves, roots and stems, vegetable fruits, peas and beans in pod, citrus fruits, mangoes	1 of fresh (gross weight) ½ of dried ½ of sprouted pulses		Unless green leaves are used regularly, one-eighth of the fat in the dietary should be in the form of a carotene-rich oil, <i>e.g.</i> , red palm oil, and a rich source of ascorbic acid also should be included
E. SUGARS			
Refined sugar, molasses, sweet stems	1 of sugar 1½ of syrups, jams 10 of sugar cane		
F. FATS AND OILS			
Vegetable oils: soya, groundnut, coconut, sesame Animal fats: lard, ghee, butter Mixed oils and fats: margarine	All replaceable on a weight for weight basis. Fresh coconut may be used to replace some fat, one whole nut, husked but including shell, being equivalent to one-quarter of its own weight in oil		The fat in the dietary may be reduced if oil seeds replace beans or if milk replaces meat (see appropriate sections above)
G. CONDIMENTS AND SPICES			
Curry stuffs, soya sauce	According to local taste		
H. MINERAL SALTS			
Common salt (sodium chloride) Lime (calcium hydroxide)	Not replaceable		
I. BEVERAGES			
Fermented: Kaffir beer, palm wine Non-fermented: tea, coffee, cocoa			Unfiltered native beers are valuable sources of B complex vitamins

* Equivalents are approximate only and are given in terms of weight units so that they are applicable to any terminology of weights and measures without further adjustments.

This plan was introduced to provide a better basis for ration schemes for collective feeding as, for example, on estates, in mines, and in institutions such as prisons and hospitals. Emphasis on the need for each category to be represented ensures a diet more nutritively adequate than is provided when only two items, maize and beans, form the ration issue. The plan was found valuable also by relatively inexperienced persons in estimating food requirements for re-occupied territories in the Far East.

Table 6 shows a dietary based on these categories.

TABLE 6
SUGGESTED COMPOSITION OF DIETARY BASED ON CATEGORIES
GIVEN IN TABLE 5

Category	Food chosen	Per head daily oz.
Cereals and substitutes	Rice, parboiled	16
Pulses and oilseeds	Kidney beans	1
Animal products	Fresh meat (edible portion)	1½
Fruit and vegetables	Green leaves (gross weight)	3
	Tomatoes	½
	Cucumber	½
Sugars	Refined sugar	2
Fats and oils	Vegetable oil	1½
Condiments and spices	Curry stuffs	½
Mineral salts	Common salt	½
Beverages		

The nutritive value of this dietary is: Calories 2413, protein 52 g., calcium 218 mg., iron 11 mg., vitamin A 9067 I.U., vitamin B₁ 1.2 mg., riboflavin 0.8 mg., nicotinic acid 22 mg., and ascorbic acid 73 mg. The calcium and riboflavin values are low, as is usual in this type of dietary. The calcium intake can be raised by the use of small fish, of which the bones are eaten, in place of meat several times a week, or by the use of lime (calcium hydroxide), either for cooking purposes or for chewing with betel. Riboflavin reaches a satisfactory level in a dietary only when larger amounts of animal products, especially milk and cheese, can be used, but intake can be raised by the use of yeast and fermented products.

The next stage in planning is the estimation of existing food supplies. Reference has already been made to an attempt to do this for three West Indian islands (Platt, 1946); a summary of the data thus collected for the daily food consumption per head in Barbados, Jamaica and Trinidad is given in Table 7.

Recommendations have been made for the improvement of the dietaries of these territories, including the use of wheat flour with a prescribed minimum content of nutrients derived from the grain, "ennobled" by the addition of calcium and 2 per cent. of food yeast. This is an example of a simple measure for increasing the nutrients in the food whilst retaining the existing food pattern of the people. Reference should be made to the report on Nutrition in the British West Indies in order to see the extent to which the application of the proposed measures would improve

the nutritive value of the dietary in terms of the immediate objective (Platt, 1946).

The final stage of ensuring that distribution should be equitable has been considered also in relation to West Indian territories (Platt, 1946) but, in making calculations, evenness of distribution has been assumed.

There are two groups of measures which can be applied in order to raise the state of nutrition. One, of which the improvement of the nutritive value of wheat flour is an example, is comparatively easy to effect. Measures in the other group may involve far-reaching plans for increasing food

TABLE 7
SUMMARY OF FOOD CONSUMPTION IN THREE WEST INDIAN ISLANDS
(oz. edible portion, per head per day)

Food category	Barbados 1944 (population 200,000)	Jamaica 1942 (population 1,237,063)	Trinidad 1944 (population 540,000)
Cereals	8.5	3.9	12.4
Starchy roots and fruits	19.2	35.2	9.8
Pulses and nuts	0.25	0.8	0.6
Animal products (1)	1.9	1.3	2.6
Milk in various forms	2.9 (2)	1.8 (3)	1.3 (4)
Fats and oils	0.8	0.6	1.4
Vegetables and fruits (5)	0.5	4.4	3.4
Sugar	3.6	1.9	3.2

(1) Except milk and fats.

(2) Including 2.7 oz. fresh milk.

(3) " 1.6 " " "

(4) Including 0.75 oz. sweetened condensed milk. The figure is, therefore, not directly comparable with the others.

(5) Other than starchy roots and fruits.

production or importation. The first type of measure, even if successfully introduced, may not be sufficient to achieve the immediate objective; other plans, which may require considerable change in agricultural and economic policy, will need careful examination of the natural resources of a territory and of the best means of utilizing them, proper consideration being given to elements in the standard of living other than food supplies. The need for application of the second group of measures, and the need for this kind of investigation, are greater for the more primitive peoples. In other words, those means by which an improvement in the state of nutrition can be effected, directly and immediately applicable to more sophisticated peoples, cannot be effective in, or, indeed, may not even reach, primitive communities, without development of transport, marketing and related facilities.

Improvement of Production and Utilization of Food

The factors which should be considered in framing plans for improved production, utilization and consumption of food are many; they are listed briefly below:

A. Production

1. Incentives: assured markets; desire for improved standard of living and availability of consumer goods such as clothing and bicycles.
2. Structure and stability of society: *e.g.*, development of co-operative and collective enterprises; nature and security of land tenure.
3. Water: control (prevention of floods); conservation (protection against effects of droughts); utilization (irrigation, fishing and fish culture).
4. Land and crops: utilization and management of land, forestry, pasture and cropping; soil conservation and reclamation; varieties and balance of crops, *i.e.*, of different food crops and of food crops in relation to cash crops; selection of crops in relation to soil and climate; use of fertilizers and crop residues.
5. Livestock: balance of kinds and numbers in relation to land available for plant crops for direct human consumption; proper use, *e.g.*, for draught and food where still used only as currency.
6. Control of pests and diseases: *e.g.*, locusts and tsetse fly.
7. Labour: health and efficiency; productivity in relation to types of husbandry and individual crops.
8. Trade: relation of development of natural resources to availability and cost of commodities from external sources.

B. Storage, Processing, Transport and Distribution

1. Provision of buffer stocks, *e.g.*, as communal stores to hold crop surpluses against possible failures; production at peak seasons for surpluses to be preserved.
2. Protection against losses, including gross wastage and subtle losses occurring in the course of treatments and storage, *e.g.*, control of infestation, preservation as by drying, retention of nutrients in milling cereals, enhancement of nutritive values by fermentation, and improved methods of large scale cooking for collective feeding.
3. Distribution, *e.g.*, by collective feeding and provision of supplements for groups with special physiological needs.

C. Education

1. Food habits, kitchen practices, farming methods, by means of co-ordinated and enlightened curricula related to school feeding, school gardens, teaching of home management and hygiene; apprenticeship systems and methods of mass adult education applied to backward countries.
2. Birth control: limitation of rate of increase of population to rate of improvement of food supply.

The farmer and teacher are the most important persons needed in effecting such improvements, but they obviously need the support of experts of many kinds and, in particular, of the food technologist. The importance of the food technologist needs special emphasis because, with his assistance, improvements in food supplies can be made without expansion of production.

Work on the improvement of nutrition must, therefore, be in the nature of a combined operation but, before undertaking such work, a plan is

needed, and certain basic data are required before plans can be drawn up satisfactorily. The value of a survey of an area and its population cannot, therefore, be too strongly stressed (Platt, 1946). The state of development of the natural resources should be compared with the potentialities of the area and its inhabitants. An estimate of these potentialities may, however, have to be determined by experiment. The results of a preliminary investigation may indicate also a method of attacking a given problem and the point in the society where the attack might be made; this is well illustrated by an observation made on the time spent throughout the year on domestic jobs by women in three types of village in Nyasaland; the results are recorded in Table 8. These

TABLE 8

TIME SPENT BY WOMEN IN THREE TYPES OF VILLAGE IN NYASALAND ON ROUTINE DOMESTIC TASKS IN ADDITION TO THEIR AGRICULTURAL WORK

Task	Type of village	Average time taken per woman daily	
		hours	minutes
First pounding of maize	HV		43
	FHV		47
Second pounding of maize	HV	1	15
	FHV	1	5
Soaking and peeling cassava	LSV	1	5
Pounding cassava	LSV	1	20
Carrying water	HV		45
	FHV		20
	LSV		30
Collecting and carrying wood	HV		53
	FHV		33
	LSV		35
Collecting materials for side dishes ..	HV	1	0*
	FHV	1	0*
	LSV		30*
Preparing materials for side dishes ..	All	1	0*
Cooking	HV	1	30*
	FHV	1	30*
	LSV	2	0*

In addition, seasonal jobs include drying leaves, burning plants for potashes, pot making, grass cutting for thatch, mudding hut walls.

HV=Hill village.

FHV=Foothill village.

LSV=Lakeshore village.

* Estimates only.

tasks were performed in addition to the agricultural work which was for the most part done by the women, many of the men having left the village to work in mines or on plantations. On the average, every woman spent about 7 hours daily on such routine domestic tasks as preparing

cereals, fetching water and collecting fuel and leaves from the bush for food. Clearly, until time spent in this way is considerably reduced, women will have little time to listen to ways of improving their lot, and still less for putting new ideas into practice.

The next stage in village evolution would seem to be, therefore, the introduction of a measure of specialization; for instance, all the grain should be handled by a miller, the water be carried on the backs of animals or otherwise laid on to the village, the fuel be obtained by rotational cutting of wood for charcoal burning in unused forests, the bush leaves be replaced by kitchen garden produce for side dishes. To some extent this phase in evolution may be regarded as requiring also a measure of industrialization; it represents what is in fact being recognized by colonial governments as the need for the development of secondary industries.

It is obviously impossible to examine all the factors affecting food production and utilization; one point, however, must be stressed; colonial territories cannot afford to continue to export the fertility of their soil indiscriminately in the form of cash crops. It is imperative that this principle be recognized, that exports be restricted almost, if not entirely, to compounds of carbon, hydrogen and oxygen, *i.e.*, oils and carbohydrates, cane sugar and fibres, for example, and that crop residues be returned to the soils from which the crops are taken. In this way, continued use may be made of the synthesis carried out by the plant in tropical conditions, without the present serious decline in production.

Organization for the Improvement of Nutrition in Colonial Territories

A great deal of the knowledge of nutrition has been acquired in recent years and has not yet been passed on to administrators and the technical staff of colonial territories, or to their populations. Members of the various departments of colonial governments work independently whilst, in the combined operation suggested, the members of district staffs and the people amongst whom they work should co-operate together as a team. New knowledge and a new point of view will have to be passed on through newly recruited staff until existing staff can be spared for further training. The plan for teaching and training personnel and its relationship to other activities connected with the development and welfare of colonial peoples is summarized in Figure 1.

Teaching and training in nutrition of personnel for the colonial territories is being mainly carried out by the Medical Research Council's Human Nutrition Research Unit. Special courses have been given to nutritionists who have been allocated to eight colonial territories. Students taking their diploma in tropical medicine and hygiene and the diploma of public health at the London School of Hygiene and Tropical Medicine are being given a course in nutrition, and students attending a course for colonial welfare officers at the London School of Economics are given instruction in the elements of nutrition.

The nutritionists referred to are expected to assist Colonial Government Nutrition Councils in the organization of nutritional investigations and in any steps taken to improve the state of nutrition in the territories.

It is proposed to extend the work of the Human Nutrition Research Unit to an African territory, and to set up there a field research station. Further, a field working party which is being assembled to carry out a

combined operation will, in its early work, follow the lines developed in the investigations begun before the war in Nyasaland (Platt, 1944, 2).

Co-operation between the various bodies which advise the Secretary of State for the Colonies, *i.e.*, the Colonial Medical Research Committee,

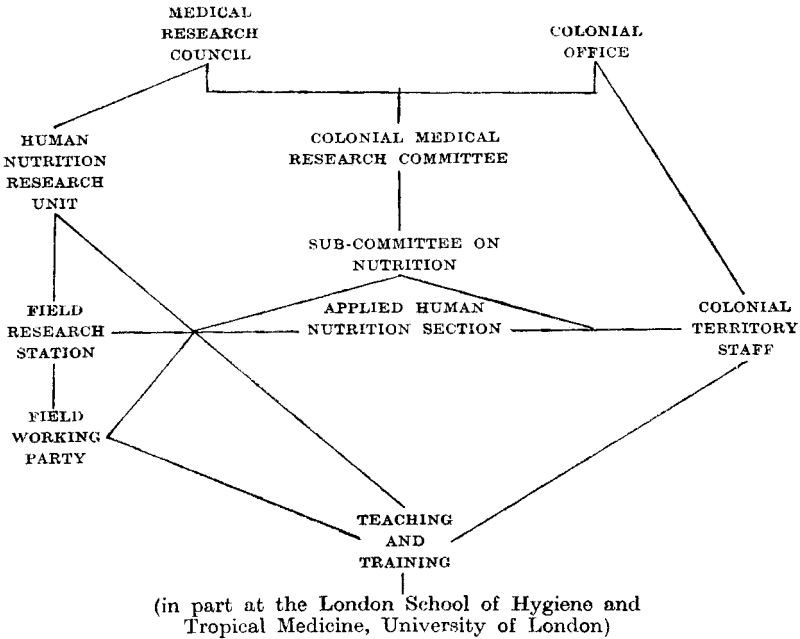


FIGURE 1. INTERRELATIONSHIP OF VARIOUS BODIES INTERESTED IN THE DEVELOPMENT OF COLONIAL PEOPLES.

the Colonial Advisory Council of Agriculture, Animal Health and Forestry, and the Colonial Social Science Research Council, is being arranged through representation on a nutrition committee working as a Sub-Committee of the Colonial Medical Research Committee.

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Discussion

Colonel W. Elliot: We are deeply indebted to Dr. Platt and also to the producer of the film. The only comment I have to make is that since that time the Middle East Supply Centre has been broken up which shows what a gap there is between promise and performance.

It is more of an uphill job than would appear from the film. These great military operations come and go, and absolute day to day plugging is the only way to make any progress. The opportunities for work in the colonial territories are far greater than the staff available to teach people anything about these very important questions.

I think Dr. Platt's remark that he would forbid the export from these territories of any substance containing anything beyond carbon, hydrogen and oxygen summed up the position. It is very true that the guts of these lands are being dragged out. Soil erosion is only one of the problems. There is the actual extraction from the soil going on every day. Take for instance the enormous export of phosphates. That is a tremendous drain on the soil. For example, it is reckoned that Australia, which is a country poor in phosphates, would require six hundred thousand tons of phosphate to replace that which has been already dragged out. There is even a similar problem within our own islands; in Scotland the change from growing mutton and wool to rearing lambs has dragged the guts out of the Scottish hills. Development is not always such a good thing for the country being developed, and I am reminded of the reference in the biography of William Morris: "Foreign trade, the suppression of which is as desirable as the suppression of the cholera".

Sir Joseph Barcroft (Physiological Laboratory, Cambridge): I always feel that I have become, as years go by, more and more of a learner and, indeed, today I have felt that I am quite a child. The film has filled me with two conflicting feelings; the first is that of hope and the feeling of rightness that all this should be done, and the second is a feeling of despair as to how it is all going to end. That seems to me to be really the problem of our time, and I should like Dr. Platt, if he knows, to tell us whether it has always been the fate of mankind to be hopelessly undernourished. I should also like to know whether Dr. Platt considers we are in a sort of vicious circle from which we cannot get out, or whether he can see any real prospect within some hundreds of years of producing and attaining a substantial level of diet for the population.

Dr. E. R. Bransby (Ministry of Health, Whitehall, London, S.W.1): I should like to ask one question with regard to the water buffalo. In the film it was stated that the milk yield was 8000 gallons per season, and I should like to know if that is a true figure. If it is, it is two or three times as great as the yield of the best dairy cattle in this country, and I am

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wondering whether those water buffaloes can be put into other territories and, if so, what is being done about it.

Mr. A. J. Wakefield (c/o Barclay's Bank, Trinidad, British West Indies): I think the statement was pounds and not gallons. The yield is about 800 gallons.

Dr. D. P. Cuthbertson (Rowett Research Institute, Bucksburn, Aberdeen): I should like to know how much the scheme cost and whether there is any likelihood of the people concerned being able to pay for it themselves.

Colonel W. Elliot: I think that doing the job at high pressure makes it enormously expensive. It can be done more slowly.

The figure given by Dr. Platt for the working time of a woman during the day, namely seven hours a day to get things ready for food, is a frightening one, and one which, I am sure, is not at all exaggerated. In West Africa there are many places where a woman will make a journey of ten miles to get water, that is twenty miles a day, which is a tremendous drain on the energies of a community. A simple water pipe would solve this problem, and although a piped water supply is not an immediately paying proposition, it would be remunerative in releasing fresh energies for other tasks.

Dr. A. C. Thaysen (c/o Glaxo Laboratories, Greenford, Middlesex): I heard in Dr. Platt's paper a brief reference advocating the adding of Kaffir beer to food. I had an opportunity to talk to one or two people recently on the subject of food supplements which were, apparently, much in use during the war in Hong Kong and Malaya. Perhaps we shall be able to hear a few words about the types of food that were used in those conditions of near starvation.

Surgeon-Lieutenant J. G. Reed, R.N.V.R. (Nevill Rise Cottage, Rodwell Road, Tunbridge Wells, Kent): I have some experience of these supplements. Many camps made yeast from whatever materials were available, maize being apparently the best, but others were not able to do so through lack of sufficient materials, chiefly sugar. On the whole, however, the problem was too great to be dealt with by such means.

If I may, I should like to draw attention to the information which is obtainable from prisoner of war and civil internee camps in the Far East and elsewhere. The material is unique. From Singapore and Hong Kong details are obtainable of the food eaten, together with the signs and symptoms of malnutrition which resulted from the various diets. In Singapore use was made of large numbers of human guineapigs, men who volunteered to be kept under close observation before signs of malnutrition even appeared. Many men, well known in the sphere of nutrition, were in these camps and are in a position to give the results of their observations. The material can be made available from British, American, Dutch, and Australian sources. Never before have such large numbers of men, well educated and able to report their condition, been kept under conditions of such extreme malnutrition.

Almost every sign of malnutrition that is known was to be found, together with many others which have never been described. These varied from a prevalence of minor signs of malnutrition with almost no

mortality, to death from starvation of a quarter of the population of 800 to 1000 in the last two months of the war with Japan. This took place in my own camp.

There is much to be learned about edible plants which grow easily, and unusual foods which effectively helped to save our lives. Many vegetables and foods which were little known were used by us. There is a great need in Malaya for republication of such books as *Gardening in Malaya*, which gives all the details of how to cultivate vegetables, how to avoid waste, and how to use materials for compost which otherwise would be wasted. In order that the increasing knowledge of nutrition should get through to the masses for whom it is intended, it has to go through doctors, agriculturists and administrators, and finally, through educated native dressers, clerks and teachers. Unless that literature is available it will not get through to the masses.

It is necessary also that all food supplements, the outstanding one of which seems to be food yeast made by Colonial Food Yeast, Ltd., should be made available as much as possible. If, however, that cannot be made available in sufficiently large quantities, then we should go into the question of yeast grown locally, such as is made in large quantities in the Dutch East Indies by methods which, although somewhat wrapped in mystery, could, I think, be brought to light.

I do not think there is any doubt as to the need of countries like Malaya. I am told that the death rate has been doubled, the hospitals are filled with cases of beriberi, malaria, venereal disease, and tuberculosis, in that order; 10 per cent. of these cases show signs of malnutrition, and 80 per cent. show some signs of it.

Dr. L. J. Harris (Dunn Nutritional Laboratory, Cambridge): I think the meeting might like to know that the Committee is now considering the project of holding a further conference dealing with conditions in prisoner of war camps and in occupied territories.

Major H. Lehmann, R.A.M.C. (c/o Imperial Bank of India, Bombay, India Command): It might be of interest to the meeting that General Headquarters (India) formed a Marasmus Research Team which studied Indian prisoners of war returning from Singapore, Bangkok, Hong Kong, Canton, New Guinea, New Britain, Halmahera and Mauratai. The team consisted of a physician and two biochemists. The neurological, haematological and biochemical data obtained in connexion with the general clinical observations will be published.

Dr. G. A. C. Herklots (Civil Affairs Staff Hong Kong, 28 Grosvenor Street, London, W.1): I think the study of malnutrition in the Empire has shown conclusively the need for co-operation and co-ordination between different departments. There is far too much isolation; in the past Departments of Forestry, Agriculture, Fisheries, and others have kept too much to themselves. Nutritional studies have proved conclusively that these departments must co-ordinate and co-operate with one another if they are to overcome this scourge of mankind.

Malnutrition in Colonial Territories

Dr. H. S. Stannus (130 Harley Street, London, W.1)

In discussing malnutrition and deficiency diseases among the native inhabitants of the British colonies, it would have been possible to show a map of the world with these dependencies painted red, and with shaded areas to indicate the known distribution of these so-called deficiency diseases, but the "unknowns" so far outnumber the "knowns" that such an approach would serve little purpose. It will be of greater advantage to attempt to discuss some more general questions having a practical bearing upon the problem.

The first problem is how to define malnutrition and the criteria to be used to determine its presence in a community. Malnutrition is but the negation of good nutrition, by which is meant, briefly, a state of metabolic equilibrium, with ability to meet all the normal demands on the body in a given environment.

It should be noted immediately that, since the first departures from normal metabolism will produce merely disturbances of function, without irreversible changes, there may be considerable difficulty in recognizing them, even in a group of selected individuals; with a large native community the difficulty is greater still.

The term malnutrition covers a wide field; the condition may be due to an inadequate supply of all foodstuffs, a state that is called starvation; or to a deficient or disproportionate intake of one or more constituents of the diet, including water, some mineral such as calcium, iron, fluorine or one of the trace elements; or to an insufficiency or imbalance in the diet of carbohydrate, fat or protein; or, lastly, to lack of vitamins.

The phrase "deficiency disease" is sometimes loosely applied only to the lack of vitamins but the term should be used in its widest sense and include, for example, endemic fluorosis. It is not possible here to do more than touch on the fringe of the subject.

Ways of attacking the problem may be considered under three headings:

Clinical observations including nutritional surveys;

Laboratory investigations;

Dietary surveys, carried out perhaps in conjunction with social surveys.

Clinical Observations

The common practice is to collect data under a number of headings from a representative sample of the population. The choice of the headings under which information is sought, or of the criteria by which the state of nutrition is to be judged, is not free from difficulties.

The criteria may include a great variety of ill-defined symptoms indicative of an upset in function, such as fatigability, irritability, apathy, depression, giddiness and loss of tone, or the long train of symptoms often described as neurasthenia, followed by loss of appetite, gastrointestinal disturbance, failure of growth or loss of weight; possibly loss of resistance to infection should be included also. Next in the series come what are commonly considered as the early signs of deficiency disease. These have formed the basis of many surveys but the results

obtained have often been of doubtful value, owing to the lack of experience of the observer and his ignorance of the range of normal variations. This was exemplified in the use of circum-corneal injection and corneal vascularization as criteria of riboflavin deficiency, and of the condition properly called *keratosis pilaris* in assessing vitamin A deficiency.

Surveys may, however, bring to light clinical syndromes well recognized as due to malnutrition, as well as cases of more fully developed deficiency disease. It is the general picture which will lead the experienced observer to a correct interpretation of the nutritional status of a community.

The word, syndrome, has just been used in order to emphasize the fact that the clinical picture presented within any group of individuals suffering from malnutritional disease, or by different groups, may vary widely and consist of one or more symptom-complexes variously intermixed, depending partly on the metabolic status of the individual or group upon which the deficiency is implanted. It has not always been realized that, in a group of persons living under identical conditions, the clinical picture which results from a deficient but identical diet may vary from individual to individual. This was demonstrated a number of years ago and the point has been very well illustrated in the outbreaks of deficiency diseases among refugees and internees of prisoner of war camps in the Far East in recent years, as it was also in the Spanish civil war.

Some of these syndromes are fairly well correlated with factors of causation; fresh facts are constantly coming to light, as is witnessed by the recent work on folic acid in connexion with the macrocytic anaemias; others of them await further investigation.

For example, the condition commonly referred to as a retrobulbar optic neuritis but which is preferably called retrobulbar optic neuropathy, was described many years ago in association with beriberi and was then believed to be part of the peripheral neuritis characteristic of that disease. Later a similar condition was noted, in some cases associated with deafness, in sufferers from pellagra. Later still what appeared to be an identical affection was discovered in West Africa and elsewhere; then it was seen during the Spanish civil war, and lastly in the Far East among ill nourished communities but not definitely associated with any one specific deficiency disease.

This syndrome was discussed three years ago; on the evidence available it was suggested that it was probably due to a deficiency state, in which a hyporiboflavinosis is associated with a deficiency of some other as yet unknown but closely allied factor.

The neurological syndromes in deficiency states again make a most interesting study. The history of their recognition is much the same as in the case of the retrobulbar optic neuropathy, and their pathogeny may be similar.

As far as I know, none of those who have had an opportunity of seeing similar cases in the East during the recent war, have been able to throw any new light on the question.

Another deficiency disease which has been called "infantile pellagra", not uncommon among native children in parts of Africa and elsewhere,

known under a number of native names and to which the term malignant malnutrition has recently been applied, I think rather unfortunately, still remains one of uncertain pathogeny.

The actual mechanism of production of polyuria and oedema associated with malnutrition, remains unknown.

There is another point I should like to refer to here. The inference is sometimes made that, because a certain syndrome has cleared up after the prolonged administration of some particular vitamin, the syndrome was caused by a lack of that vitamin. Conversely it is sometimes reasoned that, because some syndrome, often of long standing, does not clear up under treatment with a particular vitamin, the syndrome was not caused by a deficiency of that vitamin. Both arguments are, I believe, fallacious.

Laboratory Investigations

An attempt may be made to submit a sample of a population to a biochemical investigation. Estimations of any factor from calcium and haemoglobin to the vitamin values in the blood may be undertaken, including saturation and other refined tests. The results obtained, however, have been in many instances disappointing and the interpretation which may be placed upon them uncertain. They entail an enormous amount of labour by teams of specialists with laboratory accommodation and are, therefore, as a rule inapplicable to the exploration of large indigenous populations scattered over wide areas.

Dietary Surveys

With the third method of investigation, dietary surveys, the object is to determine whether or not a community is getting what is considered to be an adequate and balanced diet, and the matter might at first sight appear to be an easy one.

Such surveys have been carried out, and estimations of carbohydrate, fats, protein and calorific values made, together with values for vitamins, salts, and so on, but it is not enough to deal only with the main staple and one or two other constituents of the diet. Results are likely to be erroneous unless the investigators have an intimate acquaintance with the native and his daily life, and unless due allowance is made for the big seasonal fluctuations which occur in available foodstuffs. Excellent surveys carried out in Northern Rhodesia, in Swaziland and elsewhere show what an appreciation of these points means.

As I remarked at a previous discussion of this Society (Stannus, 1946), in surveying native diets account must be taken of the occasional snack of dried oily fish which finds its way hundreds of miles up country from the fishing area, the leg of poached venison, the luscious fat caterpillar that makes its appearance at certain seasons of the year, the tiny fly which makes up well into cakes, the fried grasshopper, the feed of wild honey, comb, honey, grubs and all, the raw sugar cane, not to mention an assortment of green leaves which the women know so well how to select and cook and, last but not least, the mug of native beer.

From the bare figures of a dietary survey, the whole community might sometimes be expected to be suffering from malnutrition, while observation would show this not to be the case.

The great mistake made in days gone by when ration scales were drawn up for our native prisons, was the failure to recognize what has just been stated. Those scales prescribed perhaps so much rice and beans together with a little salt. No wonder, now, that we were able to study deficiency disease so well in our Government institutions, for these outbreaks occurred not only in the prisons but also in native schools. Beriberi was looked upon at one time as an institutional disease.

The key to an outbreak of pellagra in a jail, witnessed some thirty years ago, lay in the discovery that the disease attacked only the long term prisoners from far off districts, whereas those that escaped were drawn from nearby areas so that their wives came and lived near the jail and were allowed to collect their imprisoned husbands' rations and exchange them for a variety of the foodstuffs to which the men were accustomed.

This question is of paramount importance when dealing with the feeding of natives in large groups, withdrawn from their normal habitat and normal environment. When the number of articles of food is large from which a choice may be made, conditions of deficiency seldom arise; when they are few, as in many native countries, or as the result of rationing, there is always danger. It is not merely a question of supplying a sufficient and well balanced ration. A very detailed knowledge is necessary of whether such rations will be acceptable or not. Outbreaks of scurvy have occurred among native labourers supplied with a balanced diet because they threw away all the green vegetables. An outbreak of pellagra among the inmates of a displaced persons camp in north Africa during the recent war was an excellent example of failure to recognize this fact.

Something has been learned concerning food prejudices in this country during rationing. Among native races, bound by custom and prejudice, tribal taboo and religious scruple, the matter becomes one of prime importance. I have seen natives during a famine refuse a grain with which they were unfamiliar, because, they said, they did not know how to prepare it. In the Bengal famine the Indian refused wheat.

In speaking of diets and the extreme variation of them upon which man subsists apparently in health, contrast is often made between the flesh-eating Eskimos and the rice eaters of the Far East. I have often wondered whether in such circumstances different metabolic patterns may have developed. There is not much evidence on the point. Perhaps someone may be able to answer the question. It might be an important one in nutrition, as similar contrasts might be drawn between the folk who eat boiled bananas and soured milk, and the eaters of maize.

In listening to the stories of returned prisoners of war from the Far East I have been struck by the fact that, after some period of semi-starvation had elapsed, accompanied by gross loss of weight and other symptoms, some kind of equilibrium seems to have been reached, as if metabolism were balanced at some lower level or as if they were "running in another gear". Sparing mechanisms are of course known to operate in the body but do they play any part in the prevention of malnutritional disease among peoples who, during their whole evolution, have probably never experienced optimum nutrition?

The Vitamin Factor in Malnutrition

The rapid growth of knowledge about what have been called accessory food factors and the enthusiasm thereby engendered, has perhaps rather tended towards too narrow a view of the problem of nutrition.

While the laboratory worker is intent on devising experimental conditions with the fewest possible variants, the clinician is faced by a very different state of affairs. I think that too often he has attempted to label some clinical picture as an X, Y or Z deficiency. It was a grave error when some writers attempted to define pellagra, a clinical disease, in terms of nicotinic acid deficiency.

I feel, as a clinician, that we should have more patience and be content to collect detailed observations, in the most precise form, using terms incapable of misinterpretation, free from preconceived ideas often based on post-mortem room pathology. The highly trained medical clinician would in this way make to the knowledge of malnutrition and malnutritional diseases a contribution, the equal of that made by the research biochemist in the laboratory.

The march of the vitamins from the day of their inception as a group of amines, which had to be introduced from without since the body could not produce them, which acted in infinitesimally small amounts but which were essential to life, has been attended by many casualties, and many derelict ideas lie by the roadside, so that now very little of the old concept holds good. The last break has been of course the demonstration that man can and does produce certain vitamins in his own body or rather that certain types of organism found in the colon can do so, after the manner of other types in the rumen of the cow. Much work will be required before the part which this intracorporal synthesis of vitamins plays in regard to metabolism can be defined, but the question may have an important bearing upon malnutrition in native races.

These organisms which synthesize vitamins doubtless require a particular substrate for their optimum activity. Is such a substrate provided equally well by two such diets as have already been mentioned, maize or rice and a few vegetables, and boiled bananas and soured milk? Certainly the contents of the colon differ on different diets but research has not advanced sufficiently to answer the question.

If one may be allowed for a moment to follow fancy's flight, will a man in the future suffering from some nutritional disturbance take himself straightway to the skatological bacteriologist who, having with some sulphur-drug killed off the ill-functioning coliforms in his bowel, will then replant his colon with some fashionable culture, boosted up with its own special food factors?

What, too, may be the effect of bowel parasites on vitamin synthesis? In many native races there may be up to 100 per cent. incidence of parasitism, mention need be made only of the amoeba, the hookworm, the round worm, the schistosome and the lamblia. We know almost nothing about the diet of these parasites or their vitamin requirements or how far they may interfere with vitamin synthesis and absorption, but the clinical association of some deficiency diseases with parasitism has been so close that pellagra, for example, was at one time thought to be a symptom of amoebiasis.

Again, a breakdown in metabolic balance, often unstable, may be precipitated by any one of the infective diseases so prevalent among indigenous peoples, malaria, yaws, syphilis, leprosy, for example.

There is yet another aspect of malnutrition to which attention has only recently been directed. The possibility of defective absorption of vitamins has been discussed from time to time but the part played by disturbance of function in what might be termed the metabolic workshop of the body, the liver, may prove to be of much greater importance in deficiency disease. In many native races pathological changes in this organ are extremely common. It would appear quite possible that, despite an adequate supply in the diet of vitamins and other factors their elaboration there might be at fault. The changes in the liver might be due in turn to dietary deficiency; in fact recent work points in that direction. Again, intestinal parasitism may play a part also in causing degenerative changes in that organ. Malnutritional disease may therefore be secondary to liver disease. Little wonder, therefore, that some cases do not respond to vitamin therapy, a point which is often lost sight of when this is used as a method of diagnosis.

Native Education

Thus, the prevention of malnutrition is not a question only of diet but is one of general medicine and hygiene, and the matter does not end there; the ethnologist, the economist, the agriculturalist, the parasitologist, the administrator and the educationalist, in addition to the biochemist, has each his part to play as we shall hear this afternoon.

I have placed the educationalist last; past experience has shown that all has not been well with our method of education and I have heard views expressed concerning the education of native peoples which have filled me with misgiving. They would seem to imply, in some cases, the imposition of a kind of present-day European school system upon peoples who have not yet evolved beyond the Briton of a thousand years ago, peoples who have, to date, not even produced some kind of primitive plough, to whom the potter's wheel is unknown, and who have no knowledge of the mechanism of the pump or of irrigation.

Vocational training on the other hand is another matter and one which could be well combined with good sanitation, good husbandry and improved food supplies.

Lastly, since all schemes need financing, it seems that the native will be called upon to become productive. If this means eventually the direction of the native away from his home and from the production of his food crops, more especially if it means direction into industry, then the results might be disastrous.

With industrialization we might see in Africa the development of a half civilized, wholly syphilized, detribalized native become "nigger", colour-conscious, imbued with an inferiority complex displaying itself in disgruntlement and unrest, accompanied by ill becoming clothing, poor housing, overcrowding and malnutrition, bought at considerable price in the local store, with the complete sacrifice of what I believe to be the greatest thing in the world, happiness.

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Relation of Animal Husbandry to Human Nutritional Needs

Dr. N. C. Wright (The Hannah Dairy Research Institute, Kirkhill, Ayr)

During the earlier stages of colonial agricultural development, overriding emphasis was placed on plant husbandry and on the production of subsistence and cash crops, whether for food or as raw materials for industry and, except in the predominantly pastoral areas, the parallel need for the development of livestock husbandry was almost entirely overlooked. The re-orientation in outlook which is now apparent can justly be attributed, at least in large measure, to the increasing recognition of the nutritional needs of the colonial populations and of the part which livestock can and must play in meeting those needs. Thus, a representative Conference of Colonial Directors of Agriculture (1938) specifically stressed the importance which should be attached to the development of animal husbandry "as a means of effecting a general improvement in human nutrition", a view which was subsequently reinforced by the Committee on Nutrition in the Colonial Empire (1939), who recorded that one of the most striking features of their inquiry was "the almost complete absence of milk, and indeed of all animal products" from many colonial, and in particular tropical, dietaries.

TABLE 1

COMPARATIVE LIVESTOCK POPULATIONS IN THE UNITED KINGDOM AND IN THE BRITISH COLONIES AND DEPENDENCIES

Type of population	British colonies and dependencies	United Kingdom	Ratio of colonial to United Kingdom stock*	Distribution in the Colonial Empire	
				Pre-dominantly pastoral areas	Pre-dominantly settled areas
Human ..	59,000,000	46,000,000	—	30,000,000	29,000,000
Cattle ..	19,500,000	8,500,000	2 : 1	16,500,000	3,000,000
Equine ..	1,300,000†	1,100,000	2 : 1	1,200,000	100,000
Camels ..	1,300,000	—		1,300,000	—
Sheep and goats ..	35,000,000‡	25,000,000	1 : 1	32,000,000	3,000,000
Pigs ..	1,000,000	4,500,000	1 : 5	100,000	900,000§

* Adjusted per head of human population. † Donkeys 80 per cent.; horses and mules 20 per cent. ‡ Sheep 45 per cent.; goats 55 per cent. § Chiefly in Malaya.

Distribution of Livestock in the United Kingdom and the Colonial Empire

At first sight this last finding might appear anomalous in view of the very large livestock populations which exist in the colonies and dependencies. A summary of the available figures, admittedly approximate, is given in the second column of Table 1. For purposes of comparison the corresponding figures for the United Kingdom are shown in the third column of this table, since these may be taken to represent the livestock

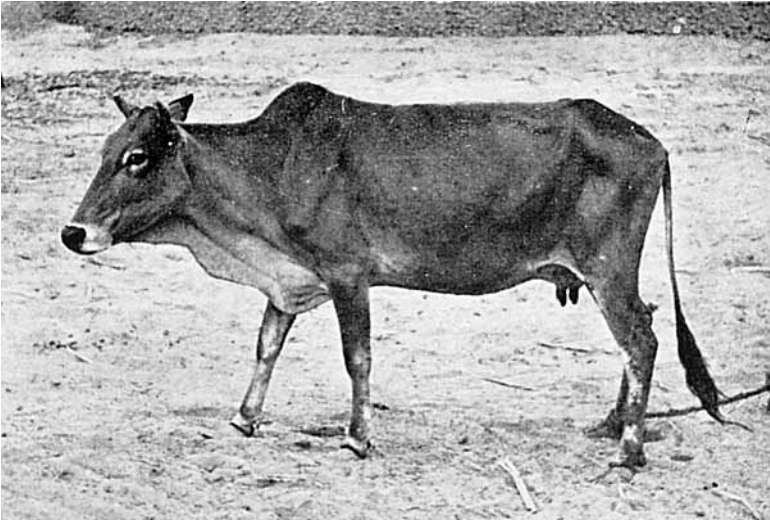


FIGURE 3.
POOR CONDITION OF NATIVE BULL ON OVER-GRAZED LAND DURING
DRY PERIOD.

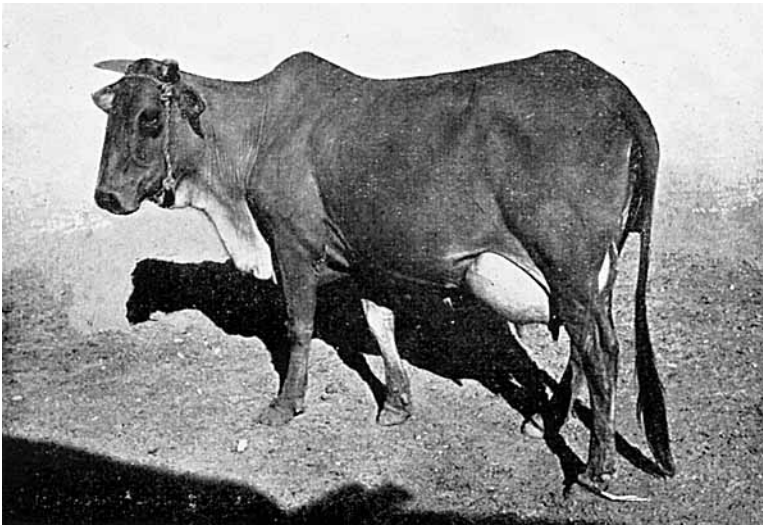


FIGURE 4.
MATURE NATIVE BULL IN PRIME CONDITION ON GOOD AND WELL
WATERED PASTURE.

PLATE 2.
THE EFFECT OF ADEQUATE NUTRITION AND GOOD MANAGEMENT ON THE
FATTENING OF NATIVE CATTLE.

(Photographs taken in East Africa and the Middle East.)

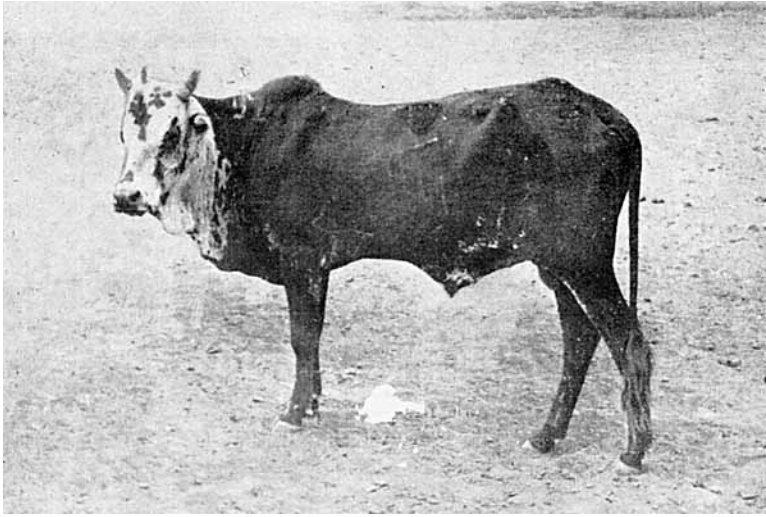


FIGURE 1.
UNDERNOURISHED COW OF NATIVE BREED, SHOWING POOR GENERAL
CONDITION AND UDDER DEVELOPMENT.

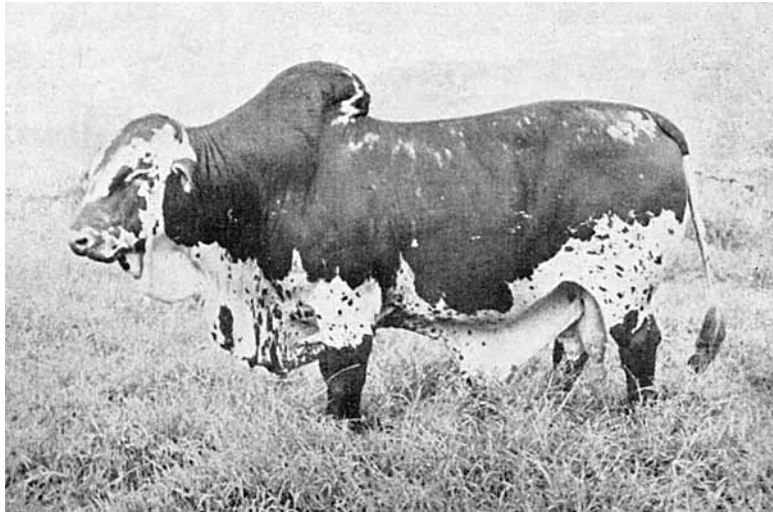


FIGURE 2.
WELL FED COW OF NATIVE BREED. NOTE EXCELLENT CONDITION AND
PARTICULARLY THE FINE UDDER DEVELOPMENT.

PLATE 1.
THE EFFECT OF ADEQUATE NUTRITION AND GOOD MANAGEMENT ON THE
MILK PRODUCTION OF NATIVE CATTLE.
(Photographs taken in East Africa and the Middle East.)

requirements of a European community of roughly comparable size. It will be observed probably with some surprise that the total stock population of the colonial territories very greatly exceeds that of the United Kingdom, both in absolute numbers and, what is more significant, in the number of stock per head of human population, as shown in the fourth column. Why, then, should the output of livestock products for human consumption be so inadequate in the colonies and dependencies?

A partial explanation lies, of course, in the fact that, while the first column in Table I shows the *total* stock population of the colonial empire, it fails to indicate *the distribution of the stock* between the constituent territories, and thus does not reveal differences in local intensities of stocking. In the fifth and sixth columns of the Table I have therefore regrouped the figures under two main geographical regions within which conditions may be assumed to be more or less uniform. Considering the vast areas covered, this assumption is not, of course, strictly valid, but it has the advantage of facilitating broad generalizations.

The most striking feature of the figures in these two columns is the very high proportion of the total stock which is located in the great pastoral areas of East Africa, the Middle East and the northern territories of Nigeria. Some 90 per cent. of the cattle, sheep and goats, as well as virtually the whole of the equine and camel populations, subsist on the natural vegetation and grazing lands of this vast region. Conversely, the total stock of the predominantly settled areas, comprising in the main the territories of the wet tropical belt, is disproportionately low in relation to the nutritional requirements of the human population. It is obvious that in discussing the problems of colonial animal husbandry, the needs of these two widely dissimilar areas must be clearly differentiated.

In the pastoral areas, it might well be assumed from the very large stock population that the level of human nutrition among the nomadic stock-owning tribes would be relatively high. Thus they can draw not only on the milk and meat of a very substantial cattle population, but equally on the animal produce of the large numbers of sheep and goats and camels. Available evidence indicates that they do, in fact, derive a satisfactory, and in some instances what might well be considered a disproportionately large, fraction of their nutrient intake from animal products. Nevertheless, even in these areas there exist many natural obstacles which tend to preclude the provision of an adequate human dietary at all seasons of the year, while the over-all efficiency of animal production is patently low. Most pastoral areas are, for instance, subject to annually recurring periods of drought which may extend, in less well favoured localities, to three or even four or five months' duration. Such droughts not only involve the stock in an unprofitable expenditure of energy in search of food, but inevitably lead to serious fluctuations in live weight and condition, the advantages gained from a period of plenty being largely, if not wholly, dissipated when sparse conditions prevail.

The total loss of stock in these pastoral areas is, too, a constant risk through outbreaks of epizootic disease, which are inevitably difficult to control through the wide dispersal of the herds and flocks and the ignorance of the native owners. Moreover, as a natural means of combating these ever present hazards and of providing an insurance against crippling loss, the native mind has turned to voluntary over-population with,

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inevitably, a resultant increase in the pressure on what are already tending to become seriously over-grazed lands. Finally, even could he be persuaded to barter his stock for goods or money, the logical incentive to improved methods of husbandry, the pastoral native is still faced with obstacles to trade in the lack of adequate communications and security in many transit areas. Small wonder, then, that even in the predominantly pastoral lands, the efficiency of husbandry is low and the output of the stock of disappointingly small dimensions.

In the settled areas, it is already apparent from the figures in Table 1 that even if the productivity of stock were high, the total output of animal products would be far too meagre to meet the nutritional needs of the human population. It is true that in most of these settled areas the stock are not subjected to the natural hazards of pastoral husbandry. Nevertheless, their productivity is, in fact, at least equally low, chiefly on account of three main factors.

First, from the agricultural standpoint, the emphasis in settled areas is essentially in the direction of subsistence or cash crops, and success in cropping in such areas can be achieved only by the extensive use of cattle for draught purposes. Without the ox, no cultivation would be possible; without the ox, no produce could be transported to the market. Under such conditions the paramount need of the cultivator, unlike his British counterpart, is *not* an animal suited to the production of meat or milk, but one possessing the stamina and conformation which goes to make the working bullock. Where this is the cultivator's prime requirement, his usually meagre supplies of concentrated foods are naturally diverted to his male stock, while the remainder have to subsist as best they can on third or fourth rate fodder, sparse in amount and poor in quality. Thus, it is not surprising that the growth rate of the stock is slow and that their productivity is on a low level.

Second, it cannot be denied that the climatic conditions in the wet tropical areas are inimical to the maintenance of hardy stamina and satisfactory health. The high, unvarying temperature and the high level of humidity combine to produce a literally oppressive cloak under which neither animals nor man appear capable of attaining full stature or high productivity and where, in addition, natural fodders grow all too luxuriantly and, therefore, all too coarsely. Moreover in these warm wet areas parasitic infestation is rife, and may largely nullify even the best directed efforts to achieve improvement.

Third, and probably the most important, for it embraces and overshadows both the first two factors, the nutrition of stock is based largely on the seasonal and sporadic growth of natural herbage, supplemented by the casual gleanings of the fields, instead of, as in this country, on the planned production of fodder crops for stock and the rational use of concentrated feeds. Investigations carried out at many government and army stock farms, have shown conclusively the great potentialities of native breeds when a more rational system of feeding is adopted, and the marked increases in their productivity which follow the provision of an adequate supply of nutrients more suited to the needs of stock. Examples of the improvement which can be thus produced in native breeds are shown in Plates 1 and 2. The benefit for human needs is obvious. In what way can such findings be more universally applied?

Improvement of Colonial Livestock

The rationale of measures for stock improvement is usually epitomized in four key words, breeding, feeding, management and disease. Disease is being handled on an increasingly ambitious and an increasingly successful scale by the veterinary services of most colonial territories and the interest and co-operation of the sedentary stock owner are being correspondingly increased while, in the pastoral areas, disease eradication, properly applied, should pave the way to solve the problem of over-population. The indifference of the sedentary cultivator to the efficient management of stock also is being slowly overcome. Moreover, while many breeding problems still remain unsolved, the potentialities of native stock are great and meantime more than adequate to meet the limitations of their environment. The direct climatic effects of the environment are, of course, largely uncontrollable. It is, therefore, chiefly to an improved supply of nutrients for stock that we are forced to look for the solution of the problem, whether such nutrients are designed to meet the seasonal shortages of grass in pastoral areas or to make good the general deficiency of fodders and concentrates in the more settled regions. It is not possible to deal at length with all the various means which might be used to solve this fundamental problem of colonial agriculture, but it is useful to try to summarize a few of the more salient lines along which progress might be made.

First, for the pastoral areas, increased and more widespread supplies of water are the prime requisite. Water for watering the stock and opening up new grazing lands, and water, where possible, to provide a modicum of irrigated crops as a standby for the lean periods of drought, since the nomad, if he is to survive at all in future years, will have to be prepared to modify his mode of life and base his husbandry on a semi-nomadic state.

Second, for the more settled areas, there must be an increasing recognition of the mutual dependence of crop and stock husbandry, of what has been termed by one authority "the dove-tailing of the arable and animal husbandries into one 'mixed-farming' system". Such a mixed farming system should involve not only the utilization of all available manure but, even more important, the regeneration of the grazing lands and the cultivation of leguminous fodder crops, which not only contribute so materially to soil conservation and fertility but simultaneously provide the stock with first rate fodder. The development of such a system of mixed farming is, indeed, already one of the main objectives of many of our colonial administrations.

Third, for both the settled and the pastoral areas, the need for general conservation measures must be stressed, and new means of fodder conservation must be sought. Only by such developments can the resources of the land be used to best advantage, and the recurrent herbage in the rainy months be profitably stored for leaner periods.

Fourth, every effort must be made to retain for home consumption those supplies of nutrients which are by-products of the colonial export trade, among which oilseeds figure largely. In this connexion I would urge most strongly the widespread setting up of oilseed crushing mills within colonial territories and the use of oilseed cakes and meals for local stock

improvement. The Colonial Empire can ill afford to lose the milk equivalent of this vast export trade, amounting to no less than 500 million gallons, even at the cost of some reduction in its general trading balance.

Fifth, and finally, work in the general field of animal nutrition must be pursued with unremitting zeal; new ideas must be probed, new methods investigated, new projects planned, new developments boldly essayed. Only by such intensive effort can the more intractable difficulties be brought within control and the more knotty problems be unravelled.

Within the confines of a very brief paper an attempt has been made to indicate some of the factors which govern the relations between animal husbandry and human nutritional needs; summarized in a single sentence, the theme of this paper is that the key to improved human nutrition lies in animal husbandry and the key to improved animal husbandry in the provision of adequate nutrients for stock. Thus the problems of human nutrition are in reality the problems of animal nutrition, and it is to the worker in the field of animal nutrition that we must largely look for their solution.

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Sociological Factors

Dr. A. I. Richards (London School of Economics and Political Science, Houghton Street, Aldwych, London, W.C.2)

Previous speakers from the medical, agricultural or veterinary side are to be envied as having better defined fields of work, even though these fields have overlapping edges. Sociology is becoming a fashionable word. It tends to be used by the general public to mean a point of view, an emphasis on the human, psychological and social, as distinct from the material and technical, aspects of life. Civil servants, on the other hand, use the term increasingly for a set of miscellaneous factors and problems which are vaguely felt to be important but which cannot be easily grouped under any other heading and for which there is no Government department responsible, and no machinery for obtaining expert advice. Only to its votaries is sociology a special discipline with its own field of study, the description and analysis of social institutions, and its own research techniques.

General Sociological Factors

In relation to nutrition the term, sociology, must be specially defined. It is used here to mean all the cultural factors, as distinct from the environmental or biological ones, which determine the amount and type of food available to a community and the use such a community makes of its supplies. It covers the complex of human institutions by which food is produced, stored, distributed, prepared, preserved, cooked, divided and consumed; in other words, it includes the economic and family organization of different peoples, their system of domestic and agricultural

education, and their rules of ownership of land and other food resources. It includes also the values, habits and ideas which determine appetite, taste, and the rhythm of meals, those irrational beliefs which make the Zulu bride refuse milk in her husband's kraal because she belongs to a different clan, and the Glasgow schoolboy reject the same food because he believes it to be a "sissy" drink, or the traditions which make the English-woman convinced that her husband cannot go to work without "a proper breakfast," while the African carrier puts his food in a bag before a journey because he is equally certain that it is dangerous to walk on a full stomach.

In this sense, the sociological approach to nutrition is equivalent to that wide general outlook already shown by Dr. Platt (1946) in the opening address to this Conference, which has become more and more common in the framing of national nutritional policies during the war. Such an approach is, however, particularly necessary in dealing with colonial peoples. The majority of these are primitive, peasant cultivators, whether they live in East Africa, West Africa, Malaya, the Pacific or the West Indies. The feeding of labour on the plantations of the West Indies, Malaya and East Africa is a separate problem. With such primitive subsistence economies, the nutritional deficiencies are crude ones, involving permanent or seasonal shortages, sometimes of the main foodstuff. In such conditions the social and economic questions of the supply and distribution of any type of food may be more urgent than the detailed elaboration of optimum diets. In such peasant economies, the system of transport and marketing may be so inadequate that the people are entirely dependent on their environment so that improvements in native systems of agriculture and animal husbandry, with all that this involves in the way of education and social organization, may be the first requirements of a nutrition policy.

Lastly, in cultures where there is no specialization in the production of food, improvements in the amount of food produced must be obtained at the expense of other economic activities such as house building, road making, crafts and wage earning, and hence food production must be seen against a background of the total economic activities of the community and its calendar of work. Economic organization itself is rarely a specialized field in such cultures. Political and kinship organization may determine the leadership in economic enterprises, and systems of land tenure are often closely related to religious beliefs and values. With cultures of this type a general approach to the question of improved nutrition is necessary. The Ministry of Information film "Today and Tomorrow" showed pictures of improved transport, school education, tree planting, erosion measures, irrigation and food distribution. Dr. Platt's talk ranged from prison feeding to the institution of village flour mills, and from school education to birth control. This all-round approach is not, or should not be, the special prerogative of the sociologist but should be shared by all those concerned with colonial nutrition. To attain this necessary attitude of mind is a different problem. It may be a question of better training, *i.e.*, of teaching medical and agricultural officers the importance of studying the social institutions of colonial peoples, and similarly of teaching administrative officers the general principles of human nutrition. The provision of expert advice on nutrition and the related social and economic problems might be another

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useful experiment, whether it took the form of creating separate nutritional councils in particular colonies, or of bringing nutritional policy into relation with the work of the various social welfare and development committees now set up in different colonies. These are points which will have to be worked out according to local needs.

Special Sociological Factors

There are other fields of work for which a specialist training is required and in which the role of the sociologist is rather different from that required in the United Kingdom. First, colonial nutritional policies have to be framed against a background of unfamiliar conditions and we need investigation carried out by specialists on the cultures of particular regions or on particular types of economy. Rural welfare policies in this country are not based on the needs of peasant cultivators since our farming is of a different type. Our practice, therefore, may need adaptation in the light of specialist study. Moreover, the colonial peasant and subsistence economies differ amongst themselves. The West Indies, West Africa and East Africa have their own systems of land tenure and of village and domestic organization, and their own diet habits. Sociologists who have made a special study of these regions, social anthropologists in the main, will be able to get to work most quickly in such areas.

Second, there is a complete lack of the basic social and economic data for all our colonies, and particularly for the areas of subsistence farming. We need population and vital statistics, and data on land utilization, economic output, national income and standards of living in particular communities. The question of improved statistics is already being considered by the Colonial Social Science Research Council and the Economic Sub-committee of the Colonial Economic Advisory Committee, but before we can go much further we need a series of detailed field studies of sample communities and areas, and this is particularly the case in relation to nutritional policy.

What specialist studies are required in relation to nutrition? Certain general features of primitive dietaries are already clear. Such characteristics as seasonal changes in the type and quantity of food, daily changes in intake, and the reliance on one foodstuff, have already been indicated in the work of anthropologists in the Gold Coast, Basutoland, Swaziland, Northern Rhodesia and Tanganyika. Dr. Platt's (unpublished) magnificent nutrition survey in Nyasaland has provided even more comprehensive and convincing data. What is the type of work now required? It is usually assumed that social anthropologists are specially required to investigate the mysterious field of primitive food taboos. The importance of these has perhaps been exaggerated. Irrational food taboos are not limited to primitive peoples. Is the African who refuses to eat bush buck because he is a member of the bush buck clan any more irrational than the Englishwoman who refuses to eat liver because she thinks it "disgusting to eat insides"? Nor are the primitive taboos commonly observed by the whole community. They have their importance certainly, but are, relatively speaking, easy to describe and recognize. On the other hand, the values attached to certain foods such as beer, commonly associated with the payment of hospitality and the fulfilment of kinship obligations, need more detailed study.

Types of Sociological Study

The sociologist's most important contribution to the knowledge of primitive nutrition would, however, probably be found to be the first-hand study of the whole economic life and social structure of a primitive people. Some such studies would probably be of a general character and others especially related to nutritional research. Of the general type, the following have been suggested:

(a) Preliminary Socio-economic Surveys

These should form a basis for framing general development policies or selecting special areas for detailed investigation. Colonies have been increasingly demanding surveys of their chief social and economic problems as a basis for a development policy. Such preliminary surveys should no doubt be carried out ideally by a team in which the sociologist and the economist combine with the agriculturist and the expert on animal health and nutrition. No such experiment has yet been tried to my knowledge, except in the case of the development team that worked under Sir Frank Stockdale in the West Indies, and which included experts on medicine, agriculture, animal health, economics and social welfare, although it had no expert on nutrition. Surveys done by a Director of Development are now taking place in West Africa, Northern Rhodesia and Nyasaland.

In the Union of South Africa a report on the economic and social resources of the country was produced by the Social and Economic Planning Council (1944). This report aroused the envy of some African colonies but could probably only have been carried out in a territory with four universities and a considerable accumulation of social, economic and medical data.

Preliminary surveys from different specialized angles have been made in a number of cases, e.g., Professor R. W. Firth's tour of the West African colonies to report on the needs of social and economic research to the Colonial Social Science Research Council, or Dr. Fox's dietary survey of the Transkei.

(b) Local Social Surveys

Detailed surveys of the standards of living, methods of production, labour supply and family organization, have been made, and will be increasingly made, in different colonial territories. Dr. Kaberry is at present doing a detailed investigation into women's life and labour in the Cameroons as a basis for the policy of the education and agricultural departments of that territory, and similar surveys of special areas are being carried out by the Rhodes-Livingstone Institute in Northern Rhodesia. Such local studies could provide useful information for nutrition experts.

(c) Nutrition Surveys

Dr. Platt's nutrition survey in three contrasting villages in Nyasaland is probably the most elaborate yet carried out. This team included a social anthropologist who provided data on the history of the different villages, the genealogies of their inhabitants, the family structure, land tenure, inter-village trade, marketing, consumption, hospitality and incentives to produce food, or alternatively to engage in wage labour.

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With the present shortage of anthropologists it may not be possible always to supply them as members of such specifically nutritional teams, and it has been argued that the search for data on the social and economic side is an invaluable training for administrative, agricultural and other officers taking part in such a nutrition survey, and had, therefore, best be undertaken by them.

(d) Local Surveys in Relation to Development

It is suggested, however, that once the findings of the nutrition survey are more or less complete and a development policy made, the sociologist has a special function in carrying out detailed local studies as a preliminary to such development. Where changes are to be introduced the most detailed local investigations are required. Such schemes of development as Dr. Platt outlined require considerable alterations of native economy and domestic activities. The people are to be asked to grow new foods in a different way, in different places, and possibly to work to that end in larger or smaller groups. There is no evidence that the African native is more conservative than other peasant cultivators, but the adaptations required by him should be understood. It is here that I believe the sociologist can be most fruitfully employed. He should study particularly:

(1) *Local Social Grouping.* The changes to be introduced have to be carried out by social groups, families, villages, districts or, in some cases, age groups. Success is unlikely unless the nature of these groups is understood. For instance, in Uganda, agricultural officers contrast the behaviour of the educated, and, relatively speaking, sophisticated, Ganda who have an individual system of land holding, with that of the less educated and more primitive Teso who live in closely organized kinship groups. Some of the latter in a space of three years adopted strip cultivation as a measure against soil erosion, as a result of cultivators' courses by which the heads of kinship groups were invited to agricultural education centres and there convinced of the value of the new methods, which they then enforced on their kinsmen. In the case of the Ganda, each individual family would have to be converted separately and the process would be slower.

Dr. Margaret Read has suggested that small-scale co-operative creameries were successful in Nyasaland in patrilocal areas where young men remained in their fathers' villages permanently and formed a closely co-operating group (see Richards, 1940). They were unsuccessful in matrilocal areas because men married into their wives' villages but had few links with the men of those villages and were anxious to remove themselves with their wives within a few years. In Uganda social welfare programmes were thought to be impossible because the people in the south did not live in villages. Even superficial sociological inquiries showed me, however, that people living scattered along a roadside were in fact closely related by kinship, and co-operation could have been arranged on such a basis. Studies of the curious West Indies family with its high illegitimacy rate and mother-daughter households would be of the utmost value in relation to agricultural policy. Where change is taking place rapidly the breakdown of social groups may be one of the

causes of increasing malnutrition. The absence of men at work in industrial undertakings alters the sex division of labour in many African societies and produces economic units too small for successful cultivation.

(2) *Native Methods of Production, Distribution and Exchange.* There is considerable variation from area to area in native theories of cultivation, principles of soil selection and alternation of crops. It is important to study how this knowledge is passed on, particularly at a time of rapid change. In Northern Rhodesia I found that young men were no longer learning from their fathers-in-law how to select soil by working under the older men's direction. They spent their learning years at the mines and came back uninstructed in native methods of cultivation. Where this has occurred, new systems of education must be introduced. All suggestions for improved production and improved diet must be seen against a background of the seasonal calendar of economic work for men and women and also the daily calendar. Dr. Platt has given exceedingly interesting figures to show the amount of time spent by women on the preparation of food with primitive equipment. I have myself observed the African woman who is too tired to cook a proper evening meal or too busy to prepare a breakfast for the children. The absence of men on wage labour may coincide with heavy demands for men's labour in the agricultural areas. The system of leadership in native agriculture and the incentives behind work are also facts on which it is impossible to generalize. Local variations are considerable. Dr. Read has shown that there are different migration rates from different areas in Nyasaland according to the type of education of the men and their local economic opportunities.

All these examples show the need for detailed sociological investigation as a basis for improved nutrition campaigns.

Machinery for Correlating Sociological and Nutritional Research

I do not know whether there is any machinery in this country for relating to nutritional policy the findings of the numerous social surveys that have been undertaken before and during the war. In the Colonies the problem is perhaps more acute since trained personnel is so scarce both on the nutritional and the sociological side, and development schemes on a large scale are awaiting the results of research.

I suggest it might be possible to attempt the following:

- (1) General socio-economic surveys now being planned might be improved by the advice of a nutritional expert; the Ashanti survey now being carried out by a sociologist and economist in the Gold Coast is an example.
- (2) An anthropologist might be attached to a specifically nutritional survey.
- (3) Local machinery for organizing continuous research on social conditions, *e.g.*, migration rates, standards of living, land tenure surveys, and urban surveys, should be set up. This is particularly important where change is taking place very rapidly.

There are at present bodies in existence that could carry out work of this kind. The Colonial Social Science Research Council has on it representatives of the following social sciences: demography, sociology, social

anthropology, economics, law, education, psychology and linguistics. This Council is considering a programme of social and economic research for West Africa and East Africa, and the West Indies are also under consideration. The work of this Council should be related to that of the Human Nutrition Unit of the Medical Research Council.

Social and economic research centres already exist at Achimota in the Gold Coast, and at Livingstone in Northern Rhodesia (the Rhodes-Livingstone Institute). A social and economic research institute has been planned for Makerere College in East Africa. It is hoped that these research institutes will be able to make continuous observation on social conditions, to train personnel and to provide expert advice and help for nutrition surveys done in those particular regions.

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Discussion

Mr. A. J. Wakefield (Inspector-General of Agriculture in the West Indies), joint opener: Dr. Platt made some references to differences which might exist between agricultural departments and medical departments. I think he was a little concerned about this, but I can assure him that it is quite unnecessary.

The moment Dr. Platt met me he talked for about half an hour and gave me some pretty good farming sense and I was converted. He was regarded both in East Africa and in the West Indies as a sort of John the Baptist, and he seemed to consider his first duty was to lay his hands on every agricultural officer he could meet and baptize him good and proper.

Speaking as an agricultural officer, I do not think that the agriculturists should have any quarrel about the share of time which has been spent at this Conference on the subject of agriculture. The very inspiring, though in many ways very frightening, film which we saw this morning, gave us some idea of what we are up against and what we are trying to do. After going from East Africa to the West Indies, and having read the book by Professor MacMillan entitled *Warning from West Indies*, I consider the moral of the film is not what the colonies can afford to have done, but what they cannot afford to do without.

I should like to talk very briefly about my own conversion. When I went to Tanganyika in 1924 the main duties of an agricultural officer, in fact almost his sole duties, concerned the production of export crops, the policy being to increase the purchasing power of the people to bring in revenue and pay taxes. It was the only way we could balance the budget, and if it was not balanced people in all the social services, agriculture, medicine and education got it in the neck.

It would, however, be untrue to say that nothing was done in those early years to improve food supplies. It was the first duty of the Department of Agriculture to ensure against famine which occurred periodically through drought and locusts. We did that by insisting on each family

growing a minimum area of cassava and, in areas where labour was employed on plantations or in mining, we gave some attention to maize.

It was fortunate that agricultural officers had all been trained in the British farming tradition, and I can say that the good of the land was the primary design in all that they did. They devised rotations in which food crops inevitably took their place, and I think I can claim that they did achieve pretty good results from the soil, coupled with a small amount of animal husbandry. I must admit, however, that all this was incidental to meeting the requirements of the industrial countries for a supply of raw materials and a market for manufactured goods. In the West Indies particularly this was regarded as exploitation and incited a kind of resentful nationalism.

About 10 years ago we began to hear about a scheme of nutrition, and we regarded it as a rather cranky business, particularly when it intruded itself in a country in which we all seemed to get along all right and in which many of us thought, with Marie Lloyd, that a little bit of what you fancy does you good. Then we met Dr. Platt, and we found that we could accept his programme of nutrition and that it meant scrapping not one bit of our work. It just fitted in with what we were doing and a little more, because it made our work more interesting. The end of this phase saw the agricultural departments beginning to take their part in nutritional work, and I agree it is still only a beginning. A speaker referred to excessive departmentalism which does exist in a most shocking form, but agricultural departments found that they could join with the nutritionists on purely technical farming ground.

In 1940 I went to the West Indies and got something of a shock. The Royal Commission of 1938 had reported after the riots, and I could see the thinness of the ice on which I had been in much of my work as agricultural officer in East Africa where we had been so actively engaged on increasing the production of export crops. The Royal Commission quite rightly criticized very severely the system of monoculture; it considered that many of the natives' troubles were due to their being dependent almost entirely on export markets. The major recommendation was for the introduction of more stable farming systems to ensure food supplies for the rapidly increasing population. The population in Barbados is 1200, and in Jamaica about 700, to the square mile, including the mountainous country which comprises about 90 per cent. of the island, and that population will, it is reckoned, double itself within forty years; with the tremendous amount of soil erosion that is going on and the terrific birth rate there is no balance and, unless something is done quickly, nothing but chaos can be expected.

The recommendation of the Royal Commission that the West Indies should get down to the production of their own food was not liked at first by the sugar manufacturers, merchants, farmers, or politicians, but I found that the West Indians are greatly devoted to their countries. I had been warned, as Dr. Richards obviously has been warned in regard to other parts of the Empire, that the people would be innately conservative and that it would be difficult to get them to accept new ideas. I found, however, that they were ready to face the issues and to accept radical reforms. The extent to which this has happened is exemplified by the Jamaican Agricultural Policy Committee of 1945 whose members

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included representatives of plantation agriculture, peasant farmers, trade unions, commerce and industry. To everybody's surprise they turned out a report which was unanimous apart from one or two minor reservations. We had the advantage of a local Medical Nutrition Committee under Dr. McCulloch; also Dr. Platt was in Jamaica at that time, and he came before the Committee and gave them his views which were accepted. I feel sure that anyone knowing the West Indies before the war would agree that that was a tremendous step forward.

The Committee emphasized that food production must be the first purpose in the use of land. It is now time to say that an agricultural revolution is in progress in which animal husbandry plays an extremely important part. We have been forced to go into animal husbandry from the point of view of the use of grass to prevent soil erosion and to rebuild ruined lands. The two main obstacles in the establishment of mixed farming are the lack of equipment and the state of the soil fertility, the structure of the land having been broken down by erosion. Livestock, farm buildings and farm machinery are all most inadequate. Buildings are essential as we have found that if dairying is to progress in hot humid climates the animals must be stall fed. We are forcing the pace as much as we dare, and I am sure this Conference, if I had time to give the details of the various proposed schemes under the Colonial Development and Welfare Act, would approve of every one of them.

That brings me to the end of the second phase of my conversion, where we have Colonial politicians joining with agricultural and medical departments to marry agriculture with nutrition. The West Indian leaders can see no reason at all why land is unused while men are hungry and people idle, and they are determined to utilize their natural resources and man power to develop their own nation. As I see it, this nationalism can be the greatest factor in promoting good nutrition in the West Indies, and I feel that the present time is ripe for some pretty vigorous work there as far as nutrition is concerned, but we must have in the field well trained as well as enlightened men.

Professor R. Firth (London School of Economics and Political Science, Houghton Street, Aldwych, London, W.C.2), joint opener: I think I am the only speaker from this rostrum so far who has no special competence in the field of nutrition, though I have had a nodding acquaintance with the subject for the last ten or twelve years.

I think the only thing I can do in opening the discussion is to tell you some of the points which have struck me as a sociologist in the various addresses, and to illustrate them from a little experience of my own.

The first and obvious point has been the great need for research in the nutritional field in the colonies. I can exemplify that from my recent tour in West Africa, and from experience in Malaya before the war.

Malaya, as you know, was one of the best governed colonies, with very capable technical officers. I was surprised in 1939 to find that, despite the magnificent work of Professor Rosedale in his analyses of foods and in the survey he was able to do of one thousand families in Singapore, all these studies were urban. Very little work had been done among the peasants, and there was not, as far as I know, a single full scale nutritional study in a rural area in Malaya. The average food intake of any large group of Malayan villagers, or the variations of it were not known.

My wife and I were there engaged in a combination of sociological and economic research and, while I cannot pretend to have had the experience in the field of nutrition that Dr. Richards has had, I would fully endorse what she has said as to the role sociologists can play on the nutritional side. Of course, it is hardly for us to say what we can do; it is more for Dr. Platt and his colleagues to say what they think we can do. However, I think it is agreed that our role is not merely to analyse and describe some of the taboos, but to give a full description and study of distribution, exchange, and consumption of food in the general setting of the social institutions of the community concerned. That should be emphasized, because to sociologists the consumption of food is so much more than the intake of nutriment. One sees it used in so many ways socially. After all, this is so in our own society. You do not invite people to dinner only to stuff them with nutriment; and when you have invited them to dinner there is a curious kind of law that sooner or later they will probably invite you back. If this use of food as a social mechanism is so prevalent in our own society, one may expect to find it even more developed in the Colonial territories among more primitive people. The whole field of food hospitality is important to the nutritionist because it regulates to some extent the intake of food by individuals.

Not only in terms of hospitality and consumption, but also in terms of productive economy, food may be important. For instance, in some communities where money is non-existent, if a house is to be built, food must be accumulated in advance, and disbursement of that food will form part of the payment for the house. Again in Malaya food preference itself is extremely important. Rice affords an example. The Malayan peasant, although he grows a great deal of his own rice, prefers to have it milled in the white form. I have known a village where people deliberately bought Siamese white rice rather than their own brown undermilled kind which, from the point of view of nutrition, is better. This is reminiscent of the controversy about the whiteness of flour and bread in this country. With flesh foods it is the same; Malays as Moslems do not eat pork. The Chinese, on the other hand, may and do eat pork. The Chinese very often grow cassava, known as tapioca in Malaya, and with the growing of cassava or tapioca they keep pigs. They get starch from the tapioca and feed the pigs on the residue, so that they keep the two types of enterprise running together at a profit. The Malay with his ritual prohibitions against pig eating and pig keeping is at an economic and nutritional disadvantage.

In any society there is a whole complex of reasons why food is produced, stored, and disbursed, and it is for the analysis of that complex of reasons that I think the anthropologist or sociologist is the best fitted. I emphasize this because Dr. Platt gave us a masterly summary of the broad field of nutrition, and he himself has exemplified in his Nyasaland survey what can be done by intensive study. When it comes, however, to the social and economic incentives and the institutional background of individual behaviour, then anthropology has a contribution to make.

On the diagnostic side I hope I have given you an idea of what attitude sociologists would take in support of the proposals put forward by Dr. Richards. On the therapeutic side it appears that Dr. Platt has a constructive plan to put forward. It may be that that plan is a very

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ambitious one, but that it is broadly agreed upon is evidenced by the unanimity displayed by all speakers.

There is just one further point. One of the speakers said that if this were a war we should take decisive action to remedy the present defects. Well, of course, is not that the trouble? We are not now at war. During a war people are willing to put up with a certain amount of sacrifice, and one such sacrifice is the loss of some individual freedom. How long will that go on? The two main difficulties in any elaborate plan for remedying the nutritional situation are the factor of competitive costs, and the degree of control. Some of us may wish that Dr. Platt were a dictator in some of these cases so that this resistance to control might be obviated. As Dr. Richards pointed out, however, you cannot get away from the so-called innate conservatism of people. That is the fundamental factor in this whole matter of therapy. At what point is it desirable to exercise direction and control? How far is it possible to leave the issue in the hands of the people themselves, and how far can they be brought to participate efficiently through a process of education? In the long run their effective participation is essential to the success of any scheme for the betterment of their nutritional conditions. That is the main theme of the second part of my remarks, which should be emphasized.

Professor J. Yudkin (King's College of Household and Social Science, London, W.8): There were two remarks made this morning upon which I should now like to comment. The first remark was made by the chairman concerning West African soldiers returning from campaigns in the Far East, and the other was made by Dr. Platt concerning the lack of riboflavin in many tropical dietaries.

I spent an appreciable part of last year at the 34th West African General Hospital, and there I saw amongst the British African troops a riboflavin deficiency affecting about 20 per cent. of them. I was fortunate enough to see also a contingent of returning African troops from Burma. I examined nearly 400 of them and could not find one with a sign of riboflavin deficiency.

Dr. Platt has said that one of the signs of riboflavin deficiency is bloody mindedness, and I can say that those troops showed an extremely venomous anticipatory bloody mindedness because, when they returned, they were told that they were then to go back to the standard British West African army diet. They locked themselves in the hospital wards, threw stones, and, one way and another, exhibited all the signs of that syndrome.

There is one interesting point about this riboflavin deficiency. I believe that we in the R.A.M.C. could say that its occurrence was not our fault; the diet was constructed to contain something like 1.5 mg. riboflavin but, unfortunately, in Sierra Leone they did not want it. They wanted rice but their source of riboflavin was millet which they would not eat.

Dr. Stannus commented upon the importance of the study of dietary habits, and it is essential, if the diets of the colonial or of any other peoples are to be changed according to nutritional standards, to know at the start what they will be willing to eat. It is no use giving them a diet containing on paper all the nutritional requirements if they will not eat it.

Mr. J. Dawson (Biochemical Laboratories, School of Medicine, Leeds): I, too, have just returned from West Africa, and I agree with Professor Yudkin about the troops returning from Burma. They do not want to return to their farms or normal African diet but want a more European form of food. I think also that they mean to get it. It must be remembered, too, that they are a more virile people than those who have remained in the Gold Coast. However, the diet in the Gold Coast appears to have been rather better than in Sierra Leone, because our troops in the Gold Coast did not show anything like a 20 per cent. incidence of riboflavin deficiency; a figure of under 4 per cent. would be nearer the truth for them and, in one case where a station grew its own vegetables, there was no evidence of any vitamin B deficiency whatever. Therefore, I feel that it is possible, in the Gold Coast at least, to provide the African peoples with an adequate diet.

Another point which Dr. Stannus raised was the question of so-called retrobulbar neuritis. In Gold Coast troops which had been in Freetown for two or three years and then returned to the Gold Coast we found five cases of it. The men were proved biochemically by the vitamin B₁ saturation test to be suffering from vitamin B₁ deficiency. The giving of large amounts of vitamin B₁, 50 mg. daily for weeks, did not improve their condition at all, nor did yeast or nicotinic acid. On the other hand, two milder cases discovered among troops returned from Sierra Leone, were cured by injections of 50 mg. of vitamin B₁ daily for ten days.

Animal husbandry in the southern parts of Nigeria and the Gold Coast is very difficult; these parts are heavily infected with the tsetse fly, and it has been found very hard to maintain cattle in those conditions. In fact there is an almost complete absence of dairy produce and a shortage of meat as the result. An intensive tsetse clearing programme should be undertaken in those parts. I am quite convinced, having seen a large number of livers, that an increase in consumption of dairy produce and meat would result in a decrease in the incidence of fatty livers and cirrhosis so common in West Africans.

Professor P. Ellinger (Lister Institute, Chelsea Bridge Road, London, S.W.1): I want to comment on three points. I would like to know what is known about the influence of climate on the nutritional requirements and habits of man. We have heard exclusively of nutrition in tropical and subtropical climates while British Colonies are spread over all climates.

I am glad Dr. Stannus stressed the importance of parasitic infections of the gut on nutritional deficiency diseases. I should like to illustrate this point in the case of pellagra. Investigation of pellagra in Lower and Upper Egypt showed that helminthic infections of the intestines as well as pellagra were much more frequent in the former than in the latter. About 99 per cent. of the pellagrins examined in Lower Egypt, and 100 per cent. of those in Upper Egypt, were infested with intestinal parasites while the infestation amongst non-pellagrous controls examined was 64 per cent. in Lower Egypt and 25 per cent. in Upper Egypt.

The role of sociological factors in the incidence of pellagra might be illustrated by the following facts. From study of the number of pellagra cases treated in certain hospitals and lunatic asylums in Lower Egypt for a period of years up to 1938, it was found surprisingly that amongst

the peasant population pellagra was much more frequent in years of general prosperity, particularly of the town people, than in times of economic depression. The reason for this was that the peasants could raise money by selling their home products such as eggs and milk in prosperous years while they consumed them when prices were low.

Amongst pellagrins examined at random in the Herzegovina district of Yugoslavia and in Lower and Upper Egypt the distribution amongst the sexes was surprising. In the former district about 90 per cent. of the pellagrins were women but in Egypt 84 per cent. were men and 16 per cent. women; of these women all but one were unmarried, divorced or widowed. In the Yugoslav area all house and field work was done exclusively by the women while the men led a lazy and sedentary life. In Egypt the conditions are just the reverse. The male farmer works exceedingly hard in the fields and the married women remain at home; only those women who are unmarried, widowed or divorced are compelled to earn their living by hard work in the fields.

Dr. W. R. Wooldridge (London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.1): This discussion has shown the value of having all sections of science represented for working upon particular problems and, as has been pointed out, in some measure the excessive departmentalism of the Colonial Service has been indicated too. I say this because scant reference has been made to the pioneer work done by the Colonial Veterinary Service in the field we have been discussing.

The major problem of the Veterinary Service has been, of course, to control the major diseases, and it is only in latter years that they have been brought under reasonable control. The rate of control has varied in different colonies, but the Veterinary Service turned its attention to the improvement of livestock together with development. This was regarded as of such importance that the veterinary profession drew up a report in 1937 which was presented to the Colonial Office, calling their attention to this important question and indicating how necessary it was that this development should be encouraged because of its important bearing on the nutrition of the natives. During the war the Veterinary Service has been responsible for the production of very large quantities of meat and milk in both East and West Africa. Thousands of tons of food have been provided for the fighting forces in the Middle East and, in very large measure, the credit is due to the pioneer work. I am only bringing this matter to the attention of the meeting because it stresses the importance of the task this Society has to do. It is important that every section of the scientific community should work in the closest harmony, and this major problem should be tackled by us all together.

Mr. A. L. Bacharach (Glaxo Laboratories, Ltd., Greenford, Middlesex): It is possible, and there is a little experimental evidence for this, that infesting helminths may compete directly for some part of the host's essential nutrients, whether provided in the host's food or by his intestinal flora. In the latter event the helminth may be considered a kind of intestinal slug in the host's alimentary allotment. Study of this matter, rendered difficult so far by the impossibility of cultivating helminths *in vitro*, might throw much light both on tropical malnutrition and on the chemotherapy of helminth diseases.

Dr. F. Yates (Rothamsted Experimental Station, Harpenden, Herts.): I should like to stress the need for considerable investigation into the agricultural side of colonial research. My department before and during the war has been consulted on experimental matters, and I think about 90 per cent. of the experiments upon which we were consulted dealt with cash crops or export crops. Almost the whole of the emphasis of pre-war colonial agricultural research was on that type of crop. Recently we had a worker who wanted to find out the fertilizer requirements of tropical food crops, and the only crop that he could really get any comprehensive data on was sugar cane which is an export crop.

There is an enormous need also for study of the different rotations and cropping systems and of the use of green manures under tropical conditions. As Dr. Platt mentioned, there must be liaison between the agricultural and nutritional side of this work.

Dr. D. A. Smith (Government Medical Department, Hong Kong): May I refer to Mr. Dawson's remarks concerning retrobulbar neuropathy? In the camp in which I was interned we were unable, as Dr. Stannus most rightly said, to incriminate any individual factor of the vitamin B complex as the one responsible for the condition. On the other hand we were able, at any rate to my mind, to acquit vitamin B₁. In a population of 2500 we had 363 cases of retrobulbar neuropathy. Over 50 of these were treated with prolonged courses of vitamin B₁ by all routes and showed no improvement; further, the condition actually developed in more than 30 patients under treatment for oedematous beriberi with high dosages of vitamin B₁. Yeast, however, which we grew ourselves in the camp, arrested the advance of a considerable number of these cases and also cured, almost uniformly, our numerous cases of riboflavin deficiency.

I think that if the innate conservatism of the Chinese prevents them from eating unmilled rice or sufficient beans or peanuts, their salvation, as regards the vitamin B complex, may lie in the use of yeast products.

Dr. B. S. Platt (Medical Research Council Human Nutrition Research Unit, National Hospital, Queen Square, London, W.C.1): I do not think I can let the occasion go by without saying that I hope Dr. Wright will not allow animals to compete with human beings for food.

I do wish that in taking animal milk production into account human milk production would be considered. I think the first factor in increased milk production in the tropics is the feeding of mothers at the time when milk is most required.

Dr. N. C. Wright (Hannah Dairy Research Institute, Kirkhill, Ayr): I would say only in reply that I feel Dr. Platt should take into account not only the rival claims for food, but the interdependence, of human beings and animals, which I have tried to emphasize.

Chairman's Summing Up

Colonel W. Elliot: We are now coming to the close of what I think we all agree has been an extremely valuable and interesting session. It has been particularly valuable because of the first hand comments we have

been able to get from those who have had experience of one kind or another overseas, and who were able to check certain points which were brought out.

Of course, some of the difficulties which have been discussed here are difficulties which are common to the human race. When I heard Mr. Wakefield say that pre-war he had been instructed to give his attention almost entirely to exports and that very little was left for the people at home, it seemed as if I had heard something like that not so very long ago in our own country! There is a great danger of relying too much upon exports. When he said further that recommendations to produce their own food in the West Indies had not been liked by merchants or politicians or manufacturers, I seemed to remember controversies in which these classes ganged up against food production here.

The fact is, as Dr. Richards brought out quite clearly, that a great many of these difficulties are common to the whole human race. There is good reason why people obstinately adhere to habits, and if you succeed in getting them to make a change, your difficulty will be not so much to induce them to go in for a certain thing, but to prevent them from going in for it to the exclusion of everything else.

I was interested in the remarks of Professor Ellinger, who pointed out that there was more pellagra amongst peasants in prosperous times than in times of depression because, in prosperous times, the agriculturists sold their produce to the town people whereas in times of depression they kept it for themselves. The human race's idea of what constitutes happiness is one of the most difficult problems with which sociologists have to grapple. The two drugs the human race is totally unable to withstand are motor transport and the cinema, and it will sell its soul for these. There is nothing to withstand the impact of those two powerful assaults.

About this time last year I was speaking to the president of a republic who was engaged in an active programme of industrialization. I said to him: "If you continue with this you will have the whole country covered with industrial work," and his reply was: "That is my great object." That is universal.

To secure a higher standard of living in the tropics there must be greater production, and greater production can come only from intensive utilization of the soil which will exhaust it, or from the introduction of power.

Certainly the least useful way of using animals is for draught purposes, and the introduction of some form of tractor draught device is almost essential. Milk and meat production is more important.

Then again there is the difficulty of industrialization, and here the work of the sociologists will be of the greatest interest and possibly decisive. It was said long ago that the life of the savage is naturally brutish and short, and he knows that too. He wants to share in what he believes to be the ideals of civilization which, as I say, consist of seeing Deanna Durbin on the films and going for motor tours, and he will destroy anything to get that.

I was very much interested in that long diet sheet quoted by one of the speakers and in the story of the native jail. It is no wonder that it was in jail, the classical field of organization, that the first nutritional disorders

were found. All captive classes of humanity, convicts, children and sailors, are classical fields where nutritional disorders are to be found. I know myself that one of Sir John Orr's assistants was given to sailing a small boat round the west coast. He was a magnificent specimen of humanity, but, in spite of that, he lived on tinned foods during these journeys until he developed scurvy, a very discreditable thing for a nutritionist. The dangers of human folly are universal.

The colonial populations are about to undergo the impact of industrial civilization and, in that process, they may find help from those of us who have already studied some of their problems. The difficulties will be immense, and one of the features of the change will certainly be a very extensive alteration in the diet of these peoples; for that reason alone any consideration that we can give to this question will be of the utmost importance in the future.