ZANZIBAR PROTECTORATE

NUTRITIONAL REVIEW

OF THE

NATIVES of ZANZIBAR

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NUTRITIONAL REVIEW OF THE NATIVES OF ZANZIBAR.

(A) A REVIEW OF THE PRESENT KNOWLEDGE OF HUMAN NUTRITION IN ZANZIBAR.

A review of the knowledge of human nutrition in a country leads ultimately to the presentation of one or a number of typical dietaries, as in the present case. Such dietaries obviously cannot be true of all people and at all times, for circumstances must induce wide divergencies from the type. Zanzibar and Pemba are small places, but although inhabited by five distinct local native tribes and a large number of mainland tribes, the tribal factor is not one of great importance in determining variation as all eat very much the same sort of food. The geographical factor is of more importance and determines such matters as the amount of fish consumed and whether it be fresh or dried, and the type of cereal or root which provides the main bulk of diet. The seasons play a part also and the month of Ramadhan is generally one of rich feeding, for though no food or drink is taken during daylight hours, much of the night is spent in feasting. At the clove picking season too, when large bodies of men are engaged together in heavy work, much more meat is eaten than usual and meals are heavier. But the most important of all determining factors is the economic one, and in times of depression and poverty such as existed in Zanzibar during the period covered by this review, undue prominence may be given to the faults of the diets. Nevertheless, these faults are inherent in the native dietaries of Zanzibar, and the glaring errors and omissions apparent in the diets of the poor, are only exaggerations of similar faults in the diets of the well-to-do

In the town of Zanzibar, conditions are different, on account of the fact that a large number of labourers obtain their meals from eating houses, where bread, meat and fat are more generally used than in the country. There is a great deal of poverty in the town and many find it difficult to obtain regularly sufficient food for their needs. It is not thought that the problem of the town native varies to any extent from that of the village native.

Consideration has not been given to the question of Indian diets, either in the town or country. The richer Indians appear to be well fed, but there are a great many petty traders who are as poverty stricken as the natives or even more so, and under nourishment exists particularly perhaps amongst the Hindus who deny themselves access to nearly all food of animal origin.

This review is therefore based mainly upon a consideration of the dietetic habits and customs of the rural African, and to a less extent on those of the town African.

2. In the Annual Medical and Sanitary Report for the year 1934, the following passage appeared under the heading "Report on Prisons and Asylums for 1934".

> "But the most important and widespread diseased condition was one which appeared to be very significant of vitamin deficiency; this involved many of the long term prisoners and some of those who were confined for a few months. The syndrome was characterized by slight weakness of the legs, sores about the lips and gums, visual defects and some xerophthalmia. In no case were the symptoms so pronounced as to warrant a diagnosis of beri-beri, scurvy or pellagra, but in general the appearance of those who were ill approximated to that described by Leitch ('Dietetics in Warm Climates') when referring to the prisoners who suffered from 'avitaminosis' in Sierra Leone prison".

These findings were confirmed by Dr. J. P. Mitchell, O.B.E., Medical Superintendent Mulago Medical School, Uganda, who acquired a considerable knowledge of avitaminosis amongst the prisoners of the Central Gaol Kampala, and who, during a visit to Zanzibar, kindly undertook a medical

survey of our prisoners. He wrote "It was of great interest to me to find evidences of diseases similar to those which existed in the Uganda Central Prison prior to the alteration of the diets. In no case were the evidences gross but the incidence over all of border line cases was definitely high. A few cases of xerophthalmia, many cases of powdered nose and cheeks (sulphur flaking) and of gum and tongue pigmentation were seen which, combined with dirty eyes, dryness of the skin and the popular eruption described by Dr. Lowenthal are all manifestations of vitamin A and probably C deficiency".

3. A medical survey of the prisoners undertaken in early 1935, revealed the fact that out of 47 prisoners who had been in gaol for six months or over, 25 showed one or more of the signs referred to above whilst nine out of 39 who had been in gaol for less than six months also showed the same signs. A revised dietary was introduced, and seven months after, a second medical survey was undertaken by the same medical officer who undertook the first, and who was unconnected with the prison. The result was, that of the 57 prisoners who had been in gaol for six months or over, 10 showed signs, and of the 53 who had been in gaol for less than six months, 19 showed signs. The following table summarizes these findings:—

	First Survey.			Second Survey.		
	Examined	With signs	%	Examined	With signs	%
In gaol 6 months or over ...	47	25	53	57	10	18
In gaol less than 6 months ...	39	9	25	53	19	36

The introduction of the new diet in the gaol had thus after seven months resulted in a decrease of avitaminosis from 53% to 18% amongst those who had been in gaol for over 6 months, whilst the continuance of economic depression amongst the free population as represented by those who had been in gaol for less than six months had resulted in an increased incidence of the condition from 25% to 36%. Although the figures are small the conclusion is inevitable that a marked degree of avitaminosis exists amongst the free population outside the gaol. This was the first clear indication that all was not well with the nutrition of the native population of the Protectorate, though it was generally believed from more or less casual observation that a state of under nutrition did exist even in times when there was no crop shortage. This was confirmed by the fact that by medical survey of all school children during the year 1935 it was established that only a third of the rural African and Arab children could be described as well nourished.

4. That is the full extent of accurate knowledge to-day of the nutritional state of the people of Zanzibar. Thanks however to the energies of Dr. W. A. Young, who undertook an extensive survey of the peoples of Pemba in 1933 and 1934 and of Dr. Harden Smith and Mrs Smith, who undertook a more limited enquiry in Zanzibar into native dietaries, there is a fuller knowledge of the dietetic customs of the people. As none of the knowledge is extensive enough to allow the law to be laid down definitely upon the subject, and as the dietaries of the native population show very considerable individual variation usually dependent upon financial considerations, it will be convenient to consider the question from the points of view of what is grown, what is imported and what is eaten.

5. There is no accurate knowledge of the areas under various crops. The crops grown vary from year to year, except in case of palms such as the coconut palm, and perennials such as the banana.

PEMBA.

In 1933 there was almost a famine in Pemba, and the result was a considerable increase in food crop production, which may not be sustained if prosperity returns once more to the Protectorate. Young's survey, which

embraced eighteen villages with a population of over 5,000 inhabitants was undertaken during this spell of activity, which continues until to-day. Among those Pemba villages he found the following conditions existed.

Rice, Coconuts and Cassava were universally grown, and these three together with fish, form the basic diet of the great number of rural Africans.

Other Cereals include Kaffir corn (Sorghum vulgare), Maize and Bulrush millet (Pennisetum typhoideum). Only five villages of the eighteen reviewed grew any of these cereals, but they are more commonly grown on the East of both islands where the soil is contained in pockets of coral outcrop unsuitable for the cultivation of rice.

Legumes include Pigeon Pea (Cajanus Indicus), Cow Pea (Vigna Sinensis), Bambara Groundnut (Voandzeia Subterranea), and Green Gram Phaseolus Mung). Of these the last is the most common but none is very extensively grown. Twelve of the eighteen villages grew a certain amount of one or the other.

Vegetables are mainly restricted to sweet potatoes, yams, and various pumpkins. Of these by far the most important are the sweet potatoes which were extensively cultivated in eleven of the eighteen villages. Wild spinach is collected, and the tops of both cassava and sweet potatoes are utilized for food. Ground nuts are cultivated, but not extensively.

Bananas were grown in all the villages, occasionally extensively so. The inhabitants of the Protectorate are not however a banana eating people in the sense that the phrase is understood amongst certain mainland tribes where the banana is the staple article, as rice is here. Nevertheless it may be said to be almost universally used in comparatively small quantities.

Other Fruits include mangoes, citrus, jack-fruit, durian, pine-apple, bread fruit, custard apple, paw-paw, tomato, and for the sake of convenience sugar-cane.

Cows and poultry were kept in all the villages and milk is produced in varying quantities.

ZANZIBAR.

The position in Zanzibar does not differ markedly from that in Pemba, and a survey of the whole island undertaken by the sanitary staff during the year reveals the following position. The island may be divided roughly into two parts. One to the west and in the centre, is the area where the clove trees are cultivated and where the soil is rich and plentiful. The other comprises the East Coast and the South of the island, where the soil is largely restricted to pockets in the outcropping coral. In spite of the handicap imposed by this type of terrain, the inhabitants of the East and South are the better cultivators, and there is some variation in practice between the two.

The staple article of diet, with coconuts which are universal, is rice. This is mainly imported but is also produced in small scattered swamps and patches throughout the island except on the rocky eastern side. There are two large rice plains namely Chaani and Cheju. Those who do grow rice may obtain enough to last the household for six months in the year. On the East coast there is little land suitable for rice cultivation, and the inhabitants either trek westward and camp at rice growing ground during the season, returning at the end with their crop to their villages, or they devote themselves to other crops and fishing and utilize the proceeds to buy rice. In any case, those who cannot afford to grow or buy rice throughout the year, and there are many, have to fall back on the secondary staples, cassava, sweet potatoes and yams. Cassava and sweet potatoes are grown universally but yams are restricted to the East and extreme North.

Of other cereals besides rice, the commonest are Kaffir Corn (Sorghum Vulgare) and Bulrush Millet (Pennisetum Typhoideum). These are more extensively grown in the coral rag country than in the clove area. Some rather inferior maize is also grown.

A number of legumes are grown, including Pigeon Pea (Cajanus Indicus), Green Gram (Phaseolus Mung), Cow Pea (Vigna Sinensis) and the Bambara Groundnut (Voandzeia Subterraneo) These are cultivated haphazardly all over Zanzibar, but again to a greater extent in the South and East than in the West and centre. Ground nuts are cultivated generally.

Vegetables, including pumpkins, pepper, melons, a type of cucumber, tomatoes, various spinaches, lady's fingers, egg-plant, marrows, etc., are grown casually by individuals, but none are cultivated seriously as are sweet potatoes or cassava. Practically no attempt is made to cultivate vegetables for the market, except by Indian market gardeners, whose efforts indicate that the whole of local requirements could be grown locally.

Of fruits, the banana, of which some eight varieties are well-known, is the most extensively cultivated. They are used as a subsidiary food to rice. Other fruits are grown as in Pemba, the mango and the orange being the most important. Of these the commonest and the most extensively cultivated are the mango and the various citrus fruits mostly orange. The others are grown only occasionally. Over 7,000 hundred weight of locally grown fruit is exported annually.

6. In considering the foodstuffs imported into the Protectorate it is perhaps most convenient to present them as the rough amount imported per annum per head of population. It must however be borne in mind that much of the more expensive items are absorbed by the better-off town or country dwellers, Indians, Europeans and Arabs, and that little may reach the poorer rural native who forms the bulk of the population.

Rice is imported at the rate of 159 lbs. per head of population per annum. It is all of the polished variety, contrasting with the locally grown rice which is consumed retaining its germ and pericarp.

Other cereals including wheat and flour. Wheat (41 lbs.) Millet (14 lbs.) and Maize (5 lbs.), respectively per head per annum.

Pulses, Legumes, etc., are imported to the extent of 20 lbs. per head of population per annum. They are mostly consumed by the Indian population.

Sugar is imported in sufficient quantities to allow 48 lbs. per person. **Molasses** and **Dates** bring the total to 52 lbs. **Tinned milk** mostly of the sweetened variety allows 1½ lbs. per person per annum.

Cattle, Goats and Sheep are imported for slaughter in quantities that allow very approximately 4 lbs. of meat for each person during the year. The greater part of this is consumed by town dwellers.

Dried Fish (mostly shark) is imported in equivalent amounts to meat.

Edible Fats are imported in quantities which allow 2¾ lbs. per person per annum. Seventy per cent consists of ghee (clarified butter) 5 per cent of "vegetable ghee" whilst 25 per cent is hydrogenated fish oil used as an adulterant of the ghee.

None of these articles is included amongst the domestic exports of the country, and as re-exports have been excluded in calculating the quantities given, they may be taken as the actual consumption of the population. There is one exception, as ghee in 1935 is shown as being a domestic export to the extent of 29,000 lbs. to Italian Somaliland. No extensive ghee

industry is known to exist in Zanzibar, nor has this product ever figured as a domestic export before, and it must be assumed that the article has been wrongly specified, and is in reality a re-export of ghee sophisticated with hydrogenated fish oil in Zanzibar.

7. In the absence of any certain figures relating to local production, it is not possible from the figures given in the two preceding paragraphs to be over dogmatic concerning the nutritional situation of the inhabitants of this Protectorate Nevertheless a clear indication is given by them that the greater part of the native population must rely upon fish, fresh or dried, for its food of animal origin, and upon the coconut for almost the whole of its fatty food. The staple foods are rice, perhaps half of which is the polished imported variety, and cassava to which may be added in varying quantities the plantains and the sweet potato. There is a definite indication that the consumption of "protective foods" is very considerably below what is necessary to optium health. A consideration of actual dietaries confirms this belief.

8. Young, in his survey of Pemba, gives four typical native dietaries. The first is that of a native town dweller, apparently earning fairly good wages. It is as follows:—

Breakfast.

Bread, amount unspecified
Tea
Sugar 1 to 6 ounces. Average ½ lb. a day
Milk up to 3 ounces.

Mid-day.

Rice, imported. Amount unspecified
or Cassava about ounce a week
or Sweet potatoes occasionally
Bananas, uncooked, 1 or 2
Fish.
or Meat occasionally. curried with onion
or Tomato
or Other vegetable relish
Fruit. much in season, particularly mango;
orange or papai about once a week.

Evening.

Bananas cooked in coconut juice.
Fish or meat occasionally
Cassava flour cake.

The second diet table was derived from a village in the centre of the island and contained:

Cassava
Dried fish in small quantities or green vegetables in small quantities boiled in coconut juice.
Tea without milk but with sugar, a great deal.
Meat occasionally.
Rice.
Bananas.

The third diet which represents that typical for the south of the island differs only slightly from the above. Mention is made of the use of sweet potato leaves, cassava leaves and certain wild plants used as a spinach. The fourth is of the poorer villager and consists solely of race, cassava, maize or sweet potatoes with curried shark and cassava foliage. Although not mentioned, it is certain that coconut was used in the preparation of the meals of this diet.

All these diets, even the best, have too high a proportion of energy producing carbohydrates and are very deficient in animal products, vegetable proteins and most of the "protective" foods. The only fat consumed regularly is that obtained from the coconut, and as the average consumption is about half a nut a day and each nut yields about 3-3½ ounces of oil, the fat intake is very low.

9. Dr. Harden Smith and Mrs. E. M. Smith published a paper on "Native Diet in Zanzibar" in the East African Medical Journal, Vol. XI, No. 8, of November 1935. They analysed the diets of four groups of Zanzibar town natives and one rural group. The cost of the diet varied from Shs. 10.50 to over Shs. 15 per month per head and the daily calorific value from 2,458 to 4,489. There are many natives in the town who cannot afford to expend Shs. 10.50 a month on each person for food, and on these findings alone it is evident that there must be many, in the town at least, who are actually not getting enough to eat, apart from the qualitative constitution of their food. This quantitative factor is not so evident amongst rural natives who can grow their food instead of buying it; but even amongst them there must be many border-line cases particularly amongst those who cultivate on the coral rag and whose crops are continually open to the ravages of wild pigs and monkeys. The following table gives a list of the foods included in the dietaries considered by the Smiths, showing the daily amount consumed in grammes in minimum, maximum and mean quantities and comparing them with the qualitits set out in Table I the "Report on the Physiological Basis of Nutrition" which formed an enclosure to the despatch under reply.

	Daily consumption in grammes.			
A. Protective foods	Min.	Max.	Mean	Standard
Milk	36	98	67	1000
Meat	1	60	30	—
Fish	76	159	117	—
Total, meat and fish	77	219	148	120
Eggs	—	—	—	50
Cheese	—	—	—	30
Green and leafy vegetables	22	55	38	100
Potatoes (Sweet potatoes locally)	43	236	140	250
Legumes Beans	12	94	—	—
Pigeon Pea	16	25	—	—
Dhall	0	22	—	—
Other pulses	0	26	—	—
Total legumes	28	167	97	10
Cod liver oil	—	—	—	3.5
An available source of Vitamin C.				
Tomatoes	26	106	61	—
Orange	11	213	112	—
Limes and Lemons	48	231	138	—
B. Supplementary energy yielding foods				
Cereals Rice	337	507	—	—
White bread	65	151	—	—
Other starch foods Cassava	101	206	—	—
Plantains, cooked	38	287	—	—
Total starch food	541	1151	846	250
Fats Ghee	3	20	—	—
Coconut, as oil	28	77	—	—
Total fats	31	97	48	—
Sugar	20	70	45	—
C. Other foods used as relishes or vegetables.				
Pumpkin and other gourds	0	57	29	—
Egg plant	0	49	24	—
Onion	11	33	22	—

This table, although it compares only the weigths of the various foodstuffs and omits comparison of the qualities, clearly shows the weakness of the dietaries of the comparatively small groups investigated by the Smiths; the frugality in the use of dairy produce; the lack of meat; the low fat intake and that mainly of vegetable origin; the unnecessarily large consumption of legumes and the enormous intake of cereals and other starchy foods.

There is reason to believe, however, that the Smith's findings relate principally to comparatively well-to-do families in regular employment, and this is confirmed by an analysis of a questionnaire undertaken subsequently by Lee amongst the poorer natives of the town. Of 652 adults interrogated, 498 affirmed that they spent not more than a shilling per head per week on food. Most received presents of coconuts or sweet potatoes from friends in the shambas, but even making a liberal allowance for these additions to the dietary, the value of food consumed by a very large number of the poorer people in the town is about Shs. 6 per month, compared with Shs. 10-50 expended by the poorest group investigated by the Smiths.

Subsequent to the Smiths' investigations, an enquiry was undertaken by the Health Staff into the general conditions of life amongst the rural natives of Zanzibar island. This enquiry is still proceeding, and the information available is thus incomplete. Nevertheless, such as it is, it throws considerable light upon the dietetic habits of the people. The following is a short list of typical native dishes and the manner in which they are prepared. It will be seen that an article called "tui" figures largely in nearly every dish. Tui is prepared from the flesh of the ripe coconut, by marerating and squeezing the grated nut with water, about a pint and a half of water being used for one nut. Its composition is given by the Government chemist as oil 30 to 39%; total solids other than oil 5 to 6% and it is in effect, a loose emulsion of coconut oil.

(1) **Rice boiled with tui.**

$1\frac{1}{2}$ lbs. of rice is washed, and to it is added tui from one coconut. A teaspoonful of salt is added, and the mixture then boiled to dryness.

(2) **Boiled Rice.**

As above, water being substituted for tui.

(3) **Fish Curry.**

Ingredients:—	Fresh fish	1 lb.
	Chillies	2 No.
	Onion	1 No.
	Limes	1 or 2 No.
	Coconut	$\frac{1}{2}$ No.
	Tomatoes	3 or 4 No.
	Curry Powder	1 Tablespoonful.
	Water	3 Cups.

Clean the fish. Rub the curry powder into the fish. Boil in water and add onions, limes, chillies and tomatoes. Boil until soft, then add tui made from the half coconut and boil again.

(4) **Fried Fish.**

Clean the fish and rub with chillies and salt. Fry in coconut oil.

(5) **Meat Curry.**

Half a pound of meat for two people. Either boil in water or fry in ghee, and add a tablespoonful of curry powder, a large onion and salt.

(6) **Sweet Beans.**

$1\frac{1}{2}$ lbs. "kunde", a species of vigna, boiled in water until soft. Add from $\frac{1}{4}$ to $\frac{1}{2}$ lb. of sugar.

(7) **Plantains.**

Peel the bananas and boil slowly in water until soft. Throw away the water, add salt and tui and boil up again.

(8) **Muhogo.**

As (7) above, substituting cassava for plantains.

(9) **Bananas.**

As (7) above, but with sugar added.

(10) **Sweet Potatoes.**

Prepared in the same way as (7) above, except that the potatoes are cut into pieces and either salt or sugar may be added.

(11) **Pumpkin.**

As (10) above

(12) **"Mseto".**

$1\frac{1}{2}$ lbs. green gram (Phaseolus Mung). Boil in $1\frac{1}{4}$ pints water until soft. Pour the water away and put on the top 3 lbs. of washed but uncooked rice. Add water to cover, and boil to dryness four times. At the fourth time of boiling add "tui" from 1 coconut.

(13) **"Mandazi".**

Wheat flour, $\frac{3}{4}$ lb
Yeast, a sufficiency
Sugar, $\frac{1}{4}$ lb.
Mix into a paste with water or milk and allow to stand. Fry in coconut oil until brown.

(14) **"Ugali".**

Take flour of cassava, rice, wheat or maize add salt and boil with water until solid.

(15) **"Uji".**

Rice or wheat flour. Pour boiling water over to make a thin gruel. Add salt or sugar to taste.

In the light of the information given above it is possible to derive some evaluation of the following typical dietaries collected during the survey referred to previously. The numbers in brackets refer to the dishes listed above.

A. Tumbatu, probably a fisherman. Locality Mkokotoni, towards the north of the island.

6 a.m. Tea, with milk if available, but no sugar. About 4 oz. of cold boiled cassava (8) or sweet potatoes (10) left over from the previous night's meal.

12 noon. "Ugali" (14) about $1\frac{1}{2}$ lbs. with fish curry (3) about $\frac{1}{2}$ lb. of fish being eaten.

8 p.m. $\frac{3}{4}$ to $1\frac{1}{2}$ lbs. of rice (1) with curry made of vegetables as in (3), the fish being omitted.

B. African, but actual tribe not known. Locality Mkokotoni as A.

6 a.m. Tea with no milk or sugar. 4 oz. boiled sweet potatoes (10).

12 noon. $1\frac{1}{2}$ lbs. Ugali (14). or plantatins (7) cooked with 2 to 3 oz. of fish.

8 p.m. Fish curry (3) or cassava (8) 1 lb.

C. Arab, well-to-do. Locality Mangapwani on the west coast.

6 a.m. Tea with sugar, but no milk. 8 oz. of Mandazi (13).

12 noon. Ugali (14) 2 lbs. or plantains (7) 2 lbs., with 4 oz. of fish.

8 p.m. Rice (1) and fish curry (3) with an ounce or so of dried fish added.

D. African (? Swahili), Locality Mangapwani.

6 a.m. 2 lbs. cold muhogo (8).

6 p.m 2 lbs. Ugali (14) made from cassava flour. or 2 - 3 lbs. of plantains (7). Occasionally a little fish, if it can be afforded.

E. Hadimu, Locality Makunduchi, in the south of the island.

6 a.m. A cup of tea, but no milk or sugar.

12 noon. Rice (1) $\frac{1}{2}$ lb. with fish curry (3). Only about 1 oz. of fish is eaten. This is varied by the substitution of Muhogo (8), or Mseto (12), in the same quantities.

7 p.m. Rice (1) $\frac{1}{2}$ lb. and Muhogo (8) 1 lb. with fish $\frac{1}{2}$ lb.

In this neighbourhood fruit and fresh vegetables are very seldom eaten, whilst meat may only be eaten once or twice a year.

F. African (Swahili or Tumbatu). A householder. Locality Chaani, in the north inland.

6 a.m. Tea with milk and sugar. $\frac{1}{2}$ lb. Muhogo (8) or 3 - 6 oz. bread.

12 noon. $1\frac{1}{2}$ lbs. Ugali (14) with fish curry (3), about 2 ounces of fish being eaten.

8 p.m. A pound to a pound and a half of rice (1) with about 2 oz. of dried fish. Alternatively 2 lbs. Muhogo (8). Vegetables are scarce, but sweet potatoes may be substituted for rice or Muhogo.

G. African (? Hadimu). Locality Chwaka, a fishing village on the east coast.

6 a.m. Tea with no milk or sugar, and about 2 oz. of Mandazi (13) or ½ lb. of Muhogo (8).

12 noon. 1½ - 2 lbs. Muhogo (8), or 1½ lbs. plantains (7) with about 4 oz. fish.

8 p.m. ½ to 1 lb. rice (1) with 4 oz. fish, and occasionally onion or tomato added.

H. African. Locality Zanzibar Town.

6 a.m. Tea, milk and sugar occasionally. Bread 2 oz.

12 noon. 1½ lbs. rice (1) with curry stuffs. Dried or fresh fish, about 1 oz.

8 p.m. The same as the midday meal. Onions, tomato and spices may be added.

I. African. Locality, Zanzibar Town. This is a very common diet amongst the poorer people.

6 a.m. Bread 2 oz.

12 noon. Nothing.

8 p.m. Muhogo (8). Any amount that can be afforded up to 2 lbs. or more.

J. African. Locality, Zanzibar Town. Also common amongst the poor.

6 a.m. Tea. No milk or sugar.

12 noon. Muhogo (8) ½ lb.

8 p.m. Sweet potatoes (10) 2 lbs.

K. African. Locality, Zanzibar Town. Also common.

6 a.m. Ugali (14) 8 oz.

12 noon. Bread. ½ lb.

8 p.m. Rice (1) and fish curry (3) about 1½ lbs. in all.

Although the information at present at our disposal is not detailed enough to allow anything like a full analysis of these dietaries to be made, it is obvious that, although in some cases the energy requirements of the individual are amply met, all the dietaries, even the best, are ill balanced and sadly lacking in protective foodstuffs. It may be confidently said that rice, cassava, sweet potatoes, plantains, and various flours, in that order form the great bulk of the Africans food; that coconut oil in some form, is universally eaten and is the only fat commonly available; that fish is commonly eaten but in small quantities and as a relish rather than as an essential article of the diet, and that the same may be said of green vegetables and legumes except that they are less commonly eaten; and that meat and dairy produce are hardly used at all as articles of food. All the valuable foodstuffs go to the town. It is a strange situation arising from economic forces. The African must clothe himself as well as feed himself, and he can only do this by trading his valuable foodstuffs to the well-to-do and buying for himself a cheaper food, using the balance on the transaction for clothes, repairs to houses, fishing nets and lines and other essential outgoings. Eggs are not eaten, because they can be sold, and often are not sold because they are potential chickens commanding a higher price. Milk is not drunk, but bartered. The only fish eaten is that which cannot be absorbed into the available markets. Everything is sold, in order to buy rice.

10. **Summary.**—There is evidence derived from the medical examination of prisoners, that an unknown degree of avitaminosis exists amongst the free population.

An examination of school children established the fact that undernourishment is apparent in nearly two-thirds of the children. The degree was marked in only comparatively few cases.

An analysis of foodstuffs imported into the Protectorate, and the knowledge derived from surveys in the field of crops grown and food eaten indicate that—

(1) the consumption of dairy produce, i.e. milk, eggs, and cheese is extremely low.

(2) The consumption of animal products is almost entirely restricted to fish and is low.

(3) Fat is eaten in small quantities and is mainly of vegetable origin.

(4) Cereals, starches and sugar are eaten in considerable quantities, replacing the "protective" foods to a very undesirable extent.

11. The following is a list of the literature published on the subject :—

1. The Annual Medical and Sanitary Report for the year 1934 Zanzibar Protectorate Page 24, 26.
2. The Annual Medical and Sanitary Report for the year 1935 Zanzibar Protectorate Pages 1, 36, 44-49, 57-59.
3. The East African Medical Journal, Vol. XI, No. 8, November 1935. Pages 246-251, "Native Diet in Zanzibar" By W. Harden Smith, M.O., T.T. (Late M.O., Zanzibar) and C. M. Smith.
4. "Report on a Preliminary Survey of the Marine Fisheries of the Zanzibar Protectorate" By Cecil von Bonde, M.A., Ph.D., B.Sc., Government Marine Biologist and Director of Fisheries and Marine Biological Survey, Union of South Africa. Printed by the Government Printer, Zanzibar.

(B) A REVIEW OF THE FURTHER STUDIES AND RESEARCHES ON THE SUBJECT WHICH APPEAR DESIRABLE.

1. The comparative table at page 12 of the first part of this report shows that the divergence between a typical local diet and the standard diet recommended by the Health Organization of the League of Nations is so great that the task of raising the local diet to the level of the standard diet is one which will require sustained effort over very many years. And as some of the reforms are likely to take much longer to effect than others it is desirable to obtain knowledge of the characteristics of local foodstuffs with a view to ascertaining if the deficiencies of the existing diets could be wholly or partly rectified in any particular in advance of the application of the standard diet as a whole. The attainment of this knowledge becomes more necessary in view of the fact that the possibility of the eventual adoption in Zanzibar of the standard diet in its entirely is extremely doubtful. Indeed, the adoption of the standards in their entirety is not contemplated by the Technical Commission who state (page 13) "They are put forward as models which could be modified in many particulars according to national dietary habits and supplies, provided that the dietary principles contained in them are duly regarded". The first problem then is to ascertain if by any means it is possible to obtain a diet made up of the common and usually eaten foodstuffs of Zanzibar which would contain, wholly or in part, the attributes of the standard diet. Much of the knowledge we require to attain this end can be ascertained from enquiry or study by officers of the various departments concerned in the ordinary course of their duties. Some is technical research for which additional provision would have to be made if it were to be undertaken in the Protectorate. It is not convenient to consider these two methods of acquiring knowledge separately but more so to consider the articles of the standard diet one by one and to indicate in each case where our knowledge is lacking.

2. **Milk** (a) The standard diet contains 1000 grammes of milk daily per person, or about one and three quarter pints. This is the item which is the most divergent from local custom and the most likely to be difficult to be encourage. Before this aspect of the question is considered, it is necessary to ascertain if the country could support sufficient cattle to provide this amount of milk, and knowledge is required upon the following points.

(i) What is the cattle population of the Protectorate.

(ii) What is the extent of existing land used for grazing cattle, and how many more cattle could it support.

(iii) Is any of the wanda country which is at present put to no purpose and uninhabited suitable for cattle grazing. If so, how many head could it support.

(iv) What is the average daily yield of milk by local cattle.

(v) What measures could be taken to increase the yield, if necessary.

(vi) What are the customs of the natives with regard to goats milk.

(vii) Could goats be utilized to increase the supply of milk and meat if necessary. Goats are usually tethered and are therefore not a menace as they are on the mainland.

(viii) What is the price of milk in local rural areas.

(ix) Could a system of mixed farming be introduced to encourage the production of meat and milk.

(x) Could any milk marketing scheme be introduced to reduce the price of milk to a level within the means of the rural peasant.

And as the enquiry continued, no doubt other points upon which knowledge is defective and required would arise.

(b) When the question of availability of milk has been studied, consideration will have to be given as to how to render it acceptable to natives, bearing in mind that from our present knowledge, it does not appear that more than 2 or 3 ounces are taken daily even in the most favourable circumstances. An enquiry into the methods of cooking by natives would be necessary, and this is, to a limited extent, being done at the moment in connexion with a scheme for the supply of free milk to school children.

(c) Finally it would be very desirable to have an accurate knowledge of the average composition of local milk, particularly of its mineral and vitamin content. It is not impossible that the milk of a different breed of cow than is found in Europe and living under tropical conditions should show significant variation from that of European cows.

3. **Meat, Fish and Poultry.** (a) The availability of **meat** would increase according to the manner in which the availability of milk increased. There is little doubt that the only factors which restrict the consumption of meat are its scarcity and price. Investigations with regard to meat would be mainly concerned with marketing, though a knowledge of how local meat differs from European meat might be desirable. It is well recognized that local meat is deficient in fat, and the extent of this deficiency could be defined on investigation.

(b) **Fish** is the staple animal food of the country, either fresh or dried. Some thirty-one varieties of fresh fish commonly seen in the markets are listed by von Bonde in his report. A knowledge of their composition is desirable and the effect that drying, salting, or smoking has upon their properties.

(c) **Poultry.**—The local strain is small and poor and the only investigations which would appear necessary are in connexion with improving the strain and feeding.

4. **Eggs** are not extensively eaten, though chickens are universally kept. They are either marketed or set. An increase in the consumption of eggs by natives would be largely dependent upon a study of native cookery. The local chicken feeds itself as best it can, and being a small bird lays a small egg. It is unlikely that it varies in its properties from the European egg but a knowledge of its composition might be desirable.

5. **Cheese** is neither made nor eaten by the native. Any investigation into the merits of a locally manufactured cheese, or other home made product of a like nature made from milk, would have to await the expansion of the dairy industry. Sour milk which forms so important a part of the dietary of Arabs in other localities is consumed to a very limited extent.

6. **Green and Leafy Vegetables.**—Besides cassava leaves and sweet potato tops, a number of leaves of wild plants are used as spinach in native dietaries. It would be desirable to ascertain if the cooked spinaches made from these various sources can replace such articles as cabbages.

7. **Potatoes.**—Sweet potatoes with plantains, and cassava constitute the staple non-cereal items of diet of the Protectorate. European potatoes are not consumed, or very rarely by natives, and it is most important to know if the sweet potato possesses the attributes of a "protective" food in the same way as the English potato. Such an investigation should extend to the various varieties of sweet potatoes and yams. Similar knowledge is desirable in the case of the cooked plantain, and most particularly of cassava, because this last crop, on account of its heavy yield, its hardiness, its ease of cultivation, and resistent properties to drought, is one that will always be likely to be grown by natives. Whether any of these commonly grows and consumed roots, together with the cooked plantain can, by the encouragement of increased consumption, serve to replace dairy produce to any extent, during the expectedly protracted period of extension of the

dairy industry, is a question of the utmost importance if a quick, even though partial, improvement in native diets is desired.

8. **Legumes** are fairly commonly eaten. A knowledge of the properties of the locally grown varieties is desirable, as in the case of other foods. And also investigation on the introduction of exotic varieties having good yielding and dietetic qualities.

9. **Cod Liver Oil** is unknown in Zanzibar except as a medicine. Shark liver oil is obtainable, but whether it would ever be accepted as an item in a normal native dietary is doubtful. The extreme rarity of rickets in Tropical Africa suggests that extra Vitamin D is not necessary under a tropical sun. Vitamin A is known to be deficient or on the verge of deficiency in native diets, but consideration should be given to whether this deficiency cannot be better rectified through the agency of such products as inbleached palm oil, yellow maize, etc. than through an attempt to popularize cod or shark liver oil.

10. Available sources of vitamin C are widely grown in Zanzibar and are consumed seasonally in the shape of papaya, limes, oranges, lemons, pineapples, tomatoes and other tropical fruits.

11. The supplementary energy yielding foods which include the universally eaten cereal rice, have in certain forms the properties of properties of protective foods which it would be extremely unwise to ignore in a country like this where the valuable protective foods are so scarce, or so little eaten. A knowledge of the protective properties of the various varieties of home grown and home milled rice is very desirable, and it would be of advantage to extend these researches to other locally grown cereals, such as maize and millet.

12. Finally there is the question of the native himself, whether as a metabolic machine he is entirely comparable to the European, or whether there are significant differences in his requirements and the manner in which he synthesises into his being elemental substances which form his food, his drink and the air he breathes. It is thus evident that the knowledge which it is desired to acquire varies in scope and extent from elementary domestic details of the every day life of the native to fundamental research into his physiological reactions to his environment, and it is necessary to consider how and where this wide range of enquiry can best be carried out within the resources of the Protectorate.

(a) Questions relating to such measures as crop culture, extension of the dairying industry, mixed farming and similar matters are best left to the staff of the Departments concerned as at present. The extent to which it is found necessary to carry these enquiries will in the course of time demonstrate the necessity or otherwise of augmenting the staff of officers concerned.

(b) The anthropological enquiries fall under two main overlapping heads; the first is concerned with native cookery and household budgeteries and the second with customs, prohibitions and taboos, if such exist. There can be no question that the services of a trained anthropologist for work in the field for at least a year would be an inestimable boon, if not an absolute necessity, in effecting a satisfactory and rapid accumulation of reliable knowledge of these subjects. Good work can be done on the domestic questions by the staff of the Jeanes Centre when established, the female staff of the Education Department, the Health Visitors of the Medical Department and by voluntary lady workers, and Administrative Officers can suitably include the collection of data regarding native customs in their routine duties. But such work requires to be co-ordinated and controlled by a trained anthropologist, who at the same time could impart to the untrained voluntary workers a knowledge invaluable to them for future work. The possibility of obtaining the assistance of a suitable anthropologist

through the good offices of some such institution as the International Institute of African Languages and Cultures or one of the big trusts or corporations should be borne in mind.

(c) The chemical and bio-chemical analysis of local foodstuffs again falls under two main headings, raw food and prepared dishes. Considerable importance is placed on the analysis of prepared dishes, because a belief in sufficiency based upon the analyses of raw foods alone may be extremely misleading. As an example, the inclusion of apparently adequate quantities of green wild spinaches in many of the native dietaries led to the belief that at least one of the protective foods was adequately represented, until it was discovered, almost accidentally, that one method of preparation at least required repeated boiling, the water being thrown away each time, until little but the fibre was left. It is evident that if cooked foods are to be subjected to analysis, this is best done in the Protectorate. The Pathologist of the Medical Department and the Government Chemist of the Agricultural Department are competent to undertake these investigations, but it would almost certainly be necessary to augment their staff by two trained Laboratory Assistants.

The necessity for the local analysis of raw foodstuffs is not so apparent, as the articles could in most cases be sent for analysis to a central laboratory on the mainland if this were available, but even so it may be advisable in certain cases to undertake the analysis locally, where the inevitable delay in transit might be likely, as in the case of green leafy vegetables, to result in a loss of vitamin content. However, as many as possible of such analyses should be undertaken at a central laboratory and not locally. At a meeting of the Standing Medical Research Committee for East Africa held at Entebbe in September, 1936, it was decided to make an application for assistance from the Colonial Development Fund for the provision of two teams of specialist workers, of which one would concern itself with the analysis of native foodstuffs. If this proposals materializes, as much as possible of the work required on Zanzibar raw foodstuffs should be left to this team of specialist workers.

(d) The second team referred to in the previous sub-paragraph it was proposed should concern itself with the basal metabolism of the African, and it is evident that this is the only practical manner of dealing with this problem in the East African territories. The subject is unsuitable for each of the laboratories of the territories to undertake themselves, without undue inflation of staff, and would need the closest co-ordination if over lapping were to be avoided, and even so, the work would tend to be patchy. It is not intended that local laboratories shall take no part in this research, but that they shall each undertake what they can most suitably do under the direction and with the assistance of the specialist workers.

(C) A REVIEW OF THE PRACTICAL MEASURES WHICH HAVE BEEN TAKEN IN THE PAST TO APPLY SCIENTIFIC KNOWLEDGE TO THE IMPROVEMENT OF NUTRITION.

1. In so far as the application of scientific knowledge of the properties of foods to the improvement of nutrition is concerned, considerable restriction has been imposed by the limitations of such knowledge. In the first place, the most authoritative figures available with regard to the vitamin and mineral contents of foodstuffs refer to European or American foods and is no certainty that they are applicable to the same articles grown under a variety of tropical conditions. Secondly there is often doubt whether the information given refers to the raw or the cooked article. Thirdly many articles commonly consumed is Zanzibar find no place in these tables, and in tables prepared by workers in the East, though foodstuffs common to Zanzibar may be included, they are often obscured under a local native name to which there is no clue here. Fourthly the vitamin contents are variously assessed by different workers in a manner which it is difficult to reconcile. In Table I of the "Report on the Physiological Bases of Nutrition" the requirements of all vitamins except B2 are expressed in International Units, but in the absence if any authoritative tables of vitamin values of foodstuffs in these units, it is not easy to apply the knowledge we possess to the attainment of the standard so expressed. A very great aid to the tropical worker would be an authoritative table of food vitamin values expressed in international units.

2. In consequence, not very much has been done to apply scientific knowledge of food values to the improvement of nutrition and what has been done has been principally in institutions. The following measures have been taken in recent years.

(a) The dietaries of the prisons and of the Lunatic Asylum were reviewed and found to be lacking in essential elements, particularly vitamins A and C and fats. New dietaries were introduced and as a result, considerable improvement of the physical condition of the inmates of these two institutions was observed after a period of 6 months. Investigations at a later date will show whether the new dietary completely fulfils our requirements. (Vide Annual Medical and Sanitary Report 1935 page 57 et seq).

(b) Investigations have been proceeding during the year as to the possibility of providing extra meals for school children; whether it is practicable to give this in the form of a pint of milk a day; and if not, how the milk, if available, could be incorporated with other foodstuffs to make it acceptable to the children. The investigations are still proceeding one of the major questions remaining being whether there are enough cows in the Protectorate to render sufficient milk available, and the other the question of cost.

(c) Yellow maize is being introduced for cultivation trials in the hope that it will grow successfully and become sufficiently popular to replace the local white variety.

(d) A variety of oil palm having a good oil-yielding pericarp has been introduced from the Far East with a view to extended propagation and distribution and the subsequent provision of an edible oil rich in vitamin A. A poor variety of oil palm grows in Zanzibar, but it yields little or no paricarp oil. It is hoped that the introduced variety will breed true and grow successfully under local conditions. The Agricultural Department has trials in progress and has a limited number of young plants available for distribution.

(e) The cultivation of rice which has extended considerably during the past few years, is being encouraged, by the introduction of ploughing and the selection of the best varieties by the Agricultural Department. The

introduction of small milling units is under investigation. The local rice is husked by hand and is consumed with its pericarp and embryo, replacing the machine milled polished rice.

3. **Food Crop Cultivation.**—The importance and value of the export crops—cloves and coconuts—have hitherto overshadowed food crop cultivation, which has in consequence been neglected. Cultivation methods are poor and primitive and the best use is not made of the cultivated land which is generally of rather poor quality because the best land is planted up with cloves and coconuts. In order to improve the utilization of the land, the Agricultural Department has under trial a number of crop rotations in which recognized local food crops are being alternated not only with a view to the better utilization of the land but also to the production of a greater variety of foodstuffs. Another feature of the rotations is the introduction of green manuring to maintain the fertility of the land and improve the crops growing thereon Local beans are under trial for this purpose and there has been introduced from Nigeria a bean which is not only a good green manure but is also edible.

Experiments are also in progress on improved methods of cultivation and on the selection of local crop varieties with a view to the propagation and distribution of imported planting material. Other varieties of food crops are being introduced from other colonies in the hope that some of them at least will prove to be an improvement on the local varieties.

Manurial trials have been initiated and investigations are in progress on the mineral deficiencies in the local soils.

Bullocks are kept on the main experimental station mostly for transport purposes, but they are being trained to plough and harrow and incidentally make farmyard manure for use on cultivated land. This is the first step in an attempt to encourage the keeping of more live stock on native farms which would provide animals for draught purposes (transport of produce and cultivation of land), cows for milk production, and cattle for slaughter, and at the same time provide farmyard manure for soil improvement.

With a view to the provision of better milk supplies, the Agricultural Department has established the nucleus of a herd of dairy cattle for breeding purposes. Only local stock is being used as it is considered that there is in that good material which by selective breeding and grading up can be so improved as to provide a good foundation stock admirably suited to local conditions.

Poultry breeding is also receiving considerable attention. An unit of about 500 birds of the Rhode Island Red breed has been established from which there is a regular distribution of eggs for hatching and young stock for crossing with the smaller native breeds.

Fruit producton largely for local consumption, has received an impetus since the Agricultural Department made available for distribution seedlings of local and exotic fruits. There is a growing demand for such seedlings.

4. No literature on the subject has been published.

(D) A REVIEW OF THE FURTHER SUCH METHODS WHICH IT APPEARS DESIRABLE TO TAKE IN THE FUTURE.

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1. In the existing state of our knowledge of conditions effecting the nutritional state of the inhabitants of Zanzibar, the practical measures it is desirable to take to apply scientific knowledge to the improvement of nutrition are restricted very considerably by the paucity of this knowledge and any programme devised would of necessity require amendment as farther knowledge came to light. As an example, it would appear desirable to encourage the growth and consumption of sweet potatoes to replace rice to a greater extent than at present in the dietaries of the natives, but until it is know if the attributes of the sweet potato are comparable with those of the English potato, it would be premature to do so. Again, a very exact knowledge of the qualities of that universally grown root cassava is necessary before it can be decided whether its cultivation is to be encouraged or discouraged. Nevertheless, there are certain innovations which are obviously desirable, even in the absence of full knowledge and in the following paragraphs, consideration will be restricted to these.

2. **The Fishing Industry.**—The native inhabitants of Zanzibar are dependent upon fish, either dried or fresh, for nearly the whole of their very small intake of animal food. It has recently been suggested that fish are less plentiful on the fishing grounds and it is less easy for the fisherman to make a living now than it was in the past, and if this contention is confirmed a position may arise which will affect adversely the whole native population of the Protectorate. Apart from this, the position to-day is that the native of Zanzibar depends almost entirely upon fish for his intake of animal food; that this intake is low; that the low intake is not a matter of choice but of poverty and that the fish caught in home waters are insufficient to meet the restricted demand, as is evidenced by the importation of approximately 10,000 cwt. of dried fish yearly. Therefore it is evident that any measures taken to increase the supply of fish available for consumption and to decrease its price will have far reaching effects upon the health of the people generally, by providing them with an essential article of food which is notably lacking in their existing dietaries.

Towards the end of 1928 C. von Bonde, Marine Biologist to the Government of South Africa, undertook a survey of the Marine Fisheries of the Protectorate and published his findings in the report referred to in the first review of this survey. It would appear from this report that the most important limitation to the extension of the fishing industry is the inability of the local craft to exploit the deep waters on account partly of their frailty, and partly of the distance to be travelled. He advocates the use of decked motor boats to undertake deep troll line fishing and also to act as mother vessel to native craft, taking them in tow to and from the fishing grounds.

His other recommendations include improvements to the inshore fishing, the use of open motor boats in certain localities, the development of crayfish capture, improved method of fish preservation and the development of fish by-products industry. There can be no reasonable doubt that the adoption of his suggestions would result in a considerable increase of the fish supply of the Protectorate, and this together with reforms in fish marketing methods also advocated by him, would result in a substantial decrease in the retail price of fish

It is certain that the inauguration of such an enterprise could only be undertaken by Government, though there would appear to be ample promise of private enterprise taking over the activities once they were established and proved. The provision of an ample fish supply at a price which would allow the native to purchase in reasonable increased quantities would be a real and substantial boon to the Protectorate.

3. **Cattle and the Dairy Industry.**—The consumption of meat and milk by the native population of the Protectorate is extremely low. Meat is not eaten because of its expense, though it is well liked when obtainable. Milk is not drunk mainly because the native is not used to drinking it. In the town where the retail cost is about one shilling cent an ounce, it is too expensive for the native to buy. The cow owner in the country considers it more profitable to sell his milk for consumption in the town than to drink it himself. Nevertheless, if there is little enthusiasm about milk as a food, neither is there any revulsion from it, and by propaganda the consumption could undoubtedly be increased, provided that the economic factors were adjusted to the financial capabilities of the native. The desirability of increasing the consumption of these articles of diet is obvious, but before it is possible to formulate any scheme to bring this about, it is necessary to have an appreciation of the existing state of affairs.

Within the township of Zanzibar and on its outskirts four or five herds of milk cows exist, numbering in all rather less than a thousand head. These herds are owned by Indians who supply the town dairies with milk and cream from them. In the rural districts in good grazing areas and in sufficient proximity to the town, there are milk cattle owned by natives numbering in all perhaps two or three thousand. In exceptional cases they may be in small herds of 5 to 10, but usually each cow is owned by one family, and sometimes by a number of families. In the more remote rural areas cows are very scarce, perhaps one to every 100 head of population, and are of course owned singly by a family or group of families.

The milk is disposed of usually in one of two ways. The owner may himself take the milk into town, on a bicycle, or employ bicycle boys to do so for him. Or he may dispose of it in the shamba to different milk buyers, who act as middlemen, transporting and selling the milk in the town to dairies, or hawking it from house to house. The price of milk bought in the shambas varies from 5 cents of a shilling to 12 cents per bottle of 26 ounces, according to season and the degree of remoteness from the town. The retail price in the town varies from 20 cents to 24 cents a bottle.

It is thus seen that nearly the whole milk supply of the island of Zanzibar is absorbed into the township, the largest consumers being the Hindu community. Even so, the supply is greater than the demand, and when milk is plentiful, over a third of the amount brought into the town may not be disposed of by the end of the day. The milk is wasted, except in a few casual instances, when it is evaporated to a powder and sold at a very low price to sweetmeat makers.

The male calves of these individually owned cows are disposed of either as draught oxen or by sale for slaughter in the township. An ox is seldom slaughtered in the shambas, as it provides too much meat to be easily disposed of.

It is obviously desirable that meat and milk should be readily available to the rural population. The habit of milk drinking will be fostered it is hoped, by the provision of free milk meals to the children at rural schools and if this comes about, the main bar to the natives access to these articles of diet will be cost. But if the habit of meat eating and milk drinking is to be fostered, it is obvious that the cattle population of the island must be increased, and the problem is how to bring about this increase under conditions of actual wastage as exists at present owing to unorganized distribution, and which must continue to exist if the cost of these articles is to be adapted to the buying capacity of the native. Expansion of the local dairy industry would necessitate the provision of an industry to deal with surplus milk and consideration might be given to the establishment of a local ghee factory. Annually some 750,000 lbs. of ghee or substitutes such as vegetable ghee and hydrogenated fish oil, are imported into the Protectorate, and there appears to be no reason why this should not be manufactured locally with advantage. Again, such an undertaking could not be left to private enterprise, but government's activities in this case might be limited to subsidy, legislation and encouragement.

4. **Rice.**—Rice is the staple food of Zanzibar, and enters into almost every meal of the native when available. An unknown quantity is grown locally. During the last ten years the average amount imported annually was 322,847 cwt. valued at £179,050, the published figures for 1935 being 332,367 cwts. valued at £132,300. In Zanzibar, the average yield per acre is about 6 cwt. or 60,000 additional acres under rice would be required to grow an equivalent amount to that at present imported.

Rice is however an arduous crop. The land needs very careful clearing, and afterwards needs to be hoed over. During growth constant watch has to be kept against the depredations of birds, and after the harvest, hand husking is a laborious occupation. It is not surprising that cassava, which yields up to 6 tons an acre, and which needs little more than planting and gathering, is preferred as a crop by the native, and that he relies upon what he can earn in the clove season to purchase what rice he can afford, falling back on his home grown cassava under almost famine conditions when his money is spent.

The main advantage accruing from a policy of encouragement of home grown rice rather than imported rice, is that whilst the imported variety is invariably polished, the home grown retains its pericarp and embryo. The polished rice is as acceptable a food to the native as home grown rice and this, combined with the difficulties of growing rice referred to above, makes it a matter of some doubt if any such policy would succeed, particularly amongst the improvident fatalistic natives who occupy the clove growing parts of Zanzibar island. As large tracts of the area occupied by the Hadimu who are not only more energetic but far better agriculturists than their Northern neighbours, are not suitable for rice cultivation, it would appear that the adoption of any such policy would be premature in Zanzibar.

In Pemba however, conditions are more hopeful. There is more rice land available and the indigenous population particularly on the East Coast are more energetic and better agriculturists. A limited and experimental policy of encouragement of the extension of rice growing there could be inaugurated by the distribution of seed, and the provision at chosen centres of small power rice huskers, made available for the use of the growers. Such an experiment would be very desirable, and could be extended if it proved successful.

5. **Education.**—The natives of Zanzibar and Pemba are extremely conservative, distrustful of change, wedded to custom and stubborn in their resistence to any change. It is, in consequence, extremely difficult to induce them to abandon old ways or to adopt new ones, and it is felt that not very much progress will be made towards the betterment of their social and material customs until the Jeanes scheme is actually working and demonstrating new methods which are at present only advocated. The importance, therefore, of the school is enhanced, as the traits so firmly established in the adults, are more easily overcome and influenced in the child, who at present constitutes the most hopeful channel of approach to better conditions. There exist in the Protectorate a number of rural schools for boys giving training up to Standard II, in the best of which special attention is given to handicrafts, gardening, etc. At present only a small proportion of the boys of the Protectorate attend these schools, but no provision exists at all for the girls who grow up illiterate and untaught, influenced only by their parents and adopting their faulty habits and methods. The establishment of rural girls schools with a bias towards domestic science adapted to native life, would constitute an important step forward in the campaign against faulty dietetic habits.

The routine medical examination of the rural school boys displays the fact that a very large number of the children are undernourished and that in many the grosser physical signs of avitaminosis are evident. On questioning the children, it is usual to find that only comparatively few have had a satisfactory meal and some have had no food at all before coming

to school. In many places it is not uncommon that the majority will have no regular food until the evening meal is cooked at dusk; one meal a day is the rule and not the exception. The provision of a daily school meal is an absolute essential if any good is to come of this enterprise. The meal should be served first thing on the opening of the school in the morning and should consist of half a pint of milk and porridge of millet flour, or cooked legumes. A second half pint of milk should be issued to each boy later in the morning and a teaspoonful of cod liver oil per child per day should also be issued. The present custom of selling the produce of the school garden to establish a small school fund should be discontinued when school meals are established, and the children should be taught to prepare and eat what they have grown. If rural girls schools are opened or girls admitted to the sub-standard classes of the boy's schools, the girls should prepare the meal and the boys assist in the collection of firewood and water, the cleansing of utensils, etc. There would probably be a loss of an hour a day from the time available for teaching, but this would be most adequately compensated by the increased capacity of the children for learning. The cost at present would be in the neighbourhood of £2,000 a year, but it is probable that the custom would attract many more pupils to the school at increased cost. The paramount importance of this service cannot be overstressed.

6. **Ante-natal Clinics Maternity and Child Welfare.**—The provision by government of services in connexion with the welfare of mother and child has awaited the addition of a lady doctor to the staff. The service, now starting, is restricted by the capacity of the single officer who alone can undertake it, and is consequently essentially a town service. Its extension to rural populations and to Pemba would depend upon an increase of the female staff, and although a second European lady doctor is desirable the possibilities of utilizing locally born Arab and Indian ladies of good education and with a knowledge of the African and his language, by giving them facilities to be trained as doctors or assailants in India or at Beirut should not be lost sight of. The service can also be extended by nursing sisters, particularly if they are qualified health visitors, and by Arab or native midwives locally trained at the Mwembeladu Maternity Home of the Zanzibar Maternity Association.

Whilst this service would appear to be but remotely connected with the question of nutrition, this is in fact not so, for in addition to the direct provision of such foods and accessories as malt, cod liver oil, and milk in appropriate cases, and the giving of advice and assistance in matters connected with the feeding of infants, these clinics will form the only effective channel of approach to any considerable body of adult native women, who, attracted by the services provided for their children or themselves, can be instructed and influenced in all matters relating the household management. The extension of activities of these clinics to social problems would depend not so much upon the professional staff, but upon the assistance of voluntary lady helpers Such a service has been started in a very small way in conjunction with the women's clinic in Zanzibar, where European ladies voluntarily give their services in rotation every morning and assist the lady doctor in dispensing her medicines. It has got no further than this at present, but if it is to be expand into an effective social service it must be built upon some firmer basis than that of individual voluntary assistance. The formation of some organized society or guild must be considered, preferably affiliated with a recignized parent siciety, possibly the St. John's Ambulance or the Red Cross Society, of which it would form a branch. In this manner the enterprise would attain a stability which must be lacking while it is maintained by individual effort only, without cohesion, and subject to the casual forces of inclination, indifference or fashion.