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would seem to be common where a total of seventy c.cs. are administered or the course of injections has been repeated, showing that this compound, which contains only 13.5% of antimony metal in contrast to tartar emetic which contains 36.46 per cent., cannot be expected to cure in less time than is required with the latter salt.

NATIVE DIET IN ZANZIBAR.

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In September and October, 1934, a short enquiry was carried out in Zanzibar with the object of getting a general idea of the type of diet used by natives.

The method of enquiry adopted was to send out a questionnaire in which householders were asked to record the number, with sex and age, of persons catered for in their houses and also to record against each item in a list of local foodstuffs the quantity used by them over any period for which it was convenient to estimate.

In order that all could be checked individually, only a limited number of questionnaires were distributed to natives representative of their class. Thirteen from shamba natives in the Shehia of Maungani and twenty-five from mosquito searchers, native dispensers, and Zanzibar-born askaris in the town were eventually accepted as being satisfactorily answered.

In the case of shamba natives and askaris the questionnaires were filled in in the first instance by the Sheha and in inspector respectively. The answers were checked later with the individual householders concerned.

The natives of the Shehia of Maungani form a homogeneous community of Hadimu origin and tradition.

Native methods of cooking were studied—mostly by watching and questioning women while preparing their meals.

COMPOSITION OF DIETS.

In the questionnaires, quantities were variously recorded in terms of weight, volume or price and from these it was possible roughly to calculate the amount of the various foodstuffs used by each family over any period. The calculations have been summarized below.

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In drawing up the tables women and children were converted to adult men by the use of the following factors:—(1)

	Factor.
Children under 5 years	0.50
Children between 6—13 years ...	0.77
Females over 14 years	0.83
Male over 14 years	1.00

The town diets have been divided into four groups according to cost. The diets in group "A" cost under Rs. 7 (average Rs. 5.7.0) in group "B" between Rs. 7 and Rs. 8, in group "C" between Rs. 8 and Rs. 10, and in group "D" over Rs. 10 per man per month.

In addition to the foodstuffs referred to in the tables there were many others, including breadfruit, tinned milk, eggs, chicken, dried shark, dried nguru and dates regarding which information was given in some of the questionnaires. The quantities and frequency of use of these were, however, too small to allow of them being included in the summary.

The quantities shown in tables I, II, III, and IV are of raw foodstuffs as bought at a market.

TABLE I.

GENERAL SUMMARY.

Foodstuffs used per person per month.

	Population converted to adult males.	White bread.		Rice.	Cassava s. potato, banana.		Pulses.	Coco-nuts.
		lb. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	No.	
1. Maungani ...	35	4 5	22 5	43 2	2 0	21.9		
2. Town group A ...	19	4 13	22 14	12 1	5 6	9.5		
3. Town group B ...	27	8 0	25 0	25 1	10 1	19.6		
4. Town group C ...	22	8 9	22 11	28 8	4 12	26.6		
5. Town group D ...	22	10 0	33 8	38 0	5 14	26.4		

	Milk.	Ghee.	Fish.	Meat.		Fruit and vegetables.		Sugar.
				lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1. Maungani ...	2 19	0 8	6 10	0 1½	10 12	1 5		
2. Town group A ...	1 18	0 3	6 8	1 2	15 8	3 0		
3. Town group B ...	2 11	0 5½	7 0	1 8	38 10	3 0		
4. Town group C ...	5 4	1 5	5 0	2 12	39 7	3 9		
6. Town group D ...	4 19	1 5	10 8	4 0	35 11	4 10		

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TABLE II.

Detail of quantities of cassava, sweet potato, and banana grouped together in the general summary.

	Amount per person per month.		
	Cassava. lbs. ozs.	Yam or sweet potato. lbs. ozs.	Unripe banana. lbs. ozs.
Maungani	12 8	15 10	15 0
Town group A	6 11	2 14	2 8
Town group B	13 10	6 7	5 0
Town group C	10 15	7 1	10 8
Town group D	10 8	8 8	19 0

TABLE III.

Detail of quantities of pulses grouped together in the general summary.

	Native beans (kunde)	Pigeon pea.	Dhall.	Other pulses.
	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
Maungani	0 13	1 3	—	—
Town group A	1 12	1 12	1 6	0 8
Town group B	6 3	1 1	1 1	1 12
Town group C	2 13	1 7	0 8	—
Town group D	3 12	1 10	0 8	—

TABLE IV

Detail of quantities of fruit and vegetables grouped together in the summary.

	Oranges and tan-	Lime and lemon.	Pumkin, vegetable marrow.	Egg plant.	Onion.	Green leaves.
	Tomato. lb. oz.	gerine. lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Maungani	1 11	0 12	15 4	—	1 7	1 10
Town group A	3 12	2 4	3 3	3 9	0 9	0 12
Town group B	4 14	12 0	10 1	3 9	3 1	1 7
Town group C	7 0	14 1	10 1	2 3	0 10	2 0
Town group D	6 13	12 3	10 1	1 1	0 7	2 3

The chemical composition of the diets was estimated from analyses collected from various sources and the figures shown can only be regarded as approximate. In particular, the amount of animal fat could not be estimated with any degree of certainty since the fat content of different kinds of fish varies within wide limits, and the average proportion of 1% of fat in fresh fish which was chosen may be wide of the mark. Further, ghee sold in Zanzibar is not always entirely of animal origin, vegetable ghee being imported from Europe and blended locally with animal ghee. In the summary, however, all ghee has been taken as being of animal origin.

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 6 7 ... 5 0
 7 1 ... 10 8
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 1 1 ... 1 12
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 Egg plant. Onion. Green leaves.
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result compared with previous estimates of the oil content of local nuts. It appears that practically all the oil is expressed and an average quantity of 3 ozs. of oil per nut has been adopted in the calculations.

TABLE V.

ESTIMATED CHEMICAL COMPOSITION OF DIETS.

Protein, fat, and carbohydrate in grammes per man per day.

	protein. Total	protein. Animal	fat. Total	fat. Animal	hydrate. Carbo-	Calories per day. per man
Maungani	51.4	10.7	76.6	9.9	480	2,904
Town group A	60.0	13.2	37.2	5.7	460	2,458
Town group B	88.6	15.8	68.6	8.7	614.3	3,520
Town group C	74.3	19.8	105.7	24.2	560	3,584
Town group D	102.8	31.5	108.6	26.9	745.7	4,489

Since the figures in the table V are not based on analysis of local foodstuffs comment on them must be guarded, but in the absence of more accurate information the following conclusions may be drawn.

ENERGY.—The caloric values shown are full values for the diets and therefore greater than the energy actually available, since the absorption of vegetable protein and probably of carbohydrate is not complete. The energy value of the cheaper diets is therefore insufficient if it is taken that 3,000-3,500 calories per man per day are required for light work.⁽¹⁾

PROTEIN.—About half the protein content of all the diets is derived from rice and wheat flour, and assuming that "if proteins are derived from animal sources some sixty to seventy grammes per man per day are sufficient, while if derived from poorer cereals, double this quantity may be required"⁽¹⁾ only in the most expensive diet does the total protein content and the proportion of animal protein reach minimal standards.

FAT.—The animal fat content of all the diets is too low, but, as in the case of animal protein, it tends to vary directly with the cost of the diet.

VITAMIN CONTENT.—Owing to the small amount of animal fat and green vegetables in all the diets and to the fact that all the rice used is polished, it is probable that the diets are deficient in Vitamins A and B, unless the amount of these vitamins contained in sweet potato, banana and tomato make up the deficiency. Beri-beri occurs in Zanzibar and a condition

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resembling, or identical with, Wright's disease or the A and B avitaminosis of Sierra Leone, is frequently observed. Vitamins C and D are probably taken in sufficient quantity in fresh fruit and coconut oil respectively. It is not possible to express an opinion as to the amount of vitamin G in the diets.

METHOD OF COOKING AND ARRANGEMENT OF MEALS.

The daily food of the natives varies very little and ways of cooking are limited.

Coconut enters into most dishes and is always used as *tui*, i.e. the extract obtained by washing and squeezing grated nut. The first product is a thick cream, subsequent ones are thinner, and finally the gratings are thrown away. A fairly large nut produces about $1\frac{1}{2}$ pints of *tui*, which is sufficient for cooking with $1\frac{1}{2}$ lbs. of rice. *Tui* is sometimes rendered down into oil, but ghee is preferred if it can be afforded.

Rice is prepared thus: It is slightly pounded, sifted, and washed in three lots of water. Then it is put into boiling water, or *tui* to which sufficient water has been added to absorb in the cooking. Salt is added to flavour. When the grains are nearly soft the pot is removed from the fire and cooking finished by top heat from embers heaped on top of an iron lid.

The bread of choice is baker's white bread, but several native breads are made. The commonest are (a) *Mkate wa kusukuma* or chapattie. White wheat flour is mixed to a paste with water and rolled out. Ghee is incorporated in much the same way as in making flaky pastry. It is then cooked like a pancake. *Tui* may be used for mixing; if so, ghee is not used. (b) *Mkate wa kumimina*. This is made of rice flour and yeast and baked in an earthenware pot.

BREAKFAST.—Tea is usually taken at this meal. If it can be afforded, tinned milk or fresh milk and sugar are taken with it. If food is taken in addition, white bread is most common, otherwise *mkake wa kusukuma* or gruel of millet or other flour. Dates or fresh fruit are sometimes eaten.

MIDDAY.—A dish of fish is usually prepared with one of the following: cassava, green banana, sweet potato, yam, or breadfruit. The vegetable is put into enough boiling water for it to absorb in cooking and when nearly soft, fresh fish, onion, salt, and chillies are added. Finally *tui* is poured in to make a thick sauce. Other midday dishes are *mseto*, i.e. rice and dhal boiled together with *tui*; and *kiwanda*—eggs beaten up and fried, eaten with rice and raw green leaves.

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EVENING.—At this time the main meal of the day is eaten. It consists of rice with a curry or else meat with some kind of bread.

The curry may be of fish or meat—first parboiled, then onion, tomato, lemon juice (about $\frac{1}{2}$ lemon per person), green mango or *mbirimbi* or tamarind (one per person or less), and curry powder are added with a very little water. This is cooked slowly till soft. If coconut is not used with the rice, ghee is added to the curry. Bread may be eaten with it instead of rice.

Boiled green leaves may be eaten as a third dish, but sometimes they are cooked with *tui* and onion and used as a separate relish. Other relishes are brinjal or pulses, cooked with *tui*, salt, onion, and curry powder.

Chicken is cooked in three ways—in a curry as above; fried in ghee with onions, or fried first and then cooked slowly with a sauce of *tui*, curry powder and onions.

SWEET DISHES.—These are not much liked except during the month of Ramadhan, when they are largely eaten. *Tambi*, a vermicelli, is cooked with *tui* and sugar, and many town people break their fast with it. In the shambas, sweet gruel is used.

Peas, beans, or ripe banana or pumpkin or sweet potato are made into a pudding with *tui*, sugar, and a flavouring of cardamon or cinamon.

For a feast, *pilau* is the dish of choice: made with beef, mutton, or goat's meat with much ghee and gamti rice. Bread is served with it.

Ripe fruit is eaten when and as obtainable.

CONCLUSIONS.

Further study of Zanzibar native diets is required, but from the figures presented, and remembering that there are many people both in the town and districts who cannot afford the cheapest of the diets analysed, it is probable that the consumption of animal fat and protein and also of vitamins A and B are insufficient.

REFERENCE.

- (1) Leitch, J. Neil. Dietetics in Warm Climates.

We are indebted to the Directors of Medical Services, Zanzibar and Tanganyika, for permitting the publication of this paper.