large quantity. In the meeting houses water is always taken round at [illegible]

Nature of Foods.

Fresh foods and vegetables cooked in the earth oven were very tender. There was, however, a good deal of hard food consumed, such as dried shell fish, preserved fish and preserved pigeons. *Kao* or dried cooked sweet potato was also very hard. The fern rhizome and the underground stem of the cordyline contain much fibrous material.

Chewing.

In spite of the introduction of cultivable food plants, the pre-European Maori had to do a considerable amount of chewing, much more so than the present-day European. Besides the hard foods mentioned above, he used masticatories from the milky substance of the sow-thistle, the gums of various trees and bitumen. He liked chewing. The chewing of hard and fibrous foods is shown by the marked attrition of the teeth of Maori skulls of the pre-European period. Scott[1] drew attention to the dislocation of the first molar of the upper jaw and the oblique wearing on the outer side of the tooth. This is to be seen also on the lower jaw. Professor Pickerill has noted that this dislocation is always associated with an alveolar abscess. The final factor in the dislocation would seem to be the pressure from without inwards as the fern rhizome is being chewed.[2] The length of rhizome is not cut or bitten off, but is fed in transversely between the two first molars.

Summary.

No attempt is made in this paper to give the food values of the various foods used. In most cases these have yet to be worked out in a scientific laboratory. The following facts, however, stand out.

1. The coastal regions were the most occupied because of the marine food supply. A large amount of marine food was eaten, fish, shell fish and seaweed.

2. The greater part of the shell fish supplies were eaten raw. Every part was eaten even in the haliotis and echidna. The contained liquid was drunk. Snapper and on occasion other fish and the sea crayfish were eaten raw. In the crayfish every part was eaten except the thin alimentary tract.

3. Shell fish cooked for immediate use were never cooked hard and dry. They were left on the embers until the bivalve showed the slightest opening. The contained liquid was drunk.

4. Inland tribes often came down to the sea coast to picnic on fish and shell fish. Continual barter went on for preserved fish and dried seaweed.

5. The eel was one of the staple articles of diet especially with up river tribes.

6. With pigeons, parrot, *tui* and godwit, all the internal organs including the entrails were eaten. As little as possible was wasted of any food.

7. Green vegetables as a *puha* were always sought after to add to the root and flesh foods. The two commonest, the sow-thistle and the *solanum nigrum* with their thin green leaves, give the requirements the perfect green vegetable.

8. In the earth oven, the steam was kept in by the sealing with earth. Casserole cooking is the nearest approach to it. There was no subjecting of vegetables to combined boiling in a large quantity of water which was afterwards thrown away.

8. More chewing was necessitated by the harder dried foods and the staple fern root. Between meals, masticatories were greatly in use.

10. There were two meals a day.

11. Fresh spring or stream and river water was the only beverage.

Conclusion.

On the diet described the pre-European Maori maintained a magnificent physique. He is counted amongst the tall races of the world and the muscular development of the lower limbs was second to no other race in the world. He possessed physical energy and endurance to a very high standard and he excelled in athletic exercises and in hand to hand encounters. In considering the relationship of diet to the health and physique of the Maori, the other part of the ethnological food complex must not be forgotten. The Maori procured his foods himself. He was hunter, fisherman and agriculturist in turn. He had to make his own implements. In the strenuous quest for food he was constantly in the open air. He was in constant physical training for labour and for war. These factors cannot be divorced from diet in their effect on health and physique. There is an old Maori saying against coming to hasty conclusions based on three articles of diet:

> If you drink the juice of the *tutu* whilst it is warm, you go mad.
> If you eat the kernel of the *karaka* before it is cooked, you will become paralysed.
> If you eat the flesh of the herring too quickly, you will be choked by a bone,
> For that was the fish which killed Tamarereti.

References.

(1) J. H. Scott: *Transactions of the New Zealand Institution*, 1893, Volume XXVI, page 22.
(2) P. H. Buck: *New Zealand Dental Journal*, May, 1925.

DIET AND NUTRITION IN NORTHERN MELANESIA.

By R. W. Cilento, M.D., B.S., D.T.M. and H.,
Director of Public Health, Territory of New Guinea.

There are two common but erroneous ideas concerning the island peoples of the Pacific, the first that they lead an idyllic life of ease and plenty and the second that there is a mysterious automatic doom which of necessity must overtake them in the presence of a "higher race."

As a matter of fact the "idyllic life" of the native becomes on examination a miserable and primitive struggle for existence amidst all the myriad hardships incidental to savagery, while the further one

Thus figures obtained by investigators in the Philippine Islands and elsewhere give the following food properties for this root:

Constituent.	Food.	
	Taro (whole).	*Caladium colocasia* (peeled).
Protein	1·29	1·16
Carbohydrates	33·51	39·17
Fat	0·39	0·12
Water	63·21	58·35
Ash	1·01	0·69
Fibre	1·59	0·51
Peel	10·7	..
Vitamin *A*	Very low	
Vitamin *B*	++	
Vitamin *C*	0	

From these analyses it will be seen that *taro* is definitely deficient in protein and in fat, grossly so in vitamin *A* and quite lacks vitamin *C*. The further examination of native staples serves to emphasize the same deficiencies in a greater degree in the lesser esteemed foods.

It is, of course, true and obvious that these defects are partly or wholly balanced by the inclusion of protein and edible native leaves where these can be obtained, but it is desired to stress the fact that such balance is only attained irregularly.

The most commonly diminished factor is fat and it should be expected if the experimental work of recent years is well founded, that there should be a ready field for the implantation of tuberculosis among the Melanesians. This is so.

From the *post mortem* figures of Rabaul taken from autopsies performed on all labourers dying during their term of indenture, it is found that tuberculosis kills 25% and pneumonia 24%, while 24% die from bacillary dysentery. In other words, half of those who die, die from respiratory infections and half of the remainder from bowel infection.

While these figures are not truly representative of the population in the villages, they are sufficiently significant.

It may be said that the natives of New Guinea even in their villages have medium to poor physique, lowered capacity for continued work and lowered resistance to disease, especially to respiratory and intestinal infections. In fact, they reveal precisely those conditions which accompany dietetic deficiencies, while in conclusion examination of the diets in common use demonstrates just those deficiencies which might be expected.

References.

(1) E. V. McCollum and N. Simmonds: "The Newer Knowledge of Nutrition," Second Edition.
(2) A. Castellani and A. J. Chalmers: "Manual of Tropical Medicine," Third Edition, 1919, page 107.
(3) —. McCay: *Indian Medical Gazette*, 1907, page 370; "Scientific Memoirs," Government of India, Nos. 34, 37 and 48.
(4) J. N. Fowler: "Tuberculosis in the Tropics," extracts from a paper read before the International Conference on Health Problems in Tropical America, held at Kingston, Jamaica, July 22, 1924.

THE RELATION OF GASTRIC FUNCTION TO THE CHEMICAL COMPOSITION OF THE BLOOD: A PRELIMINARY REPORT.

By FRANK L. APPERLY, M.A., M.D., D.Sc.,
Honorary Physician to St. Vincent's Hospital, Melbourne;
AND
KATHLEEN SEMMENS, B.Sc.
(*From the Macleod Laboratory, Department of Pathology, University of Melbourne.*)

A CONSIDERATION of the literature concerning the function of the stomach under normal and pathological conditions viewed in the light of our own clinical and experimental work long ago led us to suspect that the chemistry of the blood has some relationship to gastric muscle function. As this in turn seems to have a direct bearing on dyspeptic symptoms, we determined to investigate this relationship and, if present, to find how far the alteration of blood chemistry could be utilized in the treatment of certain dyspeptic conditions.

The evidence we have mentioned seems to indicate that conditions in which the sodium bicarbonate of the blood plasma is increased, are associated with increased tonus and activity of gastro-intestinal muscle. Thus, the activity and tonus of intestine are increased in dogs by the intravenous injection of sodium bicarbonate (King and Church),(1) human gastric tonus and contractions are increased during sleep and in the early morning (Carlson)(2) at which times a raised blood bicarbonate is known to be present (Luckhardt,(3) Leathes(4)) and also as the bulk of the gastric contents diminishes (Hurst and Ryle(5)) when the same condition of the blood is present. Acidity during meals, which as a rule varies directly with gastric tonus, has been shown to be high in those persons who show a high alveolar carbon dioxide before meals (Bennett and Dodds(6)) which in turn varies with blood bicarbonate. Acidity is also increased after the intensive alkali treatment of Sippy's diet (Hardt and Rivers(7)). By direct experiment it has been proved that isolated plain muscle has a higher tonus when bathed in fluids of slightly more alkaline reaction than normal plasma and a lower tonus under the opposite conditions (Underhill(8)), while the electrical excitability of muscle is increased in conditions of alkalosis in the intact animal (Morris(9)). It seems probable that the blood condition in these persons really acts by producing a slight anoxæmia (Morris(9)) with the result that the blood glucose required by muscle cannot be readily utilized (Bulatao and Carlson(10)) and that, as the condition of increased tonus is that condition in which the least oxygen consumption occurs (Evans(11)), alkalosis therefore leads to this condition of hypertonicity.

On the other hand when blood bicarbonate is diminished we have a fall in tonus of gastric and other plain muscle or clinically the symptoms thereof. All those conditions associated with hyperpnœa and therefore a lowered alveolar carbon dioxide and blood bicarbonate, such as balloon and