

THE FOOD OF THE TASMANIAN ABORIGINES.

BY FRITZ NOETLING, M.A., PH.D., ETC.

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I.—INTRODUCTORY REMARKS.

In a previous paper (1) I made a short calculation as to the quantity of shells that would collect on the refuse heaps within a given time, supposing each person consumed 50 oysters or haliotis per day. The quantity, 36 million shells per year for a population of not more than 2,000 souls, is startling; but subsequently I had my doubts whether such a small quantity, though yielding an enormous number of shells, contained sufficient nourishment to be of material use in sustaining life. A priori it seems that 50 oysters represent such a small quantity of food that this could hardly be considered sufficient, and that it must be supplemented either by other foodstuffs or that the quantity of shell fish consumed must be much larger. If only 100 instead of 50 oysters were consumed, the number of shells produced would just be double the quantity of my previous estimate: that is to say, it would cover a tract of land half-a-mile in width, 10 feet deep for 20 and 32 miles respectively in length. But even 100 oysters are not much to sustain life on, and we will see later on that the number to supply the necessary quantity of nourishment is so large that it is out of question altogether. I therefore went somewhat closer into the study of their diet, with the result that I have been able to throw some new light on the physiology of that race—a light that will greatly help us in our knowledge of primitive man on the whole.

I am greatly indebted to Dr. George Webster, who not only drew my attention to a valuable paper published by Dr. Harry Campbell on the diet of the primitive

(1) The Antiquity of Man in Tasmania, Pap. and Proceed. Roy. Soc. Tasman., 1910.

racés (1), but also gave me some literary references, which were of the greatest value to me. I wish to thank Dr. A. H. Clark for the loan of Thompson's Practical Dietetics, which was of the greatest assistance to me. In it I found all those data necessary to calculate the nutritious value of the food consumed by the Aborigines.

Ling Roth in his classical book on the Aborigines of Tasmania devotes an interesting chapter to the subject of food. His account is based on the evidence of numerous eye witnesses, and it must therefore be considered as a reliable source of information. It is certainly more explicit and accurate than Dr. Campbell's account (*l.c.* p. 40), which is not free of errors (2).

One source of information with regard to the diet of the Aborigines has not been considered yet, *viz.*, the vocabulary. It is *a priori* very probable that the vocabulary will contain the names of those substances of either animalic or vegetabilic origin that formed the staple articles of their food. Though it is pretty certain that those animals and plants with which they came in frequent contact, either in a friendly or hostile way, were also distinguished by special names, we may safely assume that chiefly those that were valuable as foodstuffs were specially named.

It will be the best plan first to record the evidence of eye witnesses, and then to see how far this agrees with the evidence of the vocabulary.

II.—EVIDENCE OF DIFFERENT PREVIOUS AUTHORS.

(Summarised from Ling Roth, *Aborigines of Tasmania*, pag. 85-97.)

All accounts agree that the chief articles of food were meat and shell fish. "The craw-fish and oysters if immediately on the coast are their principal food. Opossums

(1) The diet of the Precibiculturist, *British Medical Journal* for 1905, Vol. II., pag. 40, 208, 304, 350, 406, 665, 813, 979, 1,217, 1,658.

(2) For instance, the use of underground ovens, and they certainly made no bark canoes or rafts.

and kangaroo may be said to be their chief support" (1). Cook found they were fond of birds, and Davies (2) states that he saw a female eat sixty eggs of the sooty petrel. He also states that they collected the eggs of the black swan for food (3). The emu was apparently a particularly sought for delicacy.

Davies further states that they were very fond of a large white grub (4), found in rotten wood, and that the eggs of the large ants (5) were considered a delicacy.

So far all writers agree, but I can find only one reference (6) that they were "particularly fond of the flesh of the deadly snakes and guana."

It further seems that they never touched fish of any kind. Several writers, like Holman, Lloyd, and Melville are very emphatic on this point, and their evidence is in some way supported by the fact that no fish bones were so far found in the kitchen middens. They were, however, experts in spearing fish, and one of the few of their legends that are handed over to us describes a deadly fight between a man and the dreaded stinging ray (*Urolophus cruciatus*).

Not one of the authors quoted by Ling Roth even hints that they consumed the flesh of *Dasyuridae*, viz., *Thylacinus cynocephalus* (the so-called tiger), *Sarcophilus ursinus* (the so-called devil), *Dasyurus maculatus* (the native cat), and *Dasyurus viverrinus*. They neither consumed the *Monotremata*, viz., *Platypus* and *Echidna*.

It is undoubtedly very remarkable that even at the low state of civilisation represented by the Aborigines, human beings preferred the flesh of the herbivorous animals, and declined to eat that of the carnivorous. The

(1) Widowson, *Present State of Van Diemen's Land*, London, 1829.

(2) Davies, on the Aborigines of Van Diemen's Land, *Tasm. Journ. Nat. Science*, Vol. II., 1846.

(3) In addition to the eggs they certainly consumed birds, as proved by the numerous bones found in the Rocky Cape cave deposits.—F. N.

(4) Most probably the larvae of *Zeuzera eucalypti*.

(5) Probably *Diamma bicolor*.

(6) Melville, *Van Diemen's Land*, comprising a variety of statistical and other information, Hobart, 1833.

kangaroos, the wallaby, the wombat, and *Phalangista* (1) are all vegetabilic feeders, and certainly formed the staple articles of food. On the other hand, they apparently did not disdain insectivorous animals like *Perameles Gunnii* (the kangaroo rat). Considering that they made such a distinction in the selection of meat, and that they showed an unquestionable preference for herbivorous animals, it may be questioned whether they were really so fond of "the deadly snakes and the guana" as Melville states them to be.

With regard to the vegetabilic food, Ling Roth is certainly mistaken if he says that the edible productions abound in their island, and the error seems to have arisen out of Gunn's (2) paper and the list of "Plants that 'could' have been used for food by the original Tasmanian natives," supplied by the Government Botanist of Victoria to Brough Smyth (3). No doubt all these plants occur in Tasmania, but whether they were habitually used as food by the Aborigines seems rather doubtful (4).

All writers agree that their chief vegetabilic foods were the pith of the fern tree, the roots and young shoots of the braken fern, besides various fungi, for instance the truffle-like *Mylitta australis*; the leaves and tubers of various orchids, particularly those of *Gastrodi sessamoides*, the roots of *Geranium parviflorum*; the seeds of different acacias all these entered largely into their diet. But there is no doubt that the most common of all these vegetables obtainable all the year round were the ferns, *Cibotium Billardieri*, *Alsophila australis*, and *Pteris esculenta*.

(1) In Australia *Phalangista* is usually, but wrongly, called opossum. I need hardly to point out that it has nothing whatsoever to do with the true "opossum," which are a family of the Rapacia, of which the *Dasyuridae* are the Australian representatives, while the *Phalangista* belongs to the *Carpophagae*.

(2) Remarks on the indigenous vegetable productions of Tasmania available as food for man, *Tasman. Journ. of Nat. Science*, 1842, Vol. I., pag. 35-52.

(3) *Aborigines of Victoria*, Vol. II., pag. 394.

(4) When Dr. Campbell states that the Aborigines consumed 37 different kinds of vegetables, he probably referred to Brough Smyth's list, overlooking that this was a list of plants that "could" have been used, but not a list of plants that "were" used. Inter lineas, it may be remarked that this list comprises not less than 108 species.

I may also mention that according to Bunce (1) "the natives obtained from the cider trees (*Eucalyptus resinifera*) of the lakes a slightly saccharine liquor resembling treacle (2). At the proper season they ground holes in the tree, from which the sweet juice flowed plentifully. It was collected in a hole at the bottom near the root of the tree. . . . When allowed to remain any length of time, it ferments and settles into a coarse kind of wine or cider, rather intoxicating if drunk to excess" (3).

III.—THE EVIDENCE OF THE VOCABULARY.

I originally intended to give the native names of the animals, birds, and plants contained in the different vocabularies, but I soon found that this was unfeasible. The different vocabularies give such different names for one and the same animal that only the trained philologist will be able to ascertain which is the correct one. For instance, Norman's vocabulary gives under the heading "kangaroo" (4) the following words:—

1. terrar.
2. woolar.
3. iilar.
4. pleathenar.

(1) Bunce, *Twenty-three years' wanderings in the Australias and Tasmania*, Geelong, 1857. (Published also in Melbourne under the title *Australasian Reminiscences*, 1857.)

(2) Which, according to Milligan, was called wayalinah.

(3) I commend this fact to the notice of those who wish to reform mankind by the total prohibition of all alcoholic drinks. The craving of the human body for alcohol cannot be better illustrated than by the example of this primitive type of human beings. It does not matter in the least, whether they found out accidentally or not, that the sweet juice of a certain tree yielded, on being allowed to stand for some time, a liquor that had a peculiar effect on the system. They had discovered this fact, and they made use of it, probably to a much greater extent than we know of.

(4) The wallaby (*H. Billardieri*) is not mentioned at all in Norman's vocabulary.

Milligan quotes the following:—

	Eastern Tribes.	Southern Tribes.	N. and N.W. Tribes.
Forester Kangaroo } (<i>Macropus major</i>) }	ne-wittye	tarrana	tarraleah
Brush Kangaroo } (<i>Halmaturus</i> <i>Bennettii</i>) }	oaleetyaree-ena or lyenna	lazzah-kah	kuleah
Wallaby } (<i>Halmaturus</i> <i>Billardieri</i>) }	lukangana or lakanguna	taranna or tarra	noguoyeah or tahah

This number of names for three animals which are so easily distinguishable is formidable enough, but it gets worse when we consult the others. According to Ling Roth we have the words:—

1. lalliga (Dove, Jorgensen, Brain)
2. lemmook, male kangaroo (ditto)
3. lurgu, female kangaroo (ditto)
4. lelagia (McGeary).
5. leina (Roberts)
6. taramai (Gaimard)

all of which denote kangaroo, and the wallaby is distinguished by the words

7. tarana (Roberts)
8. tana (Dove, Jorgensen, Brain).

We have therefore 25 words for three animals!

This number can, however, be reduced to 16, because terrar, tarrana, taranna, tarra, tarana, tana, tarra-leah, tanah, as well as lalliga and lelagia and lukangana and lakanguna are unquestionably one and the same word. But we find still other difficulties quite apart from the etymological ones. According to Milligan the eastern tribes called the Great or Forester kangaroo, the largest animal of Tasmania, "newittye"; but if we peruse his vocabulary we find that "Seal (*Phoca*) on sandy beach" is called "naweetya." I do not think that anybody will dispute the fact that these two words are identical; but I also think that everybody will agree with me if I say that it is impossible that one and the same tribe called two animals

that could hardly be more different than the great kangaroo and the seal, by one and the same name. The word "naweetya" gave me, however, a clue; it is unquestionably the same word as "noattye." Now, we know that the negative is expressed by the word "noia" or "noattye," and I think it therefore very probable that Milligan's informant when questioned as to the names of these animals simply replied naweetye(a), "I do not know."

From the above list it further appears that the Aborigines, at least the southern and northern tribes, had no distinguishing names for the Great Forester kangaroo and the wallaby. Both were tara or tara-na. Now, I do not think it very probable that if they did not distinguish between these two animals whose habitat is widely different (1), they would have distinguished the Brush kangaroo, which is much closer related to the Forester, from the latter animal.

Another instance will still more emphasise the discrepancies of Milligan's vocabulary. According to it the word for fern tree is in the eastern dialect "nowarra-comminea," but the same tribe calls the small hawk (*Astur approximans*) "nowarra-nenah." I fail to discover anything in common between a fern tree and a small hawk; if both had any common quality the word "nowarra" might be accounted for; but as there could be hardly anything more different than a bird and a fern tree, the peculiar similarity of these words had first to be explained before we could accept them as correct (2).

(1) The forester inhabits the open eucalyptus forest, while the wallaby lives in the dense scrub of the valleys.

(2) There are some other remarkable anomalies. According to Milligan the southern tribes called the large owl (*Strix castanops*) "rokatah," from which the word cockatoo is unquestionably derived. The birds the Europeans call by this name were called "weeanoobryna" or "oiynoobryna" by the eastern tribes, and "nghara" or "oorah" by the southern tribes.

The popular word for *Spheniscus minor*, the penguin, is apparently derived from "teng-wynne," the word in the eastern dialect for this bird. The most curious coincidence exists, however, in the words for dog (spaniel) and gosling. The dog is "kaeeta," and the gosling "kaeeta-boena." As we know for certain that there were no indigenous dogs in Tasmania, and that the Aborigines became acquainted with this useful animal only through the Europeans, the mental process which brought a dog and a gosling together is rather a curious one.

It is to be hoped that Mr. Hermann B. Ritz, who has already done such a lot of good work in explaining the language of the Aborigines, will throw some light on these anomalies.

Till then, and till all the discrepancies are cleared, I prefer not to give the names of the animals and plants distinguished by the Aborigines, but to summarise the facts ascertained from the vocabulary.

The Aborigines distinguished by different words:—

A.—Animals.

1. Mammalia	25 species (1)
2. Reptilia	4 „
3. Amphibia	1 „
4. Aves	53 „
5. Pisces	5 „
6. Crustacea	3 „
7. Insecta	13 „ *
8. Mollusca	12 „
9. Vermes	2 „
B.—Plantae	11 „
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Total	129 „

That is to say, about 12 per cent. of the number of words enumerated in Calder's vocabulary and 15 per cent. of the words contained in Milligan's vocabulary.

We will now consider the different classes separately:

I.—MAMMALIA.

The following 25 species have been distinguished:—

1. Ant-eater	<i>Echidna setosa</i> .
2. Bandicoot	<i>Parameles obesula</i> (2)
3. Bat	<i>Vespertilio tasmaniensis</i> .
4. Native Cat	<i>Dasyurus maculatus</i> .
5. Tiger Cat	<i>Dasyurus viverrinus</i> .
6. Native Devil	<i>Sarcophilus ursinus</i> .
7. Dog	<i>Canis</i> sp. (domesticus).
8. Forester Kangaroo	<i>Macropus major</i> .
9. Brush Kangaroo	<i>Macropus Bennettii</i> .
10. Mouse	<i>Mus tasmaniensis</i> (?).
11. Kangaroo Rat	<i>Hypsoprymnus apicalis</i> .

(1) Including the imported dog.

(2) Including *P. Gunnii*.

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| 12. Black Opossum | Phalangista fuliginosa (1). |
| 13. Ring-tailed Opossum | Phalangista viverrina. |
| 14. Opossum Mouse | Phalangista nana. |
| 15. Porpoise | (?) |
| 16. Platypus | Ornithorhynchus paradoxus. |
| 17. Water Rat | Hydromys chrysogaster. |
| 18. Rat (long tailed) | (?) |
| 19. Seal (Phoca) on sandy beach | (?) |
| 20. Seal (black) on rocks | Arctocephalus lobatus. |
| 21. Seal (white-bellied) | Stenorhynchus leptoxix. |
| 22. Tasmanian Tiger | Thylacinus cynocephalus. |
| 23. Wallaby | Halmaturus Billardieri. |
| 24. Whale | (?) |
| 25. Wombat | Phascolomys wombat. |

Milligan's list of words is by no means very satisfactory, and rather carelessly compiled. We find, for instance, that the two species of *Dasyurus* occur under two different headings, viz., Cat (large native), Cat (small native), and again Native Cat (large), Native Cat (small), and the first time the *Dasyurus maculatus* is called *luyennah*, and the second time this name is given to *Dasyurus viverrinus*.

The name for mouse again occurs later on under the heading Rat, long bandicoot nose; the same applies to *Echidna setosa*, which is first referred to as "ant eater," and later on as "porcupine." The "rat" mentioned on page 39 is apparently the same as the "long-tailed rat" on page 40, and it need hardly to be mentioned that the words "dog" and "spaniel" are the same.

Though Milligan enumerates 30 names of mammals, these represent only 25 different species, as above mentioned. These 25 species, or, if we omit the whale and the porpoise, practically represent the whole of the mammalian fauna occurring in the island, a fact which proves that the mammals must have played a great role in the life of the Aborigines.

(1) Including the common or grey opossum, *Phalangista vulpina*. The grey opossum is, and probably was, much more common than the black one. If the Aborigines did not distinguish between a grey and a black opossum, is it probable that they would have given different names to the great and the brush kangaroo, which are much more alike than the black and the grey opossum?

2 & 3.—REPTILIA AND AMPHIBIA.

Only five species were distinguished, viz.:—

1. The Iguana (1) *Tiliqua nigrolutea*.
2. Another Lizard *Homolepida casuarinae* (?).
3. The Black Snake *Hoplocephalus curtus*.
4. The Diamond Snake —
5. The common Frog *Rana spec.*

This list is a meagre one, but it is hardly astonishing that we find two such dangerous reptiles as the black and the diamond snake distinguished under special names. The formidable looking, though quite harmless iguana, which is so common in Tasmania, could also not fail to escape their notice, as well as the common frog, whose native designation, rallah, is decidedly of onomatopoeic origin.

4.—AVES.

The following 53 species are enumerated by Milligan:

1. Albatross *Diomedea exulans*.
2. Bald-coot *Porphyrio melanotus*.
3. Cobbler's-awl *Acantorhynchus tenuirostris*.
4. Cockatoo (white) *Cacatua galerita*.
5. Cockatoo (black) *Calyptorhynchus funereus*.
6. Crow *Corvus coronoides*.
7. Wild Pigeon (Dove) *Phaps elegans*.
8. Wild Duck (?)
9. Eagle *Haliaeetus leucogaster*.
10. Eagle (Osprey) *Pandion leucocephalus*.
11. Eagle (wedge-tail) *Uroaetus audax*.
12. Emu *Dromaeus Diemenensis*.
13. Firetail *Estrellda bella*.
14. Gannet *Sula australis*.
15. Cape Barren Island Goose *Cereopsis nov. Hollandiae*
16. Gull *Larus pacificus*.
17. Native Hen *Tribonyx Gouldi*.
18. Hawk *Hieracidea orientalis*.
19. Small Hawk *Astur approximans*.
20. Egret *Herodia syrmatophorus*.
21. Heron *Ardea nov. Hollandiae*.
22. Honeysucker *Meliphaga australasiana*.
23. Kingfisher *Alyone Diemensis*.
24. Magpie (Shrike) *Gymnorhina organicum*.
25. Magpie (black) *Strepera fuliginosa*.
26. Mountain Duck *Anas punctata*.

(1) According to Milligan's vocabulary the eastern tribes called this animal Lyennah—that is to say, by the same name as that given to *Halmaturus Bennettii*.

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| 27. Musk Duck | <i>Biziura lobata.</i> |
| 28. Mutton Bird | <i>Puffinus tenuirostris.</i> |
| 29. Owl (large) | <i>Strix castanops.</i> |
| 30. Owl (small) | <i>Athene boobook.</i> |
| 31. Parrot (green) | <i>Platycercus flaviventris.</i> |
| 32. Parrot (rosehill) | <i>Platycercus eximius.</i> |
| 33. Parrakeet (swift) | <i>Lathamus discolor.</i> |
| 34. Parrakeet (musk) | <i>Trichoglossus concinnus.</i> |
| 35. Parrakeet | <i>Euphema chrysostome.</i> |
| 36. Pelican | <i>Pelicanus conspiculatus.</i> |
| 37. Penguin | <i>Spheniscus minor.</i> |
| 38. Pewit (wattled) | <i>Lobivanellus lobatus.</i> |
| 39. Bronzewinged Pigeon | <i>Phaps chalcoptera.</i> |
| 40. Quail | <i>Coturnix pectoralis.</i> |
| 41. Rail | <i>Rallus pectoralis.</i> |
| 42. Redbreast (Robin) | <i>Petroeca phoenicea.</i> |
| 43. Sandlark | <i>Hiaticula ruficapilla.</i> |
| 44. Black Cormorant | <i>Phalacrocorax corboides.</i> |
| 45. White-breasted Cormorant | <i>Phalacrocorax leucogaster.</i> |
| 46. Swallow | <i>Hirundo neoxena.</i> |
| 47. Swan (black) | <i>Chenopsis atrata.</i> |
| 48. Thrush (spotted) | <i>Cinclosoma punctatum.</i> |
| 49. Thrush (dense forest) | <i>Geocichla macrorhyncha.</i> |
| 50. Wattle Bird | <i>Acanthochaera inauris.</i> |
| 51. Wattle Bird (smaller) | <i>Acanthochaera mellivora.</i> |
| 52. Wren (blue headed) | <i>Malurus longicaudus.</i> |
| 53. Red Bill | <i>Haematopus fuliginosus.</i> |

As already stated it seems a large number, but if we go through the list we find that it practically contains all the more common birds of Tasmania. No doubt most of them, in particular the sea birds, supplied the eggs, and if the birds were caught they were eaten just as well, as the remains in Rocky Cape cave prove. The most important bird was, however, the emu, which formed one of the staple articles of their diet.

5.--PISCES.

Only five species are mentioned:—

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|------------------------------|---------------------------------|
| 1. Eel | <i>Anguilla australis.</i> |
| 2. Flounder | <i>Rhombsolea monopus.</i> |
| 3. Ray (Stingaree) | <i>Urolophus cruciatus.</i> |
| 4. Seahorse | <i>Hippocampus abdominalis.</i> |
| 5. Shark | Genus uncertain. |

All authors agree that fish did not form one of the articles of their diet, and it is hardly to be wondered at that only such a small number were named. It is interesting to note that the same words are used for "flounder" and the stinging ray, namely, *lerunna* (flounder) and *leranna* (ray). The last-named fish was one of those they

dreaded most, but apparently when asked the name for flounder they gave it the same name as the ray, because of the similarity in shape and its habit to rest flat on the bottom of the sea. It is somewhat astonishing that they should distinguish the hippocampus under a separate name, because this fish can hardly be considered a very prominent representative of the fauna. It is very probable that on closer examination the native word will have quite a different meaning.

6.—CRUSTACEA.

Three species are mentioned, viz. :—

1. The large Crab. *Pseudocarcinus gigas*.
2. The Crayfish *Palinurus Edwardsii*.
3. The Freshwater Lobster. . . *Astacopsis Franklinii*.

Though small, the above list is very significant. At least two, the crayfish and the fresh water lobster, were consumed, the latter being of a particular sweet taste, equal in flavour to, if not better than, the greatly appreciated *Astacus fluviatilis* of Europe. The large crab is a remarkable object, which cannot fail to attract anybody's attention. That they distinguished it by a name is therefore hardly surprising, but there is no record that they also ate it.

7.—INSECTA (1).

There are five insects mentioned, viz. :—

1. Large blue ant *Diamma bicolor*.
2. Largest venomous rat *Myrmecia pyriformis*.
3. Small black *Colobopsis Gasseri* (?).
4. Red body and black head . . *Camponotus consobrinus* (?).
5. Blow fly *Calliphora oceanicæ*.
6. Caterpillar Genus and species uncertain.
7. Flea *Pulex irritans*.
8. Locust *Chortoicetes terminifera* (?).
9. Spider Genus and species uncertain.
10. Tarantula. Genus and species uncertain.
11. Tick *Ixodes* (spec. uncertain).
12. White grub *Zeuzera eucalypti*.
13. Mole cricket. *Gryllotalpa coarctata*.

When we go through this list we will see that with a few exceptions only the names of insects are recorded that are annoying to human beings. Anybody who has been in the Tasmanian bush knows how annoying, for instance, blow flies and ticks can be.

(1) I am greatly indebted to Mr. A. Lea for the scientific determination of the somewhat vague popular words.

The number of ants distinguished is remarkably large, but we find that the native words are all combinations of the word "tietta" or "teita" with another word. Considering that the eggs of these insects were delicacies, it is hardly surprising that they distinguished such a large number. The "white grub," which was also considered a delicacy, is distinguished from the ordinary caterpillar (1).

9.—VERMES.

Only two species are distinguished, viz. :—

1. The leech
2. The common earth worm.

The first is a particularly objectionable inhabitant of the Tasmanian bush, which must have greatly worried the naked Aborigines; and the second is so common an object that it cannot fail to attract notice. It is pretty certain to assume that neither served as food.

10.—MOLLUSCA.

The last group of animals, but not the least important one, includes the names of 13 species, viz. :—

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| 1. Chiton (2) | Chiton pectolatus. |
| 2. The Mutton Fish | Haliotis tuberculata. |
| 3. The Mutton Fish | Haliotis glabra. |
| 4. The Limpet | Patella tasmania. |
| 5. Mussel | Mytilus latus. |
| 6. Aragonauta | Aragonauta nodosa |
| 7. Oyster | Ostrea edulis. |
| 8. Periwinkle (3) | (?) |
| 9. Turbo | Turbo (Marmorostoma) undulatus. |
| 10. Triton | Triton spengleri. |
| 11. Voluta | Voluta mamilla. |
| 12. Voluta | Voluta fusiformis. |
| 13. Wherry | (It is impossible to say what species was understood by this name). |

(1) I might again draw attention to another of the anomalies in Milligan's vocabulary. The ant-eater (*Echidna setosa*) is called mung-yena or moynea by the eastern tribes, and in the same dialect a grub is called mung-wenya or menia.

(2) There are several species of Chiton, but *Ch. pectolatus* is the most common.

(3) It is difficult to say what kind of gastropod was understood under this name, probably one of the larger species of *Fusus* or *Fasciolaria*.

We know that most of these species, perhaps with the exception of the Argonauta and the large Triton and Volutas, were consumed, and it is therefore hardly astonishing that they were distinguished under separate names (1).

The evidence of the vocabulary is fully borne out by the shell heaps. We find all the specimens above enumerated, in addition to a number of smaller species, which most probably were accidentally mixed with the larger kinds. The absence of the valves of the Pectines will be referred to later on.

B.—PLANTAE.

The names of 11 plants only are given, which is a very small number considering the richness of the flora (2). These are:—

1. Blanfordia nobilis.
2. The Bracken fern Pteris esculenta.
3. The Fern tree Cibotium Billardieri.
4. Wattle tree
5. Gum tree Eucalyptus spec. spec.
6. Mushroom
7. Sheoak
8. Blackwood tree.
9. Bullrush Typha.
10. Waratah Telopea truncata.
11. Acacia Acacia maritima.

The above list proves more than anything what a small role the vegetabilic kingdom played in the life of the Aborigines. It is mostly the plants they consumed as food and those that they came daily across that were named.

(1) I think, however, that a critical examination will reduce the number of names. How careless Milligan's vocabulary is sometimes compiled will be seen from the following. Pag. 30 he says:—

		East. Tribes	West. Tribes
Haliotis	{ H. tuberculata }	yawarrenah	netepah
(ear-shell)	{ H. glabra }		
and on pag. 36 we read:—			
Mutton-fish, smooth—(Haliotis)		magrannyah	lorokakka
Mutton-fish, rough—		yawarrenah	teeoonah
Now, which version is the correct one?			

(2) I mentioned above that Brough Smyth quoted on the authority of the Government Botanist of Victoria not less than 108 different species occurring in Tasmania which could be used as food.

The absence of a name for the greatly appreciated fungus, *Mylitta australis*, is rather strange, and difficult to account for. We know that up to the present day this fungus is popularly called "native bread," but I cannot find any word under that heading. There is a word for bread, "pannaboo" or "pannaboona," but as we know that bread was unknown to the Aborigines until they came in contact with the Europeans, we must either assume that this word signifies the *Mylitta australis* or, as I rather feel inclined to believe, that it is an adopted word (1).

A further omission is also remarkable: Billardiere refers to *Fucus palmatus* and *ficoides* as being favourite vegetables. No name can be found in any of the vocabularies.

All evidence tends to prove that the Aborigines existed mainly on a meat diet, consisting of the following classes:—

A.—MAMMALS.

1. Kangaroo (2 species).
2. Wallaby.
3. Opossum (3 species).
4. Wombat.
5. Seals (3 species).
6. Kangaroo rat.

It is certain that they never touched any of the carnivorous animals, though they distinguished them by names. There is also no record that they consumed the *Prototremata*, *Echidna* and *Platypus*, though both animals were well known to them.

B.—BIRDS.

Besides the emu, which probably formed one of the staple articles of food, a large number of birds were distinguished by them. Though the bones of birds are rather common in the cave deposits near Rocky Cape, in

(1) Can it be possible that it is a corrupted form of the French "pain"?

particular the sea birds, they were probably hunted less for solid food than for their eggs (1).

C.—MOLLUSCA.

1. Oyster.
2. Mutton fish (*Haliotis*).
3. Mussel.
4. Turbo.
5. Limpets.

Besides this five kinds, of which the oyster and the *Haliotis* are the most important, they apparently consumed also a number of smaller kinds, which were probably brought up together with the larger specimens. There is, however, a very strange and almost unaccountable absence of three of the most conspicuous mollusca of the present fauna, viz., the three large *Pectines* :—

Pecten asperrimus,
Pecten bifrons,
Pecten meridionalis,

the last being the now highly appreciated scallop. No names of these species appear in the vocabulary; neither have I ever found any of their valves in the shell heaps. This is particularly conspicuous in the shell heaps along the Derwent, where all these species are very common at present, while the *Ostrea* has almost disappeared. We must therefore either assume that the *Pectines* came to the Derwent after the disappearance of the Aborigines, or that the latter for some reason or other disliked this kind of mollusca (2).

D.—CRUSTACEA.

The common *Palinurus Edwardsii* of the Tasmanian coast, as well as *Astacopsis Franklinii* of the rivers, seem

(1) There is a remarkable survival of the diet of the Aborigines in the ordinary diet of the present population. *Puffinus tenuirostris*, the sooty petrel, or as it is popularly called, the "mutton bird," is a very favourite dish. To my taste it is too greasy, as it contains a large percentage of fat; but it is probably on this account that it was consumed by the Aborigines.

(2) The above is a question of greatest interest, but further investigations will have to be made before anything definite can be said.

also to have been consumed, though both apparently does not come anywhere near in importance to the other three classes.

E.—INSECTS.

The fatty, oily larva of *Zeuzera eucalypti* was when found apparently much appreciated, though it probably did not enter into the regular diet, as well as the eggs of ants.

F.—VEGETABILIC FOOD.

Their vegetabilic food was unquestionably much less varied than their animalic food, the forest of Tasmania being devoid of those kind of trees like the oak, the beech, and the hazel tree, whose nuts formed such an important part in the diet of palaeolithic man in Europe (1). Though, according to Brough Smith, 108 different kinds of edible plants occur in Tasmania, this does by no means prove that all served as food to the Aborigines. The principal plants used were—

1. *Pteris esculenta* (the common or bracken fern).
2. *Cibotium billardieri* (the common fern tree).
3. *Alsophila australis* (the rarer species of fern tree).
4. *Mylitta australis* (the so-called native bread).
5. *Fucus palmatus* (the sea wrack).
6. *Gastrodi sessamoides* (the native potato).

Besides these six species they consumed the tubers of several of the orchids; mushrooms, the seeds of several species, particularly of the *Acacia sophora* and others, which were freely eaten.

(1) How important the role these nuts played in the household of palaeolithic man must have been will be seen best if we examine their fuel value per pound. According to Langworthy the fuel value per pound of

Filbert nuts	3,432 cal.
Beech nuts	3,263 cal.
Acorns	2,718 cal.

If we consider that the fuel value per pound of beef is 1,130 cal., that of wheat flour 1,640 cal., and that of potatoes only 385 cal., the importance of the above kind of nuts in the diet of palaeolithic man is obvious, particularly if we remember that beech and oak grow abundantly in Central Europe, and that a good harvest was always certain.

The fern trees were split, and the core or pith was eaten, probably after being roasted; the young shoots of the *Pteris esculenta*, but in particular the roots, which were roasted, appear to have been their staple vegetable food. If available, the truffle-like fungus *Mylitta australis* seemed to have been greatly valued.

The other plants mentioned were probably only eaten when available, but they always could depend on a good supply of fern trees and fern roots.

IV.—THE NUTRITIOUS VALUE OF THE DIET OF THE ABORIGINES.

We will now examine the value of their diet from a physiological point of view. Unfortunately the data on which we can base our researches are very scanty. There is, as far as I know, not a single analysis made of the meat of the animals above mentioned. It is, however, probably not too far out if we assume that the meat of kangaroo or wombat (1) has somewhat the same percentage of protein, fats, and carbo-hydrates as lean beef.

According to Parkes, beefsteak contains:—

	Per Cent.
Water	74.4
Protein	20.4
Fats	3.5
Carbo-hydrates	Nil
Salts	1.6

We are somewhat better informed as to the composition of the shell fish, of which we may take the oyster as the type. According to Woodruff oysters (2) contain—

	Per Cent.
Water	87.1
Protein	6.0
Fats	1.2
Carbo-hydrates	3.7
Salts	2.0

(1) Kangaroo, in particular wombat, meat, is very dry, lean, and contains hardly any fat. Whatever its percentage of protein may be, its percentage of fats must be small.

(2) As far as I can find out oysters seem to be the only animalic food that contains carbo-hydrates, and what is more, to such an extent that they amount to nearly 66 per cent. of the protein. It is probably on account of this high percentage of carbo-hydrates that the Aborigines so eagerly consumed oysters and other shell fish, because their full value of 230 cal. per pound is amongst the lowest of all food stuffs.

Though nothing is known as to the nutritious value of emus, swans, and other eggs, we may take it that they do not differ very much from an ordinary egg, which contains—

	Per Cent.
Water	73.5
Protein	13.5
Fats	11.6
Carbo-hydrates	—
Salts	1.0

All data are wanting with regard to the vegetabilic food. Nothing is known about the percentage of carbo-hydrates in the pith of the fern tree or the root of the common fern, but we may take it that it consists mostly of woody fibre, and that the percentage of carbo-hydrates is less than that of cabbage, viz., 5.8 per cent.

As the *Mylitta australis* is a kind of truffle, the composition of this fungus should serve as a guide. It contains :

	Per Cent.
Water	72.08
Non-nitrogenous substances . .	16.45
Fat	0.62
Woody Fibre	7.92
Ash	2.21

We will further assume that the tubers of the orchids contain 10.1 per cent. of carbo-hydrates, like the onion, though this is certainly too high an estimate. It is, however, pretty certain that except in the *Mylitta australis* and other fungi, as well as the tubers of the orchid, not one of the vegetables consumed by the Aborigines contained carbo-hydrates in any appreciable quantity. We will further assume that the average person requires per day—

	Grams.
Water	2,800
Solids, viz.—	
(a) Protein	130
(b) Carbo-hydrates. . .	402
(c) Fat	84
	} 618

The actual figures vary somewhat with age and sex, as well as with the work. The maximum seems to be 824 grams., the minimum 460 grams., of solids. In order to

keep the metabolic equilibrium it seems, however, necessary that the ration of Proteids (nitrogenous food) to the non-nitrogenous food (carbo-hydrates and fats) should be 1:3.5 in the minimum and 1:4.5 in the maximum. We will now see how far the diet of the Aborigines answers the above requirements.

We will return to the original estimate, and assume that while on the coast the average consumption was 50 oysters per day per individual. The average weight per oyster may be taken at $\frac{1}{4}$ ounce, four oysters to go to the ounce; 50 oysters weigh therefore $12\frac{1}{2}$ ounces=354 grams. (1). They contain therefore—

	Grams. (2)
Water	308
Protein 21	} 45.7 solids.
Fats 4	
Carbo-hydrates. 13	
Salts 7	

In order to obtain the necessary 130 grams Protein, $6.12 \times 50 = 306$, say 300 oysters, weighing 2,166 grams.= $4\frac{3}{4}$ lbs. in the aggregate, had to be consumed. These oysters would contain—

	Grams.
Water	1,850
Protein 130.00	} 276.46 solids.
Fat 25.74	
Carbo-hydrates. 78.54	
Salts 42.48	

We therefore see that though oysters contain a remarkably high percentage of carbo-hydrates for animalic food, the deficiency of the necessary quantity is—

325 grams in the carbo-hydrates
58 grams in the fats.

If this deficiency be made good on an exclusive oyster diet, about 30 times the above quantity, viz., 1,500 oysters, weighing about 11 kilogram, that is to say more than 24 lbs., would have to be consumed per day by one individual. It is obviously absurd to assume that this was possible, but even if it were possible there would be

(1) Even this is perhaps too high an estimate.

(2) Omitting decimals.

such an excess of proteids that the rates of the nitrogenous to non-nitrogenous substances would be 1 : 0.8 instead of 1 : 3.5.

There is no doubt that no human being could exist on such a diet, and it would have either to alter it or to perish.

We can take it as pretty certain that the required quantity of protein was not solely supplied by shell fish food, even if they were plentiful. An average consumption of 300 oysters, not to speak of 1,500, per day per head would soon exhaust even the richest shell beds. We may therefore take it that the daily consumption was considerably under 300 oysters. If we take it at 50 oysters only we have seen that even this small number produces in 5,000 years such a quantity of shells as to cover a tract of land of half a mile in width and 10 miles in length 10 feet deep (1).

This number of shell fish is, however, not sufficient to sustain life, other more solid food was required. A crayfish may have often helped, but it did not materially alter the above figures, as it added only more Protein, but none of the other substances. We will assume that in addition to the oysters each person consumed 1 kilo---2.2 lbs. of meat of sorts (kangaroo, wombat, etc.). The quantity contains—

	Grams.
Water	744
Protein 205	} 240 solids.
Fats 35	
Carbo-hydrates. —	
Salts 16	

(1) In five thousand years 1,500 oysters per day per individual would form a shell heap half-a-mile in width, 10 feet deep, and 300 miles in length; or, if we were to assume that the layer was not thicker than 1 foot, the shells would cover an area of 1,500 square miles. In 100,000 years more shells would have been produced as to cover the whole island with a layer of one foot in thickness! Even if we were to take the minimum number of 50, the shells produced in 100,000 years would be sufficient to cover more than one-fifth of the present island by a layer of one foot in thickness.

If 50 oysters were daily added to the meal this quantity of food would contain—

		Grams.
Water		1,052
Protein	226	} 278 solids.
Fats	39	
Carbo-hydrates.	13	
Salts	23	

Two facts are obvious; the above quantity of food does not contain a sufficient quantity of solids to sustain life, and what there is contains Protein in excess, while the non-nitrogenous substances are insufficient altogether (1). This will be still better illustrated if we calculate the fuel value.

	Calories.
Protein, 226 gram.	= 926.6
Fats, 39 gram.	= 362.7
Carbo hydrates, 13 gram.	= 53.3
Total	<u>1,342.6</u>

According to Mrs. E. H. Richard, the ration to barely sustain life contains—

	Gram.
Protein.	75
Fats	40
Carbo hydrates	325

and is equal to 2,000 calories.

A Tasmanian who consumed 1,354 gram. of meat and oysters would therefore still be short of 857 calories in order to barely sustain life (2). How is he to make good this shortage? Another 50 oysters supply not more than 176 calories. Another kilogram of meat would supply 1,165 calories. Therefore, if he were to consume 2,708

(1) Chittenden says: To consume protein in excess of that required for the repair of the tissues is a physiological sin, the wages of which is migraine in earlier life and cardio-vascular degeneration in the later. Is it probable that the exclusive protein diet of the Aborigines is largely responsible for their rapid disappearance?

(2) The potential energy of his nutrients would still be lower than that of a sewing girl of London, who sustains life on 1,829 calories, or the factory girl of Leipzig, who does the same on 1,940 calories.

gram.—5½ lb. meat and oysters, the potential energy of his food would be equal to 2,683 calories—that is to say, about the same as that of the German soldiers on peace footing, whose fuel value represents 2,827 calories. A reference to the diet of the German soldier will, however, show that it is more judiciously composed, inasmuch as the ratio nitrogenous to non-nitrogenous is 1:4.6—5, and that it contains 641—893 gram. solids, while our Tasmanian consumes 627 grams. of solids only, and the ratio nitrogenous to non-nitrogenous substances is 1:0.23.

It is more than questionable whether the Tasmanian race could have existed on a diet of so small a potential energy as 1,342.6 calories if we consider the active life they led, particularly when their food contained such an excess of protein.

They may have, and they certainly did, supplement their diet by eggs; but considering that eggs contain 13.5 per cent. protein, this would only tend to increase the quantity of protein in a diet which is already too rich in these substances. It is true eggs contain 11.6 per cent. of fat, but this substance could comparatively easily be supplied by consuming the more fatty animals like seals, or the marrow of the bones; and, what is still more important, eggs can be obtained for about three months only out of twelve. Eggs were largely consumed when in season, but for the above reason we cannot consider them to enter into the regular all-round diet of the year.

We will now turn to the vegetabilic food, which chiefly supplies the carbo-hydrates. No analysis being available, we will assume that fern root and the pith of the fern tree contain 5.5 per cent. of carbo-hydrates,¹ the same as cabbage, though we can be pretty certain that even this is too high an estimate; therefore 1 kilogram fern root would contain 55 gram. of carbo-hydrates. Assuming their diet consisted of 1 kilo meat and 100 oysters (1), weighing in the aggregate 1,708 gram., and containing—

(1) I take this number on account of the high percentage of carbo-hydrates the oyster contains.

	Gram.
Water	1,360
Protein	247
Fat	43
Carbo-hydrates	26
Salts	30

a deficiency of 378 gram. of carbo-hydrates, omitting the fats (1), had to be made good by eating vegetables. If this were made good by eating cabbage, onions, or truffle, it would require in round figures—

Cabbage, 7 kilogram (2)=15½lb.
 Onions, 3½ kilogram=7.7lb.
 Truffles, 2 1-3 kilogram=5.0lb.

Taking even the most exaggerated view of the food value of fern root or fern pith, it would require 7 kilogram, or 15½lb. of this stuff, to supply the required quantity of carbo hydrates. No human being could digest such a quantity of vegetabilic matter, even if it did not contain such an enormous mass of wood fibres as fern roots do. Supposing they had, however, always an ample supply of *Mylitta australis* (the native bread), it would still require 2 1-3rd kilo=5.0lb., to produce the sufficient quantity of carbo hydrates, which would, by the way, contain 1,848 gram. of undigestible wood fibre.

The daily diet of the Tasmanians would therefore be approximately—

Meat, 1 to 2 kilo.
 Oysters, 354 to 708 gram.
 Fern tree root and other vegetables, 2 1-3rd to 7 kilo.

If we were to take the most favourable mixture, the total quantity of food consumed would be—

Meat, 1,000 gram.	}	4,141 gram.
Oysters, 708 gram.		
Native bread, 2,333 gram.		

If no native bread be available and fern root had to be consumed, the total quantity would be 8,679 gram.

(1) Deficiency in fat could always be made good by a supply of eggs or a small quantity of marrow.

(2) More correctly 6.871 kilogram.

I have pointed out above that too large a quantity of shell fish could not possibly be consumed, on account of the limited supply. I therefore think that 100 oysters per day are too high an estimate, and that the deficiency had to be made good by the consumption of meat.

We will therefore assume the diet consisted of—

Meat, 2,000 gram.	}	4,687 gram
Oysters, 354 gram.		
Native bread, 2,333 gram.		

This quantity would be increased by 4,667 gram. up to a total of 9,358 gram. if the vegetables consisted of fern tree only, because more than 7,000 gram. would be required of this stuff.

We have therefore the following total weight of the food consumed daily per head:—

(a) If the carbo-hydrates were chiefly supplied by the consumption of fungi—min. 4,141 gram. 9lb. max. 4,687 gram.—10lb.

(b) If the carbo-hydrates were chiefly supplied by the consumption of fern roots—min. 8,679 gram. 19lb. max. 9,354 gram.—20lb.

It may be questioned whether a human stomach could digest such enormous quantities of food, in particular the large vegetabilic portion. It is much more certain that the Aborigines did not consume anything near the quantity of vegetabilic food theoretically required.

It is therefore certain that their diet was considerably in excess of protein and greatly deficient in carbo-hydrates. There was no possible way of making good the latter deficiency, and this accounts for their voracity. They were bound to consume enormous quantities of meat and shell fish in order to get even a small supply of carbo-hydrates. They attempted to add to this by eating certain vegetables, but the percentage of carbo-hydrates in them was so small that it did not assist materially unless enormous quantities, which no human being could digest, were consumed. It is pathetic to think that the whole existence of this race was a permanent struggle to satisfy the craving of the body for carbo-hydrates, but that they were never able to provide a sufficient supply.

The above investigations have solved that problem: which so greatly puzzled the early explorers and colonists, namely, the voracity of the Aborigines on one side, and their hunger for bread, flour, or potatoes on the other. Dixon says:—"As their subsistence was precarious, their gluttony was great." Davies explains their voracity to a certain extent as Ling Roth thinks:—"They were often a long time without food, and then ate it in large quantities. . . . The enormous quantity of food which they are capable of eating, when they have an opportunity, would scarcely be credited. A native woman, at the settlement at Flinders Island, was one day watched by the officers, and seen to eat between fifty and sixty eggs of the 'sooty petrel' (*Procellaria spec.*), (1) besides a double allowance of bread. These eggs exceed those of a duck in size."

We now know that it was not lack of food that made them voracious, but its composition, which was unsuitable to sustain life if eaten in small quantities only.

We also understand now why the Aborigines were so particularly fond of bread, flour, and potatoes. One authority (O'Connor) goes in that respect as far as to say:—"The chief thing they want is bread, and they prefer getting a sack of flour by robbing a hut than to hunting opossums." All these articles of food are those that contain the carbo-hydrates, and by being particularly fond of them the Aborigines simply satisfied the unconscious craving of their body after non-nitrogenous, in particular carbo hydraceous food.

There is also another aspect of their essentially nitrogenous diet: All proteid foods are "tissue builders" or "flesh formers," while the non-nitrogenous group—the "respiratory or calorificent food"—has the function in it to furnish fuel in order to maintain animal heat. The great deficiency of the carbo-hydrates in the diet of the Tasmanians made it therefore extremely difficult for them to maintain the animal heat, and it is probable that sufficient temperature was only maintained at the expense of the muscular tissue. If this be so, there was a great waste of bodily strength, notwithstanding the enormous quantities of food they consumed, and this again must have

(1) Now called *Puffius tenuirostris*.

weakened their bodies to such an extent that they easily succumbed to any disease. The excessive protein diet did therefore not benefit the race, though it must have lasted for generations; in fact, though a tissue-builder, the protein diet made the race as a whole weaker. It is also more than probable that the insufficient quantity of fuel, which made it extremely difficult to maintain the required temperature, paralysed the activity of the brain. During my studies I have dwelt over and over again on the absolute lack of inventive genius that was displayed by the Aborigines (1). If my theory is correct—if the sluggishness of their brain is the result of the lack of carbo-hydraceous food and the excess of protein—quite a new light is thrown on the evolution of the human race. As I have shown elsewhere, the archæolithic Tasmanians must have branched off before the Strepyian stage set in. Is it possible that the great change that came over the human race of that period is due to an increased consumption of carbo-hydrates? In fact, that the protein diet of the Mesvinien was superseded by a diet in which nitrogenous and non-nitrogenous food was more suitably mixed, resulting in an increased heat of the blood, which in its turn stimulated the brain. The greater activity of the brain led to those inventions which the Tasmanian race never could make, but which revolutionised the life of human beings, that had been stagnant for millions of years? Is it probable that the Cro-Magnon race first adopted this new diet, and thereby gained that predominance which enabled it to wipe out the Neandertal race, of which the Tasmanians are only a branch? If my theory is correct, it is a great pity that we have no measurements of the body temperature of the Tasmanians, because it may perhaps have been somewhat lower than that of the Europeans.

(1) A peculiar group of tronattas, Pap. and Proceed. Royal Soc. of Tasmania, 1909. See also Noetling *Studien ueber die Technik der tasmanischen tronatta*, Archiv. f., Anthropologie Neue Folge Bd. viii., heft 3, 1909, pag. 197.