

look forward with a fatal resignation to the destiny of the final extinction of their race. They themselves say, 'As clover killed the fern, and the European dog the Maori dog, as the Maori rat was destroyed by the *pakeha* rat, so our people also will be gradually supplanted and exterminated by the Europeans.'

From Featherston in 1856 to Walsh in 1907 is half a century. The cumulative experience and study of half a century led the writers quoted above to see the Maori race facing nothing but rapid extinction. In view of the fact that these writers gathered the procurable data of their day and subjected them to careful analysis, their conclusions must be treated with respect. The Maori race should show more active signs of becoming extinct; yet in spite of the hopeless outlook expressed to von Hochstetter by the victims of the Taranaki War, the present generation refuses to comply with the picturesque but illogical simile of following the way of the vanished Maori rat and the extinct Maori dog. They do not appear to belong to the same class of mammal. The native fern does not seem to be tamely giving way to the European clover. In this respect the Maori has more in common with the flora than with the fauna.

The quick and easy death prescribed by Dr. Newman has not been availed of as he led us to expect. Sir Walter Buller's twenty-five years grace expired in 1909. The race that Archdeacon Walsh said was already potentially dead in 1907 should be literally so in 1922.

Of the five papers quoted above, four have been published in the *Transactions* of this Institute, whilst the fifth was read before the Wellington Philosophical Society. Since the last address was delivered fifteen years have elapsed. It is therefore fitting that the present condition of the Maori race should be reviewed, to see how far the sad prognosis of the past has been borne out by the facts of the present.

POPULATION. -

Cook estimated the Maori population as 100,000. As pointed out by various writers, this estimate could have been only a very rough guess, formed from the coastal tribes that he saw.

The west coast of the North Island he never explored. Northern Taranaki, from the evidence afforded by the denseness of the terraced hills, must have supported a very large population. Whakatane, the Waimana Valley, and the Tauranga district show innumerable signs of close occupation. In the Oruru Valley, in the north, the forts were so close together that they were termed *Oruru pa karangatahi* (Oruru with the forts aroused by one call). Consider the huge garrisons that must have been required to man the crater-forts near Pakaraka and Ohaeawai, in the Bay of Islands, and the many terraces extending over acres of ground in the Tamaki forts, on Mount Eden, and One Tree Hill. If the present Maori population of Orakei and the villages about Onehunga and Mangere were gathered to man the reconstructed parapets of Maunga-kiekie, how many terraces would they occupy? And yet there were other forts in this same district occupied at the same time. Furthermore, the population was not confined to the coast-line and its immediate vicinity. Occupation depended on food-supplies, and, incidentally, of course, on the ability to hold the territory producing them. The larger rivers and inland lakes produced fish in abundance in their due seasons. This supply was not confined to eels, but smaller fish, not considered by Europeans, made up for their lack of size by their quantity.

Lakes Rotorua and Taupo have no eels, yet the fresh-water fish furnished supplies throughout the year, sufficient being preserved to last between the seasons. The forests teemed with birds, which in turn had their seasons. Hence there were large tribes settled along the courses of the larger rivers, such as the Waikato, Waipa, Whanganui, Waitara, and others, whilst the larger lakes of Rotorua, Rotoiti, Taupo, and Waikaremoana supported large numbers upon their shores. As the forest is being cleared away, signs of terraced occupation are being revealed in inland parts concerning which traditional records are meagre or non-existent. Though many of these sites may have been temporary abiding-places for fishing and hunting purposes, and others again have not been continuously occupied, after making liberal allowances the signs of occupation point to the existence of a large population in pre-European days.

Some rough idea may be formed by comparing these past traces of occupation with the actual villages occupied in a district at the present time. Compare the numbers living at Orakei and Mangere with the number required to man either Maunga-kiekie (One Tree Hill) or Maungawhau (Mount Eden). This having been done, remember that there are none left to man some of the other forts that were occupied at the same time. The fighting Ngati-Tama, who manned and held the many strongholds of that stormy strip of Taranaki coast between the Mokau River and the White Cliffs, the "gateway of the west," have dwindled down to a single scattered village of barely fifty souls; yet in their day they not only withstood the ceaseless onslaughts of the great Maniapoto and Waikato tribes, but conducted victorious campaigns to the north and to the south. Some of them live in conquered country to the south, but where are the people whom they dispossessed? North and south, east and west, the same sad comparisons hold. There are stretches of coast with many magnificent *pa*, girt with fosses and rising strong and impressive with tier on tier of terraces, but with no modern villages nestling at their bases, and no living descendants of the old-time military engineers to recite the history of ancestral achievement. What proportion, then, shall we say existed in the numbers of the men of the past to the men of the present? Were they four times as many? They were at least that. Were they ten times as many? It does not seem improbable. With a present basis of 50,000 this would mean a pre-European population of from 200,000 to 500,000. We shall never know.

Whether the expressed view of some European writers that the diminution of the population had commenced before the advent of their own recent ancestors is in the nature of an excuse or not, we certainly know that the diminution was considerably accelerated after their arrival. The introduction of firearms by civilized traders altered the whole aspect of Maori warfare. What might almost be termed a manly physical exercise degenerated into killing expeditions to avenge old defeats and to acquire new territory. There were never such numbers slain of old as occurred after the acquisition of guns in the first quarter of the nineteenth century.

Archdeacon Walsh estimates that in the campaigns of Hongi Hika, Te Wherowhero, Te Waharoa, and Te Rauparaha, fully one-half of the population were killed. The introduction of epidemic and venereal diseases, and the abuse and misuse of European alcohol, foods, and clothing, all played their part in the decimation of the race. Influenced by the above causes, there was an added infant mortality. To aggravate the introduced wastage of Maori life were the unnecessary European wars of the "forties"

and "sixties." The wonder is that extinction was still being argued about in 1907.

In the following table the figures for the earlier years are estimates. The lowest ebb appears to have been reached in 1871, with another serious drop in 1896.

Table 1.—Population.

Authority.	Year.	Population.	Increase or Decrease.
Captain Cook	1769-74	100,000 (400,000)	
Nicholas	1814	150,000	
Rev. W. Williams (estimate) ..	1835	200,000 (120,000)	
Estimate	1840	114,000	
Governor Grey	1849	120,000	
Mr. McLean	1853	60,000	
Judge Fenton	1858	55,970	
Estimate	1867	38,540	
"	1871	37,520	
Colonial Government	1874	45,470	
"	1891	41,993	
"	1896	39,854	
"	1901	43,101	
Colonial Government (proper census) ..	1906	47,731	In. 4,630
"	1911	49,844	In. 2,113
"	1916	49,776	Dec. 68
"	1921	52,751	In. 2,975

Sir Walter Buller, when he made his prognosis in 1884, estimated the population at the low figure of 30,000. Twenty-five years later what should have been a remnant had reached the healthy figures of over 48,000. Archdeacon Walsh held that no reliance could be placed in the figures until the census of 1906. Here proper house-to-house visits were made by properly qualified enumerators, and the assistance of intelligent and trustworthy Maori with local knowledge was obtained. He considered that previous rises in population were due to inaccuracy of returns. He was so sure of the accuracy of the 1906 census that he further stated, in 1907, "Finality has now been reached, and the next census will show that the Maori population, instead of increasing, has been diminishing all the time, and that if the present rate of declension continues it must soon reach the vanishing-point." The next census, in 1911, taken by the same system which gained the Archdeacon's confidence, showed an increase of 2,113. The census of 1916 showed a falling-off of 68; but when it is remembered that hundreds of Maori troops were out on war service it will be seen that the decrease was not real. The next census, in 1921, showed an increase of 2,975. This increase is the more meritorious when it is remembered that, during the period it covered, the influenza epidemic of 1918 carried off over 1,000 victims. Thus, since Archdeacon Walsh said sixteen years ago that finality had been reached, there has been an actual increase of 5,020; and his vanishing-point has, we hope, been deferred for ever as far as extinction is concerned.

INCREASED PERCENTAGE OF THE YOUNG.

We are apt to think that, as the older type of Maori passes away, so the race is decreasing, and the census increase is not real. There can be no doubt that large villages, populous within the memory of people of fifty years of age, have diminished in size and population. Whilst the decrease has in some cases continued up to the present time, in a majority of cases the increase in the last twenty years has been real. Through individualization of land the communistic village life is being broken up, and settlements have a scattered and sparse appearance as compared with the past. It is only when the tribes rally to the village meeting-house for some tribal object that a real idea can be formed of the numbers that are scattered on individual holdings. The increase in the number of children is shown by the increased problem of accommodation in Native schools. The following table shows the steady increase that has been taking place in the percentage of children in the whole population :—

Table 2.—*Maori Population under Fifteen Years.*

Year.	Population.	Percentage of Total Population.
1891	14,251	34·1
1896	14,248	35·7
1901	16,082	37·3
1906	18,417	38·6
1911	19,902	40·0
1916	20,536	41·3
1921	21,071	40·0

THE STAYING OF EXTINCTION.

In the confusion that followed the clash of two cultures, the Maori of the early nineteenth century was unable to distinguish the good from the evil in the two systems.

By adopting European weapons, food, and clothing, and becoming Christianized, he himself voluntarily commenced the disintegration of his own system of culture. No neolithic people could in one or two generations adopt and assimilate European culture in its best features. The Maori was further retarded by the fact that the culture introduced by many of the early trading and whaling vessels was, to say the least of it, not of a high standard. The influence of so many escaped convicts from Australia also retarded the efforts of the early missionaries. With so much to contend against, the Māori had to pay a heavy toll of life, and it is no wonder that the serious reduction in the number of the population should have made people think that the extinction of the race was close at hand.

The present increase of the race is due to the gradual elimination of the factors that caused decay. The first great change was the cessation of intertribal warfare with European weapons. The main cause of this cessation was the acceptance of Christianity. Defeated tribes who had subsequently acquired guns and were organizing for the day of vengeance accepted the teaching of peace and good will and laid aside their arms and thoughts of revenge. It must always remain a matter for regret that this peace should have been ruptured between the pakeha and the Maori in the "forties" and the "sixties," through lack of full appreciation of more pacific ways of dealing with the warlike Maori. More lives were lost, and

progress received such a shock that in some districts the evil effects still linger.

Though the guns and tomahawks were laid aside at a fairly early period, the effects of other evils continued for a longer time. Venereal diseases that were introduced by the crews of the early traders and whalers had their dying fires revived by the soldiers of the "sixties." I have learned on reputable authority that seventeen Maori women captured by white troops at the fall of one of the Waikato forts, on their liberation spread the disease amongst their people. The disease died out after working its havoc on the fertility of the race. Any serious recrudescence that might have occurred as the effect of helping to share the "white man's burden" during the Great War has, owing to modern methods and treatment, been arrested.

Epidemic diseases that claimed so many in the past are no longer allowed to go unchecked. The prevention of disease by the organization of a special Department of Health has been of comparatively recent origin amongst the Europeans. In the benefits of such measures the Maori has shared to a material degree. The reorganization of Maori Health Councils, the appointment of Native Health Nurses and Sanitary Inspectors, and the setting-up of a Division of Maori Hygiene in the Department of Health have all had their effect in lowering the heavy mortality due to epidemic diseases. When we consider the mortality still caused by typhoid fever, we shudder to think of the days when it went unchecked, and *tangi* after *tangi*, in lamentation of the dead, spread the scourge from village to village. Medical Officers of Health and Hospital Boards keep a wary eye upon their districts, and the Maori people as a whole no longer accept disease and death with fatal resignation. In the last year or so, in districts where typhoid has occurred, over 2,000 inoculations against the disease have been made. The *Tokotoko rangi* ("Spear from heaven that sweeps away food and man"), that the ancient poet Turaukawa lamented over, no longer makes thrusts that go unparried.

Sanitation has made great advances. The simple but efficacious form of latrine that Rupe first instituted in the home of the god Rehua in the tenth heaven, copied by succeeding generations in the hill-forts of old, and abandoned with so much of good in the old culture, is being restored in its modern form in a modern environment. Water-supplies are protected, and modern systems installed. Ventilation, which as applied to communal meeting-houses was bitterly opposed twenty years ago, is now treated as a matter of course. Model by-laws are administered by Village Committees acting under the authority of Maori Health Councils. *Tangi*, *hui*, and such gatherings are conducted under sanitary rules, and avoid the disasters of the past.

Maori communal life is disintegrating. Each generation has added something of European culture, and the old order changes, giving place to new. The thatched house with earthen floor is now, because of its rarity, a thing of ethnological interest. No longer is a group of small huts clustered round a meeting-house typical of a Maori village. Individualization of land and European needs are dispersing the families to their separate holdings. In many places the tribal meeting-house stands alone, or flanked by a solitary cooking-house, patiently waiting until a death or some object of great moment shall for a brief period draw its people together beneath its sheltering roof. Visiting ethnologists have asked me to take them to some typical Maori village where they would see something of the old Maori life, but I am unable to comply. The time was when I

could send a message to the chief of the village to assemble his people in the daytime—but not now: they are too busy attending to their farms or labouring to obtain a livelihood, and cannot afford to waste a day. Meetings must be held at night, and sufficient notice must be given to inform the scattered households. Then, when the discussion is over, instead of reclining in their rugs and telling tales of ancient days till dewy morn, they pick up their belongings and depart for their homes, for the coming day has its duties. This is as it should be.

Many people express the opinion that it is a pity that the old Maori *haka* (war-dances) and *poi* dances are being lost. In the same breath they say that the Maori must work his land and live like Europeans. The two are incompatible. The *haka* and the various dances were the amusements of a people living together and spending their evenings in a communal meeting-house. The Maori is adapting himself to changed circumstances, to a changed environment. The dirge of the lament and the rhythm of the dance will disappear with the communism that brought them into life. It is a pity from the point of view of sentiment, but sentiment alone will not provide for man's material welfare.

In the changes that have been taking place, the misunderstandings about food and clothing also have gradually been dispersed. Many of the old Maori foods, that were once a necessity, are now prepared only as a luxury on special occasions. European foods, in the orthodox combinations and methods of preparation, are now the ordinary fare of every household. The once universal earth-oven is used only on special occasions. Even at some of the large gatherings, steam generated by traction-engines is used instead of the heated stones of the past. European clothing is now misunderstood by the Maori no more than by the average European.

To see old Maori men of the present day changing into pyjamas ere ensconcing themselves between clean sheets is to realize the significance of the change they have undergone on their not long, if arduous, road of modern progress. All down the changing years the things that appeared impossible to one protesting generation of Maori were advanced a step nearer by the very ones who protested, and made possible for the generation following. The Maori who fought unsuccessfully against European troops in the wars of the "sixties" saw his hopes blighted and his visions of a Maori world crumble into ruins about him. He told von Hochstetter that the Maori would become extinct like the New Zealand fauna. Hochstetter and others believed him. The Maori of the present day, who fought side by side with the descendants of his former enemies on the fields of Gallipoli, France, and Belgium, fought for the honour of a common home and the saving of the new culture which he has adopted as his own. His horizon has expanded, and he realizes even more than a goodly number of the people of England what the British Empire really means. The nightmare visions of the past have been thrown off like a frayed-flaxen cloak, and the unfettered Maori of to-day with self-reliance looks confidently forth into the future.

At the time Featherston, von Hochstetter, Newman, and Buller wrote they were probably justified in their doleful outlook. Hill enumerated various proposals, most of which have come to be adopted. The cumulative effects resulting in recovery were not so obvious to Walsh in 1907 as they are now. There was a tendency in the past to attribute the Maori decrease in population to an implied law that all dark-skinned races die out after contact with civilization. The Maori was regarded as inheriting extinction

because it was overwhelming other branches of the Polynesian race to which he belonged. Marett (6) points out that evolution is influenced by race, environment, and culture. He says: "Life evolves—that is to say, changes—by being handed on from certain forms to certain other forms, and a partial rigidity marks the process together with a partial plasticity. There is a stiffening, so to speak, that keeps the life-force, up to a point, true to its old direction, though short of that limit it is free to take a new line of its own. Race, then, stands for the stiffening in the evolutionary process. Just up to what point it goes in any given case we probably can never quite tell." It was this stiffening or partial rigidity in the evolutionary process, termed "race," that was to doom the Maori to extinction. The element of partial plasticity in the evolutionary process has not had sufficient weight attached to it as an avenue of escape for the Maori. It is this "superadded measure of plasticity, which has to be treated as something apart from the racial factor," that responds to the effects of environment and culture. As the environment has been changing, so the Maori, whilst maintaining his race, has been changing with it. To compare him with the present-day Polynesian of the tropics is unfair to the Polynesian.

Though the Maori is still of the same race, the plastic part of him has been subjected for over five centuries to a changed environment. Five centuries in a temperate climate toughened his constitution, sharpened his mentality, and altered his material culture. The islanders, with their open houses, scanty *tapa* clothing, and food without labour, were left far behind the Maori. The sea-roads to Hawaiki were closed down for ever. Warmer houses were built, weaving was invented, the cultivation of the *kumara* and the *taro* demanded more onerous care. The working of large forest-trees for buildings and canoes, the excavation of fossed and palisaded forts, and the numerous changed conditions induced by a more vigorous climate, caused him to shed the indolence of the tropics.

A more vigorous and virile people was bred, and when conditions were rudely changed with the nineteenth century the Maori was in a better condition to survive extinction than his more easy-going kinsman in Polynesia. As his material environment has changed in New Zealand, the Maori has strewn the century path with the thousands of his dead; but generation by generation the measure of plasticity has reacted little by little, until now the survivors have weathered the storm of extinction. In like manner the introduced culture has gradually been assimilated through necessity, association, and the teaching of schools. Better housing, regular work, a settled source of income, with regular meals, are resulting in an improved material environment for the family, which in turn provides a better prenatal environment for succeeding generations.

Dr. Rivers (7), in discussing the depopulation of Melanesia, assigns the greatest factor in the nearing extinction of some of these people to a psychological cause in the lack of the incentive to live. We know that the Polynesian can resign himself to die for no organic cause. The Maori in the past has been no exception. We have seen that some of the older generations, after the failure of military and religious attempts to restore the *mana* and power of the old-time regime, have prophesied early extinction, and had no hope in life. Fortunately, they produced offspring, and the healing hand of time has effaced such destructive pessimism. The Maori has a happy disposition, and his sense of humour has saved him from undue depression. In these days he has his amusements and manly

games, his hopes and aspirations, and every desire to prolong life. It was his sense of humour and his happy disposition that made him such a good soldier. He reacted less to the depressing conditions of European warfare than most of his white comrades, and there could be no greater test.

PROPORTION OF SEXES.

When the number of males exceeds the number of females to an extensive degree it is looked upon as a very important factor leading to the disappearance of a race. Newman pointed out the great preponderance of males in the Maori population, and quoted Judge Fenton's figures for 1859, and those of the census of 1881. I have reduced these figures to females per 1,000 males, and added the European figures, in the following table:—

Table 3.—Females per 1,000 Males.

Year.	Maori.	European.
1859 (Fenton)	766	..
1881	809	..
1891	832	883
1901	866	903
1906	869	887
1911	882	896
1916 (war-time census)	919	993
1921	890	959

It will be seen that since Newman's figures there has been a steady increase in the proportion of females. The 1916 census must be disregarded, as there were so many males out of the country on war-service.

From the data compiled with the kind assistance of Native-school teachers, the following result was arrived at:—

Number of Native schools	..	..	102
Number of pupils with Native blood	..	..	4,549
Females per 1,000 males	..	..	921

If we may take this as an indication of the proportion in the rising generation, it will be seen that the improvement is being steadily continued, and the menace of speedy extinction from the undue proportion of males is steadily being effaced. The change from 766 per 1,000 in 1859, to 890 in 1921, and 921 amongst the children in 1922, is one that is of the greatest importance.

ABSORPTION OF THE RACE.

Though we have pointed out that the theory of rapid extinction has been disproved by the increasing population shown by the latest census returns, it does not follow that the Maori will continue to exist as a distinct race for an indefinite period. The anthropological study of races teaches us that where a people survive extinction and at the same time are not able to maintain a certain amount of isolation they become merged in the general population. Dr. E. B. Tyler, in speaking of the unity of mankind, says, "All human races, no matter form or colour, appear capable of intermarrying and forming crossed races." In historic times, mixture of race is the rule, whilst racial purity is the exception. In no part of the world has the anthropological method of following up certain physical features, such as head-form, hair- and eye-colour, and stature, been used to disentangle the confusion of race-mixture with such

success as in Great Britain and France. The ancestors of the white New-Zealanders were the result of the blending in Britain of a number of ethnic waves, commencing with the long-headed cave-dwellers, whose implements have been found in the river-drift of the late glacial epoch, and ending with the last of the Teutonic series in the recent Norman Conquest. The ancestry of the brown New-Zealanders is still exciting inquiry, but we have been assured that Caucasian and Mongoloid blood entered into it in far-off Asia, and that Negroid and Melanesian elements contributed very slightly during the colonization of the Pacific. Another intermixture should not matter much to either side, since each was long ago deprived of any pretensions to purity of race.

We have not sufficient data to show completely what has taken place with regard to assimilation, but we respectfully submit a few facts for consideration, with the hope that they may be amplified later.

DENSITY OF THE MAORI POPULATION.

By its own natural increase the larger European population (1,218,913, as against 52,751 Maori in 1921) is every year rendering the proportion of the Maori population less and less in the total population of the country. The following table shows that the number of Europeans to one Maori has been steadily increasing in spite of the fact that the Maori population has also been increasing :—

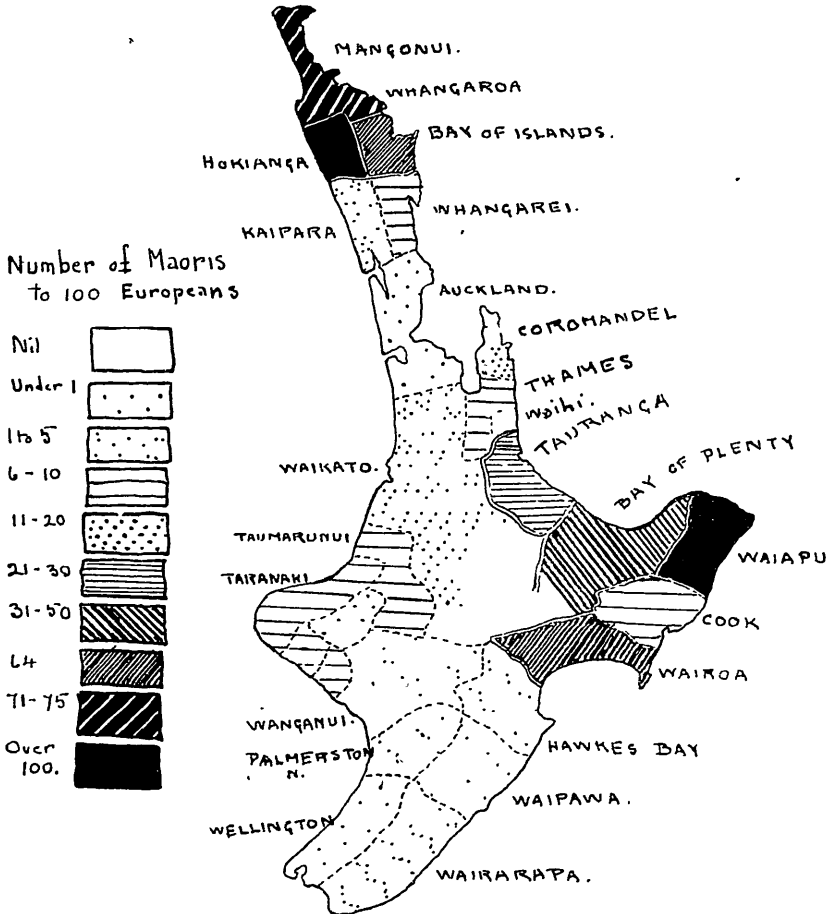
Table 4.—Ratio of Maori to European.

Year.	Number of Europeans to One Maori.		
1891	..	..	14.9
1896	..	..	17.6
1901	..	..	17.9
1906	..	..	18.6
1911	..	..	20.2
1916	..	..	22.0
1921	..	..	23.6

The proportion of 23.6 Europeans to 1 Maori, or 4.2 Maoris for every 100 Europeans, is the ratio for the total population of both Islands.

The density of the Maori population in particular districts, however, varies considerably. This is clearly shown in the accompanying map. The population of Maoris and Europeans was taken for each hospital district, and the number of Maoris to 100 Europeans shown for each area. The boundaries may not be quite accurate in every particular, but they serve to convey a general idea. The outstanding feature is that there are two areas of dense population, one in the north and one in the east. In the black area of Hokianga, on the west side of the northern area, there are more Maoris than Europeans. To the north and north-east of it lie Mangonui and Whangaroa, with 71 and 74 respectively to the 100 Europeans. To the east lies the Bay of Islands with 64. Though these parts have probably always carried a large Maori population owing to the climate suiting the cultivation of the *kumara*, its present high ratio was further assisted by lesser European settlement. Though containing the oldest European settlements, the area contained so much poor gum-lands unsuitable for closer settlement that European settlers went elsewhere. The Maoris naturally hold the fertile valleys; and except for timber, gum, and trading there was not so much inducement for white occupation. With the opening-up of some of the land, and better travelling facilities,

the European population is increasing, and in the future we may see the shading of this area becoming lighter. This density of population has in the past been protected by the isolation the area enjoyed on account of bad roads and comparatively poor country. Passing south, we encounter larger towns at Whangarei and Dargaville, with larger white populations, thus further reducing the Maori density to 8 and 12.4 respectively. In the Auckland district, in spite of a fairly large Maori population of 1,733, the huge white population reduces the density to less than 1. Owing to



Map of North Island, showing density of Maoris to Europeans, in hospital districts.

prosperous European settlements, the Waikato district, though containing 9,234 Maoris, has its density reduced to 11.9 when spread over its very large area.

Turning to the other dense area, in the east, we find that it also has enjoyed isolation in the past. Owing to bad roads, land-buyers of the early days sought holdings in more accessible places. During those days of isolation the Ngati-Porou Tribe, of Waiapu, learned sheep-farming, and are working their lands themselves. Knowing how to utilize their lands, they now refuse to provide the opportunity for excessive European

penetration. Their material prosperity is no doubt having its effect in increasing the population, which for Waiapu is 3,643. East of Waiapu we have the Bay of Plenty, with a fairly dense population owing to conditions being congenial to the Maori, and lack of roads retarding European settlement. Tauranga, farther east, owing to old European settlement, shades off to 27. Below Waiapu we have the comparatively large town of Gisborne reducing the density of the Cook County to 9·7, but farther on Wairoa rises to 64. Wairoa has in the past suffered a certain amount of isolation from bad roads and an uncertain port, whilst the Maori in the district have always been strong. From now on we reach country easily accessible and early acquirable, and so we pass through Hawke's Bay, Waipawa, and Wairarapa, with densities of 3·6, 2·7, and 2·4 respectively. On the west coast from Taranaki to Wellington the same conditions hold, owing to early settlement, early acquisition of Maori land, roads and railways, large towns, and the continuous decrease in the density of the Maori population of the area. If smaller parts of the areas were taken, such as the Wanganui River and Lake Taupo, a slightly different arrangement of shading would be shown in those particular parts.

For the South Island, Picton and Wairau, with 6 and 1·6 respectively, are the only districts with a density not below 1. For the whole of the South Island there are 4 Maoris to 1,000 Europeans. In two Hospital Board districts there are 4 to 10,000 whites, and in three districts there are none at all.

When the density falls very low, the opportunities for assimilation by intermarriage are increased.

MISCEGENATION.

Intermixture between the two races has been going on from the earliest days of colonization. Newman held that half-castes were a feeble race, tending rapidly to extinction, and with no improved fertility. He produced no data to support his statement. I doubt its applicability at the present time, but hope to acquire further data on the subject. In the United States Boas found that in half-breed women the fertility was considerably larger than among full-blooded women. At the present time there is, in the accredited Maori population, a larger percentage with mixed blood than we are apt to think. In the census returns half-castes living as Maoris are counted with the Maori population, and those living as Europeans are correspondingly counted with the European. It would be interesting to know what are the exact boundaries of the two modes of living. In lieu of the 1921 census, if we take the 1916 census and add the European half-castes to it and then work out the percentage of the total half-castes to the full Maori population, we get 6,750 half-castes, or 12·7 per cent. Thus we know definitely that 12·7 per cent. of the 1916 population had European blood in their veins. But this is not the full measure of intermixture, for the children of half-castes with Maori and other combinations are counted as Maori in the census. It would be interesting to know what percentage of the 52,751 in the last census had white blood. Of 814 men of the Maori Battalion examined by me in 1919, 48 per cent. had white blood. Of 4,039 pupils from 94 Native schools the following results were obtained:—

Race.	Number.	Percentage.
Full Maori	2,016	49·9
Maori with white blood	2,023	50·1
	4,039	100·0

These results would indicate that a considerable amount of miscegenation exists. With the increasing dilution of the Maori in so many districts, and improved material welfare and education making both sexes more attractive, miscegenation is likely to increase. Every person of mixed blood marrying a full-blooded Maori adds further to the process of gradual assimilation or absorption. The full Maoris are constantly having their ranks depleted by marriages, not only with full Europeans but with Maoris of mixed blood. The question is whether the full Maoris are reproducing enough to make up for the wastage from their ranks by death and marriage. To keep up their numbers they must, of course, marry full Maoris themselves. Every full Maori who marries any one not of full blood like himself has deliberately stepped outside the narrowing confines of the full-bloods, and the more children he begets the more he is assisting in changing the full Maori into another type.

An idea prevails that the full Maori is really decreasing in this manner, and it is the mixed part of the Maori population that is causing the increase in the census returns. A very significant fact was brought to light by the returns kindly sent me by the Native-school teachers. In the proportion of sexes already dealt with the return for over 4,000 children of full and mixed blood was 921 females per 1,000 males. Returns for 1,159 children of the same series enumerated the sexes in each class from full blood to the various fractions of mixed blood. From them I give the following :—

Race.		Males.	Females.	Number of Females per 1,000 Males.
Full Maori ..	..	318	238	748
Mixed blood ..	..	313	290	926

The numbers are too small, but the hint is so important that I give them. If in the improved condition of the total Maori population the improvement augured by the increase in the proportion of males applies only to the mixed-blood element, whilst with the full Maori it is falling, as hinted at by the figures 748 per 1,000, then the full Maori will disappear more quickly than we imagined. However, there is need of research work here. The only scientific method to apply is to subject as many settlements as possible to investigation by the genealogical method. Every family should be traced back genealogically until full blood is arrived at on both sides. Thus the amount of miscegenation could be arrived at, and light thrown on various other important matters.

In conclusion, I have to thank the Native-school teachers for sending me returns from their schools showing the proportion of sexes and the amount of mixed blood amongst their pupils. Available data from the census returns has been used to show that the rapid rate of decrease that occurred in the early half of the nineteenth century has ceased, and that the pendulum has begun to swing in the other direction.

The large pre-European population will never be regained by the full-blooded race, but the steady increase of the last twenty years shows there is something in the old tribal proverb, "We will never be lost, for we spring from the Sacred Seed which was sown from Rangiatea."

Miscegenation has stepped in, as it has all down the ages, and will render the assimilation of culture and physical features the stepping-stone to the evolution of a future type of New-Zealander in which we hope the best features of the Maori race will be perpetuated for ever.

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The Food Values of New Zealand Fish: Parts 3 and 4.

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PART 3: SOME CALORIMETRIC ESTIMATIONS.

THIS paper continues the series begun by Mrs. D. E. Johnson (*Trans. N.Z. Inst.*, vol. 52, 1920, pp. 20-26, and vol. 53, 1921, pp. 472-83), and many of the estimations were made on dried-fish powders that had been prepared and analysed by her.

METHODS.

The form of calorimeter employed was the Berthelot-Mahler. The combustion was done in compressed oxygen (25 atmospheres), and the rise in temperature was taken with a Beckmann thermometer graduated in $1/100^{\circ}$ C. and read with a lens to $1/500^{\circ}$. The quantity of water used, including the water-equivalent of the bomb, &c., was 2,500 grammes, and our results with substances of known caloric value indicated an experimental error of less than 1 per cent.

Since it was necessary to extract the "fat" with solvents that are themselves combustible, we considered it advisable to test our methods in this way: in several powders we determined the caloric value of the whole, and then the caloric values of the extracted fat and of the residue separately. By comparison we found that no appreciable change, such as absorption of the solvent by the fat or residue, had occurred during the manipulations.

Example: In a dried-fish powder (proper 5—see Table I) we found by analysis 19.50 per cent. fat (= ether-soluble substance), 6.52 per cent. extractives, and a residue, chiefly protein and salts = 74.0 per cent. The caloric value of the fat was found to be 8.6 calories per gramme, of the extractives 5.3, and of the residue 5.6. On calculating the caloric value of the powder from these data we get the figure 6.159 calories per gramme, while the direct estimation of the caloric value of the powder gave 6.165.

FAT.

The ethereal extract of the dry-fish powder was used, since that is usually reckoned as fat in the analysis of foodstuffs. The following values were obtained :—

TABLE I.

Fish.	No.	Caloric Value of Fat per Gramme.	Remarks.
Kingfish (haku ; <i>Seriola lalandii</i>)	1	8.706 calories.. 8.822 8.805 (average)	Fat extracted from dried-fish powder.
Kingfish ..	2	8.857	Same.
Groper (hapuku ; <i>Oligorus gigas</i>)	5	8.670 8.678 8.674 (average)	Same.
Groper ..	X	9.059 9.045 9.052 (average)	Fat extracted from alcohol-dried fish, low temperature ; old.
Groper ..	Y	9.842	Same, but fresh.

These results indicate that during the drying of the fish (but probably in greater degree during its storage)—exposed to the light and to a certain amount of air—some oxidation occurs, sufficient to reduce the caloric value from 9.8 to 8.6. It would be interesting to find out how much depreciation of the fuel-value occurs in the cooking of fish, and how fish-fats compare with other fats in this respect.

UNSAAPONIFIABLE MATTER.

When the ethereal extract of fish is saponified with alcoholic potash, a certain amount of fatty material, soluble in ether, remains unattacked. This consists of cholesterol and other alcohols which replace the glycerol of the ordinary fats. We have reason to believe that little, if any, of this unsaponifiable matter is digested or absorbed in the human alimentary tract, and the caloric value of this part of the fat should therefore be subtracted in order to arrive at the true or utilizable fuel-value of the ethereal extract. In the specimen of groper-fat X in Table I the caloric value of the unsaponifiable material was found to be 10.4 calories. In quantity it amounted to about 10 per cent. of the fat, so that while the total fuel-value of the fat was 9.05 calories the true value was only 8.01.

These two considerations—viz., depreciated value on heating and drying, and the presence of a relatively large amount of unsaponifiable matter—both tend to reduce the standard figure (9.1) for caloric value of fat. When applied to fish-fats our estimations indicate a net value not above 8.0 calories per gramme.

EXTRACTIVES.

In a weak alcoholic extract of the dried-fish powder we obtained a caloric value of 5.3 per gramme. The figure usually given for caloric