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DESCRIPTION OF CRANIAL REMAINS FROM
WHANGAREI, NEW ZEALAND.

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(Plates xxxii.-xxxiii.)

In February, 1910, Mr. W. M. Fraser, County Engineer of Whangarei, New Zealand, wrote to me that he was forwarding a box containing the upper part of two human skulls. He said that until about two years ago these remains had been hermetically-sealed under fifty feet of decomposed sand for not less than seven hundred or one thousand years, judging by the nature and formation of the country, and that the bone marked "A" was found on a lower level than the one marked "B." The box contained two packages. In one were two pieces of bone marked "A"; in the other there were five or six pieces marked "B."

I first cemented together the parts marked "A," and examined them. They formed the whole of a frontal bone and part of the parietals. After an extensive examination of the fragments and a comparison with other skulls of various races I made a summary of the facts and inferences.

After I had pieced together the fragments marked "B" I found that they and those marked "A" all belonged to the same skull. The amount of skull present made it possible for one to make a far greater number of measurements for comparison, and gave a fairly accurate idea of its peculiarities (Pl. xxxii., fig. 1).

Although the bones have the appearance of having been exposed to the weather, the lines defining the boundaries or attachments of muscles are fairly well marked. From this fact and from certain other appearances one infers that it is the skull of a full-grown subject, in all probability a male. There is no appearance of disease nor any sign of artificial deformity produced either during life or after death.

One striking feature is the thickness of the bones. In some parts the frontal bone measures 16mm. in thickness, and the

parietals in places are little if anything less. The thickening is also pronounced in the region of the asterion and the occipital protuberance. The spongy bone is well marked between the outer and the inner tables.

In a view from above the cranium is seen to be elongated, and were it not for the fairly well marked parietal eminences it would be properly termed oblong-looking. The frontal portion is unusually long, smooth, and rounded. It has the frontal eminences distinctly marked. There is no trace of a metopic suture. There is a flattened lozenge-shaped area above the glabella. From the upper part of this to the bregma there is a slight ridge. Behind this the cranium is distinctly scaphocephalic in form, with marked flattening on the left side and still more marked flattening on the right between the bregma and the parietal eminence, and this is associated with an increase, on the right side, in the distance between the sagittal suture and the parietal eminence (Pl. xxxii., fig. 2). The median ridge gives the skull a distinctly pentagonal outline when viewed from behind (Pl. xxxii., fig. 3). The temporal ridge of the frontal bone, about midway in its course backwards, divides into an upper and a lower limb. The upper limbs on each side run high up on the vault and at a point about 1cm. behind the bregma are within 68mm. of each other. Each passes backwards well up on the parietal eminence and strikes the lambdoid suture about midway between the lambda and the asterion. On the parietals these superior lines are markedly double, the distance between the component parts being about 1cm. The superior curved lines of the occipital bone form a large raised crescentic mass. This does not appear to be caused by any diseased condition. Unfortunately the lower portion of the occipital, forming the posterior boundary of the foramen magnum, is imperfect. Probably about 14mm. of the arc is wanting.

The coronal suture is simple from the bregma as far as the stephanion on each side. Beyond this it is obliterated. The sagittal suture has been dentated in character, but is nearly obliterated except at its posterior portion. The lambdoid suture is well marked and dentated or serrated. There is no appearance of pathological synostosis.

There is one parietal foramen: it is on the right side. Below the superior curved lines of the occipital there is one foramen in the middle line, and there are two foramina, a right and a left, below this.

A view from below shows that the sutures on the inner table are all obliterated. The depressions for the blood vessels are fairly large and correspond in distribution with those seen in the

higher races. The lateral sinuses of the occipital bone are at the same level as the superior curved lines. The frontal crest begins half-way down the bone and as it passes downwards it becomes a very prominent ridge.

An examination of the eyebrow region (Pl. xxxii., fig. 4) shows that the internal third of the supra orbital margin on each side is much rounded, and is coalesced with the superciliary eminence; the external two-thirds is sharper, but still comes within the category of "rounded" as orbital margins go. On the right side there is a notch for the supra orbital nerve, on the left a foramen; and from these a groove or depression passes obliquely upwards and outwards on each side, separating the superciliary eminence from the trigonum supraorbitale. The trigonum is not so flattened as in modern peoples but has the rounded appearance often seen in the Australian aboriginal and some other races. The superciliary eminences are distinctly marked on each side and are continuous with the glabella. The conditions in this region conform with Cunningham's type II, which is very common in the Australian aboriginal and is the form that exists in the skull of *Pithecanthropus*.

The frontal sinuses are fairly large (Pl. xxxii., fig. 5). It has to be noted that the front and back walls of these sinuses are both thick as contrasted with the condition found in many Australian aboriginal skulls, in which the posterior wall is very thin while the anterior wall is much thickened to form a very large portion of the projecting glabella and the superciliary ridges. The notch at the root of the nose is shallow as contrasted with the deep indentation which is almost universal in the aboriginal. This character in the Australian, however, as appears from a variety of considerations, is not a primitive one; nor is its associated feature, viz., the great projection of the glabella.

One other character demands attention. A horizontal line drawn through the nasion shows a relatively large part of the orbits above it, and these portions of the orbits are rounded in form—the right more so than the left. This, together with the characters already mentioned, forms an assemblage of primitive characters in the eyebrow region of this skull.

It may be well at this point to give some details regarding the curve of the front bone.

For purposes of comparison, I have tabulated (see Table I) certain measurements of this skull along with those of two Moriori skulls in my possession, four Maori and one Fijian skull in the South Australian Museum, which the Director, Professor E. C. Stirling, kindly allowed me to examine, and a New Cale-

donian skull in my collection exhibiting mixed Polynesian characters described by Professor David Waterston.

The table shows that the frontal curve angle, 134° , is less open (that is, the curvature is greater) than in the two Moriori skulls and than in the average of all the Maori skulls, 134.75° . This means that the actual forehead portion is more rounded, less flattened, than among the Morioris and Maoris. The following figures from Cunningham will show how the frontal curvature compares with skulls of Australian aboriginals. In eight males from Victoria the figures for the angles were 134° , 136° , 133° , 133° , 130° , 131.5° , 133.5° and 133° , giving a mean of 133° . In five females from Victoria the figures were 130° , 132° , 131° , 133° and 126° , giving a mean of 130.4° . In ten males from Queensland the mean was 133° , the extremes being 127.5° and 146° . In two females from Queensland the figures were 125° and 140° . In one South Australian skull the angle was 141° , in a Central Australian 141° , and in a skull from New South Wales also 141° . I measured two aboriginal skulls—almost the first that came to hand, and I find that one gives an angle of 127° and the other an angle of 146° —almost the extremes of roundness and flatness.

Cunningham is inclined to place more reliance on the results yielded by the index of the frontal curve than on the angle of the curve. This index in the Whangarei Skull is larger (*i.e.*, the curving of the bone is greater) than in the two Moriori and the four Maori, and much the same as in the Australian where the means of indices given in Cunningham are 22.4, 23.9, 21.4, 23.3 and the indices of single skulls are 17.3, 18.4 and 18.2. In seven Scottish crania (six male and one female) the figures were 20.2, 26.2, 22.1, 25.4, 23.8, 25.2 and 21.7, giving a mean of 23.7.

It may be said that the Whangarei Skull in respect to the curving of the frontal bone, comes within the limits of the Australian which are very wide, corresponds with what is found in some Maoris, Fijians and New Caledonians, and does not differ greatly from what may be found in individuals belonging to white races.

Before I had discovered that all the fragments sent to me belonged to one skull, I had made a somewhat extensive inquiry into the occurrence of frontal bones having a longitudinal arc as large as this one. From a consideration of the measurements made of Australian and South Seas skulls by Turner, Scott Waterston, Duckworth, Klaatsch and others, and of Barnard Davis's descriptions of skulls of Ancient Britons, aboriginal Swedes and Danes, Ancient Romans, Anglo-Saxons, Scandinavians and Romano-Britons, it appears that frontal bones with a longitudinal arc of 136mm. or over have usually small trans-

verse diameters and belong to skulls that are very long, very narrow, of great cubic capacity and not infrequently of great thickness.

For the purposes of comparison several important absolute measurements can be made on the skull and also some approximate ones. These are tabulated (see Table II) along with those I have made of the skulls already mentioned and a South Australian skull in the Stuttgart Museum described by Klaatsch.

The chief feature of the skull is its great length both absolutely and relatively to its breadth. It is in a very high degree dolichocephalic, its cephalic index being only 67. The height, unfortunately, can only be estimated comparatively and approximately. When Moriori "B" and Whangarei are placed with the occipital bone resting on a table and the nasion in each case at the same height above the table the top of Whangarei skull stands 2cm. above the top of the Moriori skull. This would give a basi-bregmatic height of 148mm. This estimate can be checked by comparison with other skulls through approximate determination of the nasion point in various ways. The skull therefore is remarkable for its height as well as its length, the height also being greater than the breadth. From the measurements thus obtained one would estimate, by Topinard's formula modified by Manouvrier, the capacity of this skull at about 1,600cc., allowing for thickness and other peculiarities.

In order to facilitate comparison of the brain-containing portion of this Whangarei skull with the corresponding cavity of the two Moriori, four Maori skulls, the Fijian and the Stuttgart South Australian skull, I have made tracings with what rough appliances were ready to my hand and have set forth the measurements in Table III. The tracings of this skull (fig. 52), and the measurements are made in such a way as to allow them to be compared with Klaatsch's. An examination of the figures will show that the part of the skull that lodges the brain is very capacious, even after all allowances are made for thickness of the bones and for the projecting mass at the inion, and for the small transverse diameters. The Stuttgart South Australian skull, which is the longest in Klaatsch's list is practically of the same length as the Whangarei skull but is considerably less in the height of its cranial portion, had a capacity of 1,450 cubic centimetres.

In view of recent researches and speculations regarding the value to be attached to certain characters as primitive features, some remarks are necessary regarding other measurements of the Whangarei skull.

height of the bregma is 49.7, and the index of the height of the vertex is 56; but in connection with these somewhat low figures the great length of the glabello-inion line has to be taken into account.

Scott's records shows that of seventy-six Maori skulls measured by him 43.4 per cent. were dolichocephalic. Three had cephalic indices under 70, viz., 69.9, 69.6, and 69.1. None were so low as in this Whangarei skull. The vertical indices of those three were 72, 68 and 70.1 respectively. In none of the three was the absolute height so great—being 134, 132 and 136mm. respectively. Investigations by Flower and Turner bear out Scott's figures regarding Maoris. The vertical index of the Whangarei skull is probably 77.4, much higher than the average of the Auckland skulls measured by Scott and of the Whangarei skulls measured by Flower, although within the range found in other Maori skulls possessing a higher cephalic index.

The vault corresponds generally with what is not unusual in Maori skulls, being rafter-shaped with a median ridge and showing a flattening of the parietal region between the ridge and the eminences, giving the skull, as has been noted, a pentagonal outline when viewed from behind. The sutures have the same characters as are found in Maori skulls, and the temporal ridges also run above the parietal eminences.

Of a total of fifty Moriori skulls examined by Scott and Duckworth, nine (*i.e.*, eighteen per cent.) are dolichocephalic. Maori skulls show about forty-three per cent. of dolichocephalic specimens. Scott found no Moriori skull with a cephalic index below 70; and among ten Cambridge specimens described by Duckworth the lowest was 73.1. In respect to this index and also to the great height compared with the width, the Whangarei skull differs greatly from the Moriori, although in some features there may be a resemblance.

One would certainly not expect to find such a skull as the Whangarei one among Morioris, and although it might possibly occur among Maoris its appearance would be somewhat phenomenal even in that race notwithstanding the mixed racial characters of the Maoris.

One must search elsewhere in order to find a race in which the members usually possess the cranial character exhibited by the Whangarei skull, viz., strongly dolichocephalic, with a high vertical index, the height being greater than the breadth, the cranial vault roof-shaped, the glabella and superciliary ridges fairly marked and the root of the nose not greatly depressed. Skulls with these characters well marked in the majority of the indivi-

duals have been described by Turner from the south and east of New Guinea, by the same writer from the Admiralty Islands, from the interior of Fiji by Turner and by Flower, and from New Caledonia by Turner and by Waterston. They have also been recorded from the Loyalty Islands. Recently by the courtesy of the Trustees of the Australian Museum in Sydney, I had the privilege of examining a collection of skulls from various parts of the South Seas, and in it I found a skull from Epi in the New Hebrides corresponding closely to this type (Pl. xxxiii.). Its measurements are given in the tables.

It has to be remembered that among the Sandwich Islanders, a distinctly Polynesian race, there is a dolichocephalic type as well as a brachycephalic type; but among the dolichocephalic specimens recorded by Turner the lowest cephalic index is 71—in fact the index is strangely constant, since in fifteen skulls it ranges from 71 to 74. This bears out the statement which is being found true in so many instances that in every primitive race one finds a dolichocephalic and a brachycephalic element co-existing. It will be apparent that there is little resemblance between the Whangarei skull and these Hawaiian specimens.

The Whangarei skull, in its resemblance to specimens from parts of New Guinea, the Admiralty Islands, the interior of Fiji, New Caledonia, the Loyalty Islands and the New Hebrides, is distinctly Melanesian, differing in this respect from the Polynesian type of Maoris and Morioris even when the mixed characters of these two races is taken into account.

Some reference is required to the relative length of the frontal and parietal arcs. So far as I can find, in the vast majority of skulls of Melanesians of pure race the parietal arc is longer than the frontal; but it sometimes occurs that the frontal is the longer, as is the case in the Whangarei skull.

One must admit the possibility of a "freak specimen" in any race; but if one were asked to classify the Whangarei skull from a consideration of its most obvious characters and without the knowledge that it was found in New Zealand one would almost certainly class it as the skull of a Melanesian, and would describe it as possessing certain well-marked primitive racial characters.

There is some evidence in support of the theory that the Melanesian or Negrito element, at a time prior to the Polynesian (Indonesian or Caucasian) emigration, spread over the whole of the South Seas. If any further remains resembling the Whangarei skull were found in New Zealand there would be fairly strong evidence that the members of the Melanesian race had reached that land if they had not actually peopled it.

Table I.

Dimensions.	Whan-garei.	Moriari.		Maori.					Fijian.	New Caledonian	Epi.
		"A."	"B."	1	2	3	4	Mean.			
Frontal longitudinal arc	136	120	118	121	123	123	124	122.75	132	131	125
Nasio-bregmatic distance	119	111	109	110	112	108	111	110.25	116	—	115
Index of frontal curve	21	20.7	18.3	18.1	21.4	21.3	21.6	20.6	21.5	—	16
Frontal curvature angle-degrees.	134	136	138	140	134	132	133	134.75	135	—	146
Stephanic diameter.....	100	102	106	114	103	100	98	103.75	101	104	93
Greatest breadth	128	131	144	134	135	133	130	133	128	130	120
Minimum frontal diameter	91	93	94	94	92	92	91	92.25	101	90	85
Frontal index	71	70.9	65.2	70.1	68.1	69.1	70	69.3	78.9	69.2	70.8

Table II.

Measurements.	Whan-garei.	Moriari.		Maori.				Fijian.	New Caledonian	South Australian (Stuttgart)	Epi.
		"A."	"B."	1	2	3	4				
Capacity	—	—	—	—	—	—	—	—	1,300	1,450	—
Glabello-occipital length	191	184	182	183	186	160	175	183	193	192	190
Minimum frontal width	91	93	94	95	92	93	90	89	90	93	85
Stephanic breadth	100	102	106	114	103	100	98	97	104	—	93
Asterionic breadth	105	116	106	103	102	108	105	99	107	—	119
Greatest width	128	130	142	133	130	134	130	128	130	130	120
Cephalic index	67	70·6	78	76·2	69·8	83·7	74·2	69·9	67	67·7	63·1
Horizontal circumference	513	510	505	500	504	480	490	496	525	538	513
Frontal arc	136	120	118	121	123	123	124	128	131	134	125
Parietal arc	133	116	120	120	125	110	115	130	147	125	143
Occipital arc	111	124	120	117	112	102	116	101	128	128	110
Total arc	380	360	358	358	360	335	355	359	406	387	378
Glabello-inion arc	330	290	315	287	311	276	293	310	—	308	325
Glabello-inion length	191	174	174	179	181	165	171	177	—	192	186
Glabello-lambda length	190	173	182	181	181	165	171	180	—	185	185
Greatest length	191	184	183	183	181	167	176	183	—	192	190
Basi-bregmatic height	148(?)	132	128	131	131	132	136	128	143	138	134
Vertical index	77·4(?)	71·7	70·3	71·5	70·4	82·5	74·2	69·9	74·0	71·8	70·5

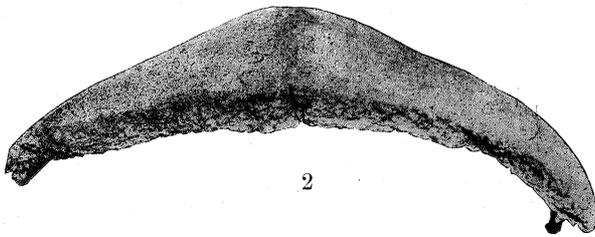
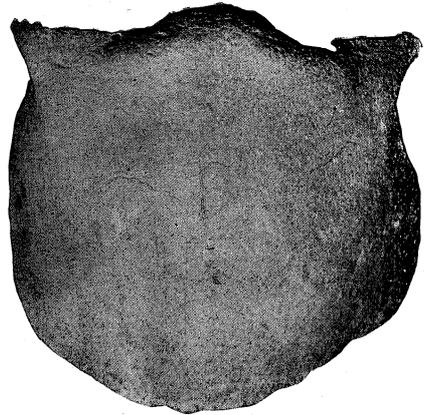
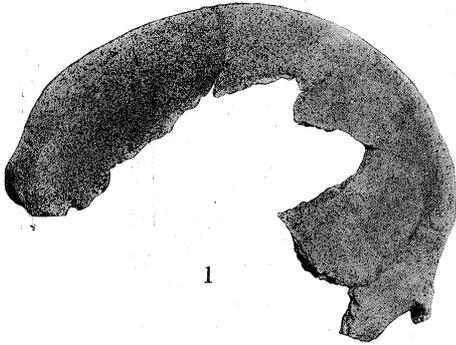
Table III.

Crania.	A Glabello-inion length	B Height of breg- ma above A	C Height of breg- ma above gla- bello-lambda line	D Height of ver- tex above gla- bello-inion line.
Whangarei	191	95	65	107
Mori "A"	174	85	58	99
Mori "B"	173	90	52	108
Maori 1.....	179	83	59	93
Maori 2.....	180	90	63	102
Maori 3.....	165	77	62	82
Maori 4.....	171	90	64	98
Fijian	177	89	66	100
South Australian (Stuttgart)	192	86	62	94
Epi.....	186	91	1	102

EXPLANATION OF PLATE XXXII.

CRANIAL REMAINS FROM WHANGAREI, N.Z.

- Fig. 1. Partially restored portion of skull: side view.
,, 2. Do. do. view from behind.
,, 3. Partially restored skull, to show median ridge.
,, 4. Do. to show supra orbital margin.
,, 5. Partially restored skull, to show frontal sinuses.



EXPLANATION OF PLATE XXXIII.

Skull from Epi, New Hebrides, in the Australian Museum.



H. BARNES, JUNR., photo.,
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