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THE CRANIOLOGY OF THE NATIVES OF ROTUMA.

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[WITH PLATES XLII, XLIII.]

I. *Introductory.*

A COLLECTION of human crania was made by J. S. Gardiner, M.A., Fellow of Gonville and Caius College, Cambridge, on the occasion of his visit to Rotuma in 1897. Of the history of that island, and of the appearance, customs, and traditions of its inhabitants, Mr. Gardiner has given a very complete account, which was published *in extenso* in this Journal (vol. xxvii, June–October, 1898).

The present account of the human crania consists of a general description of the specimens, followed by a discussion of the conclusions to be drawn from this study; finally, detailed descriptions of the individual specimens, together with some numerical data, are appended.

The crania are nine in number, and from their general appearance, they would appear to have lain partially covered by a very dry sandy soil; in consequence of which the gelatinous constituents of the bony tissue have been largely removed, leaving the specimens in a brittle and fragile state. Some of the specimens show signs of weathering. Six crania are fairly complete with mandibles; there are two incomplete crania from which the facial bones and mandibles are missing, and there is a single calvaria. All the skulls are adult; and, in all, the facial bones have suffered more damage than those of the cranial vault. With two exceptions the skulls are those of males; there is one skull (1817) which is probably, but not certainly, male, and there is one female skull (1811).

II. *General Results.*

Excluding the female skull (1811), the specimens fall into three groups, as follows:—

- (a) Typical Polynesian of the western variety. The qualifying adjective *western* is found to be necessary, inasmuch as the researches of De Quatrefages and Hamy show that the Western and Eastern Polynesians are to be contrasted in respect of cranial type. In the

following notes, the term Polynesian is to be taken as signifying Western Polynesian, and indeed the Western Polynesian is to be regarded as the Polynesian *par excellence* in respect of skull-form. The specimens of Polynesian aspect are the following:—Nos. 1809, 1813, 1814, 1815, 1816, 1817. It must be mentioned that the cephalic index ranges in this series from 71 to 86·5.

(β) Typical Melanesian; represented by a single specimen, viz., No. 1812. (See Fig. 1, on p. 437 below.)

(γ) A form intermediate between the two preceding types, partaking of characters distinctive of both Polynesian and Melanesian crania; a single specimen, No. 1810, figures in this group, to which the female skull, No. 1811, is more nearly allied than to either of the foregoing.

The indication of craniology is thus that the island is inhabited by people of the tall brown-skinned Polynesian type, and also by individuals of the shorter and much darker-skinned Melanesian type, as well as by individuals possessing physical characters (such as stature, skin-colour, hair-colour, form of the hair, and the like) intermediate between those of the two foregoing stocks.

Since Rotuma is so situated geographically as to render it accessible to either Polynesians or Melanesians, such a combination of cranial forms is what one would have expected *a priori* to find among its inhabitants. It is now appropriate to adduce some evidence from the proportions of the crania, in support of the foregoing statements as to the way in which they may be classified. For this purpose several tables have been drawn up, the first of which shows that from the consideration of several of the principal indices, the differences previously mentioned are fully corroborated. In Table A the most striking contrasts are seen

TABLE A.

	Index from the averages for 1809, etc.	1812.	1810.
Breadth index ...	80	71	74·6
Height index	77·5	73·2	—
Alveolar index	98·1	105	—
Orbital index	84·5	80·9	95·1
Nasal index	46·7(?)	55	46
Palato-maxillary index.	109·8	110·3	116·4
Naso-malar index	105·4	109	108·4
Cubical capacity	1,552	1,405	1,310
Group	^a “Poly- nesian.”	^β “Mela- nesian.”	^γ “Inter- mediate”

TABLE B.

	Average for Rotuma skulls considered to resemble the Polynesian type.	Average for Polynesian crania examined by Flower and Topinard.	Rotuma skull considered to be of Melanesian type.	Averages for Melanesian crania from Flower and Topinard.
Breadth index	80	79·7	71	71·4
Height index	77·5	75·5	73·2	74·9
Alveolar index....	98·1	98·6	105	103·4
Orbital index	84·5	91·6	80·9	80·6
Nasal index	46·7(?)	47·9	55	55·6
Palato-maxillary index.	109·8	?	110·3	?
Naso - malar index.	105·4	?	109	?
Cubic capacity	1,552	1525 (Deniker)	1,405	1,460 (Deniker)
Group	^a		^β	

between the indices of the chief averages as obtained from the skulls No. 1809, 1813, 1814, 1815, 1816, 1817, on the one hand, and the skull No. 1812 on the other. For this reason the former skulls have been associated in a single group (α), while the latter (No. 1812) is regarded as a representative of a second group (β). The specimen No. 1810 will be seen to occupy an intermediate position inclining in some respects to group (α) and in others to group (β).

In the next place it is necessary to show that of the two groups just described, the first (α) may definitely be recognized as approximating to the Polynesian, and the other (β) to the Melanesian type form. With this aim in view, Table B was drawn up, and is next to be considered. A glance at the figures will establish the correctness of the proposition that among the Rotuma crania a Polynesian group and a Melanesian specimen are present.

That Rotuma is liable to be visited by Polynesians and by Melanesians is not only a matter of surmise from the consideration of its geographical situation, but is also evidenced by the information collected by Mr. Gardiner (*loc. cit.*, reprint, pp. 4 *et seq.*), which shows that the inhabitants do actually vary in appearance to a considerable extent, the majority, however, resembling men of the Polynesian type, the Melanesian element being apparently subordinate in amount. Mr. Gardiner records that the Rotuman legends mention the advent of visitors from Tonga, Samoa, and Niuafouu, but naturally reliable historical evidence on the subject of the peopling of the island is scanty in the extreme. It is noteworthy that Mr. Gardiner mentions that while Polynesian or Micronesian strangers might be adopted through marriage into a Rotuman family, Fijians and Melanesians on the contrary were always treated as inferiors, and when dead their remains were buried on some islet on the reef, apart, that is, from the Rotuman burial-places. Linguistically the affinities of the Rotuma natives are with the Samoans, who may be taken as representing the Polynesian type, rather than with the Fijians, who represent a Melanesian stock.

From the foregoing considerations it will be seen that the evidence of craniology is in accord with that furnished by the external appearance, the traditions, customs, and language of the natives of Rotuma. There remain two points for discussion in connection with this part of the study of the natives of Rotuma. In the first place, the proximity of Rotuma to the Micronesian area suggests the possibility of the presence of what might be referred to as a Micronesian constituent in the population of the island. This is a subject hard to deal with craniologically, because there has not yet been established satisfactorily in the Micronesian area a cranial form sufficiently constant to justify its description as a type-form. Indeed, so far as the researches of one of us go, Micronesian skulls are more closely matched by a skull from Easter Island (separated by the whole breadth of the Pacific Ocean) than any others from the more immediate vicinity of that island-group. There is consequently but one observation to be recorded in this connection. One might expect, in the Micronesian area, the occurrence of skulls with Mongoloid features, inasmuch as the islands of Micronesia

have been subject to immigration, on a fairly considerable scale, from the Asiatic mainland. The fact, then, that the Rotuman skull, No. 1814, though of the Polynesian type, also presents the Mongolian characteristic of large and widely divergent malar bones, is worthy of mention in this connection.

The other point remaining for consideration is the inquiry whether one should look for other cranial morphological types beyond those already mentioned. In this connection, too, there is but one fact to record, viz., that the Rotuman specimen, No. 1815, is, superficially at least, very similar to a skull from Vancouver Island, now in the Cambridge Collection. No stress need be laid on this observation, however, beyond the remark that, after all, the form of the skull, even in the most isolated communities where the character has become almost stereotyped, is liable to occasional varieties departing far from the usual form, and that in a case where two skulls from widely separated localities are compared, it is of course possible that either specimen may constitute an abnormality. In conclusion then, no elements beyond the Polynesian and Melanesian can be distinctly demonstrated to exist in the population of Rotuma, when one is confined to the evidence afforded by this collection of skulls.

III. *Detailed descriptions of the crania.*

The individual specimens will now be described in the numerical order of the catalogue of the Cambridge Anatomical Museum.

1809. This specimen consists of the bones of the cranial vault with the two temporal bones; the facial skeleton, including the mandible, being absent. The sex was male.

The general form in *norma verticalis* is brachycephalic (breadth-index = 81). The maximum breadth occurs in the region of the parietal eminences. Synostosis has commenced in the sagittal suture, at each extremity of which it has advanced further than in the intermediate portion. The parietal foramina are inconspicuous.

In *norma lateralis*, massive supra-orbital ridges are very noticeable; hereby the length of the skull is considerably augmented. Examination of the curve of the cranial vault leads to the observation that flattening is marked from the junction of the middle and posterior thirds of the sagittal suture onwards, being continued beyond the lambda. The external occipital protuberance is moderately prominent. The mastoid processes are massive and much prolonged downwards. At each asterion there have been wormian ossicles. On the posterior part of the frontal and on the parietal bones, the temporal ridges are reduplicated. At the pterion, the parietal and great wing of the sphenoid articulate with one another.

In *norma facialis*, the massive brow-ridges again attract attention. In comparison with the inter-parietal breadth (which is the maximum width of the skull) the frontal width seems unusually small. The maximum breadth occurs at a level far above the bases of the mastoid processes. The vertical height of the

skull is great, though actually it is exceeded by the figure representing the maximum transverse diameter.

In *norma basilaris*, the following points are to be noticed:—The glenoid fossæ are of moderate depth only; the occipital condyles are somewhat asymmetrical in position as regards the margin of the foramen magnum; the endocranium presents no features of special interest.

In *norma occipitalis*, the form of the skull is pentagonal, and, as has been noted, the maximum breadth is found at the parietal eminences, from which level the lateral parietes converge so that the inter-mastoid diameter is relatively small. Distinct asymmetry in the positions of the occipital condyles is again noticeable; that of the left side descending to a lower level than its fellow of the right side, so that a slight degree of plagiocephaly is produced.

1810. A male skull, the base of which has been to some extent destroyed; the basilar portion of the occipital bone is imperfect; the nasal bones and ethmoid are also incomplete, so that the internal orbital walls are imperfect.

In *norma verticalis* the general form of the skull is oval. The cephalic index places it in the dolichocephalic class (index 74.6); it is also phænozygous; synostosis is seen in the sagittal suture, and the skull presents a ridge-like elevation along the line of this suture; there are two small parietal foramina.

In *norma lateralis*, the brow-ridges are massive and prominent, the face prognathous, the temporal ridges well marked, and the mastoid processes large. A ridge marks the line of the articulation of the sphenoid and temporal bones, and the coronal suture is synostosed near the pterion, where the sphenoid and parietal bones meet.

In *norma facialis*, the brow-ridges and zygomatic arches are again noticed as being massive. A depression, seen above the left external angular process on the frontal bone, indicates probably that injury had been sustained here through a blow.

The frontal bone shows post-orbital compression and is, generally speaking, developed to an extent small in comparison with that of the other cranial components. The orbits are shallow with very oblique roofs, and the lachrymal fossæ are particularly shallow. The nasal aperture is long and narrow, and the remnants of the nasal bones suggest that these were also long, narrow, and not very prominent. Sub-nasal fossæ are distinct (amblycraspedote).

In *norma basilaris*, the teeth are seen to be large and not much worn. The palate has a parabolic outline. There are large infra-temporal crests, long styloid processes, deep glenoid fossæ, and prominent mastoid processes.

In *norma occipitalis*, the skull appears scaphoid. The external occipital protuberance is inconspicuous, but there is a well developed transverse occipital torus. At the right asterion is a small wormian bone.

Large Pacchionian depressions mark the endocranium. The angle of the mandible is small, being nearly 90°.

1811. A female skull with the mandible in fairly good preservation; the ethmoid bone and septum nasi are, however, much damaged.

In *norma verticalis*, the skull is of moderate length (it is mesaticephalic); the parietal eminences are well developed; there are two parietal foramina; the principal sutures are unclosed.

In *norma lateralis*, prognathism is very marked, especially the sub-nasal variety of the character; the frontal region is not full, the muscular crests, brow-ridges, and mastoid processes are feebly developed. The sphenoid and parietal bones articulate on either side; there are wormian bones in the lambdoid suture. The curve of the cranial vault runs fairly uninterruptedly from nasion to opisthion; slight flattening occurs at the bregma, and again between the obelion and the lambda, the latter flattening contributing to the formation of a slight but distinct occipital *renflement*; the inion is not prominent, nor are the occipital crests large.

A small fissure indicative of a suture dividing the malar bone horizontally is observed to start from the temporo-malar junction on either side. On the left side a variety of the pterygo-spinous foramen is seen.

In *norma facialis*, the orbits are rather low, with deep lachrymal depressions; the apertura pyriformis nasi is wide, with large, deep pre-nasal fossæ, of the type so frequent in Polynesian crania (cf. Macalister, *Journal of Anatomy and Physiology*, Jan., 1898). The nasal bones are wide and flat.

In *norma basilaris*, the palate is seen to have a parabolic contour; the condyles are placed slightly asymmetrically on the margin of the foramen magnum.

In *norma occipitalis*, the outline is pentagonal with very distinct flattened areas above and below the parietal eminences. A wormian bone is seen at the lambda. The angle of the mandible is nearly 90° ; the coronoid processes large and higher than the condyles; the sigmoid notch is shallow.

Female characteristics are well marked in this specimen.

1812. A male skull with the mandible; the zygomatic arches and the condyles of the mandible are broken; the bones of the cranial vault show evidence of weathering. Before proceeding to the detailed description, it may be remarked at once that this skull is in many respects typically Melanesian; at the same time, it closely resembles a skull in the Cambridge Collection labelled "Skull of a Bushman chief" (to which a similar description applies, and which is therefore not a typical Bush skull).

In *norma verticalis*, great elongation is noticed (the cephalic index is 71). The skull is is phænozygous; there



FIG. 1.—SKULL NO. 1812. MELANESIAN TYPE.

is marked post-orbital frontal compression; the sutures are complex, and in the left half of the coronal suture is a long narrow wormian bone.

In *norma lateralis*, the glabella and brow-ridges are prominent; a moderate degree of prognathism is observed. The external occipital protuberance is large, but the mastoid processes of moderate size only. The sphenoid and parietal bones articulate on either side, and at each asterion is a wormian bone. The sphenopalatine foramen is very large on each side and is visible from the sphenomaxillary fossa.

In *norma facialis*, shallow wide orbits with bevelled outer margins are seen; the lachrymal fossæ are deep. On each side the maxilla and sphenoid cut off the malar from the sphenomaxillary fissure. The nasal bones are short and upturned, wider below than above; the *apertura pyriformis nasi* is wide, with indistinct lower margin.

In *norma basilaris*, the palate appears parabolic in outline; the glenoid fossæ are of moderate depth. On the right side the foramina spinosum and ovale are confluent with each other and with the petrosphenoidal fissure.

In *norma occipitalis*, the outline is pentagonal; small parietal foramina are seen.

The mandible is massive, the angle large, and there is a depression in front of the gonion. The molar teeth decrease in size from before backwards.

1813. A male skull of very great size. The specimen is in good preservation; the mandible accompanies it; parts of the inner walls of the orbits have been destroyed.

In *norma verticalis*, the outline is elongated; on either side of the sagittal suture is an area of flattening which gives rise to a slightly keeled appearance. No parietal foramina are present. The temporal ridges are rather tortuous.

In *norma lateralis*, prognathism is distinct; the supra-orbital ridges and the external occipital protuberance are large and massive. The frontal bone recedes rapidly from the glabella, and the median sagittal arc of the cranium is regular except near the lambda, where the conformation is slightly bathrocephalic, the appearance being the more pronounced in consequence of the massive transverse torus crossing the occipital bone. The coronal suture is synostosed on the right side just above the pterion; on both sides the sphenoid and parietal bones articulate in this region. The temporal ridges are well marked; at the right asterion is a wormian bone.

In *norma facialis*, the orbital apertures are seen to be high and their margins bevelled; the *apertura pyriformis nasi* is of moderate width, the lower margins being indistinct; the nasal bones are large.

In *norma basilaris*, a hypsiloid palate is seen; the teeth are slightly worn down, the molars decreasing in size from before backwards; the first molars of the upper jaw have four cusps, of the lower have five cusps, the second molars resemble the first as regards the number of cusps, the third molars of the upper jaw have three cusps, and their *vis-à-vis* in the mandible five cusps. The teeth on

the left side of the mandible are irregularly placed. The very great capacity of this cranium is to be specially noted. It is allied to the Polynesian type, but also resembles certain crania from North America in the Cambridge Museum.

1814 (Fig. 2). A large and almost perfect male skull with mandible; there are several perforations, probably due to injury incurred in exhumation. The great prominence of all crests and ridges giving attachment to muscles indicates the great physical development of the individual.

In *norma verticalis*, the skull is of moderate length; the sagittal suture is closed at the obelion, and no parietal foramina are present.

In *norma lateralis*, the skull appears moderately prognathous, the prominence and massive character of the brow-ridges, external occipital protuberance, mastoid processes, and zygomatic arches are marked. The frontal bone retreats somewhat rapidly from the glabella backwards, there is no flattening at the bregma, and the median sagittal arc is regular as far as the lambda, where a slight tendency to bathrocephaly is noticed. The sphenoid and parietal bones articulate at each pterion near which the coronal suture is closed. At each asterion is a wormian bone. As regards the facial bones, the profile is flattened.

A peculiar condition exists at the upper portion of each mastoid process (Fig. 3). The temporal ridge traverses the parietal bone and descends to the lambdoid suture, where the parietal bone is thickened and overlaps the occipital, passing backwards over it like a sort of operculum. But the



FIG. 2.—SKULL NO. 1814, NORMA LATERALIS.

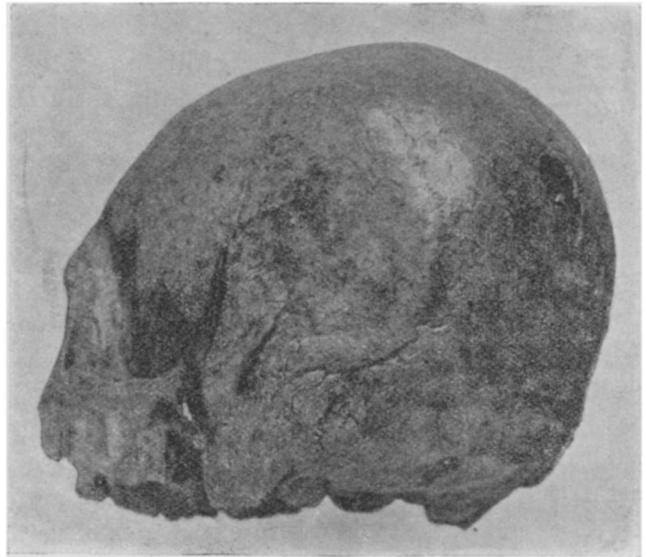


FIG. 3.—SKULL NO. 1814, SHOWING CURIOUS RIDGES NEAR ASTERION.

temporal crest now running forwards is not confluent with the posterior zygomatic root on the temporal bone, for it is separated from that ridge by a deep fissure running obliquely upwards, to end in the squamo-parietal suture; this fissure is in turn overlapped by a thickening of its anterior lip, which is continuous with the posterior root of the zygoma. In the absence of evidence to the contrary, it is suggested that the fissure which separates temporal ridge and posterior root of the zygoma represents the original line of demarcation between the squamous and mastoid (*i.e.*, petromastoid) elements of the temporal bone. Traces of a single arrangement appear in No. 1813.



FIG. 4.—SKULL 1814, SHOWING THE HORIZONTAL LINE OF THE SKULL.

In *norma facialis*, a depression, probably the relic of a wound, is seen over the left orbit; the orbits are shallow, with high orifices, and bevelled orbital margins; the nasal bones are small and narrow. The *apertura pyriformis* is wide and has well-marked sub-nasal fossæ. On the left side is a small bony tubercle on the lower margin of the nasal aperture. There is slight post-orbital compression of the frontal bone. The canine fossæ are practically non-existent, and this combines with the much splayed and massive malar bones to confer on the countenance a decidedly Mongolian cast.

In *norma basilaris*, an hypsiloid palate is seen; the glenoid fossæ are deep, the zygomatic arches outstanding. On the left side is a double pterygo-spinous foramen. The great development of the ridges on the occipital bone reminds one of the corresponding region in the gorilla, especially of immature specimens.

In *norma occipitalis*, the chief features are the extraordinarily prominent occipital ridges and crests.

The mandible is massive, the coronoid processes being higher than the condyles; a deep notch is seen in front of the gonion. The symphysis is prominent. Some crenation is seen on the surface of the crowns of the molar teeth.

1815. A male skull with mandible; much of the facial skeleton is absent; muscular ridges and processes are moderately well marked. There is a slight degree of prognathism.

In *norma verticalis* the form is that of an oval posteriorly truncated; the skull is of moderate length and cryptozygous; synostosis is seen in the sagittal suture from the obelion to the lambda; there are very small parietal foramina; on either side of the sagittal suture is an area of flattening.

In *norma lateralis*, the chief feature is the prominence and high development of brow-ridges, external occipital protuberance, mastoid processes, temporal ridges,

and other bony crests. On each side the sphenoid and parietal bones meet at the pterion, near which the coronal suture is closed. The frontal bone retreats rapidly from the ophryon, but the median sagittal arc is regular till interrupted by a slight bulging of the occipital bone beyond the external occipital protuberance. At the left asterion is a wormian bone, and there is a slight exostosis behind and below the left parietal eminence. The occipital condyles are very prominent; and on the left side the middle meningeal artery threw out an external branch.

In *norma facialis*, the orbits are seen to be shallow and wide; the lachrymal fossæ are deep; orbital margins are sharp; the remains of the nasal bones are sharply upturned.

In *norma basilaris*, the only point to notice is the depth of the glenoid fossæ.

In *norma occipitalis*, the outline is pentagonal, and synostosis of the lambdoid suture is noticed near the lambda.

In the mandible the angle is large, the coronoid processes are higher than the condyles; the chin is prominent; anteriorly to the gonion is a well marked notch.

The teeth show slight crenation; the third molars are the smallest, and these and the first molars are pentacuspidate, the second molars are tetracuspidate.

1816. A calvaria of the male sex. In *norma verticalis*, the contour is obovate and brachycephalic, with slight post-orbital frontal compression; the right half of the coronal suture is closed, the left half being closed near the pterion; the sagittal suture is tortuous and synostosed at the obelion. As regards the endocranium, synostosis is almost complete, showing that this process commences and is completed earlier on this surface than on the exterior of the skull. There is one parietal foramen (the left). The calvaria is much broader below the parietal eminences, but this appearance may be due to posthumous deformation or pressure.

In *norma lateralis*, the brow-ridges are moderately prominent; the external occipital protuberance of similar development; the median sagittal arc is regular. The same description applies to the transverse arc as seen in *norma occipitalis*.

1817. A much damaged skull of which it is hard to determine the sex, which is probably male. The facial skeleton is absent, as is also the mandible and much of the base on the right side. The cranium is large, with but moderately marked prominences and muscular ridges.

In *norma verticalis*, the outline is ovoid, with outstanding parietal eminences; brow-ridges are not prominent. There are no parietal foramina; the sutures are not tortuous. It is particularly noteworthy that there is considerable asymmetry (plagiocephaly), flattening on the right side being accompanied by corresponding bulging outwards on the left.

In *norma lateralis*, no marked prominence of brow-ridges or other muscular ridges or processes is to be observed. At each pterion the sphenoid and parietal bones seem to have come into contact, but there is now synostosis of the coronal suture in this region. The frontal bone rises fairly steeply from the ophryon, and

TABLE C.—ROTUMA SKULLS.

Anatomical character.	1809.	1810.	1811.	1812.	1813.	1814.	1815.	1816.	1817.
1. Character of lower nasal margins ...	?	Spine distinct; margins indistinct, with small fosse.	Deep fosse; bothrocraspedote variety.	Margins indistinct, no fosse.	Margins indistinct, no fosse.	Fosse are distinct but not large, spine broken.	?	?	?
2. Infra-orbital suture, pars facialis ...	Closed.	Closed.	Present R. and L.	Closed.	Closed.	Present.	?	?	?
3. Post-palatine spine ...	Absent.	Absent.	Blunt; trace of a notch.	Sharp.	Sharp.	Blunt.	?	?	?
4. Divided malar bone ...	Not seen.	Not seen.	Trace of suture R. and L.	?	Not seen.	Not seen.	Not seen.	?	?
5. Lachrymo-ethmoidal suture ...	?	?	?	Present R. and L.	?	Present R. and L.	?	?	?
6. Conformation in region of pterion ...	Parietal; Sphenoid. ?	Parietal; Sphenoid. Parietal sphenoid. ?	Parietal; Sphenoid. Parietal sphenoid. None.	Parietal; Sphenoid. Parietal sphenoid. None.	Parietal; Sphenoid. Parietal sphenoid. None.	Parietal; Sphenoid. ?	Parietal; Sphenoid. Parietal sphenoid. ?	?	Parietal; Sphenoid. Parietal sphenoid. ?
7. Palatine torus ...	?	?	Present on L.	Absent R. and L.	Absent R. and L.	Ridge, no torus. Absent R. and L.	Absent R. and L.	?	Absent L. ? R.
8. Pterygo-spinous foramen ...	?	Absent R. and L.	?	Normal.	Normal, but large foramen.	Normal.	Normal.	?	Normal.
9. Margin of foramen magnum ...	Tubercle on anterior margin.	?	?	?	?	?	?	?	?

From the foregoing table it appears that—

- (1) The lower nasal margins are commonly indistinct, though never entirely obliterated, and that fosse of the type so common in Polynesian crania are here met with.
- (2) That the pars facialis of the infra-orbital suture is rare.
- (3) That the post-palatine spine is commonly sharp, not bifid.
- (4) That division of the malar bone (os japonicum) is rare.
- (5) That the lachrymo-ethmoidal suture is normal and that it is long.
- (6) That the parietal and sphenoid bones commonly meet at the pterion.
- (7) That a palatine torus is rare.
- (8) That the pterygo-spinous foramen is rare.
- (9) That tubercles on the anterior margin of the foramen magnum are rare.

TABLE D.—SKULLS FROM ROTUMA.

Measurements.	1809.	1810.	1811.	1812.	1813.	1814.	1815.	1816.	1817.
Maximum length	189	185	172	183	203	187	193	178	176
Ophryo-iniac length	175	175	169	178	191	185	186	176	173
Maximum breadth	149	137	131	130	150	148	148	154	149
Bi-auricular breadth	? 114	120	107	115	118	132	123	?	124
Bi-stephanic breadth	114	94	104	106	115	122	123	114	?
Bi-zygomatic breadth	?	136	121	? 128	? 140	148	?	?	?
Basion-nasion	? 97	?	97	96	111	110	111	?	97
Basion-prosthion	?	?	97	101	105	? 115	?	?	?
Basion-bregma	142	?	132	134	147	147	149	?	140
Basion-lambda	120	?	115	117	133	? 123	130	?	118
Basion-inion	87	?	81	84	94	90	90	?	79
Basion-opisthion	34	?	34	34	42	37	40	?	35
Orbit : height	?	39	33	34	? 41	38	38	?	?
„ breadth	?	41	41	42	? 47	46	44	?	?
Ap. py. nasi : height	?	63	48	51	? 58	? 62	?	?	?
„ „ breadth	?	29	30	28	? 27	29	?	?	?
Pal. max. : length	?	55	52	58	61	? 59	?	?	?
„ „ breadth	?	64	62	64	? 60	67	?	?	?
Jugo-nasal arc	?	105	102	110	124	120	?	?	?
Jugo-nasal width	?	97	94	101	? 112	110	?	?	?
Dental series	?	? 43	? 38	? 43	50	?	?	?	?
Horizontal circumference	518	509	483	507	555	534	540	523	522
Nasi-alveolar height	?	82	65	69	? 74	80	?	?	?
Bi-gonial breadth	?	103	99	103	102	116	102	?	?
<i>Indices.</i>									
Cephalic	80·9	74·6	76·1	71	73·9	79·1	76·7	86·5	84·6
Height	77·8	?	76·7	73·2	72·4	78·6	77·2	?	79·5
Alveolar	?	?	100	105	?	104·5(?)	?	?	?
Orbital	?	95·1	80·5	80·9	87·2(?)	82·6	77·3	?	?
Nasal	?	46	62·5	55	46·5(?)	46·8(?)	?	?	?
Palato-maxillary	?	116·4	119·2	110·3	98·3(?)	113·6(?)	?	?	?
Naso-malar	?	108·2	108·5	109	101·8	110	?	?	?
Cubic capacity	<i>Circa</i> 1,550	1,450	1,315	1,405	1,720	1,600	1,695	<i>Circa</i> 1,550	1,530

the median sagittal arc is regular, with slight elevation at the bregma and slight sub-iniac bulging of the occipital bone; at each asterion is a wormian bone.

In norma basilaris, the only point to notice is the shallowness of the glenoid fossa.

In norma occipitalis, the form is pentagonal in outline; the maximum breadth is found in the mastoid region; in addition to wormian bones at each asterion, there are two others of larger size in the lambdoid suture. The inion is not prominent; there is a small exostosis on the right parietal eminence.

List of Tables.

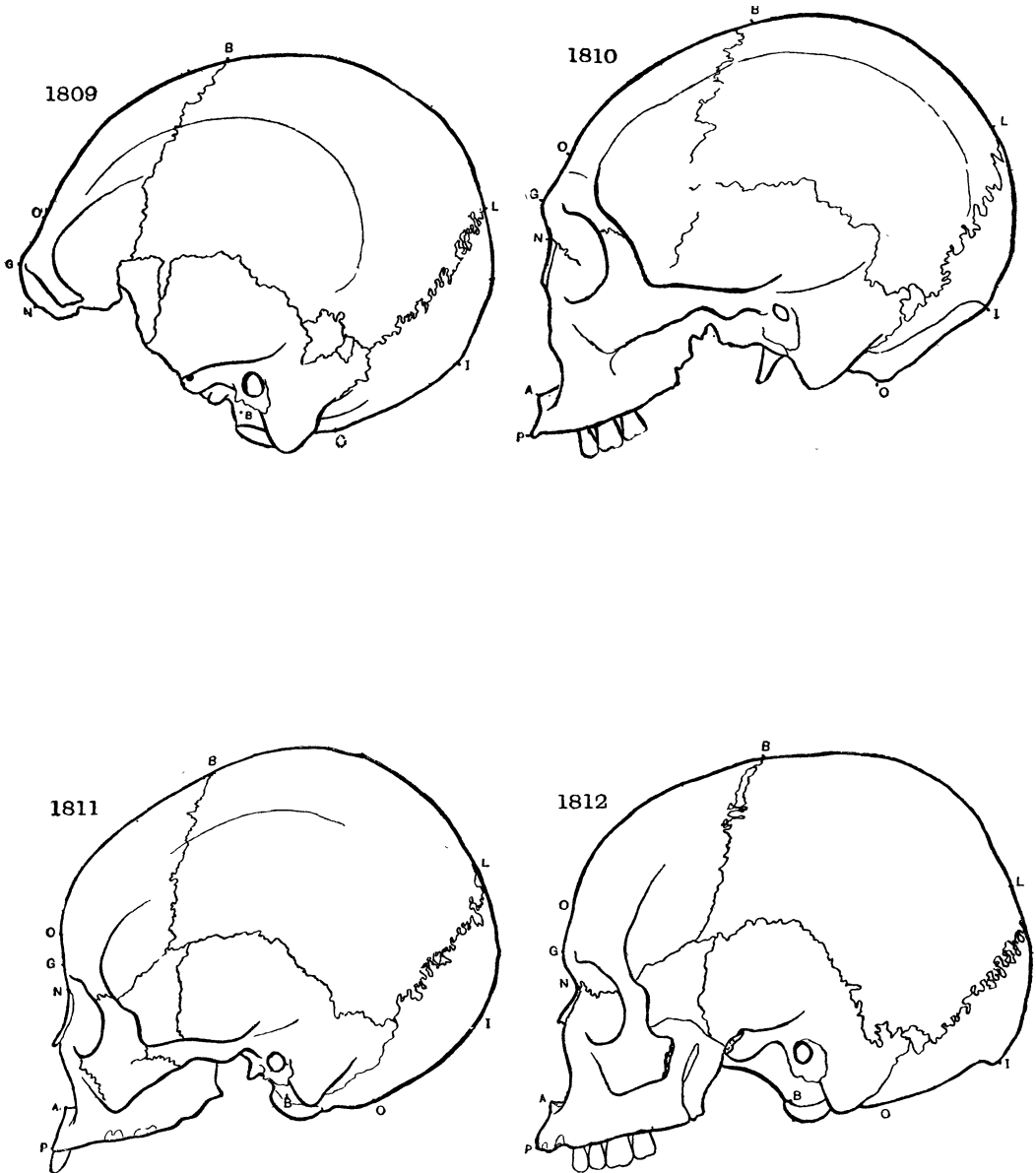
- A. The three groups.
- B. Groups α and β with Melanesian and Polynesian types.
- C. Certain cranial characteristics.
- D. Measurements and indices.

Plates XLII, XLIII.

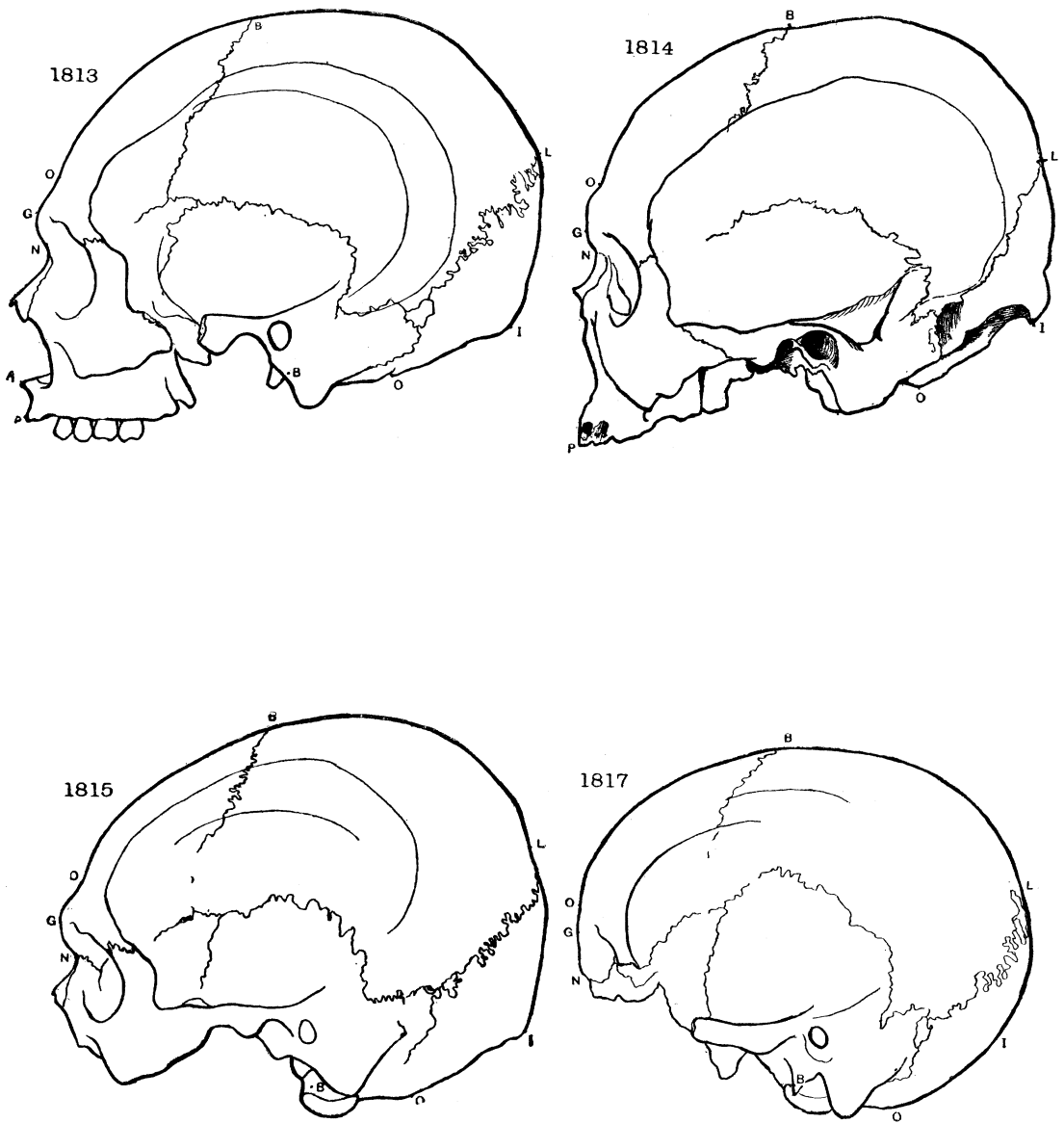
Outline drawings of all skulls in norma lateralis.

Figures in the Text.

- (1) Skull 1812. Melanesian type (p. 437).
- (2) Skull 1814. Norma lateralis (p. 439).
- (3) Skull 1814. Showing curious ridges near asterion (p. 439).
- (4) Skull 1814. Showing horizontal line of the skull (p. 440).



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