

A contribution to the craniology of the natives of Borneo, the Malays, the natives of Formosa, and the Tibetans / by Sir William Turner.

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A CONTRIBUTION TO THE CRANIOLOGY OF THE
NATIVES OF BORNEO, THE MALAYS,
THE NATIVES OF FORMOSA, AND THE TIBETANS.

BY

PRINCIPAL SIR WILLIAM TURNER, K.C.B., D.C.L., F.R.S.

[WITH FIVE PLATES.]



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XXVIII.—A Contribution to the Craniology of the Natives of Borneo, the Malays, the Natives of Formosa, and the Tibetans. By Principal Sir William Turner, K.C.B., D.C.L., F.R.S. (With Five Plates.)

(Read 10th June 1907. Issued separately July 20, 1907.)

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In three memoirs published from time to time in the *Transactions* of this Society* I have described the characters of the crania in several Asiatic races, the bulk of which were natives of India, though a few were from countries adjoining Hindostan. In this memoir I intend to continue my inquiries into the cranial characters of Asiatic people, and to give an account of natives of Borneo, the Malays, the natives of Formosa, and the Tibetans.

BORNEO.

Through the courtesy of a former pupil, Dr ROBERT E. ADAMSON, I received between the years 1898 and 1901 fifteen skulls of natives of North Borneo. They were carefully labelled by him with the name of the tribe, and in many specimens also with that of the district from which they had been obtained. Ten skulls were discoloured with smoke, and several retained fragments of dried skin attached to the bones. They had been suspended in the houses of the natives by split cane, which in some specimens had been wound around the skull, so as to enclose it in an open cage with a long loop for suspension; in one skull the loop had been passed through the nose; in two others through a hole artificially made in the sagittal suture. Obviously these skulls had been trophies collected by the head hunters. In several, a part of the occipital bone bounding the foramen magnum had been removed, so as more readily to extract the brain.

In the following description the skulls are arranged in groups in accordance with the tribes to which they belonged.

* Part I., Hill Tribes of the North-East Frontier of India and the People of Burma, *Trans. Roy. Soc. Edin.*, vol. xxxix., 1899; Part II., Aborigines of Chûta Nâgpûr, the Central Provinces, Orissa, Veddahs, Negritos, *Transactions*, vol. xl., 1901; Part III., Natives of Madras Presidency, Thugs, Veddahs, Tibetans, Seistanis, *Transactions*, vol. xlv., 1906.

The names of the tribes, their geographical distribution in North Borneo and Sarawak, and the external physical characters of the people have been obtained from the following authorities:—MM. DE QUATREFAGES and HAMY, "Crania Ethnica," 1882; HENRY LING ROTH, "The Natives of Sarawak and British North Borneo," 1896, which contains an admirable résumé of the writings of travellers and British residents up to the date of publication, as well as a list of the tribes in Borneo, p. 37, prepared by Mr CHARLES HOSE; Sir HUGH LOW, "Sarawak: its Inhabitants and Productions," 1848; CARL BOCK, "The Head Hunters of Borneo," 1881, a narrative of travel in the south-east of the island; ALFRED C. HADDON, who travelled in the interior of Sarawak, "Head Hunters, Black, White and Brown," 1901; SPENCER ST JOHN, "Wild Tribes of the North-West Coast of Borneo," in which Land and Sea Dyaks are described (*Trans. Ethnol. Soc. Lond.*, vol. ii. p. 232, 1863); Lieut. C. DE CRESPIGNY, R.N., "On Northern Borneo" (*Proc. Roy. Geogr. Soc.*, vol. xvi. p. 171, 1872); F. W. BURBIDGE, A. HART EVERITT, F. R. O. MAXWELL, F. WITTI, quoted by LING ROTH. C. HOSE, "Natives of Borneo," describes the people of the Baram district, North Sarawak (*Journ. Anth. Inst.*, vol. xxiii. p. 156, 1894); C. HOSE and W. M'DOUGALL, "The Relations between Men and Animals in Sarawak" (*Journ. Anth. Inst.*, vol. xxxi. p. 173, 1901); C. HOSE and R. SHELFORD, "Materials for a Study of Tatu in Borneo" (*Journ. Anth. Inst.*, vol. xxxvi. p. 60, 1906).

MURUTS. TABLE I. PLATES I., V.

The Muruts are essentially an inland tribe in Borneo, occupying a district which extends from the Limbang river in Sarawak as far to the north as Mount Kinabalu, 13,700 feet high, in North Borneo. They inhabit the basins of the Padas and the Pagalan rivers, and they constitute an important element in the population of the western part of North Borneo.

The Muruts have a light brown or bronzed skin, which is in part tattooed; the hair is jet black, long, and frequently tied in a knot at the back of the head; the nose is flattened and the stature is said to be low. They pluck out the eyebrows and eyelashes, and during mastication and betel chewing they grind the teeth to the level of the gums. Their clothing is often limited to a loin cloth formed of bark. They live in long houses, are filthy in their habits, indulge freely in intoxicating drinks, and are lethargic in mind and body. They were inveterate head hunters, and the heads suspended in their houses became blackened with smoke. The killing of people for the sake of the heads is being repressed, under the British administration.

Five of the skulls were labelled Murut. In Table I. they are lettered A to E inclusive. A to D were adults. In E the basi-cranial synchondrosis was not ossified, the wisdom teeth were concealed in the bone, but the other permanent teeth were erupted, and the age was probably from 18 to 20. D and E were apparently females, and in each the occipital squama had been in part removed. B, C and E retained the lower jaw.

Norma verticalis.—The cranium in A, B, C and E was elongated, ovoid, and characteristically dolichocephalic in form and proportion; the cephalic index was in each below 75, and in C as low as 69.9. In D, again, the cranial outline was more broadly ovoid, and the cephalic index was 77.7, *i.e.* in the mid-term of the mesaticephalic group. The crania were not ridged in the sagittal line, the parietal eminences were moderate, and the slope of the vault outwards varied in the degree of steepness. Except in D the squamous region was not bulging, and in B and E the greatest breadth was in the

parietal region. The parieto-occipital slope was moderate, the occipital squama projected behind the inion, and there was no artificial flattening. Four were cryptozygous, one phænozygous.

Norma lateralis.—The forehead slightly receded in the male and approached the vertical in the female skulls. The glabella and supraorbital ridges were not prominent and were distinct from the outer upper orbital border, and the frontal bone was flattened in the area between that border and the temporal ridge. The nasion was not depressed except in E, the nasal bridge was not keeled, and tended to be flattened, though with a shallow upward concavity. The occipital arc was the shortest in all the specimens, and, with one exception, the frontal exceeded the parietal arc, though in two only by 1 mm. The crania rested behind on the cerebellar fossæ.

Norma facialis.—In A and C the floor of the nose was separated from the incisive region by a sharp ridge, but in the others the ridge was smoothed down. In all the maxillo-nasal spine was distinct. In B the nares were narrow, the nasal height was more than double the width, and the nasal index was leptorhine; in the others they were wider both absolutely and relatively to the height of the nose, so that the index in A and C was mesorhine and in D and E platyrhine, but the mean index of the series, 50·5, was mesorhine. In B the complete face was long and the index was leptoprosopic, in C it was low and the index was chamæprosopic, but in four skulls the mean maxillo-facial index, 51·2, was leptoprosopic.* In A, B, D the upper jaw was orthognathous, in C feebly mesognathous, and the mean gnathic index computed by FLOWER's method was 94·2. The relation of the bi-malar to the nasio-malar diameter gave a nasio-malar index † which ranged from 108·4 to 111·4, and the mean, 110, was mesopic and indicated a nose not specially flattened at the root. In A, C, D, E the orbital aperture was rounded, and the mean index, 94·4, was megaseme, in B the breadth was relatively greater, and the index, 87·2, was mesoseme. The hard palate was shallow in A, D, E, and more arched in B and C. In three skulls the palato-maxillary index was hyperbrachyuranic, in one brachyuranic. The teeth, with few exceptions, had been lost; those that remained were betel-stained and worn by use, but not to the level of the gums. The lower jaw had a square projecting chin, the angle was well marked and the muscular ridges were distinct.

The cranial sutures were moderately denticulated. In E the sagittal was closed, but the cranium was not scaphocephalic. A few small Wormian bones were present, though

* In my memoir on the Craniology of the People of Scotland (*Trans. Roy. Soc. Edin.*, 1903), I have explained KOLLMANN's plan of obtaining facial indices, and have suggested a modification in the grouping as follows:—

	Complete facial index.	Maxillo-facial index.
Leptoprosopic, narrow face,	90·1 and upwards	50·1 and upwards
Mesoprosopic,	85 to 90	45 to 50
Chamæprosopic, low face,	below 85	below 45

† See OLDFIELD THOMAS in *Journ. Anth. Inst.*, vol. xiv. p. 332, 1885. My suggested modification of the divisions of the nasio-malar index is: *platyopic*, low flat-faced profile, index below 106; *pro-opic*, projecting profile, index above 110; profile intermediate in degree, *mesopic*, from 106 to 110 (*Trans. Roy. Soc. Edin.*, vol. xlv. p. 263, 1906).

D had a left epipteris; the alisphenoid articulated freely with the parietal. The mastoids,inion and curved lines were moderate. C had a smooth surface on the left jugal process which had probably articulated with the transverse part of the atlas; there was no 3rd condyl.

The mean cephalic index of the five Murut skulls was 73·9, and if the mesaticephalic D be excluded, only 72·9; in both instances the mean index was dolichocephalic. The mean vertical index in four specimens was 75, metriocephalic. The mean glabello-occipital length was 179·2 mm.; the mean greatest breadth 132·4 mm.; the mean basi-bregmatic height 134·2 mm. As regards the relations of the breadth to the height of the cranium, in only one skull did the breadth exceed the height, and the mean breadth-height index of the four specimens was 100·97; the crania belonged therefore to the group to which I have extended the name *hypsistenocephalic*,* to include skulls in which the index exceeds 100.

The three male crania ranged in internal capacity from 1300 c.c. to 1430 c.c., and the mean was 1370 c.c.; in the female E the capacity was 1330 c.c., whilst in D, the sex of which was doubtful, it was 1430 c.c.†

DUSUNS. TABLE I. PLATE I.

The name Dusun is given to a tribe in Borneo which occupies the interior of the island from its northern end to as far south as the Dutch territory. Their country is to the north and east of the Muruts, and the Sulus intervene between them and the eastern sea-coast. They are well built, muscular and active. The skin is a light, clear brown, fairer than the Malays of the coast; the hair is black, and is worn by the men hanging down over the shoulders; the eyes also are black. BURBIDGE says that some have well-cut features, though the Mongolian type of face prevails; the nose is flattened at the root and the nostrils are wide. The teeth are filed and blackened, and the skin is tattooed. The usual stature is 5 feet 4 or 6 inches. The Dusuns are by some authorities considered to possess a strain of Chinese blood, and are less given to head hunting than some of the other tribes. By some authorities the name *Ida'an* is applied to the Dusuns.

Three skulls presented by Dr ADAMSON were labelled Dusun, and of these F was further designated Tegahas, a tribe which lives in the hilly country in the interior; G was from the Kinarut district in north-west Borneo; H, Dusun Dyak, Si Labandang, of Ulu Papar, near the source of the river Papar. They were male adults; G and H retained the lower jaw, and in G a large part of the two parietals and of the occipital squama had been apparently sliced off by a sharp weapon. The skulls were not uniform in character. H was much larger and more massive than the others; and

* See my memoir on Scottish Crania, *op. cit.*, vol. xl. pp. 598, 599, 1903, for explanation of the terms *metriocephalic* and *hypsistenocephalic*.

† The cranial capacity in this as in my previous memoirs was taken by the method employed and described in my *Challenger Report*, Zoology, part xxix. p. 9, 1884, the accuracy of which has been confirmed since that time by repeated investigations.

TABLE I.
North Borneo.

	Muruts.					Dusun.			Dalit.	Kweejow.	
	A.	B.	C.	D.	E.	Tegahas.	Kinarut.	Ulu Papar.	I.	L.	K.
Collection mark,	Ad.	Ad.	Ad.	Ad.	Adol.	Ad.	Ad.	Ad.	Ad.	Ad.	Youth.
Age,	M.	M.	M.	F?	F.	M.	M.	M.	M.	M.	...
Sex,	1380	1300	1430	1430	1330	1270	...	1570	1360	1435	1330
Cubic capacity,	180	178	183	175	180ap.	173	180ap.	187	177	180	177
Glabello-occipital length,	135	133	136	133	...	121	135	138	138	144	131
Basi-bregmatic height,	75	74.7	74.3	76	...	69.9	75	73.8	78	80	74
Vertical Index,	91	90	88	88	90	86	91	97	96	96	85
Minimum frontal diameter,	96	105	103	105	103	97	98	112	107	104	98
Stephanic diameter,	105	107	104	110	98	118	105	110	109	118	96
Asterionic diameter,											
Greatest parieto - squamous breadth,	133s.	133p.	128s.	136s.	132p.	135s.	130	141	136s.	141	129p.
Cephalic Index,	73.9	74.7	69.9	77.7	73.3	78	72.2ap.	75.4	76.8	78.3	72.9
Horizontal circumference,	505	508	508	505	505	499	502	529	508	516	498
Frontal longitudinal arc,	128	128	132	126	130	124	130	125	127	129	127
Parietal " "	127	127	129	134	125	133	...	128	135	122	131
Occipital " "	114	105	109	115	106	102	...	139	...	...	...
Total " "	369	360	370	375	361	358	...	392	...	...	...
Vertical transverse arc,	295	290	296	301	280	285	285	317	309	313	300
Basal transverse diameter,	121	118	121	121	113	114	123	124	125	120	109
Vertical transverse circumference,	416	408	417	422	393	399	408	441	...	433	409
Length of foramen magnum,	38	37	37	36	...	33	33	33	...	...	...
Basi-nasal length,	101	100	104	94	...	90	102	100	100	97	...
Basi-alveolar length,	94	90	102	90	...	91	97	94	96ap.	92	...
Gnathic Index,	93.1	90	98.1	95.7	...	101.1	95.1	94	96ap.	94.8ap.	...
Total longitudinal circumference,	508	497	511	505	...	481	...	525	...	...	...
Interzygomatic breadth,	127	128	131	127	...	127	132	133	139	129	119
Intermalar " "	117	118	117	115	...	113	117	124	128	123	105
Nasio-mental length, . . . . .	...	117	106ap.	...	114	...	110	111	...	...	...
Nasio-mental complete facial Index, . . . . .	...	91.4	80.9	...	...	...	83.3	83.4	...	...	...
Nasio-alveolar length,	64	65	68	66	63	62	64	65	66ap.	59	61
Maxillo-facial Index,	50.4	50.7	51.9	51.9	...	49.6	48.4	48.8	47.5	45.7	51.2
Nasal height,	52	54	53	50	49	50	54	50	52	46	45
Nasal width,	26	25	26	27	26	26	26	27	24	29	27
Nasal Index,	50	46.3	49.1	54	53.1	52	48.1	54	46	63	60
Orbital width,	37	39	36	34	37	38	37	37	40	40	33
Orbital height,	35	34	36	31	34	33	34	36	34	35	33
Orbital Index,	94.6	87.2	100	91.2	91.9	86.8	91.9	97.3	85	87.5	100
Palato-maxillary length,	46	45	51	48	...	48ap.	57	50	49ap.	...	...
Palato-maxillary breadth,	61	63	60	61	62	58	59	64	64	...	...
Palato-maxillary Index,	132.6	140	117.6	127	...	120	103.5	128	130	...	...
Nasio-malar Index,	111.4	108.4	109.2	111.2	...	106.6	107.3	108.2	109	106	112.3
Cranio-facial Index,	70.6	71.9	71.6	72.6	...	73.4	73.3	71.1	78.5	71.7	67.2
Lower jaw. { Symphysial height, . . . . .	...	35	32	...	32	...	29	28	...	...	...
{ Coronoid " " . . . . .	...	61	55	...	60	...	63	72	...	...	...
{ Condylod " " . . . . .	...	59	56	...	58	...	58	69	...	...	...
{ Gonio-symphysial length, . . . . .	...	86	88	...	73	...	89	91	...	...	...
{ Inter-gonial width, . . . . .	...	106	...	...	94	...	103	97	...	...	...
{ Breadth of ascending ramus, . . . . .	...	30	36	...	33	...	44	35	...	...	...

whilst they were smoke-stained, it was not, and evidently had not been suspended in a hut. This man was an ambitious, turbulent native, who had been executed for rebellion.

Norma verticalis.—The cranial outline in H was elongated, somewhat broadly ovoid, the form was dolichocephalic, but the cephalic index, 75·4, slightly exceeded the upper numerical limit of that group. The sagittal line was slightly raised, the vault had a steepish slope downwards to the moderate parietal eminences, below which the side walls were almost vertical. The occipital squama projected behind the inion.

The Tegahas skull was smaller, but the relative breadth was greater, the cranial outline showed a wider ovoid, and the cephalic index, 78, placed the skull in the higher term of the mesaticephali. G, again, was so injured that the form of the vault could not be seen; the length and breadth could only be stated approximately, but the cephalic index was obviously below 75. G was phænozygous, and H and F were cryptozygous.

Norma lateralis.—In all these crania the forehead slightly receded, the glabella and supraorbitals were moderate and distinct from the outer upper orbital borders, above which the frontal was flattened towards the temporal ridge; the nasion was a little depressed, the nasal bridge was not keeled, tended to be flattened from side to side and slightly concave upwards. The nasal bones were well formed, and in H were mesially 27 mm. long. In F and H the parietal arc was longer than the frontal, but in H the occipital arc was the longest, 139 mm., owing to the occipital squama, which was not quite symmetrical, being 105 mm. in its longitudinal diameter. The crania F and G rested behind on the cerebellar fossæ, but in H on the tips of the mastoids.

Norma facialis.—In H a low but smooth ridge separated the floor of the nose from the incisive region; in F and G it was smoothed down and one region was continued into the other; in F the maxillo-nasal spine was faint, in G and H a little stronger. The anterior nares were almost alike in width, and the mean nasal index, 51·3, was mesorhine, though in H, owing to the smaller proportion of nasal height to width, the index was platyrhine: the nasio-malar index ranged from 106·6 to 108·2, and the mean, 107·3, was mesopic.

The face in G and H was low, and the complete index was chamæprosopic, but owing to the nasio-alveolar length the maxillo-facial index was leptoprosopic. The mean gnathic index, computed on the relation of the basi-nasal and basi-alveolar diameters, was 96·7, *i.e.* orthognathous; but in F the incisive part of the upper jaw projected forward, and the index, 101·1, was mesognathous. The interorbital diameter was 23 mm. The orbital aperture was rounded, megaseme, in G and H, but in F the index, 86·8, was mesoseme. The palate had a moderate depth; in F and H the index was brachyuranic, in G hyperdolichuranic. The teeth when present were worn and stained with betel. In the jaws the alveoli were not absorbed; the angles, chins, and muscular markings were distinct in the lower jaws.

The cranial sutures were simple, sutural bones in the lambdoid region were small and sparse, pterion normal. In G and H the styloids were fused with the temporals.

The mean cephalic index in the Dusuns was 75·2 mesaticephalic, and F was in the upper term of that group. The mean basi-bregmatic index was 72·9, metriocephalic. The general dimensions were as follows:—mean length 180 mm., height 131 mm., breadth 135 mm.; the breadth was therefore greater than the height, a character which is usually associated with mesaticephalic and brachycephalic crania. The mean breadth-height index was 97, for in the Tegahas skull the height was only 121 mm. The cranial capacity could be taken only in F and H, which showed great diversity, for F was only 1270 c.c., whilst H, 1570, was above the mean of male Europeans, and was associated with the large cranium and the mental capacity of the individual.

DALIT. TABLE I.

In Dr ADAMSON'S collection was an adult male skull of a tribe living in the Dalit country, which he stated to be in the interior of North Borneo, bordering on Dutch territory. The skull was smoke-stained and had attached to it a loop of split cane for suspension. The lower jaw was absent.

Lieutenant DE CRESPIGNY, R.N., in his memoir on Northern Borneo, published a vocabulary of the Dali Dusun tribe living near the Limbang river, to a member of which tribe this skull may have belonged. There appears indeed to be an association between the Dalits and the Dusuns, as Mr WITTI states that many words probably of Dalit origin occur in Dusun speech. South of the Limbang, in the Baram district of Sarawak, is the well-known Mount Dulit, a name which may be associated with the Dalit branch spoken of as Mount Dulit Dusuns.

Norma verticalis.—The cranium was elongated, but owing to the relative breadth the cephalic index, 76·8, placed the skull in the lower term of the mesaticephalic group. The sagittal line was somewhat ridged and the vault sloped steeply down to the parietal eminences, below which the side walls were almost vertical. The parieto-occipital curve was steep and the occipital squama scarcely projected behind a feeble inion. The skull was phænozygous.

Norma lateralis.—The forehead was slightly receding, the glabella and supra-orbital ridges were moderate in size, the frontal was flattened above the external orbital process, and the outer border of the orbit was thickened; the nasion was not depressed, the bridge of the nose was low, tended to be flattened from side to side, and was 25 mm. long in the middle line. The parietal arc was longer than the frontal; the occipital condyls, cerebellar region and mastoids had been injured.

Norma facialis.—A low ridge separated the floor of the nose from the incisive region, the maxillo-nasal spine was moderate. The anterior nares were narrow, and the nasal index, 46, was leptorhine. The nasio-malar index was 109, and therefore mesopic. The canine fossæ were deep. The maxillo-facial index, 47·5, was mesoprosopic, and the interzygomatic breadth was 139 mm. The upper jaw was broken in the incisive region, and the gnathic index was possibly orthognathous. The orbital aperture was

mesoseme, index 85; the interorbital breadth was 23 mm. The hard palate was wide and shallow, and the palato-maxillary index was hyperbrachyuranic; none of the alveoli contained teeth.

The cranial sutures were mostly simple, and those of the vault were undergoing ossification; they had no Wormian bones, and the pterion was normal. The vertical index, 78, was more than the cephalic, and in the height being greater than the breadth the cranium was associated with a character customary in dolichocephalic skulls, and the skull in its breadth-height index, 101·4, was hypsistenocephalic. The internal capacity of the cranium was 1360 c.c.

KWEEJOW. TABLE I. PLATE III.

Dr ADAMSON informed me that the tribe which he calls Kweejow or Kijow is found in the interior of North Borneo. He stated that they live on the hills, and that their language differs from that of the other tribes in proximity to them. Obviously little is known of these people, as the name does not occur in Mr LING ROTH's admirable compendium of information on the natives of Sarawak and North Borneo, in Mr C. HOSE's memoirs, or in Mr HADDON's work on Head Hunters. In Lieutenant DE CRESPIGNY's memoir already quoted is a passage which without doubt refers to this tribe. He says, p. 176, on the Kalias river, near Padas,* live a tribe of people called Kōijoes. They differ much in their habits from the neighbouring tribes, and more especially in their food, for where, as among the Muruts and Dusuns, a certain discrimination is exercised in the choice of food, nothing comes amiss to the Kōijoes—snakes, worms, and beetles are eaten by them as a matter of course. I received two skulls marked Kweejow; one an adult male without the lower jaw, which weighed 1 lb. 12 ozs. avoirdupois. It was stained deep brown from adherent soot. The other, smoke-stained and without the lower jaw, was that of a youth with the dentition incomplete and the basi-cranial synchondrosis unossified.

Skull L. *Norma verticalis*.—The adult male cranium was broadly ovoid in outline, with a cephalic index 78·3. The vault was not ridged in the sagittal line, and curved at first gently, then more steeply outwards to feeble parietal eminences, below which the side walls were a little convex. The parieto-occipital slope was not steep, and the occipital squama projected much beyond a feeble inion. The skull was phænozygous.

Norma lateralis.—The forehead was receding; the glabella and supraorbital ridges were well-marked and blended with the thickened superior border of the orbit. The nasion was depressed, the nasal bones were short, only 18 mm. long in the mid-line, and did not form a keel, so that the root of the nose was flattened from side to side and the profile outline was concave from above downwards. The frontal arc was 7 mm. longer than the parietal. The skull rested behind on the cerebellar part of the occipital bone, which was broken at the foramen magnum.

* The Kalias and Padas rivers are in the western part of North Borneo.

Norma facialis.—A low smooth border separated the floor of the nose from the incisive region, the maxillo-nasal spine was moderate. The anterior nares were wide and the nasal length was small, so that the index, 63, was highly platyrrhine. The nasio-malar index in the adult was 106, on the line between platy- and mesopic. The maxillo-facial index, 45·7, was mesoprosopic. The alveolar border of the upper jaw was broken and the index was possibly orthognathous. The upper and outer borders of the orbit were thick; the aperture, 87·5, was mesoseme. The hard palate was wide and shallow, all the teeth had been lost. The projection of the glabella and supra-orbital ridges, the depressed nasion, the short nose and wide nostrils gave to the face a forbidding aspect.

The cranial sutures were simple and to a large extent ossified. No Wormian bones were observed, but a large left epipteric was present. The cephalic index, 78·3, was in the higher term of the mesaticephalic group, the height of the cranium was greater than the breadth, the vertical index of the skull, 80, was hypsiccephalic. The internal capacity of the cranium was 1435 c.c.

Skull K.—The youth's skull differed materially from that of the adult. It was definitely dolichocephalic, with the cephalic index 72·9, and the height was more than the breadth; the nasio-malar index, 112·3, was prosopic. Although the dentition was incomplete, the face was actually longer than in the skull of the adult, and the maxillo-facial index, 51·2, was leptoprosopic; the orbit was rounded with a megaseme index, 100, and the nasal index, 60, as in the adult, was platyrrhine. The skull was smoke-stained, and had doubtless been suspended in a house as a war trophy, for the head-hunting tribes do not scruple to make victims of women and children; possibly the skull was not a Kweejow, but had belonged to a neighbouring dolichocephalic tribe. The cranial capacity was 1330 c.c.

DAYAKS.

The term Dyak is sometimes incorrectly used by travellers to designate generally the wild people of Borneo. Mr EVERITT contends that it should only be applied to the tribes who themselves use it as their distinctive appellation. In this sense it seems to be employed by the resident officials in Sarawak and North Borneo. The late Sir JAMES BROOKE used the word as properly applicable to wild people "inhabiting parts of the north-western coasts and the mountains of the interior," and he divided them into two groups, Land Dyaks and Sea Dyaks. At one time the difference between them was regarded as one of circumstance only, and that they were essentially the same people. More recent inquiries have led to the belief that these groups differ from each other in many particulars.

LAND DYAKS. TABLE II. PLATE II.

The Land Dayaks chiefly occupy the Sadong and Sarawak river districts and extend into Dutch Borneo. They are described as having the skin of a reddish or yellowish brown colour, the hair black and worn generally long, the eyes black, the nose flattened at the bridge and wide at the nostrils; the face broad; in stature the men range from 5 feet 2 inches to 5 feet 5 inches, rarely 5 feet 7 inches, whilst the women are from 4 feet 6 inches to 5 feet. They file the teeth, which are stained of a black colour. They are head hunters, and the heads are kept in houses specially built for their reception, in which the bachelors live.

Dr ADAMSON sent me the skull of an adult male Land Dayak from Sarawak, which was not smoke-stained and had no loops of cane attached to it. The lower jaw was absent.

Norma verticalis.—The skull was somewhat elongated in relation to the breadth, and the cephalic index, 76·3, was in the lower term of the mesaticephali. The vault was a little ridged in the sagittal line and had a marked downward slope to the moderate parietal eminence, below which the side walls were almost vertical. The parieto-occipital slope was not abrupt and the occipital squama scarcely bulged behind the inion. The skull was phænozygous.

Norma lateralis.—The forehead receded slightly, the glabella and supraorbitals were moderate in projection, and the latter did not blend with the outer upper border of the orbit; the frontal was flattened above the external orbital process. The nasion was scarcely depressed. The parietal longitudinal arc was the longest, the occipital the shortest. The skull rested behind on the cerebellar region of the occipital bone.

Norma facialis.—The nasal floor was separated from the incisive region by a low ridge, the incisive and canine fossæ were deep, the maxillo-nasal spine was feeble. The anterior nares were moderately wide and the index, 49·1, was mesorhine. The mid-length of the nasal bones was 25 mm. The nasio-malar index was 106·1 and the face was mesopic. The maxillo-facial index, 52·4, showed a relatively narrow, leptoprosopic face, and the interzygomatic breadth was 132 mm. The upper jaw was orthognathous. The orbital aperture was round and the megaseme index was 100. The hard palate was shallow, the palato-maxillary index was hyperbrachyuranic. The teeth were slightly worn and not stained with betel.

The sutures of the cranial vault were simple and were to some extent obliterated. The right half of the occipital squama formed a large triquetral bone, partially fused with the rest of the squama. The pterion was normal. No special variations were seen at the base of the skull.

Although the cephalic index, 76·3, was in the lower term of the mesaticephalic group, the general form of the cranium was dolichocephalic;* the vertical index, 75·1, hypsi-cephalic, was less than the cephalic, and the breadth and height index was 98. The internal capacity of the cranium was 1230 c.c.

* Mr HADDON states, *op. cit.*, p. 322, that the cephalic index of the skull of a Land Dyak in the Cambridge Museum was 71·3.

SEA DYAKS. TABLE II. PLATE II.

The Sea Dyaks occupy Sarawak to the east of the Land Dyaks; they have settled on the banks of the Rejang, Kalakah, Saribas and Batang-Lupar rivers, with their tributaries, and they are found also in Dutch Borneo. Mr MAXWELL states that they are more stoutly built than the Land Dyaks. The skin is a rich brown, the hair is long, jet black and flowing; the eyes are black; the nose is short and upturned at the tip. The women are not so dark as the men and the skin has a yellowish tint. The average stature of the men is about 5 ft. 3 in., though occasionally it reaches 5 ft. 7 in. They exceed the Malays in height and have graceful figures. They file the teeth and stain them black. They are head hunters. Tattooing is not universally practised. Mr HADDON adopts the name Iban in substitution for Sea Dyak, and he gives the following physical characters:—average stature 5 ft. 2½ in.; broad head, average cephalic index 83; skin darker than among the inland tribes; long, slightly wavy, black hair, showing a reddish tinge in certain lights; the people, though short, are active.

The skull of an adult male Sea Dyak was in the collection made by Dr ADAMSON. It was not smoke-stained, nor was a loop of cane attached to it for purpose of suspension. It was injured in the left parietal and squamous regions, and the lower jaw had not been preserved.

Norma verticalis.—The cranium was broadly ovoid in outline, and the cephalic index, 78·5, was in the upper term of the mesaticephalic group. The vault was faintly keeled, and it sloped definitely down to the parietal eminences, below which the side walls bulged a little. The parieto-occipital slope was steep, though not vertical, and it was oblique to the left, probably from artificial flattening. The skull was phænozygous.

Norma lateralis.—The forehead was somewhat retreating; the glabella and supra-orbitals were well marked; the outer part of the upper border of the orbit was thickened but distinct from the supraorbital process, and the corresponding part of the frontal bone was flattened. The nasion was slightly depressed; the bridge of the nose was broken, but obviously had only slightly projected, and had been somewhat flattened from side to side. The frontal longitudinal arc was the longest, the occipital was the shortest. The skull rested behind on the mastoids.

Norma facialis.—The floor of the nose was separated from the incisive region by a low ridge; the maxillo-nasal spine was short. The anterior nares were relatively wide, and the nasal index, 50·9, was mesorhine. The canine and incisive fossæ were moderately deep. The nasio-malar index was 108·9 and mesopic. The maxillo-facial index, 51·8, was narrow or leptoprosopic, although the interzygomatic breadth, which gave width to the face, was 139 mm. The upper jaw showed alveolar prognathism and the gnathic index was highly mesognathous. The interorbital breadth was 26 mm., the orbital aperture was nearly equal in its two dimensions and the index was megaseme. The hard palate was moderate in depth and the palato-maxillary index, 116·3, was brachyuranic. The teeth had not been preserved.

TABLE II.

	Borneo.				Malays.	
	Land Dyak, Sarawak.	Sea Dyak.	Tali, Bajau, Brunei.	Bajau.	Perak.	Challenger.
Collection mark,	O.	P.	M.	N.	P	C.
Age,	Ad.	Ad.	Ad.	Ad.	Ad.	Ad.
Sex,	M.	M.	M.	M?	M.	M.
Cubic capacity,	1235	...	1350	1180	1515	1515
Glabello-occipital length,	173	172	164	154	173	163
Basi-bregmatic height,	130	140	137	124	141	145
Vertical Index,	75.1	81.4	83.5	80.5	81.5	89.
Minimum frontal diameter,	93	94	86	92	94	96
Stephanic diameter,	95	101	103	92	113	121
Asterionic diameter,	118	118	101	103	106	107
Greatest parieto-squamous breadth,	132s.	135s.	136p.	137s.	140	151
Cephalic Index,	76.3	78.5	82.9	89.	80.9	92.6
Horizontal circumference,	496	496	478	470	505	508
Frontal longitudinal arc,	116	128	123	111	126	127
Parietal " "	120	124	129	115	127	123
Occipital, " "	111	103	109	96	116	111
Total, " "	347	355	361	322	369	361
Vertical transverse arc,	284	300	300	287	312	330
Basal transverse diameter,	122	130	115	125	126	135
Vertical transverse circumference,	406	430	415	412	438	468
Length of foramen magnum,	40	37	37	36	34	35
Basi-nasal length,	99	102	96	90	104	98
Basi-alveolar length,	90	100	93	92	104	92
Gnathic Index,	90.9	98.	96.9	102.2	100	93.8
Total longitudinal circumference,	486	494	494	448	507	494
Interzygomatic breadth,	132	139	123	129	136	145
Intermalar,	121	127	114	114	126	128
Nasio-mental length, . . . . .	...	...	114	...	115	127
Nasio-mental complete facial Index, . . . . .	...	...	92.6	...	84.5	87.6
Nasio-alveolar length,	69	72	68	64	68	74
Maxillo-facial Index,	52.4	51.8	55.6	49.6	50	51
Nasal height,	53	53	50	48	53	58
Nasal width,	26	27	24	26	26	25
Nasal Index,	49.1	50.9	48.	54.2	49.1	43.1
Orbital width,	37	39	38	36	35	41
Orbital height,	37	37	33	36	32	38
Orbital Index,	100.	94.9	86.8	100.	91.4	92.7
Palato-maxillary length,	49	55	54	51	55	51
Palato-maxillary breadth,	66	64	68	62	67	65
Palato-maxillary Index,	134.6	116.3	125.9	121.5	120.1	127.4
Nasio-malar Index,	106.1	108.9	107.5	103.	108.1	106.8
Cranio-facial " "	76.3	80.8	75.	83.8	78.6	89.0
Lower jaw. { Symphysial height, . . . . .	...	34	...	...	34	31
{ Coronoid, " " . . . . .	...	66	...	...	64	67
{ Condylod, " " . . . . .	...	66	...	...	63	65
{ Gonio-symphysial length, . . . . .	...	85	...	...	87	98
{ Inter-gonial width, . . . . .	...	99	...	...	101	106
{ Breadth of ascending ramus, . . . . .	...	33	...	...	41	45

The cranial sutures were simple and unossified; a few small Wormian bones were in the lambdoid and the right pterion had an epipterice bone; the jugal processes were tuberculated. The inion was strong and dependent, and the muscular ridges were pronounced. The cephalic index, 78.5, in the higher term of the mesaticephalic group, approached the brachycephali; the vertical index, 81.4, hypsicephalic, was greater than the cephalic. The internal capacity could not be accurately obtained, owing to the cranium being injured.

BAJAUS OR SEA GYPSIES. TABLE II. PLATES III., V.

The Sea Gypsies, named Bajau, Bajow, Baju, or Badjoo, are wandering fishermen, who live either in boats or in houses raised on piles near the mouths of rivers in Borneo and Celebes. They are said by Sir HUGH LOW to have come originally from Johore on the Straits of Malacca.* Sir SPENCER ST JOHN described them as short in stature, slight and active, with pinched small faces, low foreheads and bright eyes. They wear the hair tied in a knot on the front of the head. They practise tattooing.

Two adult skulls presented by Dr ADAMSON were labelled Bajau or Bajow. The larger, M, that of Mohammed Tali, was from Brunei, a small native State intervening between North Borneo and Sarawak. The man was said to have been muscular, about 5 ft. 4 in. in stature, with dark skin, coarse long black hair, brown eyes, nose flattened at the bridge, lips moderately thick. He was a well-known cattle thief, and was shot whilst defending a fort which he had built. The smaller skull, N, was marked Malay trader; it may have been that of a man, though the sex characters were not very definite; the wisdoms had not erupted, but the basi-cranial synchondrosis was ossified. The skulls were not smoke-stained, and M retained the lower jaw.

Norma verticalis.—The crania were rounded in outline; that of Tali was brachycephalic, cephalic index 82.9, whilst N was hyperbrachycephalic, index 89. The high index was due to the glabello-occipital diameter, in the mean 159 mm., being much less than in the other native skulls from Borneo, whilst the greatest breadth was about the average. The crania were not keeled in the sagittal line; the vault sloped gently downwards to the prominent parietal eminences, below which the side walls were not quite vertical. In M the parieto-occipital slope was almost vertical, though with a slight obliquity to the left, and the back of the skull was flattened, apparently by artificial pressure, so that it was almost in the same vertical plane as the inion. N had a similar parieto-occipital flattening, though without any obliquity. Both were phænozygous.

Norma lateralis.—The forehead was almost vertical, the glabella and supraorbital ridges were feeble and distinct from the upper border of the orbit; the nasion was not depressed. The bridge of the nose was faintly keeled with a shallow concavity forward. In M the nasal bones were 17 mm. long in the mesial line, in N only 13 mm. and very

* They are well known at the present time as frequenting the straits between the islands of the Johore Archipelago, where they bear the name Sea-Jakun or Orang Laut. They have been regarded as an aboriginal, primitive Malay sea tribe. *Vide* the works of Nelson Annandale, Rudolf Martin, and Messrs Skeat and Blagden.

narrow. In both, the occipital longitudinal arc was the shortest, the parietal the longest. The skulls rested behind on the cerebellar fossæ of the occipital.

Norma facialis.—The floor of the nose was separated by a low ridge from the incisive region; the maxillo-nasal spine was moderate, the incisive fossæ were moderate, and in N the canines were deep. In M the anterior nares were relatively narrow, the nasal index, 48, being leptorhine: in N the index, 54·2, was platyrrhine. The nasio-malar index ranged from 103 to 107·5, and the mean was 105·2, platyopic.

The complete facial and maxillo-facial indices were computed in M and seen to be leptoprosopic, and in N the maxillo-facial was almost in the same group; the proportions of length and breadth gave a narrow-faced skull. In M the incisive region projected forwards and produced an alveolar prognathism, although the gnathic index, 96·9, as determined by FLOWER's method, placed it in the orthognathic group; in N the index, 102·2, was mesognathous. In M the orbital index, 86·8, was mesoseme, but in N the aperture was rounded and the index, 100, megaseme. In both skulls the hard palate was moderate in depth, and the palato-maxillary index was hyperbrachyuranic. The teeth were betel-stained; the crowns were much flattened in M, but less so in N. The lower jaw in M had strong masculine characters.

The cranial sutures were simple and unossified, without Wormian bones in the lambdoid; the right jugal process in M and both jugals in N had a short pointed paracondylar process. In M the styloid process was ossified to the temporal, and there was a right epipteric bone. In M the basi-bregmatic height was 1 mm. more than the greatest breadth of the cranium, but in N it was 13 mm. less: the mean cephalic index, 85·9, of the two crania exceeded the mean vertical index, 82, hypsiccephalic, which is the rule in brachycephalic skulls, and the mean breadth-height index was 95·2. The internal capacity of the cranium of Tali was 1350 c.c., but that of N was only 1180 c.c., a capacity which is more in accordance with that of the female than the male skull.

MALAYS. TABLE II. PLATE IV.

The Museum does not contain any Malay skulls from Borneo with which to contrast the skulls above described. Several specimens are indeed marked Malay without any further information, but as their history is obscure I do not dwell on them. Two Malay skulls which have a definite history are worthy of description. One, from a man who had died in hospital in Calcutta, was given to me more than twenty years ago, along with the other bones of the skeleton, by Lieut.-Col. DOUGLAS D. CUNNINGHAM, M.D., F.R.S., and the skeleton, the skull excepted, was described in my memoir in the *Challenger Reports*.* The other was presented to me, along with the pelvis, in 1889 by the late Dr WM. DUNCAN SCOTT, medical officer in Perak, Malay Peninsula. They were parts of the skeleton of a male Malay, said to be about 26 years old, who

* Zoology, part xlvii., 1886,—part ii., the Bones of the Skeleton.

had lived near the junction of the Perak and Chenderiang rivers. The lower jaw was present. These skulls are marked P and C in Table II.

Norma verticalis.—The cranial outline in P was broadly ovoid, the cephalic index, 80·9, was brachycephalic; in C the outline was rounded, and the index, 92·6, was hyperbrachycephalic. They had no sagittal ridge, and the slope of the vault to the parietal eminences was moderate, below which the side walls were a little convex. The parieto-occipital slope in P was steep, and the occipital squama projected behind the inion, possibly there was slight occipital flattening; in C the slope of the parieto-occipital region was vertical from the parietal foramina, and the artificial flattening was so marked that the occipital squama did not project behind the inion. The skulls were cryptozygous.

Norma lateralis.—In P the forehead was almost vertical, in C it somewhat receded; in both the frontal eminences were distinct, and the bone was flattened above the upper border and external process of the orbit; the glabella and supraorbital ridges were moderate, and the nasion was slightly depressed; the nasal bridge was feeble, the profile outline was concave; in C the mid-nasal length was 32 mm., in P, with a deeper concavity, 26 mm. The occipital longitudinal arc was the shortest, the frontal and parietal were almost equal. The skulls rested behind on the mastoids.

Norma facialis.—The floor of the nose was smoothed down into the incisive region; the maxillo-nasal spine was moderate; the incisive and canine fossæ were moderate: in P the nasal index, 49·1, was mesorhine, in C the nasal height in relation to the width was greater and the index, 43, was leptorhine; the nasio-malar indices showed the profile of the nose to be mesopic. The complete facial index in P was chamæprosopic; in C mesoprosopic, in which the interzygomatic diameter was 145 mm.; in both the maxillo-facial index was leptoprosopic. The gnathic index, as determined by FLOWER's method in P, was mesognathous, in C orthognathous, though to the eye the upper jaw in C had a forward projection. The orbital aperture was rounded, megaseme; the interorbital diameter was 26 and 24 mm. respectively; in P the supraorbital foramina had complete bony walls. The palatal arch in P was 18 mm. deep opposite the second molar, in C it was shallower; in both the palato-maxillary index was hyperbrachyuranic. In P the teeth had all erupted except the upper wisdoms, the crowns were worn and flattened by use, especially the incisors, the flattened biting edges of which were in contact with each other when the mouth was closed.* In C the crowns were also much worn, though the edges of the incisors were not so closely adapted as in P; the teeth were deeply stained. The lower jaw was strong, the chin was square and projecting, the angle was well defined.

The cranial sutures were simple and no sutural bones were present. The mastoids and the temporal curved lines were well marked, the inion and occipital curved lines were feeble; in P the styloids were ossified to the temporals, and each vaginal process

* I may refer to my paper on the relations of the Dentary Arcades in the Crania of Australian Aborigines (*Journ. of Anat. and Phys.*, vol. xxv. p. 461, 1891) for an account of this character in certain races. I may state that I have twice seen the adaptation of the biting edges of the incisors in Scottish students of my anatomical class.

the customary width of the angle in the male than was the angle, 76° , of the Challenger specimen. The shape of the brim of the pelvis was not uniform; in the Perak specimen the transverse diameter was much in excess of the conjugate, the form of the inlet was ovoid transversely, and the index was platypellic; whilst in the Challenger example the conjugate exceeded the transverse diameter, the brim was ovoid antero-posteriorly, and the index was dolichopellic. On the other hand, the intertuberal diameter of the pelvic outlet and the depth of the true pelvis were much less in the Perak than in the Challenger examples. The length of the sacrum measured in a straight line and the breadth of the bone at the base were almost alike in the two specimens, and the sacral index was dolichohieric. The first coccygeal vertebra was not ankylosed to the sacrum. The præ-auricular sulcus was a shallow vertical groove; the pectineal line was not raised into a sharp ridge, and the pubic spine was prominent.

The University Museum has recently received two male adult Malay skulls collected by Messrs ANNANDALE and ROBINSON in their expedition to the Malay Peninsula in 1901-02. They have been described in detail by NELSON ANNANDALE, D.Sc., in "Fasciculi Malayenses."* One, No. 21, was from Jambu, Jhering; the other, No. 22, a Kalantan Malay, was from the town of Patani. In No. 21 the cranium was "square shaped" in outline, the parieto-occipital slope was abrupt and unsymmetrical, the cephalic index 85.9, the skull cryptozygous. In No. 22 the cranium was broadly ovoid, the parieto-occipital slope not quite so abrupt, the cephalic index 79, the skull phænozygous. The vertical index in No. 21 was 85.2, in No. 22, 75.5, and in each, as is so common in brachycephalic skulls, the breadth was greater than the height. In both, the nose was leptorhine, the upper jaw projected forward, the palato-maxillary region dolichuronic, and the complete facial index chamæprosopic. In No. 21 the orbit was microseme and in No. 22 mesoseme.†

The Jambu skull had an incomplete skeleton, the pelvis of which possessed male characters and was a little smaller than the pelvis in my specimen described in the *Challenger Reports*. The conjugate diameter of the brim, 98 mm., was almost equal to the transverse, 100 mm., and the pelvic index, as in the Challenger specimen, was dolichopellic. The length of the sacrum in a direct line was 102 mm., and along the curve 110 mm.; the maximum breadth was 98 mm.; the sacral index, 96.1, was dolichohieric, as in the Challenger and Perak pelves. The subpubic angle was 60° .

* *Anthropology*, part ii. (a) p. 93, 1904.

† The most recent information on the physical characters of the Malays is to be found in NELSON ANNANDALE'S description in "Fasciculi Malayenses," 1904; RUDOLF MARTIN, *Die Inlandstämme der Malayischen Halbinsel*, Jena, 1905; W. W. SKEAT and C. O. BLAGDEN, *Pagan Races of the Malay Peninsula*, London, 1906.

GLOGNER, "Sieben malaische Schädel," *Verhandl. der Berliner Gesells. für Anth.*, p. 378, 1892.

KOHLBRÜGGE, "Anthrop. Beobacht. aus dem Malayische Archipelago," *Verh. der Berliner Gesells. für Anth.*, p. 396, 1900.

GENERAL OBSERVATIONS ON BORNEO CRANIA.

Owing to the limitation in number of the skulls and the restricted area in the island in which they were collected, the material at my disposal is not adequate to permit a comprehensive survey, based on my own observations, of the craniology of the natives of the whole of Borneo. Sufficient have, however, been examined to enable me to state that in North Borneo, Brunei and Sarawak the crania of the natives are not uniform in character, but show diversities in form and proportion, which justify the conclusion that the island is inhabited by different races. Attempts have been made from time to time, amongst others, by MM. DE QUATREFAGES and HAMY, Mr C. HOSE and the naturalists who have studied the people of Sarawak along with him, and by NIEUWENHUIS and KOHLBRÜGGE, from observations on the people of Dutch Borneo, to differentiate the several races, the period when they populated the island, and the order of their immigration.

In an ethnographical survey of the great islands in the Malay Archipelago one cannot overlook the possibility of the presence in them of a Negrito element, characterised by pigmy stature, black skin, and short woolly black hair, either pure or cross-bred with another race or races. The Semangs in the adjacent Malay Peninsula, the Mincopies of the Andaman Islands, and the Aëta Pigmies in some of the Philippine Islands are well-known examples of Negritos occupying countries in more or less close proximity to the great islands of the Archipelago.

In Borneo itself apparently the most primitive people are the Punans, or, to employ the name given by BOCK, as used in south-east Borneo, the Orang Poonans. They are the Forest people who live in the jungles and dense forests in the mountains at the head waters of the big rivers. HOSE and BOCK regard them as the aboriginal inhabitants; they do not cultivate the soil, but live by hunting and on the products of the jungles, and are nomadic in their habits. If a Negrito element existed one would expect it to be met with in these tribes. BOCK described those seen by him in Dutch territory as yellow in colour, the women being much lighter than the men, the hair long and black and the stature moderate, all of which do not conform with Negrito characters. HOSE recognises their fair skin and also large-boned, strong physique. HADDON says that the Punans are broad-headed, with an average cephalic index 81.

The physical characters therefore in important particulars do not accord with those of the Negritos, although, if HADDON's statement be correct, they approximate to them in the relations of the breadth to the length of the head. It should be stated that the Punans are not head hunters and do not build houses. There is also no evidence that the Ukits, also nomadic, who live in the Kayan country in Sarawak, are to be associated with the Negritos; probably they are a branch of the Punans.

The river valleys and the adjoining hill ranges in Borneo are peopled by tribes bearing various names, *e.g.* Sebop, Melanau, Kadayan, Kalabit, Ot Danum, Ulu

Ajar, Land Dyaks, Muruts, Dusuns, Dalits, etc. HOSE, SHELFORD and HADDON have grouped these tribes together by the general name Kalamantans, a term derived from the natives of Sarawak, who give the name Pulo Kalamantan to Borneo. HOSE and SHELFORD group the Punans with the Kalamantans, although the latter are agriculturists and have a higher social organisation than the nomadic Punans. The Kalamantans had probably migrated into Borneo, either from the Asiatic Continent or from the groups of islands to the eastward, at some unknown period.

The observations recorded in the earlier pages of this memoir enable one to speak of the cranial characters of the Muruts, Dusuns, the Dalit Dusun, who form so considerable a proportion of the inland population of North Borneo, and also the Land Dyak from Sarawak. The cephalic index in the ten skulls examined ranged from 69.9 in a Murut to 78 in the Tegahas Dusun, and the mean of the series was 74.8. Five of the skulls had the index below 75, and were distinctly dolichocephalic in form and proportions; in the other five the greater relative breadth placed them in the mesaticephalic group, and of these three were below 77. In four specimens the vertical index exceeded the cephalic, in one these indices were equal, in four the cephalic index was the greater; in the entire series the mean vertical index was 74.6, fractionally lower than the mean cephalic, and not showing so large a difference as is customary in dolichocephalic crania. The nasal index ranged from 46 to 54; three were platyrrhine, two were leptorrhine, five were mesorrhine; the mean of the entire series, 50, was mesorrhine. The gnathic index in nine skulls, as determined by FLOWER's method, ranged from 90 to 101; seven were orthognathous, two were mesognathous, and the mean of the series, 94.8, was orthognathous.

The interzygomatic breadth ranged from 127 to 139 mm. and the mean was 130.6 mm.; the nasio-alveolar length ranged from 62 to 69 mm. and the mean was 65.2; the maxillo-facial index ranged from 47.5 to 52.4; no specimen was chamæprosopic, four were mesoprosopic, the majority were leptoprosopic, with relatively narrow faces, to which group the mean index of the series, 50, is to be referred. The nasio-malar index ranged from 106.1 to 111.4; no specimen was platyopic or flat-faced, *i.e.* with the index below 106, two were pro-opic, index above 110, the majority were mesopic, which was the mean index, 108.6, of the series, the profile of the nose having a moderate projection. The orbital index ranged from 85 to 100; no skull was microseme, three were mesoseme, seven were megaseme; the mean of the series, 92.5, was also megaseme, with rounded orbits. The palato-maxillary index ranged from 103.5 to 140 mm.; only one specimen had the arch long in relation to the breadth, dolichuranic; the rest had relatively wide arches and were brachy- or hyperbrachyuranic.

From this summary of the characters of the skulls in these Kalamantan tribes it may be stated that they were dolichocephalic or approximated thereto; whilst in some the height was more than the breadth, in others the reverse was seen, but in the crania as a whole the mean height and breadth were almost equal. The nose was moderately wide at the anterior nares and not greatly flattened at the bridge. The face was not

low and of moderate width; the upper jaw was not very projecting; the orbits were rounded, and the palate had, as a rule, a wide and shallow arch.

Since the time of ANDERS RETZIUS anthropologists have recognised the importance of determining the relation of the length to the breadth of the cranium in different races of men and have for many years expressed these relations numerically by the cephalic index. Attention has been subsequently called by J. KOLLMANN to the relation between the length and breadth of the face, and he has employed the term *leptoprosopic* to express a face long and narrow in relation to its breadth, and *chamæprosopic* for a face relatively low and broad. In my memoir on the Craniology of the People of Scotland* I have suggested an intermediate or *mesoprosopic* group between the two extreme forms.

Little attention, however, seems to have been given to the relation between the length of the cranium and the breadth of the face, and to distinguish if differences in this relation existed in dolichocephalic when contrasted with brachycephalic crania. A numerical expression of the relation between cranial length and facial breadth may be obtained and a *cranio-facial index* computed by the following formula $\frac{\text{interzygomatic breadth} \times 100}{\text{maximum length}}$, the length being regarded as = 100.

In the nine crania of the Kalamantan group, in which both the glabello-occipital and the interzygomatic diameters were measured, the cranio-facial index varied from 70.6 in a Murut to 78.5 in the Dalit skull, and the mean was 73.2. It would seem, therefore, that in these people a face relatively high and narrow was associated with a cranium relatively long and narrow. The two skulls with the highest cranio-facial index, 76.3 and 78.5 respectively, had cranial proportions in which the breadth was somewhat greater in relation to the length and the skulls were in the lower term of the mesaticephalic group.

I have not, in the summary of this group, included the two Kweejow skulls, for though both were marked as being of the same tribe, the young skull was definitely dolichocephalic, whilst the adult was in the higher term of the mesaticephalic group. If the proportions shown by the youth's cranium may be regarded as characteristic of the tribe, it doubtless should be associated with the dolichocephalic Kalamantans; but if the mesaticephalic skull more nearly represented the customary proportions, then possibly the tribal character was due to a cross between the Kalamantan and a race the crania of which possessed brachycephalic proportions. The low cranio-facial index, 67.2, of the Kweejow youth is associated with the imperfect development of the face and the dental arcades.

Messrs HOSE, SHELFORD and HADDON have described in Sarawak tribes named Kenyahs and Kayans, and KOHLBRÜGGE and NIEUWENHUIS have also recognised Kayans in Dutch territory. They are believed to have entered Borneo by the rivers which join the sea on the east and south-east coasts, at a period subsequent to the immigration of the Kalamantans, and gradually to have penetrated westward into Sarawak, which

* *Op. cit.*, p. 606. See footnote to this memoir, p. 783.

they occupied in the region midway between the coast and the highlands of the interior. They are said to have low brachycephalic heads, but no crania of these tribes have come under my observation.

The coast line of Borneo is peopled by Sea Dyaks, Bajaus or Sea Gypsies, and Malays. To all appearance the coast tribes had settled at a period subsequent to the immigration of the Kalamantans, Kenyahs and Kayans. Unfortunately the number of specimens of the people of the coast under examination was too small to enable me to formulate a wide generalisation. Mr HADDON states that the Sea Dyaks have broad heads, with a mean cephalic index 83. The index of my only specimen of the skull was 78·5, approaching the brachycephalic in its proportions, and thereby distinguished from the dolichocephalic Kalamantans, in which group the Land Dyaks have been included.

The two skulls of the Bajaus at once strike the observer as distinct in type from the Kalamantan Muruts and Dusuns. They were on a smaller scale, especially in length, the parieto-occipital slope was so steep as to be almost vertical, and the flattened form of the occiput was obviously in part at least due to pressure applied during infancy. Both skulls were brachycephalic, one indeed was hyperbrachycephalic, the artificial flattening having doubtless contributed in part to the production of an antero-posterior shortening of the cranium.

If the Sea Dyak and the two Bajau skulls be classed as a group, the mean cephalic index was 83·4, brachycephalic, and the mean vertical index was 81·8. The nasal index ranged from 48 to 54·2, and the mean, 51, was mesorhine; the interzygomatic breadth ranged from 123 to 139 mm., and the mean was 130·3 mm.; the nasio-alveolar length ranged from 64 mm. to 72, the mean was 68 mm.; the mean maxillo-facial index, 52·3, was leptoprosopic: the nasio-malar index ranged from 103 to 108·9, and the mean was 106·4, mesopic: the gnathic index ranged from 96·9 to 102·2, and the mean was 99, mesognathous: the orbital index ranged from 86·8 to 100, and the mean was 93·9, megaseme: the palato-maxillary index ranged from 116·3 to 125·9, and the mean was 121·2, hyperbrachyuranic. The coast tribes therefore may be said to be short-or round-headed; the nose moderately wide at the anterior nares and not projecting at the bridge; the face long in relation to the breadth; the upper jaw moderately projecting; the orbits rounded, the palate shallow and with a wide arch.

The two Malay skulls described in this memoir were brachycephalic, with a mean cephalic index 86·7, and with a mean vertical index 85·2; the mean nasal index, 46·1, was leptorhine; the mean interzygomatic breadth was 140·5, the mean nasio-alveolar length was 71, and the maxillo-facial index, 50·5, was leptoprosopic; the mean nasio-malar index, 107·4, was mesopic; the mean gnathic index, 96·9, orthognathous; the mean orbital index, 92, megaseme; the mean palato-maxillary, 123·7, hyperbrachyuranic. In most of these indices the Malays corresponded with the Sea Dyaks and Bajaus.

The cranio-facial index was computed in these brachycephalic skulls. In the Bajau M, marked Tali, it was only 75. In N it was 83·8 and in the Sea Dyak 80·8, materially

higher in these two skulls than in the dolichocephalic Kalamantans, and approximating to the two brachycephalic Malays, in which the mean cranio-facial index was 83·8. The modifications in the cranio-facial index recorded in this memoir point to the association of relatively long heads with narrow faces, and relatively broad heads with wide faces. The cranial characters generally expressed an affinity between the Sea Dyaks, Sea Gypsies and Malays, and pointed in all probability to a common descent. Their immigration from the Malay Peninsula, or from the great islands of the Malay Archipelago, had in all probability been at different periods; and some amount of cross-breeding with the older Kalamantan inhabitants had not unlikely taken place.

Several Museums contain collections of skulls from Borneo which usually do not have tribal names attached to them, whilst in many cases the precise locality from which they came is not definitely specified. In the great collection formed by BARNARD DAVIS, now added to the Museum of the London College of Surgeons, twenty-three skulls said to be from the Island of Borneo* are entered by the general name "Dyak" without any tribal designation. They are all apparently from Dutch territory, and several are elaborately decorated. DAVIS has recorded the length-breadth (cephalic) index in twenty-one of these skulls. In six the index was 80 and upwards, and of these five were from localities on the coasts; for example, two were from Banjarmassin, one from Koesan near Pagottan also on the south, another from the south-east coast, another from the Kapoeas river to the west, a sixth from an unspecified locality. In eight the index was 75 or less; two were from Banjarmassin, two from Poeloe Petak, two from the Upper Kapoeas river in Central Borneo, one from Katingan, and one from an unspecified locality. In three with index 76, of which one was from the Tewen river, a source of the Barito river in Central Borneo, and one with index 77, the locality of which was not stated. One from Sango, Sambas Kapoeas had this index, 78, and two from unspecified localities had the length-breadth index 78 and 79.

In Sir WM. FLOWER's well-known catalogue† of skulls in the Museum of the Royal College of Surgeons, London, four skulls, highly decorated, from Dutch Borneo are marked "Dyak"; two others, also "Dyak," and one unmarked are from Sarawak and are smoke-stained; a skull from a village on the Pantai river, on the east coast of Dutch Borneo, and another from the north-east coast, said to be a Batta,‡ have cephalic indices respectively 81·5 and 72·6. Two additional skulls have since been acquired by the Museum,§ one from North Borneo, index 69·8, the other, a "Ukeit," index 78·5, from the interior. In this collection the cephalic index was more than 80 in three specimens obtained from the east and west coasts; below 75 in five skulls, of which three were

* *Thesaurus Craniorum*, p. 289 *et seq.*, London, 1867.

† London, 1879.

‡ BARNARD DAVIS catalogues, p. 275, a Batta or Batak skull from the Island of Sumatra, and quotes Junghuhn as locating this tribe in the narrow part of that island.

§ Quoted by H. LING ROTH, vol. 2, p. ccxi, London, 1896.

procured at or near the coast; from 78.3 to 78.7 in three specimens, of which two were from the coast.

MM. DE QUATREFAGES and HAMY, in their classical treatise,* state that nine crania from Borneo, most of which are from the south of the island, are in the Paris Museums, and of these four were dolichocephalic or subdolichocephalic, with the length-breadth index ranging from 72.4 to 74.8; three were brachycephalic and the corresponding index varied from 80.2 to 84.2. In table xlv. they have summarised the characters of eleven male "Dyak" skulls. The mean index of length and breadth was 77.5, of length and height 75.8, of breadth and height 98.5. SWAVING is quoted as saying,† the mean cephalic index of ten Dyak skulls from the interior of Dutch Borneo is 74.5.

The Museum in Amsterdam, formed by the Professors VROLIK,‡ contains a skull from Sambas on the west coast of Borneo, which was brachycephalic. Also eight skulls marked "Dyak," two of which were decorated with tin foil; of these one, apparently from Banjermassin, is said to be brachycephalic, also one from Kahayan to be dolichocephalic. Three marked "born at Banjermassin" and three without definite locality are also said to be dolichocephalic, but in none of the specimens is the cephalic index stated.

The crania comprised in the London, Amsterdam and Paris Museums, along with those in the University of Edinburgh Anatomical Museum now described, show that the coasts of Borneo are inhabited by people, as a rule, brachycephalic or approximating thereto, a character which indicates that they are either true Malays, or have Malay affinities and descent. On the other hand, the Kalamantan tribes who occupy the interior of the island, details of whose cranial characters are supplied in this memoir, are dolichocephalic in form and proportions. The cross-breeding which doubtless to some extent takes place between the people of these two different types would account for those skulls which possess the intermediate mesaticephalic characters.

BOTANS OF FORMOSA. TABLE III. PLATES IV., V.

About twenty years ago my friend the late Dr JOHN ANDERSON, F.R.S., presented to me four skulls from the Island of Formosa. They had been collected on a field of skirmish between the Botans and Japanese, by an American naval officer attached to the Japanese military expedition to that island in 1874-5. The heads had been decapitated by the Japanese soldiers, and the skulls were prepared for the American officer, in whose custody they remained until he presented them to Dr STUART ELDRIDGE, by whom they were given to Dr ANDERSON. In 1877 Dr ELDRIDGE read "Notes on the Crania of the Botans of Formosa" to the Asiatic Society of Japan, which were printed in pamphlet form, a copy of which I received along with the skulls from Dr ANDERSON.

* *Crania Ethnica*, Paris, 1882.

† Quoted by I. H. F. KOHLBRÜGGE in *L'Anthropologie*, t. ix. p. 2, 1898.

‡ *Catalogue of the Vrolik Museum*, by J. L. DUSSEAU, Amsterdam, 1865.

In this pamphlet Dr ELDRIDGE states that the Botans or Motans are one of the aboriginal tribes of southern Formosa. He describes them as a race of rather fine physical development, of medium height, courageous, frank and impressible like most savages, straight-haired, complexion various, but always of a brown tint, never black. They cultivated the soil, possessed domesticated animals, were fond of the chase, lived under a patriarchal system, and had a rude form of religion, the cult of which was in the hands of priestesses. He noted some of the more prominent characters of the skulls, and gave a number of measurements in inches. Photographs on a small scale of three of the specimens were reproduced in his paper.

As specimens of the skulls of the aborigines of Formosa are seldom met with in Museums, and as Dr ELDRIDGE's Notes seem to have received no attention from anthropologists, I have thought that a more complete description of these skulls, in accordance with modern methods, might prove of interest.

The skulls were those of men in the prime of life. The lower jaw was present in Nos. 1 and 2. No. 1 was in good order; No. 2 had lost part of the frontal, sphenoid and much of the left side of the face; Nos. 3 and 4 were injured and bore the marks of sword-cuts, and the facial bones were absent. In length, breadth and height, and in the horizontal, longitudinal and vertical transverse circumference, the skulls so closely approximated to each other in absolute dimensions and general form that they presented a strong racial or even family resemblance. The skull measurements and indices are given in Table III.

Norma verticalis.—The outline of the cranium, though elongated, was in two specimens a broader ovoid and the cephalic index ranged from 74·6 to 77·3. Nos. 3 and 4 were dolichocephalic and Nos. 1 and 2 were respectively 77·1 and 77·3, *i.e.* in the lower term of the mesaticephalic group. The sagittal region was not ridged, the transverse arc was in some rounded from side to side, the parietal eminences were fairly marked, and the skulls were a little wider in the squamous than in the parietal regions. The slope downwards and backwards in the parieto-occipital region was moderate, there was no artificial flattening, and the occipital squama projected only a little behind the inion. Two skulls were phænozygous, one was cryptozygous.

Norma lateralis.—The frontal eminences were moderate and the forehead was somewhat receding; the glabella and supraorbital ridges were not specially projecting, though most pronounced in No. 3; in all the specimens they could be differentiated from the outer upper border of the orbits. The nasion was not depressed, the bridge of the nose was not flattened, but moderately projecting. The parietal longitudinal arc was the longest and the occipital arc the shortest in Nos. 1 and 2, but the parietal was the shortest and the occipital much the longest in No. 4. The crania rested behind on the cerebellar occipital fossæ in Nos. 1, 2 and 3.

Norma facialis.—The maxillo-nasal spine was moderate in Nos. 1, 2 and 3. The sides of the anterior nares, though sharp in the upper part, were less so lower down, and the incisor border of the nasal floor was smoothed down into the incisive region of the

TABLE III.
Botans of Formosa and Tibetans.

	Botans.				Tibetans.	
	1	2	3	4	C.	D.
Collection mark,	Ad.	Ad.	Ad.	Ad.	Advd.	Ad. Metopic.
Age,	M.	M.	M.	M.	M.	M.
Sex,	1380	...	...	...	1570	1230
Cubic capacity,	179	176	181	178	186	178
Glabello-occipital length,	133	133	139	136	140	100
Basi-bregmatic height,	74.3	75.6	76.8	76.4	75.3	56.1
Vertical Index,	93	...	87	90	98	96
Minimum frontal diameter,	107	107	...	98	105	108
Stephanic diameter,	101	98	105	186	103	120
Asterionic diameter,	138s.	136s.	135s.	133s.	135	141
Greatest parieto-squamous breadth,	77.1	77.3	74.6	74.7	72.6	79.2
Cephalic Index,	515	500	...	500	518	518
Horizontal circumference,	123	120	125	117	125	132
Frontal longitudinal arc,	129	132	240	115	134	130
Parietal " "	108	110		131	120	111
Occipital " "	360	362	365	363	379	373
Total " "	298	297	308	295	305	281
Vertical transverse arc,	125	127	122	122	120	124
Basal transverse diameter,	423	424	430	417	425	405
Vertical transverse circumference,	36	34	33	35	40	31
Length of foramen magnum,	102	103	106	102	104	90
Basi-nasal length,	98	94	98	...	105	104
Basi-alveolar length,	96.1	91.3	92.5	...	101	115.6
Gnathic Index,	498	499	504	500	523	494
Total longitudinal circumference,	132	138	135	130	136	130
Interzygomatic breadth,	122	...	128	...	127	117
Intermalar " "	111	106	...	...	...	...
Nasio-mental length,	84	76.8	...	...	...	...
Nasio-mental complete facial Index,	72	63	67	...	74	65
Nasio-alveolar length,	54.5	45.6	49.6	...	54.3	50
Maxillo-facial Index,	55	54	53	...	54	52
Nasal height,	27	25	27	...	28	27
Nasal width,	49.1	46.3	50.9	...	51.8	51.9
Nasal Index,	39	39	37	...	40	36
Orbital width,	36	34	35	...	36	36
Orbital height,	92.3	87.2	94.6	...	90	100
Orbital Index,	53	50	53	...	60	53
Palato-maxillary length,	61	63	71	...	67	56
Palato-maxillary breadth,	115	126	134	...	111	105.6
Palato-maxillary Index,	108.4	...	108.3	...	107.7	102.1
Nasio-malar Index,	73.7	78.4	74.5	73	73.1	73
Cranio-facial Index,	Lower jaw.	32	23	...	...	...
(Symphysial height,		69	58	...	...	...
Coronoid " "		75	62	...	...	...
Condylod " "		98	91	...	...	...
Gonio-symphysial length,		100	...	...	...	...
Inter-gonial width,		42	40	...	...	...
Breadth of ascending ramus,						

maxilla. The mean nasal index was mesorhine, 48.7; in Nos. 1 and 2 the anterior nares were wider absolutely and relatively to the height of the nose, but in No. 2 they were narrower and the index was leptorhine, 46.3. In Nos. 1 and 2 the complete face

was short absolutely and relatively to the interzygomatic breadth, and the complete facial index was chamæprosopic. The disproportion between the interzygomatic breadth and the nasio-alveolar length was, however, not so great, and the maxillo-facial index was in No. 1 leptoprosopic and in Nos. 2 and 3 mesoprosopic. The canine and incisive fossæ were moderate in depth. The interorbital breadth ranged from 19 to 24 mm. The relation of the bi-malar to the nasio-malar diameter gave a nasio-malar index 108·3, so that the nasal profile was mesopic, *i.e.* between a platyopic and pro-opic face. The orbital apertures were rounded and the mean orbital index was megaseme, 91·3. The palatal arch was shallow in one specimen, and wide in all in relation to the length; the palato-maxillary index was brachyuranic, and in two even hyperbrachyuranic. The upper jaw was orthognathous and the mean gnathic index was 93·3.

The cranial sutures were distinct in Nos. 1, 2 and 4, but in No. 3 they were almost obliterated. No. 1 had a small Wormian bone in the occipito-mastoid suture. The alisphenoid articulated with the parietal, but in No. 3 the junction was reduced to a pointed bar of bone. Infraorbital sutures were present in Nos. 1 and 2. The jugal processes were somewhat tuberculated, but no skull had a 3rd condyl. The inion, occipital curved lines and mastoids had male characters. The lower jaw was more massive in No. 1 than in No. 2; its vertical diameters were longer and the chin was thicker and more projecting, but in both the angle was almost rectangular and the ascending ramus was broad. The teeth were stained with betel, and the molars were flattened through use on the grinding surface of the crown.

The Botan crania in their proportions were associated with the dolichocephalic type of skull, for whilst two had the cephalic index below 75, the other two were in the lower term of the mesaticephalic group. The mean cephalic index was 75·9, the mean vertical index, 75·7, was hypsicephalic. In the mesaticephalic crania the vertical index was less than the cephalic, but in the dolichocephalic the vertical index was greater than the cephalic, in accordance with the rule that in the dolichocephali the height is more than the breadth. The cranio-facial index ranged from 73 to 78·4, and the mean was 74·9, a figure which associated these relations to the dolichocephalic type in Borneo.

The northern end of Formosa and the fertile plain along the western half of the island have long been frequented for purposes of trade, and they have been occupied successively by the Dutch, Chinese and Japanese, but the mountainous districts in the interior, the south end and the east coast have been little visited, for they have been almost inaccessible through their mountainous configuration and the savage character of the people. Since Formosa was ceded by the Chinese to Japan in 1895, attempts have been made by the Japanese administrators to open up the country, to determine the names of the aboriginal tribes and to locate their position. Much useful information has been collected and embodied by Consul J. N. DAVIDSON in an important volume, well illustrated and provided with a map, compiled from the latest Japanese Government surveys.* He arranges the aborigines in eight groups, and the hilly plains of the south

* *The Island of Formosa Past and Present*, London and New York, 1903.

end of the island are occupied by the Paiwan group, of which the Botans or Bootangs are apparently members.* The Paiwans practise tattooing, they wear a disc of wood in the lobule of the ear, and are head hunters, the heads being stored in enclosures of stone near the houses. Consul R. SWINHÖE, who travelled in the southern part of the island, named the aborigines who inhabit the mountains Kalees.† He describes the people as brown or yellowish brown, the eyelids drawn down at the inner angle, eyes far apart, nose of moderate size, neither broad nor flattened, heads shaved, hair plaited into short queues. He considered them to resemble the Tagal people of Luçon in the Philippines. Dr SCHETELIG described four skulls from Formosa.‡ Two of these from the north-east coast were from a tribe which he states is named Shekwan by the Chinese, a term which is synonymous with Sek-hoan, the cooked barbarians of the plain, as the semi-civilised tribes are sometimes called § in contra-distinction to the Chhi-hoans, raw barbarians of the mountains, or unsubdued savages. SCHETELIG stated that these people had a yellow complexion, dark heavy hair, dark eyes, well-shaped oval eyelids, broad nostrils, broad faces, broad prominent cheek-bones. The skulls were oval in outline, not flattened on the roof, the mean cephalic index was 72, the mean vertical index 76·1, *i.e.* more than the cephalic; the skulls were therefore dolichocephalic, and, as is the rule in this group, the height exceeded the breadth. These skulls differed therefore materially in the proportions of the cranium from brachycephalic Malays and brachy- or mesati-cephalic Chinese. SCHETELIG also gives a brief account of two skulls obtained, it was said, from a hill tribe in the south of Formosa, which had been so much injured that only partial measurements could be taken; the mean cephalic index was 81·5, and the vertical index, in the only one in which it could be accurately computed, was 76·7. He was of opinion that these skulls showed Malayan affinities, more especially to the wild tribes of Luçon. He considered them to resemble a Malayo-Philippine type.

In regard to the question of the presence of a Negrito element amongst the aborigines of Formosa, SWINHÖE hinted at the possibility of the wildest of the mountain tribes being of dwarf stature and allied to the Negritos, though he guarded himself by saying that he had not seen them. A. B. MEYER has discussed with much detail and acumen || the distribution of the Negritos in the Philippine Islands and beyond them. He does not concur in the opinion that Negritos formed a part of the aboriginal inhabitants of Formosa, and he has also been led to the conclusion that their presence in Borneo had not yet been proved. Dr G. L. MACKAY, who spent many years as a missionary in Formosa, and lived for weeks at a time in the villages, made careful inquiries among the mountain tribes in the far south, in the centre and in the north of the island, and was

* In Consul DAVIDSON's map the most southerly members of this group are named Koaluts.

† *Report of British Association*, p. 129, Birmingham meeting, 1866. *Proc. Roy. Geogr. Soc.*, vol. x. p. 122, 1866.

‡ *Trans. Ethnol. Soc. London*, vol. vii. p. 215, 1869. I have computed the indices from the measurements recorded by SCHETELIG in his table i.

§ *From Far Formosa*, by G. L. MACKAY, D.D., p. 93, Edinburgh and London, 1896. *Pioneering in Formosa*, by W. A. PICKERING, C.M.G., p. 65, London, 1898.

|| *The Distribution of the Negritos*, Dresden, 1899.

definitely told that there were no woolly-haired races within the mountains, or anywhere else in the island.* From tradition and physical characters, he is of opinion that the aborigines are of Malayan origin, and are descendants of emigrants from the Malay Peninsula and the islands of the China Sea. He states that in the practice of tattooing, in head hunting, in their dress, ornaments and houses, and in their ancestral worship they are akin to the hill tribes of Borneo. As with the Kalamantan tribes in Borneo, their heads are dolichocephalic or approximating thereto, and not brachycephalic, a character to which due consideration requires to be given when their possible Malayan origin is under discussion.

INDONESIANS.

The islands off the south and south-east of Asia and the adjacent parts of that continent are peopled by four types of men—Mongolian Chinese, Malays, Negritos, and Indonesians. The Mongols, Malays and Negritos are brachycephalic or approximating thereto in cranial form and proportion. The term Indonesian, suggested by J. R. LOGAN, was employed by M. HAMY in 1877† to express aboriginal people properly belonging to the great islands of the Indian Archipelago, and it has even been extended so as to include the brown-skinned Polynesians of the easternmost islands of the Pacific. As the Polynesians and some of the tribes in the Indian Archipelago have crania of the brachycephalic type, the term Indonesian would therefore be held to embrace races whose skulls are brachycephalic in proportions. Other anthropologists, again, and in this I am disposed to concur, employ the term to designate tribes in whom the head and skull are dolichocephalic in form and proportion, or approximating thereto,‡ with a mesorhine nose, brown skin, varying in the depth of tint, long, straight, black hair, short stature, 5 ft. 2 in. to 5 ft. 4 in. The Kalamantans of Borneo are typical Indonesians. The Battaks of Sumatra are also regarded as Indonesians: MM. DE QUATREFAGES and HAMY refer to the skull of a Battak in a museum in Göttingen with the cephalic index 70·1; to two others in the Batavian Museum with almost the same proportions; the specimen in the BARNARD DAVIS collection had the index 77. KOHLBRÜGGE states that the Tenggerese, a mountain race in Java,§ are Indonesians. His measurements were not on skulls, but on living people, and he gave the mean cephalic index of 130 individuals, 79·7, mesaticephalic, which in the skull would have yielded an index about 77. In Timor, Celebes|| and other islands of the Archipelago Indonesian

* *From Far Formosa* (op. cit.).

† E. T. HAMY, "Les Alfours de Gilolo d'après de nouveaux renseignements," in *Bull. Soc. de géogr. de Paris*, 6th série, t. xiii. p. 491, 1877; also "Les races Malaises et Américaines," in *L'Anthropologie*, t. vii., 1896. J. DENIKER, *The Races of Men*, London, 1900.

‡ In previous Memoirs (*Trans. Roy. Soc. Edin.*, vol. xxxix. p. 744, 1899, and vol. xl. p. 596, 1903) I have noted the importance of dividing the mesaticephali into two groups, those with index below 77·5 approximate to the dolichocephali, whilst those with index above 77·5 approximate to the brachycephalic type.

§ *L'Anthropologie*, t. ix. p. 1, 1898.

|| Since this memoir was in type I have, through the courtesy of Drs PAUL and FRITZ SARASIN, received a copy of the Memoir of Dr FRITZ SARASIN, *Versuch einer Anthropologie der Insel Celebes*, Wiesbaden, 1906. An elaborate account

tribes have been studied whose heads are either dolichocephalic or approximating thereto. Professor CLELAND found* the proportion of the length to the breadth of the cranium in a Sulu Islander to be 75.

In a recent important treatise on the people of the Philippine Islands, based on the study of 270 skulls in the Museum at Leiden, G. A. KOEZE has figured and described the cranial characters of various tribes in these islands.† He recognises Negritos, whom he regards as the original inhabitants, Malays from two successive invasions separated by an interval of many years, Chinese, Japanese, and to a lesser extent Europeans. Moreover, he thinks that the dolichocephalic Tagbanua tribe is the remains of a Melanesian stock which had formerly lived in the Philippines. Cross-breeding between these races had taken place, varying in its proportion in the different tribes. He regards the Ilocanos as having the purest Malay blood; the Visayans and Tagals possess a large proportion, but also have Indonesian characters. The Igorrots, he states, are especially Indonesian; he concludes, however, that they are a cross between the Negritos and the Malays of the first invasion, though those who live in the north of Luzon show traces of Mongolian intermixture. The Igorrots in the cranial length and breadth are, from VIRCHOW's observations, mesocephalic with a great tendency to be dolichocephalic. KOEZE, again, of twelve crania found seven mesocephalic and five definitely brachycephalic, with a mean index 80.5; he sums up, therefore, that the type is mesocephalic with a great tendency to be brachycephalic. He looks upon the Igorrots as corresponding with the "Dyaks," and they are also head hunters. If the Igorrots are to be regarded as a cross between the Negrito and Malay, and at the same time Indonesians, and if a similar origin is to be associated with the Indonesian tribes of Borneo, it is difficult to comprehend how a cross between two brachycephalic races like the Negrito and Malay could produce dolichocephalic tribes such as the Kalamantan Muruts, and Dusuns. It seems, therefore, that the dolichocephalic Indonesians in their origin and descent should not be regarded as the product of cross-breeding, but that they rather are a race independent and definite in their characters. When the cephalic index is brachycephalic or approximates thereto in a so-called Indonesian tribe a cross-breeding with Malay, Negrito or Mongol may be inferred.

We may now pass, by way of the Philippine Islands, northward to the Island of Formosa. Here, as has already been stated, we find, amongst the mountains, tribes with skulls either dolichocephalic or closely approximating thereto, with brown skins, straight black hair, and from their practice of head hunting and other customs resembling the hill tribes of Borneo. It seems appropriate to associate them with the Indonesian race, which constitutes therefore a distinct factor in the population of the

is given of the external physical characters and of the measurements of the head and body of living natives. Owing to the almost impossibility of obtaining human skulls and skeletons in the course of their travels in Celebes, the authors were not able to give an account of the osteology of the people on lines similar to those pursued in their great work on the Weddas and other people in Ceylon.

* *Journal of Anat. and Phys.*, vol. xi. p. 663, 1877.

† *Crania Ethnica Philippinica*, Haarlem, 1901-1904.

great islands from Sumatra to Formosa, although modified in some localities by intermixture with Negrito, Malay, Chinese, and even Arab blood.

Turning now to the southern part of the Asiatic Continent we find in the Malay Peninsula three definite types of men.* The Semangs, a typical Negrito race, brachycephalic, with black skins, short woolly hair, broad flat noses, eyes open, not oblique, low stature, 1491 mm.; the Malays, some civilised, others savage, brachycephalic, with dark yellow or copper-coloured skins, long straight smooth hair, flattish nose, wide nostrils, high cheek-bones, eyes moderate in size, rarely oblique, stature a little higher than in the Semangs; the Sakais, or Senoi as Professor RUDOLF MARTIN prefers to name them,† are dolichocephalic, skin from dark brown to yellowish brown, hair long, black, wavy, nose not so broad and flat, high cheek-bones, eyes small, horizontal, stature slightly more than in the Semangs. In their physical characters the Sakais correspond in head form with the Indonesians, whilst the colour of the skin and the character of the hair are not unlike in the two, but in stature they are a pigmy race.

Two Selung skulls brought from the Mergui Islands on the west coast of the Malay Peninsula by Dr JOHN ANDERSON, which I measured at his request,‡ had the cephalic index 76·3 and 76·6 respectively; in the male the cranial height was more than the breadth, but in the female a little less, probably a sexual difference; in one the nose was mesorhine, in the other platyrhine. Although the index was mesaticephalic, it was in the lower term of that group, and pointed to the affinity of the people with a long-headed race. The skin was reddish brown, darker and not with the olive tint of the Malays, the hair long, coarse, black, with sometimes a tendency to curl, eyes black and slightly oblique. The Selungs show in some respects Indonesian characters, with possibly a Malay intermixture. A proportion of the people of the Nicobar Islands would seem to be dolichocephalic. The savage tribes, named by DENIKER§ the Mois, who occupy in Cambodia the country between the Mekong river and the coast of Annam, are dolichocephalic, about 5 ft. 2 in. in stature, skin yellowish brown, hair more or less wavy, eyes straight, and they have apparently Indonesian characters.

The hill districts to the north of Burma are occupied by tribes known as Lushais, Chins, and Nagas,|| the crania of which are, as a rule, dolichocephalic or approximating thereto, and I have described crania from Upper Burma itself possessing definite dolichocephalic form and proportions. From Colonel WADDELL's measurements of the heads of the people in the Brahmaputra valley¶ it is obvious that in some of these

* See the writings of NELSON ANNANDALE, RUDOLF MARTIN, and Messrs SKEAT and BLAGDEN already referred to in note on p. 797. Also my memoirs on Indian Craniology, Part ii., chapter on the Sakai, in *Trans. Roy. Soc. Edin.*, 1901; W. L. H. DUCKWORTH, *Studies from the Anthropological Laboratory*, Cambridge, 1904.

† The term Sakai is used by many travellers as a generic term to include all the pigmy wild tribes in the Malay Peninsula. In the subdivision of these into groups, whilst one is named Semang, it is advisable, as MARTIN suggests, that another term than Sakai should be applied to another of the subdivisions, hence his name Senoi.

‡ My description of the skulls, now in the Anatomical Museum of the University of Edinburgh, is included in Dr ANDERSON's memoir on the Selungs of the Mergui Archipelago, London, 1890.

§ *The Races of Men*, London, 1900.

|| I have described their crania in Part i. of my contributions to Indian Craniology, *Trans. Roy. Soc. Edin.*, 1899.

¶ *Journ. Asiatic Soc. Bengal*, vol. lxix. pt. iii., Calcutta, 1901.

tribes the skulls would be dolichocephalic, and I have elsewhere described the skull of a Kham warrior from Eastern Tibet which was distinctly dolichocephalic.

In the Island of Ceylon the Veddahs are a pronounced dolichocephalic people. In the form of the cranium, and in their long, black, wavy hair, the Veddahs have affinities with the Sakais (Senoi) of the Malay Peninsula. In India itself the Tamils and Pariahs of southern India, the Gonds, Oráons, Pahárias, Múndas, Kols and Bhúmij of the Central Provinces constitute, under the collective name of the Dravidians, a definite portion of the population, and possess marked dolichocephalic skulls.*

It is obvious, therefore, that both in the groups of islands and in the southern part of the adjacent continent, in addition to such well-marked brachycephalic types as the Negritos, Malays and Mongolians, people with skulls dolichocephalic in form and proportions are widely diffused. The dolichocephalic people, though corresponding in the character of the cephalic index, vary amongst themselves in some other respects. The nose, though not leptorhine, is often platyrhine as in the Dravidians, but mesorhine in other tribes; the face is sometimes low, chamæprosopic, at others relatively longer and narrower, leptoprosopic; the orbits in some are low, microseme, in others more rounded, megaseme; the upper jaw is either ortho- or mesognathous, seldom prognathous. The palato-maxillary arch is usually brachyuranic. The skin varies in colour from dark brown, or almost black, in the Dravidians to a lighter or even yellowish brown in the islanders; the hair is black, long, straight, though occasionally wavy; the stature is generally from 5 ft. to 5 ft. 4 or 5 in., but in the Sakais (Senoi) it is below 5 feet or pigmy. Subject to these modifications, a general physical type prevails in these scattered dolichocephalic people, one which in many respects corresponds with that so often referred to as Indonesian. It is not unlikely that they may in the main have a common descent, though, owing to their wide diffusion in southern Asia and the adjacent islands, which has brought them into close contact with such potent races as the Mongols, Malays, Negritos, Melanesians, and even Polynesians, they have become modified, and the character of the modification has been influenced by that of the race with which an intermixture of blood has been effected.

Even if we were to give as wide an interpretation to the term Indonesian as is above indicated, there would be no difficulty in differentiating them from the dolichocephalic, black skinned, black frizzly haired, platyrhine, prognathic Melanesians, or from the dolichocephalic, black skinned, black straight haired, platyrhine, prognathic aborigines of the Australian Continent.

In writing this chapter on the Indonesians I have confined myself to the consideration of the physical characters which bear on the affinities of the several tribes, and I have made no reference to the important subject of linguistic relations, a department of anthropology outside the range of my studies. I would only remark that although the Malay tongue and its dialects are spoken throughout the Archipelago and as far north as Formosa, both by Malays and Indonesians, this, in itself, does not

* See for measurements and other details my memoirs on Indian Craniology already referred to.

prove that community of language implies common descent and race. Examples are not unknown elsewhere of a race having lost its original tongue and speaking a language acquired from another race with which it has been brought into intimate contact, through conquest, immigration, or otherwise.

TIBETANS. TABLE III. PLATE V.

In Part iii. of my series of Memoirs on the Craniology of the People of the Empire of India I described and figured the skulls of two natives of Tibet, which had been presented in 1905 by Major C. N. C. WIMBERLEY, I.M.S. One of these, from Lhasa, was an example of the brachycephalic type; the other, a warrior from the Kham province in Eastern Tibet, on the other hand, was dolichocephalic in form and proportions. The skulls were representative of the two distinct types of head which exist in the people of Tibet. These skulls are marked A and B in the list of Tibetan crania in the University Museum. In connection with these specimens, I discussed the physical characters and affinities of the Tibetans.

I have the pleasure of acknowledging the receipt, in October 1906, of two skulls and a skull bowl or cap collected at Gyantse, Tibet. They were presented by Lieutenant F. M. BAILEY, the British Agent at the town of Gyantse, and they had been prepared for him by Captain Rt. STEEN, I.M.S., the Agency Surgeon. The skull bowl was said to be a part of a Khamba skull, but no special information is given regarding the other specimens.

I have carefully examined the two skulls, which I shall designate C and D. They were both males and had reached adult life, though, from the condition of the sutures and teeth, C was obviously much older than D. The lower jaws were absent.

Skull C. *Norma verticalis*.—The cranial outline was an elongated ovoid, dolichocephalic, cephalic index 72·6; there was no sagittal ridge, and though the slope from the sagittal suture to the parietal eminences was well marked, the vertex could scarcely be called roof-shaped; the side walls were almost vertical, the parieto-occipital slope was moderate, and the occipital squama projected behind the inion. The skull was phænozygous.

Norma lateralis.—The forehead slightly receded; the glabella and supraorbital ridges were moderate, and the latter were not fused with the outer upper border of the orbit, above which, as in the Kham skull, the frontal was flattened as far as the temporal ridge.* The nasion was not depressed. The bridge of the nose had a low mesial keel and the profile outline showed a shallow concavity. The nasal bones at the mid suture were 24 mm. long. The parietal longitudinal arc was the longest, the occipital arc the shortest. The cranium rested behind on the cerebellar fossæ.

* Professor CUNNINGHAM, in the study of the evolution of the region of the eyebrow, has pointed out the morphological importance of distinguishing the supra-orbital ridge and the upper border of the orbit, in their bearing on the significance of the great ridges which are found in such a skull as that from the Neanderthal.

Norma facialis.—The floor of the nose was smoothed down into the incisive region; the maxillo-nasal spine was low, the incisive and canine fossæ were deep. The anterior nares were wide, but, owing to the nasal height, the nasal index was not platyrrhine but mesorrhine, 51·8. The nasio-malar index was 107·7 and the facial profile was mesopic. The face was wide, 136 mm., but, as the superior maxillæ were relatively long, 74 mm., the maxillo-facial index, 54·3, was leptoprosopic. The upper jaw was mesognathic with an index 101. The interorbital width was 26 mm. The orbital aperture was rounded and the index, 90, was megaseme. The palate was deeply arched, being 17 mm. in depth opposite the 2nd molar; the palato-maxillary index, 111, was mesuranic. The teeth were much worn, but were not stained. The cranio-facial index, 73·1, was low, in harmony with the dolichocephalic type.

The sutures of the cranial vault, the squamous excepted, were almost obliterated; a small epipteris was in the right pterion. The temporal curved lines were well marked, but the occipital curved lines, inion and mastoids were moderate. The jugal processes were tuberculated. The cephalic index, 72·6, was dolichocephalic, the vertical index, 75·3, was hypsiccephalic, and the basi-bregmatic height exceeded the greatest breadth.

Skull D.—This skull showed structural peculiarities which had accentuated individual characters and had doubtless modified the racial features. Most remarkable was the great development of Wormian bones in the lambdoid and squamous sutures. In the lambdoid these bones were usually four-sided and the transverse diameter was the shorter; they had long denticulations intercalated between corresponding processes of the parietal and occipital bones, and as the ossicles were directed obliquely they caused the occipital squama to project backwards behind the parietal, so as to form a shelf-like projection at the back of the skull and to modify the length of the cranium.* The sutural bones in the squamous regions were much smaller, and were arranged so as to push the squamous temporals laterally, beyond the plane of the parietals, and to add to the breadth of the cranium in these regions. The alisphenoid had a narrow articulation with the parietal. A small Wormian was in the anterior sagittal suture and the frontal was metopic. Another character was a fissure which cut across the basis-cranii, 7 mm. in front of the foramen magnum, and was continued laterally into the jugular foramina. The basion sloped upwards so as to affect the measurements made from it, the plane of the foramen magnum was directed upwards and forwards, and the occipital condyls were flattened, but there was no 3rd condyl. It was difficult to say definitely if the basi-cranial fissure was a congenital defect in ossification, or was due to fracture produced during life, though the former is probably the correct explanation.

Norma verticalis.—The cranial outline was broadly ovoid and not quite symmetrical, owing to the arrangement of the Wormian bones. The vault was not ridged and the parietal eminences were feeble. The cranium was cryptozygous.

* This peculiar feature has been from time to time noticed by previous writers. LUCÆ has figured two specimens in *Zur Architectur des Menschenschädels*, plates ii., xii., Frankfurt, 1857. In the Edinburgh University Museum are two skulls dating from the time of the Monroes, one of which I have figured in fig. 26. They show the character in an extreme form, and several added by myself exhibit it in a minor degree.

Norma lateralis.—The forehead was almost vertical, the glabella and supraorbital ridges were feeble, the nasion was not depressed, the nasal bones in the mesial line were 23 mm. long; the bridge was not keeled, the nose was flattened at its root and projected so slightly in front of the outer borders of the orbits that the nasio-malar index was only 102, and the nasal profile was markedly platyopic. The interorbital width was 23 mm. The frontal longitudinal arc was the longest, the occipital was the shortest. The cranium rested behind on the cerebellar fossæ, which were unusually bulging.

Norma facialis.—The maxillo-nasal spine was moderate and the floor of the nose was smoothed off into the incisive region. The canine fossæ were deep. The anterior nares were wide and the nasal index was in the upper mesorhine group, 51·9. The upper jaw was somewhat prognathic, but the displacement of the basion interfered with the normal measurements from that region, and the gnathic index, computed by FLOWER'S method, was 115·6. The face was wide, the cheek bones were prominent, and, as the vertical diameter of the maxillæ was small, the maxillo-facial index was chamaeprosopic. The interorbital width was 23 mm. and the orbital apertures were round and megaseme, index 100. The palate was shallow and elongated, the index, 105·6, was almost dolichuranic. The teeth were lost except a right molar, the crown of which was worn. The cranio-facial index was 73.

The cephalic index, 79·2, placed the skull in the higher term of the mesaticephalic group, and the vertical index, 56·1, was remarkably low, but, owing to the osteological peculiarities of the cranium already described, the measurements of length, breadth and height were affected, and their respective indices cannot be relied on as giving definite racial characters; though, as the sutural bones had influenced both the length and breadth of the cranium, it is possible that the lambdoidal and squamosal ossicles may partially counterbalance each other in their effect on these two dimensions (Pl. V. fig. 25).

There can be no doubt that the skull C is dolichocephalic in form and proportions. In length, breadth, height, horizontal and vertical transverse circumference, nasio-malar, cranio-facial and maxillo-facial indices, it is closely allied to the measurements of the Kham warrior described in my previous memoir. It differs from it in the orbital and palato-maxillary indices being somewhat less, and in the nasal and gnathic indices being larger, so that the relative width of the anterior nares and the projection of the upper jaw are greater. The two skulls corresponded, however, with each other in so many important characters that there seems little doubt that the skull C from Gyantse was of the same race as the one from the Kham province.

Owing to the variations in the cranial bones, already described, in D, it is probable that the race type in it is modified and concealed by the special characters of the skull. It would, however, seem as if it approximated to the brachycephalic type, and was, perhaps, a cross between the broad-headed Mongolian and the long-headed race which obviously constitutes an important element in the population of Tibet.

The bowl or cap which accompanied the two skulls had evidently been carefully

removed from the base of its skull, for the sawn edge was horizontal and had been polished. I compared it with some specimens of Tibetan praying drums in the Anatomical Museum of the University, formed by the apposition of the vaults of two skull bowls, and I have little doubt that the cut section had been covered with a layer of dried skin, and had formed one of the two segments of a praying drum. The Tibetans evidently regard the bowl of the skull as an object to be utilised in religious ceremonial and as having a symbolical or mystic signification. Colonel WADDELL, in his admirable work on Tibet,* gives a figure "Revelation Gospels" in which a skull bowl is held in the left hand and a trumpet formed of a human thigh bone in the right, and another figure of a hermit of the order of St Mila who holds a skull bowl also in the left hand. The conversion of the femur into a trumpet is another example of the utilisation of a part of the human skeleton in the ceremonial observances of the people of Tibet, and the Museum possesses several specimens of this kind.

In this skull bowl the section had been made a little above the glabella through the supra-nuchal part of the occiput, and below the highest part of the squamous suture. The length was 176 mm. and the greatest breadth 134 mm., which gave an index 76.1. If the glabella had been present, the index would have been a little less, so that the skull had probably been dolichocephalic. In the bowls of the two praying drums in the Museum the section had been made somewhat higher in the skull, and the relations of length and breadth could not so well be determined.

SAGITTAL SECTIONS.

In this memoir, as in its predecessors, I have reproduced tracings of sagittal sections of some of the skulls which have been described, in order to show the contour of the skull immediately on one side of the mesial plane. Lines, radiating from the basion to definite points on the surface of the skull, as well as other lines which pass between other anatomical points, have been drawn. As I have explained the direction of the lines and the position of their terminal points in my *Challenger Report*, and in Part iii. of "The Craniology of the People of the Empire of India," I may refer to these memoirs for a detailed description of the significance of the lines. The measurements and the points between which the lines were drawn are given in Table IV.

In comparing the measurements of the three skulls with each other, it should be kept in view that they differ in the proportions of length and breadth. The Murut is dolichocephalic, the Botan from Formosa is mesaticephalic, the Bajau is brachycephalic. Whilst those radial measurements which express the height of the cranium as the basi-lambda, -perpendicular and -bregmatic, show comparatively little difference in the three crania, the radii which run more in the direction of cranial length, as the basi-inial, -glabellar, -nasial, are much shorter in the Bajau than in the other crania.

* *Lhasa and its Mysteries*, London, 1905.

TABLE IV.
Sagittal Sections.

	Murut A. C.In. 73·9.	Bajau M. C.In. 82·9.	Botan 1, Formosa. C.In. 77·1.
Basi-inial radius.	83 mm.	75 mm.	81 mm.
„ occipital „	96	98	106
„ lambdal „	112	113	110
„ perpendicular „	136	139	134
„ bregmatic „	135	137	133
„ glabellar „	107	100	111
„ nasial „	101	96	102
„ alveolar „	94	93	98
Nasio-tentorial plane,	176	158	175
Tentorio-bregmatic line,	88	89	86
„ perpendicular „	90	93	88
„ lambdal „	56	58	49
„ occipital „	7	28	36
Nasio-bregmatic chord,	108	107	110
Perpendicular therefrom to outer table of frontal,	27	26	26
The same to inner table,	20	20	20
Fronto-occipital diameter of cerebral cavity,	163	151	161
From perpendicular radius to frontal pole of cavity,	90	82	78
From perpendicular radius to occipital pole of cavity,	73	72	83

This difference in the antero-posterior diameter of the brachycephalic Bajau is also very marked in the length of the nasio-tentorial plane and of the fronto-occipital diameter of the cerebral cavity above that plane. The cavity in front of the perpendicular radius expresses generally the position and extent backwards of the frontal lobe of the cerebrum, its antero-posterior diameter is longest in the dolichocephalic Murut and shortest in the Botan; whilst the part of the cavity behind that radius, in which the parietal and occipital lobes are lodged, is shortest in the Bajau, and much the longest in the Botan. The series of measurements above the nasio-tentorial plane, more or less vertical in direction, which express the height of the cerebral cavity, though not differing much from each other in the bregmatic and perpendicular regions, show a marked difference in the tentorio-lambdal and -occipital regions, for whilst in the former the Bajau is the longest and the Botan much the shortest, in the tentorio-occipital the Botan is the longest and the Murut is remarkably small. The arc of the frontal bone and the space in the cerebral cavity bounded by the nasio-bregmatic chord, to which attention has been especially called by Professor CUNNINGHAM, is almost equal in the three crania. The length of the cerebral cavity between the frontal and occipital poles and the height as expressed by the collective tentorio-bregmatic, -perpendicular, -lambdal, and -occipital diameters in the three crania are as follows: Murut, L. 163 mm., H. 241 mm. = 404; Bajau, L. 151, H. 268 = 419; Botan, L. 161, H. 259 = 420. In the collective dimensions of length and height the Bajau and Botan crania are

almost equal to each other, and to the Múnda skull measured in Part iii. Table VI. of my series of Indian Memoirs. The corresponding dimensions in the Murut skull are distinctly smaller. The sections do not permit the breadth of the cranium to be given.

I have computed in the three crania the length of the three factors which make up the longitudinal circumference of the skull so that they may be compared with the corresponding dimensions of the skulls measured in my previous memoirs.

	Murut A.	Bajau M.	Botan I.
Base line,	139	133	138
Longitudinal arc,	369	361	360
Longitudinal circumference,	508	494	498
Base line to longitudinal arc,	2·6	2·7	2·6
Base line to longitudinal circumference,	3·6	3·7	3·6

By the base line, a term employed by Professor CLELAND, is meant the length of the foramen magnum along with the basi-nasal diameter. It will be seen that the proportion of base line to the longitudinal arc or to the longitudinal circumference is almost the same in the three crania. They closely correspond with the proportions which I showed to exist in the Tamils, Pariahs, Veddahs, and Kham skulls described in Part iii. of my Memoirs on Indian Craniology.

EXPLANATION OF PLATES I.-V.

The process blocks are reproduced from photographs of the skulls prepared by Messrs John Henderson and William Gill of the Anatomical Museum.

PLATE I.

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| Fig. 1.—Murut, face view. Table I., A. | Fig. 4.—Dusun, face view. Table I., H. |
| „ 2.—The Same, vertex view. | „ 5.—The Same, vertex view. |
| „ 3.—The Same, profile view. | „ 6.—The Same, profile view. |

PLATE II.

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| Fig. 7.—Land Dyak, face view. Table II., O. | Fig. 10.—Sea Dyak, face view. Table II., P. |
| „ 8.—The Same, vertex view. | „ 11.—The Same, vertex view. |
| „ 9.—The Same, profile view. | „ 12.—The Same, profile view. |

PLATE III.

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| Fig. 13.—Bajau, face view. Table II., M. | Fig. 16.—Kweejow, face view. Table I., L. |
| „ 14.—The Same, vertex view. | „ 17.—The Same, vertex view. |
| „ 15.—The Same, profile view. | „ 18.—The Same, profile view. |

PLATE IV.

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| Fig. 19.—Botan of Formosa, face view. Table III., I. | Fig. 22.—Malay from Perak, face view. Table II., P. |
| „ 20.—The Same, vertex view. | „ 23.—The Same, vertex view. |
| „ 21.—The Same, profile view. | „ 24.—The Same, profile view. |

PLATE V.

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| Fig. 25.—Tibetan, profile view. Table III., D. | Fig. 27.—Sagittal section through skull of Murut A |
| „ 26.—Skull in Anatomical Museum. This and the Tibetan skull are figured to show the variation in the form of the occiput, due to the remarkable development of the Wormian bones. | „ 28.— „ „ „ Bajau M. |
| | „ 29.— „ „ „ Botan I. |

In the sections the lettering is as follows :—

<i>b. al.</i> basi-alveolar	radius.		<i>b. oc.</i> basi-occipital	radius.
<i>b. n.</i> basi-nasal.	„		<i>b. in.</i> basi-inial	„
<i>b. g.</i> basi-glabellar	„		<i>f. m.</i> plane of foramen magnum.	
<i>b. br.</i> basi-bregmatic	„		<i>n. t.</i> nasio-tentorial plane.	
<i>b. p.</i> basi-perpendicular	„		<i>n. br.</i> nasio-bregmatic chord.	

SIR WILLIAM TURNER ON "Craniology of Natives of Borneo, Malays, Formosa."—PLATE I.



FIG. 1.—Murut.



FIG. 4.—Dusun.



FIG. 2.—Murut.

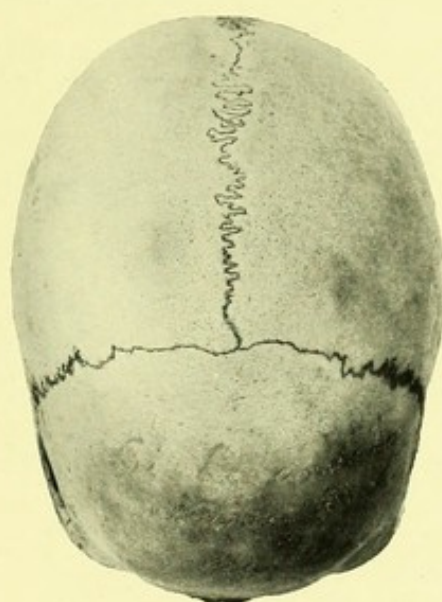


FIG. 5.—Dusun.



FIG. 3.—Murut.

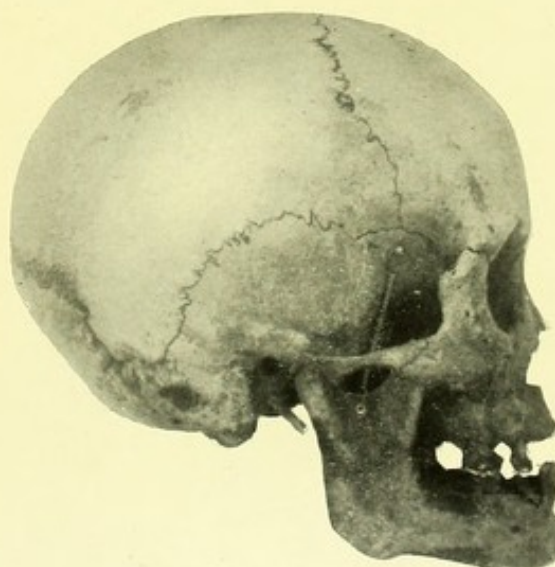


FIG. 6.—Dusun.

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FIG. 7.—Land Dyak.

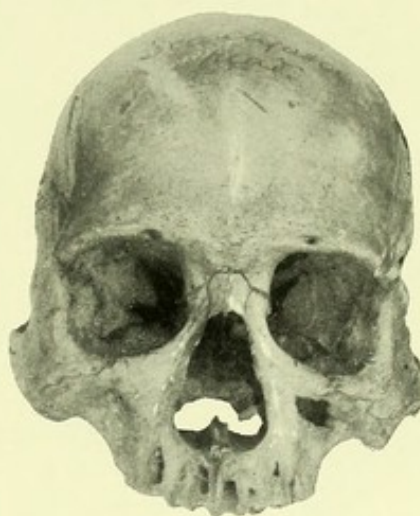


FIG. 10.—Sea Dyak.



FIG. 8.—Land Dyak.



FIG. 11.—Sea Dyak.



FIG. 9.—Land Dyak.



FIG. 12.—Sea Dyak.

SIR WILLIAM TURNER ON "Craniology of Natives of Borneo, Malays, Formosa."—PLATE III.

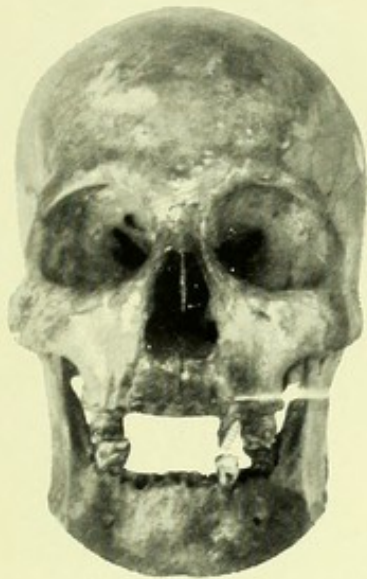


FIG. 13.—Bajau.



FIG. 16.—Kweejow.



FIG. 14.—Bajau.



FIG. 17.—Kweejow.



FIG. 15.—Bajau.



FIG. 18.—Kweejow.

SIR WILLIAM TURNER ON "Craniology of Natives of Borneo, Malays, Formosa."—PLATE IV.



FIG. 19.—Formosa.



FIG. 22.—Malay.



FIG. 20.—Formosa.



FIG. 23.—Malay.



FIG. 21.—Formosa.



FIG. 24.—Malay.

SIR WILLIAM TURNER ON "Craniology of Natives of Borneo, Malays, Formosa."—PLATE V.



FIG. 25.—Tibetan.

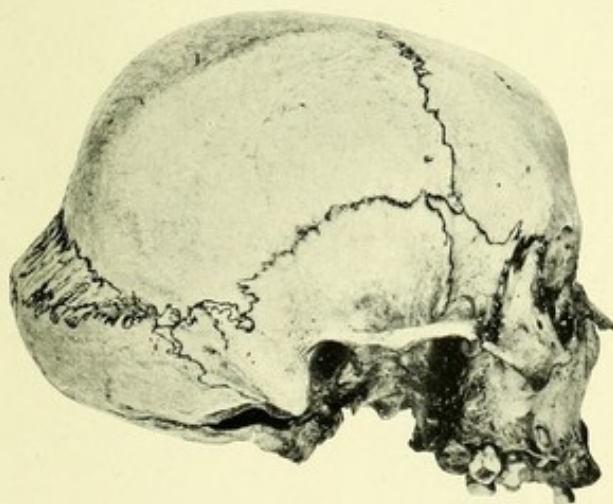


FIG. 26.

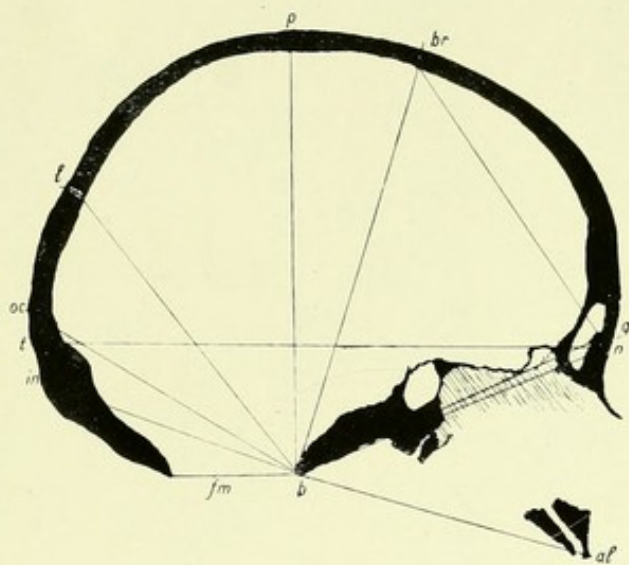


FIG. 27.—Murut.

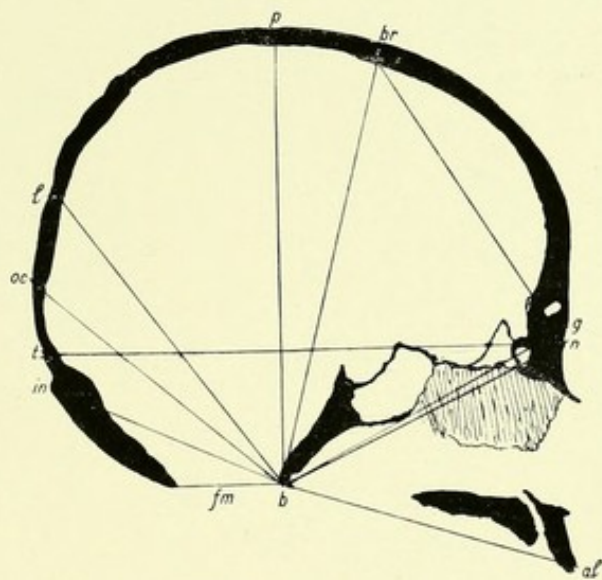


FIG. 28.—Bajau.

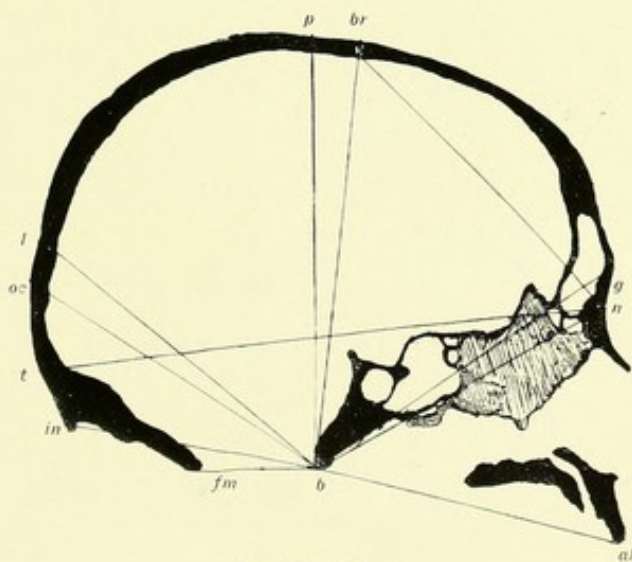


FIG. 29.—Botan.



