Metric Data of the Ryukyuan Crania

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Abstract Eighteen cranial measurements including 6 flatness measurements of the facial skeleton were taken for crania from the Amami, Okinawa, and Sakishima Islands, which constitute the Ryukyu Islands. The data will be useful for future multivariate statistical analyses of Ryukyuan crania.

Keywords: cranial measurements, facial flatness measurements, raw data, Ryukyu Islanders

Many near modern skeletal remains were found at burial caves (Fuso-baka) in the Ryukyu Islands, which consists of the islands of Amami, Okinawa, and Sakishima. Using these skeletal materials, we initiated a joint research project “Anthropological Reexamination of Skeletal Remains from the Ryukyu Islands” in 1993. This research project has yielded the two articles that refute the so-called Baelz’s “Ainu-Ryukyu common origin theory”, based on cranial nonmetric variation and flatness of facial skeletons (Dodo et al., 1998, 2000). However, as reported in Dodo (2001), cranio-metric analyses of the Ryukyu Islanders were not successful because two different definitions of upper facial height were used to make comparisons.

The present report is the final work of our joint research project and provides 18 cranial measurements for each cranium of the male and female series from the Ryukyu Islands.

Materials

Well-preserved crania in which all 18 measurements could be obtained were used. These materials consisted of 15 male and 13 female crania from the Amami Islands, 22 male and 21 female crania from the Okinawa Islands, and 23 male and 13 female crania from the Sakishima Islands. Sex determination was made based mainly on the

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Table 1. Cranial measurements

Measurement	(Abbreviation)	Method
Maximum cranial length	(L)	Martin #1
Basion-nasion length	(BL)	Martin #5
Maximum cranial breadth	(B)	Martin #8
Minimum frontal breadth	(FB)	Martin #9
Basion-bregma height	(H)	Martin #17
Basion-prosthion length	(GL)	Martin #40
Bizygomatic breadth	(J)	Martin #45
Upper facial height	(G'H (H))	Howells NPH
Orbital breadth	(OB)	Martin #51
Orbital height	(OH)	Martin #52
Nasal breadth	(NB)	Martin #54
Nasal height	(NH)	Martin #55
Frontal chord	(FC)	Yamaguchi (1973)
Frontal subtense	(FS)	ditto
Simotic chord	(SC)	ditto
Simotic subtense	(SS)	ditto
Zygomaxillary chord	(ZC)	ditto
Zygomaxillary subtense	(ZS)	ditto

size and shape of the cranium because of the difficulty of identifying whole skeletons in cave burials.

Many of these materials were from university collections and are housed in Kyoto University, University of the Ryukyus, and University of Tokyo. However, some crania from the Okinawa Islands and many from the Sakishima Islands were studied *in situ* at the burial caves at Gyokusendo in Okinawa Honto and Nagabaka on Miyako Island.

These cranial samples are believed to date from the early modern Edo period (ca. 1600–1900 A.D.).

Methods

The 18 cranial measurements are listed in Table 1. Abbreviations for these measurements shown in Table 1 are tentatively defined by the present authors.

With the exception of the upper facial height, the 11 traditional measurements were carried out after Martin (1914). The upper facial height was measured from the nasion to prosthion as defined by Howells (1973). When comparing the upper facial height of Howells (nasion~prosthion) with that of Martin (nasion~alveolare), it is recommended that 2.5 mm in males and 2.0 mm in females are added to the Howells' upper facial height (Dodo, 2001).

Table 2. Craniometric raw data for the Anami/Okinawa Islanders (male)

ID	L	BL	B	FB	H	GL	J	G'H (H)	OB	OH	NB	NH	FC	FS	SC	SS	ZC	ZS
T-1235 (K)	183	105	135	93	130	104	125	63	40	33	26	51	93.4	11.1	9.1	2.3	97.5	19.6
T-1236 (K)	180	100	140	92	135	104	134	65	38	31	24	48	90.6	14.4	7.4	3.2	94.2	19.0
T-1237 (K)	187	101	141	98	140	101	135	68	41	32	28	51	99.0	15.4	9.5	2.6	108.0	20.7
T-1240 (K)	173	100	136	91	128	96	136	63	43	33	26	51	100.3	13.0	5.7	1.8	102.4	21.8
T-1242 (K)	180	102	136	93	135	100	127	61	40	35	27	46	95.5	16.0	7.4	1.4	94.2	17.8
T-1246 (K)	186	100	139	85	139	105	130	66	41	32	29	49	96.1	11.3	5.7	1.1	94.1	22.3
T-1258 (K)	177	104	144	92	137	106	138	69	43	35	27	54	97.1	14.6	10.0	3.2	99.7	25.7
T-1266 (K)	184	103	141	88	139	102	130	64	43	35	27	50	97.4	8.6	5.5	1.2	97.6	17.1
T-1268 (K)	170	97	132	87	128	100	133	62	41	32	26	49	97.5	14.3	7.7	2.1	99.2	17.2
T-1270 (K)	175	103	140	94	137	99	137	62	41	35	26	50	98.9	15.8	9.3	3.7	103.1	22.1
T-1272 (K)	178	102	134	91	133	98	140	65	40	34	29	50	98.7	14.4	7.1	2.3	94.5	21.1
T-1274 (K)	175	102	143	97	141	104	143	73	45	36	28	55	100.1	12.6	8.4	3.0	108.3	22.9
T-1280 (K)	178	96	132	93	127	100	126	57	38	27	26	47	93.9	16.8	11.0	1.5	90.6	20.9
T-1286 (K)	174	103	145	93	143	99	142	68	41	33	26	55	98.9	15.1	11.4	3.6	99.0	24.3
KI-1172 (K)	189	104	147	99	138	106	139	70	42	35	23	50	95.9	14.3	13.1	3.7	96.7	16.7
H-4 (G)	186	101	138	89	145	100	131	67	41	31	26	51	92.3	15.4	6.5	1.9	99.9	20.4
H-12 (G)	168	101	140	85	141	100	137	63	40	33	25	50	91.5	9.9	9.1	2.1	99.0	25.0
H-18 (G)	178	98	138	88	133	100	135	58	40	32	25	44	89.9	12.8	6.3	3.3	94.9	19.5
H-200 (G)	185	99	139	91	142	97	131	64	40	31	28	49	94.9	12.6	9.5	3.9	96.8	22.2
H-A02 (G)	175	100	140	95	133	103	134	63	40	33	23	48	94.2	12.0	6.6	1.0	95.6	20.9
H-1063 (K)	178	101	150	95	135	99	141	72	41	34	27	52	100.7	13.0	8.6	2.3	100.6	19.2
H-1082 (K)	183	100	143	98	134	104	136	62	41	32	28	50	98.6	14.7	7.3	1.7	101.5	20.0
H-66 (UT)	180	106	136	88	142	104	137	76	41	40	29	53	96.5	15.1	8.6	2.6	101.5	24.9
H-67 (UT)	177	99	152	91	135	98	139	71	44	36	27	53	97.9	15.2	6.7	1.8	99.2	21.4
H-69 (UT)	176	100	143	92	135	98	137	71	43	35	23	54	96.8	14.2	8.6	4.0	104.1	21.8
H-72 (UT)	180	107	130	88	136	99	136	68	41	33	25	52	93.4	13.3	9.4	3.9	102.0	21.1
H-115 (UT)	178	98	133	98	132	93	132	60	43	31	28	49	99.4	18.3	9.1	3.1	103.0	28.0
H-168 (UT)	195	110	140	91	139	115	138	74	44	35	26	49	99.4	18.3	9.1	3.1	103.0	28.0
KU-002 (R)	183	100	141	94	141	99	133	67	45	32	28	56	101.0	18.0	8.3	2.4	103.2	21.8
KU-003 (R)	178	106	143	95	145	103	139	66	43	33	29	53	99.7	14.4	11.3	3.5	104.8	20.7
KU-010 (R)	171	97	144	89	127	97	130	68	39	33	23	51	92.0	13.7	8.2	2.9	100.0	17.6
KU-011 (R)	182	104	142	89	134	108	139	67	47	31	25	52	106.0	10.6	6.4	1.9	96.9	17.2
KU-012 (R)	178	99	136	93	131	98	134	68	41	34	24	53	94.0	15.5	11.0	3.6	103.0	23.2
KU-016 (R)	175	96	142	88	134	99	123	61	42	33	25	48	93.1	15.3	8.6	2.1	98.5	19.3
KU-017 (R)	174	99	138	95	133	96	135	64	42	36	25	49	97.0	12.8	10.2	2.5	97.7	16.0
KU-021 (R)	177	102	139	91	136	95	137	71	42	37	26	56	95.3	11.6	8.0	2.7	98.0	18.7
KU-032 (R)	174	97	142	87	132	95	130	66	40	32	25	49	88.2	15.1	9.0	1.9	95.7	21.6

Table 3. Craniometric raw data for the Amami/Okinwa Islanders (female)

ID	L	BL	B	FB	H	GL	J	G'H(H)	OB	OH	NB	NH	FC	FS	SC	SS	ZC	ZS
T-1218 (K)	178	100	145	93	138	93	139	65	42	35	24	52	97.5	13.6	6.4	1.5	98.3	20.2
T-1221 (K)	176	95	134	92	132	95	124	66	41	33	28	49	94.2	10.7	8.7	1.3	91.8	14.5
T-1227 (K)	179	96	142	91	137	94	131	65	39	33	25	46	86.3	10.2	8.2	4.4	93.6	18.8
T-1229 (K)	172	99	130	95	135	97	129	62	42	33	28	49	98.6	13.6	7.4	1.6	92.2	17.5
T-1239 (K)	181	99	134	87	132	98	130	58	41	32	26	44	90.8	9.8	4.0	1.3	97.1	18.1
T-1248 (K)	170	97	135	89	134	93	127	61	42	32	28	50	94.0	9.2	6.8	1.6	92.4	17.9
T-1251 (K)	177	99	138	93	133	96	124	63	41	31	26	49	92.8	13.8	10.1	3.7	94.7	20.6
T-1252 (K)	181	99	135	90	140	96	121	62	38	33	24	46	88.0	16.1	5.9	1.1	91.4	21.4
T-1255 (K)	172	102	137	100	139	99	134	62	40	32	26	50	98.1	14.5	11.9	3.3	99.7	16.5
T-1267 (K)	169	96	137	86	129	100	124	63	39	31	24	44	94.0	12.9	9.0	1.0	95.7	17.4
T-1276 (K)	175	95	133	94	129	96	126	64	39	35	24	50	95.8	13.6	10.9	2.5	95.6	19.3
T-1281 (K)	170	98	138	86	131	100	122	63	40	34	26	49	90.5	15.2	9.1	2.2	90.0	19.6
KI-1183 (K)	171	90	137	88	128	86	121	53	36	30	23	40	84.2	9.0	9.2	1.8	91.8	14.7
H-16 (G)	183	98	146	99	137	97	129	59	41	32	28	49	96.1	14.0	6.8	1.0	99.6	23.3
H-22 (G)	180	93	137	89	131	89	123	58	40	32	26	47	90.1	12.7	6.4	2.3	90.5	19.4
H-27 (G)	178	96	138	84	134	93	126	66	40	33	24	51	89.8	11.7	6.3	1.7	94.2	20.9
H-30 (G)	167	93	138	90	133	101	129	61	39	31	28	47	90.9	10.7	10.0	1.6	92.8	17.9
H-166 (K)	174	97	142	90	132	99	125	62	42	33	27	46	97.6	13.6	8.7	2.1	94.0	17.8
H-1064 (K)	171	98	135	82	134	94	127	60	40	31	25	44	91.9	13.5	6.0	1.5	92.0	18.9
H-1065 (K)	176	97	136	95	127	92	125	62	39	33	26	47	91.9	11.6	9.5	2.0	92.3	15.2
H-1081 (K)	170	97	137	88	131	95	124	65	42	33	24	46	91.3	12.4	7.8	1.9	88.6	17.1
H-1101 (K)	169	97	135	81	129	91	119	60	39	30	24	49	83.5	13.1	6.3	2.5	90.0	19.9
H-68 (UT)	179	105	138	91	138	100	136	65	42	33	27	50	90.0	13.2	8.5	2.1	100.2	21.2
H-70 (UT)	174	96	133	94	128	101	129	60	41	32	31	48	96.3	13.5	11.1	1.1	105.7	20.0
H-73 (UT)	177	99	134	84	129	95	126	62	40	33	26	48	88.3	12.9	9.2	1.2	90.1	18.4
KU-004 (R)	169	96	140	87	131	96	127	65	41	34	28	52	93.0	14.1	6.0	1.5	92.2	17.9
KU-010 (R)	163	91	137	90	134	95	124	59	40	30	23	47	87.6	13.2	7.5	2.1	90.0	19.6
KU-014 (R)	176	102	142	96	136	101	131	62	43	33	28	49	94.3	18.1	11.5	2.3	101.2	18.7
KU-015 (R)	170	100	139	95	125	100	133	60	41	33	26	49	94.7	16.2	8.8	2.4	104.0	19.7
KU-018 (R)	170	96	133	90	134	91	122	62	40	32	25	49	94.3	13.9	7.8	1.3	93.1	20.6
KU-027 (R)	169	91	136	89	123	99	121	64	41	31	26	47	90.8	15.4	5.2	0.9	96.1	18.4
KU-031 (R)	176	93	141	88	121	96	122	62	39	35	26	49	86.8	13.8	7.6	2.0	94.0	22.2
KU-037 (R)	167	93	141	86	132	98	116	65	36	31	23	47	84.2	10.7	10.0	3.5	87.0	21.7
KU-038 (R)	170	87	129	87	122	93	115	59	37	31	21	44	88.0	13.9	8.1	1.7	85.7	20.1

Table 4. Craniometric raw data for the Sakishima Islanders (male)

ID	L	BL	B	FB	H	GL	J	G'H(H)	OB	OH	NB	NH	FC	FS	SC	SS	ZC	ZS
M-1 (N)	179	95	138	94	131	100	129	65	41	32	28	48	96.9	10.8	6.3	1.5	99.6	15.3
M-3 (N)	182	104	135	97	135	111	133	75	43	33	27	54	97.8	15.5	8.8	3.6	99.5	26.7
M-4 (N)	180	106	142	101	130	109	141	72	45	35	25	52	109.0	19.4	11.1	3.4	107.3	21.6
M-6 (N)	189	102	143	90	141	101	132	66	42	35	27	49	98.3	13.4	7.5	2.3	101.8	19.1
M-11 (N)	180	100	135	97	135	102	135	64	44	32	26	50	100.3	14.7	6.8	1.6	101.6	21.5
M-14 (N)	186	105	135	91	140	100	136	65	43	31	26	49	101.4	16.0	8.3	3.7	101.1	24.2
M-17 (N)	190	102	141	89	138	102	145	71	46	37	25	53	103.6	17.9	4.4	1.7	97.3	24.0
M-18 (N)	184	104	139	97	137	102	134	63	45	36	26	48	101.3	15.3	7.3	3.9	96.5	18.3
M-25 (N)	178	107	134	91	137	103	129	67	45	33	26	53	97.4	17.8	7.3	2.9	100.0	23.7
M-30 (N)	189	98	143	95	143	98	130	62	43	32	27	47	94.9	11.8	6.6	1.8	96.7	19.8
M-31 (N)	181	107	130	99	137	103	138	69	47	31	28	54	105.6	16.9	8.0	3.3	102.2	25.8
M-32 (N)	181	100	139	94	142	103	142	69	43	36	25	53	99.0	12.3	7.8	2.9	97.9	21.7
M-34 (N)	178	98	149	90	137	96	131	66	41	30	21	50	94.8	12.4	6.4	2.2	96.3	20.5
M-36 (N)	185	104	149	93	139	105	138	69	43	36	24	53	96.8	13.7	10.8	3.8	97.4	23.0
M-37 (N)	185	102	142	94	137	102	137	67	41	32	27	51	95.8	11.2	10.2	2.8	89.9	18.9
M-39 (N)	176	101	138	90	136	99	132	60	43	30	24	46	95.8	12.9	7.8	3.2	95.5	18.2
M-44 (N)	189	109	145	95	144	106	135	73	43	35	25	52	97.8	16.6	9.6	3.6	102.9	22.1
M-58 (N)	177	109	138	91	137	104	133	70	41	32	24	53	96.6	14.6	5.1	2.7	97.0	24.3
M-C3 (13) (R)	179	102	131	85	136	99	131	66	43	34	24	55	92.7	14.3	8.5	2.7	98.5	24.6
M-C3 (15) (R)	177	99	136	94	128	98	136	65	43	36	26	51	95.7	13.1	9.0	2.6	100.8	22.0
IR-2A (R)	181	99	137	87	136	101	134	68	42	34	22	47	100.7	15.0	5.6	1.1	100.9	16.7
IR-2B (R)	184	100	135	94	135	98	132	68	40	33	25	55	100.0	15.3	8.2	2.4	99.0	19.8
IS-62 (UT)	178	96	141	88	133	102	132	64	41	31	26	48	90.8	11.4	6.1	2.1	93.7	22.4

Table 5. Craniometric raw data for the Sakishima Islanders (female)

ID	L	BL	B	FB	H	GL	J	G'H(H)	OB	OH	NB	NH	FC	FS	SC	SS	ZC	ZS
M-5 (N)	173	97	138	91	133	93	126	69	40	33	27	53	94.6	11.4	7.5	2.7	95.1	18.0
M-12 (N)	172	99	133	91	134	101	125	66	42	31	28	50	93.5	12.7	5.5	1.4	90.0	17.8
M-19 (N)	174	99	136	90	133	96	127	65	42	32	28	48	96.0	16.0	11.7	2.7	96.1	20.4
M-21 (N)	172	95	133	90	133	95	122	64	39	32	26	48	88.3	14.9	6.6	2.0	90.3	21.1
M-22 (N)	183	97	142	89	132	97	129	62	41	31	26	49	95.8	13.3	8.2	2.5	96.2	17.7
M-23 (N)	176	97	136	97	131	96	132	63	42	36	27	51	95.2	13.8	8.8	2.3	98.3	20.1
M-24 (N)	177	98	124	92	126	108	125	62	40	30	25	45	91.7	17.1	11.3	3.0	95.5	21.3
M-26 (N)	170	101	136	88	135	97	124	65	39	33	21	49	91.2	15.0	8.9	3.1	91.3	21.6
M-33 (N)	175	102	133	91	135	104	125	67	42	31	24	49	96.3	14.9	11.0	1.8	97.3	16.3
M-70 (N)	179	99	136	90	131	97	116	62	39	33	23	48	88.7	14.1	5.0	2.1	86.4	19.3
IR-12 (R)	177	93	134	92	129	94	124	61	39	31	26	45	96.6	13.1	10.1	2.0	87.2	15.7
YO-27 (UT)	180	102	137	91	140	98	126	64	42	34	24	51	91.5	16.5	9.0	3.7	87.2	23.6
YO-58 (UT)	179	105	130	93	135	105	130	65	43	31	30	53	97.8	14.8	7.5	1.9	101.4	24.9

The remaining 6 measurements were those assessing the transverse flatness of facial skeletons as described by Yamaguchi (1973).

Craniometric Raw Data

Taking the geographically and culturally close relationship between the Amami and Okinawa Islanders into consideration (e.g., Fujimoto, 1988; Asato, 1996), these two groups were combined as a single population unit. Craniometric raw data for the Amami/Okinawa Islanders are shown in Table 2 for males and Table 3 for females. The raw data of the male and female Sakishima Islanders are given in Tables 4 and 5, respectively.

In these tables, the capital letter prefixed to an ID number represents the name of the island from which the cranium is derived: T and KI stand for Tokunoshima and Kikai-jima of the Amami islands group; H and KU stand for Okinawa Honto and Kume-jima of the Okinawa islands group; M, IR, IS, and YO, respectively, indicate Miyako-jima, Iriomote-jima, Ishigaki-jima, and Yonaguni-jima of the Sakishima islands group. The capital letter in parenthesis following an ID number represents the location where the cranium is kept: K, UT, and R, respectively, stand for Kyoto University, University of Tokyo, and University of the Ryukyus; G and N designate the Gyokusendo burial cave of Okinawa Honto and the Nagabaka burial cave of Miyako-jima.

For more extensive data of Ryukyuan mean cranial measurements, see Ikeda (1974), and Tagaya and Ikeda (1976).

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