

REPORT ON THE SKELETAL REMAINS FROM THE NEOLITHIC SITE AT BÀO JI, SHENSI

YEN YIN, LIU CHANG-ZHI & GÚ YÚ-MIN

(Institute of Vertebrate Paleontology and Paleoanthropology, Academia Sinica)

The material on which this report is based was recovered from the 1958—59 excavations at Bào Ji, Shensi.

The excavations were reported by the archaeological team of the Institute of Archaeology, Academia Sinica, in "Kao Gu" 1959 and 1960.

Most of the bones are preserved in good condition, but some are rather in friable condition. There are 16 complete skulls that could be measured in details, about 21 skulls that could be measured partially. For taking measurements 23 mandibles are available. Long bones that could be used for study are as follows: 170 femora, 115 tibiae, 9 humeri, 34 ulnae, 22 radii. The bones represent at least a minimum of 136 individuals.

On a certain number of skulls, we have observed the remarkable slanting of forehead, notable prognathism, and noticeable prominence of brow-ridges etc. These indicate that they correspond to some characteristics of Austral-negroid, or these might be regarded as the primitiveness of neolithic skulls.

Observation and measurement (see tables 1. and 2.)

Observations reveal that the majority of the skulls are elliptical and pentagonal in shape, with simple sutures, weak brow-ridges, round-oval orbits and also associated with the predominance of the infantile form of pyriform aperture, the projection of the malar bone and the inconspicuous canine fossa. All these indicate that this series of skulls is Mongoloid.

Measurements reveal that the male skulls are mesocranial (79.34), hypsicranial (78.73), and acrocranial (78.73, 98.80), metriometopic fronto-parietal index (65.35). The face is characterized by the moderate size of upperfacial height (72.66 cm) and the moderate size of the bizygomatic diameter (137.13 cm). The whole facial angles show mesognathic and the naso-facial angle shows orthognathic. The horizontal naso-zygomatic facial angle (144.13) is closing to the limits of the variation of the Mongoloid (145—149°). The orbital index 100 02/01, d-ek, either right or left, shows mesoconch, and the nasal index shows platyrrhine. All the measurements of the female skulls, both absolute and relative, are smaller than the males but the measurements of the cranial index, height-breadth index, fronto-parietal index, orbital index (mf-ek) and the whole facial

angles are higher than the males. The characters of the female skulls are similar to the males.

Racial type

The limits of the inter-grouping variations which have been used often by the Soviet anthropologists (Я. Я. Рогинский, Г. Дебец) as a criterion to carry on the intra-grouping comparison in the study of their anthropological material, we use in the present instance similarly for the study of our material. The available characteristics of our material are only 8 in number, such as, maximum height, maximum breadth, cephalic index, cranial height, facial height, bizygomatic breadth, orbital index and nasal index etc. The results are presented as percentage in the following:

Báo Ji Neolithic series—Bán Po neolithic series	10.91.
Báo Ji Neolithic series—Indo-China neolithic series	19.47.
Báo Ji Neolithic series—Kansu Honan neolithic series	20.9.
Báo Ji Neolithic series—near Lake Baikal series	30.1.

The racial type of these series of skulls is in general Mongoloid. In comparison with the neolithic series (see table 3), such as, Bán po series, Indo-China series (H. Mansuy et M. Colani) Kansu Honan series (Black) and the near Lake Baikal series A (Дебец), it shows that Báo Ji series and Bán po series are fundamentally similar with one another. The resemblance between the Báo Ji and Indo-China series, and that between the Báo Ji and the Kansu-Honan series are not quite different when judging from the values of their inter-grouping variations, yet from the characteristics of the skulls of the Báo Ji series, such as, moderate size of upperfacial height, platyrrhine shape of nasal index and the alveolar prognathism of the maxilla, we can say that the Báo Ji series resembles more to the Indo-China series.

The limits of intra-grouping variations devised and put into use by Prof. Дебец for carrying on the inter-grouping comparisons in the anthropological material of Kamchatka, are used as criterion here for the inter-grouping comparison between the Báo Ji neolithic group and the Mongoloid groups. The characteristics used here are 19, which correspond to those selected by prof. Дебец. The results are presented as percentage in the following:

	Absolute measurements	Indices
Báo Ji neolithic series—South China series	30.80	31.96
Báo Ji neolithic series—North China series	36.72	37.06
Báo Ji neolithic series—Indonesia series	27.66	15.35
Báo Ji neolithic series—Eskimo series	29.39	39.18
Báo Ji neolithic series—Mongol series	36.38	35.89
Báo Ji neolithic series—Tibetan series	32.92	21.11

In comparison with the modern Mongoloid series (see table 4), such as, South China series (Harrower), North-China series (Black), Alaska Eskimo series (Hrdlička and Дебец), Mongol series (Дебец) Indonesia series (Бонин) and Tibetan B series

Table 1 Morphological Observations

Characteristics	Sex	Percentage					
		Round	Elliptical	Ovoid	Pentagonal	Sphenoid	
Cranium form	Male(27)	11.11%(2)	29.63%(8)	18.52%(5)	29.63%(8)	11.11%(3)	
	Female(13)	7.69%(1)	15.39%(2)	23.08%(3)	46.15(6)	7.69%(1)	
Asymmetry	Male(28)	No asymmetry 26.57%(8)	Left occipital prominence 50%(14)	Right occipital prominence 21.43%(6)			
	Female(9)	44.44%(4)	33.33%(3)	22.22%(2)			
Sutures	Male(30)	Linear	Very simple 53.33%(16)	Simple 46.67%(14)	Complicate		
	Female(11)		45.46%(5)	54.54%(6)			
Brow ridges	Male(28)	Trace 39.29%(11)	Prominence extending less than $\frac{1}{2}$ of the supraorbital margin 35.71%(10)	Prominence extending up to $\frac{1}{2}$ of the supraorbital margin 25%	Continuous torus		
	Female(12)	38.33%(10)	16.97%(2)				
Pterion form	Male(12)	H. type L. 50% R. 66.67% (6) (8)	I. type	K. type L. 8.33% R. (1)	X. type L. 16.67 R. 8.33% (2) (1)	Epiteric L. R.	Rt. unable for obser- vation 25% Lt. unable for obser- vation 25%
	Female(9)	66.67% (6)	55.56% (5)			22.22% (2)	Rt. unable for obser- vation 33.3% Lt. unable for obser- vation 11.1%

Table 1 Morphological Observations (Continued)

Characteristics	Sex	Percentage				
		Round-dull quadrangular	Round-dull, quadrangular	Angular, quadrangular	Low	High
Orbital shape	Male(19)	42.11%(8)	52.63%(10)	5.26%(1)		
	Female(9)	33.33%(3)	66.67%(6)			
Shape of nasal aperture	Male(15)	Cardial 31.25%(5)	Triangular 6.25%(1)	Pyriform 62.5%(10)		
	Female(7)	14.29(1)	28.57(2)	57.14%(4)		
Lower margins of nasal aperture	Male(16)	Infantile 56.25%(9)	Anthropine 6.25%(1)	Fossa praeasialies 31.25%(5)	Sulcus praeasialies 6.25%(1)	
	Female(8)	62.5%(5)	25%(2)	12.5%(1)		
Nasal spine	Male(17)	Broca I 100%(17)	II	III	IV	V
	Female(9)	88.89%(8)	11.11%(1)			
Form of jugal	Male(15)	In mild degree: widened above downwards, with sharp angle. 26.67%(4)	In excessive degree: widened laterally, deep from downwards, with sharp angle. 73.33%(11)			
	Female(6)	16.67%(1)	83.33%(5)			
Canine fossa	Male(19)	None 21.05%(4)	Trace 47.37%(6)	Medium 31.58%(6)	Moderate	Excessive
	Female(8)	12.5%(1)	75%(6)			
Shovel shape of Incisors	Male(5)	None 20%(1)				Shovel-shape 80%(4)
	Female(4)	25%(1)				75%(3)

Table 2 Cranial measurements

NN (Martin)	Characteristics	Male	Female
1.	Max, length	180.22(26)	175.3(10)
8.	Max. breadth	143.25(24)	138.56(9)
17.	Height (Ba-B)	141.55(14)	135.94(8)
9.	Least frontal breadth	93.29(21)	91.96(12)
	Basion nasospinale length	96.4(10)	90.58(6)
45.	Bizygomatic breadth	137.13(8)	128.25(4)
40.	Basion prosthion length	102.02(9)	96.58(6)
50.	Basion nasion length	102.63(12)	96.57(7)
48.	Upper facial height	72.66(11)	68.26(7)
55.	Nasal height	52.13(15)	49.12(9)
54.	Nasal breadth	27.29(15)	25.86(8)
52.	Orbital height	R: 33.9(13)	33.23(7)
		L: 34.02(17)	33.02(9)
51.	Orbital breadth (mf-ek)	R 43.60(14)	L 41.64(7)
		L 43.50(13)	L 41.34(8)
52a	Orbital breadth (d-ek)	R: 40.47(11)	38.53(6)
		L: 40.70(11)	38.60(5)
	Simotic height	2.28(16)	2.11(8)
8:1	Cephalic index	79.34(24)	78.59(9)
17:8	Length height index	78.73(14)	78.68(8)
9:8	Breadth height index	98.80(14)	97.91(7)
48:45	Fronto-breadth index	65.35(19)	66.37(9)
54:55	Facial index	53.49(6)	52.39(3)
	Nasal index	52.50(15)	52.43(8)
52:51	Orbital index (mf-ek)	R: 77.98(12)	79.85(7)
		L: 78.30(13)	79.91(7)
	Orbital index (d-ek)	R: 84.41(10)	86.07(6)
		L: 85.58(11)	83.38(5)
	Simotic index	28.09(15)	24.27(8)
74.	Alveolar angle	70.73(14)	74.44(9)
72.	Facial profile angle	82.35(16)	83.22(9)
73.	Naso-spinal angle	86.06(16)	86.67(9)
77.	Naso-maxillary angle	144.13(12)	143.50(9)
	Zygo-maxillary angle	137.38(12)	138.92(6)
	Frontal angle	78.51(16)	75.89(9)

(Morant), it may be said that the degree of likeness to Báu Ji is shown strong in Indonesia, moderate in South-China series and Tibetan B series and the least in the rest, when judging from the values of their inter-grouping variations (see table 4). From the characters of the Báu Ji series, such as, platyrrhine shape of nasal index (52.5), low perpendicular

Table 3 Averages of the skulls of Bào Ji Neolithic and comparative data (male)

NN (Martin)	Characteristics	Bào Ji Neolithic series (Yen & others)	Bán Po Neolithic series (Yen & others)	Kansu Honan Neolithic series (Black)	Indo-China Neolithic series (H. Mansuy et M. Colani)	Near Lake Baikal series A (Джебу)
1.	Max. length	180.22(26)	180.8(11)	181.65(25)	177.0(2)	191.5
2.	Max. breadth	143.25(24)	138.9(9)	137.0(26)	135.0(2)	138.8
17.	Height (aa-b)	141.55(14)	138.8(3)	136.8(23)	138.5(2)	126.8
9.	Least frontal breadth	93.29(21)	93.1(11)	92.3(24)	97.0(2)	94.07
45.	Bizygomatic breadth	137.13(8)	130.5(2)	130.7(19)	136.5(2)	137.50
48.	Upper facial height	72.66(11)	75.9(5)	74.8(16)	66.5(2)	75.10
52.	Orbital height	33.9(13)	34.2(2)	33.8(16)	34.5(2)	—
51.	Orbital breadth mf-ek R d-ek R	43.5(13)	42.8(2)	45.0(18)	41.5(2)	—
55.	Nasal height	40.47(11)	40.0(2)	42.0	38.6(2)	—
54.	Nasal breadth	52.13(15)	55.5(7)	55.0(20)	51.0(2)	—
8:1	Cephalic index	79.34(24)	78.38(7)	74.06(25)	76.48(2)	—
48:45	Facial index	53.49(6)	51.28(1)	56.48(15)	—	54.6
52:51	Orbital index mf-ek	R. 77.98(12)	R. 82.14(1)	R. 75.02(19)	83.15(2)	—
52:51A	d-ek	R. 84.41(10)	R. 85.18(1)	R. 80.48	89.14(2)	89.2
54:55	Nasal index	52.5(15)	50.00(5)	47.33(18)	58.49	45.1
72.	Facial profile angle	82.35(16)	81.00(3)	82.16(17)	—	85.2
74.	Alveolor angle	70.73	78.5(4)	—	—	—

Table 4 Averages and indices of Bào Ji Neolithic skulls and comparative data (male)

NN (-Martin)	Characteristics	Bào Ji Neolithic series (Yen & others)	South China series (G. Harrower)	North China series (Black)	Mongol series (Дюбун)	Indonesia series (Бонин)	Tibetan B series (Morant)	Eskimo series (Hdljka & Дюбун)
1.	Basion prosthion length (na-pr)	102.02	96.04	95.2	98.5	98.8	98.5	102.6
2.	Basion-nasion length	102.63	98.3	99.0	100.5	99.3	99.2	102.3
3.	Upper facial height	72.66	73.8	75.3	78.0	70.9	76.5	77.6
4.	Bizygomatic breadth	137.13	132.6	132.7	141.8	134.7	137.5	138.4
5.	Orbital height	R. 33.9	R. 34.6	35.5	35.8	34.2	36.7	36.1
6.	Orbital breadth d-ek	R. 40.47	R. 38.7	40.87	40.4	38.7	41.2	41.2
7.	Nasal height	52.13	52.6	55.3	56.5	50.6	54.8	54.6
8.	Nasal breadth	27.29	25.2	25.0	27.4	26.8	27.1	24.4
9.	Maximum length	180.2	179.9	178.5	182.2	173.7	185.5	182.3
10.	Maximum breadth	143.25	140.9	138.2	149.0	142.2	139.4	141.2
11.	Cranial height	141.55	137.8	137.2	131.4	135.5	134.1	135.2
100.	1:2 Facial prominence index	99.38	96.72*	96.16*	98.0*	99.5*	98.80*	100.3*
100.	3:11 Perpendicular cranio-facial index	52.01	53.6*	54.2*	59.4	52.3	57.0	57.4
100.	4:0.5 (9+10) Horizontal cranio-facial index	85.76	82.67*	83.80*	85.62*	85.28*	84.64*	85.56*
100.	3:4 Upper facial index	53.49	55.7	56.80	55.01	52.64	55.64	56.07
100.	8:6 Naso-orbital index	66.88	65.12*	60.98*	67.82*	69.25*	65.78*	59.22*
100.	5:6 Orbital index	84.41	89.35	86.6	88.80	88.4	88.60	87.60
100.	8:7 Nasal index	52.50	48.50	45.5	48.6	53.10	49.50	44.70
100.	9:10 Cephalic index	79.34	78.75	77.6	82.0	82.0	75.10	77.40
100.	11:0.5 (9+10) Average height index	86.79	85.90	86.64	79.6	85.8	82.50	83.60

*Ratio of the two mean measurements.

cranio-facial index (51.2) and alveolar prognathism, the Bào Ji series is more closer to the Southern Asiatic Mongoloid series.

Mandible

Few mandibles are available for measurements. The measurements of Bào Ji neolithic series are fundamentally similar to the Bán Pò neolithic series. In comparison with the recent series, such as, Fushun series (Shima), North-China series (Koganei), Peking series (Haberer), South-China series (Harrower) and Hainan series (Harrower), it shows that the bigonial dimeter is similar to the Peking series, height of symphysis is similar to Fushun series and North-China series.

Long bones

The index of shaft of femur of Bào Ji series is higher than the series in comparison, such as, Sha Ko T'un neolithic series and Yang Shao neolithic series and North-China recent series, it shows that the dimensions of the femoral shaft at its middle are probably wider in the Bào Ji series than amongst the groups in comparison. The pilaster index of the Bào Ji series is higher than or even equal to the groups in comparison, and their values are all over 100. All these indicate that their pilasters are well developed, and the intensity of labor of this group of people is not less than the groups of people in comparison.

From the comparison of the lengths of long bones, we can presume that there are obvious inter-grouping variations to be noted amongst the different groups, such as, the variation of the length of femur of the male groups ranges from 0.47—1.19 cm, the length of tibia ranges from 1.37 cm—9.06 cm, the length of humerus ranges from 0.11 cm—2.06 cm. In the meantime we can see that the lengths of long bones of Bào Ji series are greater than the Pi Zi Wō neolithic series and on the other hand smaller than the Yang Shao neolithic series in the following aspects: maximum length and physiological length of the femur of the male groups, the maximum length of the tibia of the male groups and the maximum length of the humerus of the male groups.

Stature

The stature is reconstructed from the formulae evolved by Trotter & Gleisser for the Mongolian male sex. For this purpose the following available bony lengths are used, e.i. maximum lengths of femur and tibia of the males, no. M174, M197, and M272 etc. The estimated stature for the male of this group of people is 169.45 cm.

Cranial capacity

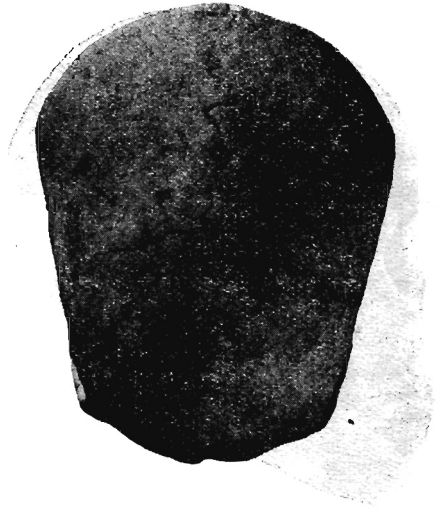
The cranial capacity is estimated according to the formulae of Pearson. The average of the cranial capacity of the 12 males is 1472.04 c.c. and the average of the 6 females is 1325.63 c.c.

Conclusion

From the above numerous observations and measurements we can draw the conclusion that the racial type of Bào Ji neolithic series is fundamentally Mongoloid. In



1



3



2



4

A neolithic skull excavated from Bào Ji, Shensi, catalogue No. 38 ♂ (1/3 size)

1. Lateral aspect,
2. Anterior aspect.

3. Vertical aspect.
4. Basal aspect.



1



3



2



4

A neolithic skull excavated from Bào Ji, Shensi, catalogue No. 8 ♀ (1/3 size)

1. Lateral aspect.
2. Anterior aspect.

3. Vertical aspect.
4. Basal aspect.

view of the high vault (Ba-B141.55 mm) and the moderate size of facial width (maximum zygomatic length 137.13 mm) the skeletal remains from the neolithic site at Bào Ji, Shensi can be classified as the Pacific Ocean branch of the Mongoloid race or Southern Mongoloid race according to the Soviet classification. From the moderate size of facial height, platyrrhine shape of nasal index and the alveolar prognathism and the slanting of forehead, they have more affinity with the modern Southern Asiatic Mongoloid groups.

References

- Дебец, Г. Ф., 1948. Палеоантропология СССР. *Труды института Этнографии* Н. С. Т. IV.
- Дебец, Г. Ф., 1951. Антропологические исследования в камчатской области. *Труды института Этнографии АН СССР*, Н. С., Т. 17.
- Чебоксаров, Н. Н., 1947. Основные Направления Расовой Дефференциации в Восточной Азии. *Труды института Этнографии АН СССР*, Н. С., Т. 2: 24—83.
- Рогинский, Я. Я., Левин, М. Г., 1955. Основы Антропологии, Московского университета.
- Токарев, Т. Я., 1937. Материалы по краниологии Алеутов. *Антроп. журнал*, (1): 57—72.
- Bào Ji Archaeological Team, Institute of Archaeology, Academia Sinica: 1959 & 1960. Excavations of a Neolithic Site at Bào Ji Shen-si. *Kaogu* No. 5, 229—230; No. 2, 4—6.
- Black, D., 1925. The Human skeletal remains from the Sha-Kuo T'un cave deposit in comparison with those from Yang Shao Tsun and with recent North China skeletal material. *Palaeont. Sinica*. Series D. 1(3): 38—102.
- Black, D., 1928. A study of Kansu and Honan Aeneolithic skulls and specimens from later Kansu prehistoric sites in comparison with North China and other recent crania. *Palaeont. Sinica*, Series D. 6 (1): 1—83.
- Harrower, G., 1928. A study of the crania of the Hylam Chinese. *Biometrika*, 9B: 245—278.
- Hooton, E. A., 1947. *Up from the Ape*, the Macmillan Co. New York, pp. 423—698.
- Lawrance E. W. & Latimer H. B., 1957. Weights and Linear measurements of 105 Human skeletons from Asia. *Amer. J. Anat.*, 101 (3): 445—459.
- Mansuy, H. et M. Colani, 1925. Contribution A la préhistoire de L'Indochine, VII, Crânes de gisement de Lang-Cuom. *Mém. Surv. Geol. L'Indochine*, 12: 11—47.
- Martin, R., 1957. *Lehrbuch der Anthropologie*, Gustav Fisher Verlag. Stuttgart., 1: 429—574.
- Trotter, M. & G. C. Gleser, 1958. A re-evaluation of estimation of stature based on measurement of stature taken during life and of long bones after death. *Am. J. Phys. Anthropol.*, 16 (1): 79—123.