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Fascicle I.

A STUDY OF KANSU AND HONAN ÆNEOLITHIC SKULLS AND SPECIMENS FROM LATER KANSU PREHISTORIC SITES IN COMPARISON WITH NORTH CHINA AND OTHER RECENT CRANIA

PART I.

ON MEASUREMENT AND IDENTIFICATION

BY

DAVIDSON BLACK M.A., M.D.,
PROFESSOR OF ANATOMY
PEKING UNION MEDICAL COLLEGE, PEIPING

TEXT FIGURES 1 TO 31 AND 21 TABLES

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PALÆONTOLOGIA SINICA

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A Study of Kansu and Honan Æneolithic Skulls and Specimens from Later Kansu Prehistoric Sites in Comparison with North China and Other Recent Crania.

PART I

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BY

Davidson Black M.A., M.D.,
Professor of Anatomy
Peking Union Medical College
Peking

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ERRATA.

Page 5 line 5, for *thereofe* read *thereof*

line 15, for *norm* read *norma*

35 Footnote, for *expaess* read *express*

41 line 6, for *valves* read *values*

44 line 13, for *Benington* read *Bennington*

45 Table 16 Title, for *Coutours* read *Contours*

54 line 13, for *ambda* read *lambda*

55 line 18, for *arger* read *larger*

66 line 8 from bottom, for *palne* read *plane*

67 last line, for *Hsien Tien* read *Hsin Tien*

69 Table 19 Title, for *use* read *used*

Second last subdivision, for *subense* read *subtense*

A STUDY OF KANSU AND HONAN ÆNEOLITHIC SKULLS AND SPECIMENS FROM LATER KANSU PREHISTORIC SITES IN COMPARISON WITH NORTH CHINA AND OTHER RECENT CRANIA.

PART I

ON MEASUREMENT AND IDENTIFICATION*

BY

DAVIDSON BLACK

INTRODUCTION.

The material on which this report is based was recovered during a series of extensive archæological reconnaissances carried out over a period of years from 1921 to 1924 by Dr. J. G. Andersson under the auspices of the Geological Survey of China. A general account of the archæological work in Kansu during the years 1923-24 has been published in Dr. Andersson's preliminary report on that research (1). In the introduction to the latter publication there will also be found a brief historical review of the work done in this field in China up to and including the year 1924. In December of the latter year the splendid collection of prehistoric human skeletal material from the Kansu sites was placed in my hands for study and description—a privilege for which I wish again to express my most sincere thanks to Dr. Andersson and to the Directors of the Geological Survey of China, Drs. W. H. Wong and V. K. Ting.

The human skeletal remains other than skulls from the Sha Kuo T'un cave and from the type Yang Shao site in Honan have already been described (4). Of the material recovered at the Honan Yang Shao site but few of the skeletons were associated with skulls in a good state of preservation and up to the present no description of these has been published. At this site one adult female and two adult male skulls were recovered unbroken and among the remaining material it has been possible to restore in some degree seven other adult skulls. These specimens (6 ♂ and 4 ♀) have been studied in detail and subsequently incorporated with others from similar Kansu

*Received for publication July 1928.

culture horizons to constitute the series designated *Æneolithic* in the present report.

A brief note on the Kansu skeletal material (5) was published with Dr. Andersson's preliminary report in 1925 (1), the meagre descriptions and tentative conclusions contained therein being based upon general impressions gained during the preliminary work of unpacking, cleaning and arranging the specimens. At the time the latter note was written the Kansu prehistoric collection was said to include "remains representing more than 120 individuals." This statement may now be supplemented by one to the effect that within this collection 133 individuals are represented by skulls or parts thereof. Among these, 58 adult males and 16 adult females are represented by skulls sufficiently well preserved to permit of measurement in whole or in part. These specimens (58 ♂ and 16 ♀) with those from the Honan Yang Shao site noted above, constitute the series designated *Pooled Prehistoric* in the present report, and their distribution within the various divisions of the prehistoric collection is described below.

The mechanical work in connection with the preparation of the whole series of prehistoric skulls and the routine of photographic and craniographic record was not completed till the autumn of 1926; and it was not until June 1927 that all the raw date of observation and measurement on the prehistoric skulls and on the recent North China and Non-Asiatic series used in comparison throughout this report were completely in hand. The arrangement of records on the basis of sex and age and the preparation of corrected tabular summaries of measurements together with the seriation of selected data and the construction of type craniographic contours was completed by December 1927. In bringing this phase of the work to its completion at that time much credit is due to the skill, care and team-work of my technical assistants of whom I wish to mention in particular Mr. Chao Han Fen for his preparation work on the material and subsequent accurate drafting of diagraphic and dioptrographic tracings, Messrs. Chao Te An and Hsieh Jen P'u for their work on summaries and seriation, Mr. Li K'ai Yuan for the preparation of drawings for publication, and my secretary Miss Olga Hempel for her painstaking and careful work on records.

The subsequent preparation of Part I of this report has been carried on during my absence from China on furlough and it is a pleasure to express here my thanks to Professors J. G. Fitzgerald and R. D. Defries of the Department of Hygiene and Public Health of the University of Toronto for their kindness in loaning me a Marchant calculating machine. I have also to thank Dr. Stewart Wallace for his courtesy in extending to me the privileges of the University of Toronto Library during the progress of this work.

It had originally been intended to include the whole of my report on the Kansu and Honan prehistoric skulls in one fascicle of this Journal. However, since the work falls naturally into two phases, one dealing with measurement and identification and the other with more general considerations, it has been decided to publish the communication in two parts. Part II will contain a protocol of all the skull material recovered, a list of the individual measurements from which the computations in Part I have been derived, a description of the morphology of the crania and mandibulæ in the collection, together with an adequate number of plates and illustrations. Part I, constituting the present communication, will be devoted entirely to a consideration of measurements and form relations treated from the standpoint of the material as a whole, in an endeavour to arrive at some definite and exact understanding as to its racial identification.

It is worthy of note that the state of preservation of the skulls recovered from the Honan Yang Shao site differs for the most part quite markedly from that of the majority of those recovered from Kansu horizons of whatever age. In general it may be said that the Honan material whether entire or fragmentary was mineralized and in a considerable proportion of cases this process had reached an advanced stage. Among the whole of the Kansu collection but two or three specimens showed any appreciable evidence of mineralization. On the contrary, the majority of the Kansu skulls were somewhat rarified as though through the action of an acid soil and the process had proceeded in many cases to a point where the teeth only were preserved. Had it not been for the excellent way in which all skulls and fragile specimens from the Kansu sites were reinforced in the field by the pasted paper method, few if any could have reached the laboratory entire. In the subsequent preparation of these skulls it became necessary in many cases to proceed by stages first to remove a part of the paper reinforcement and adherent loess and then after drying to apply a heavy coat of supporting shellac before proceeding to the further removal of the field wrappings.

Much care has been exercised in sexing the adult skulls forming the basis of the present report. In the case of the Honan material skulls and skull parts were associated in most instances with almost complete skeletons and no adult skulls of questionable sex were encountered. Under field conditions in Kansu it was not practicable to collect entire skeletons from each grave investigated. Of course in many instances, owing to the advanced stage of bone disintegration this was impossible, but when a selection of material could be made Dr. Andersson endeavoured to preserve skulls together with associated pelvic and long bones. These additional parts together with Dr. Andersson's field records have been of great assistance in sexing the Kansu material. Among the adult Kansu skulls lacking associated skeletal parts very few specimens have had to remain in the categories "questionable male" or "questionable female." In the summaries "questionable male" skulls have been grouped with the male series and similarly "questionable female" specimens have been included in the female group.

It will be of advantage at this point briefly to review the relative chronology of the Kansu and Honan prehistoric sites as these have been determined by Dr. Andersson in his preliminary roport (l. c.) and further to indicate the number and sex of the adult skulls available for the present study from each of the archæological horizons represented.

NORTH CHINA PREHISTORIC STAGES IN RELATIVE CHRONOLOGICAL ORDER

EARLY BRONZE AGE AND COPPER AGE	(6)	Sha Ching Stage (Kansu) - 14 ♂.
	(5)	Ssu Wa Stage (Kansu) - 4 ♂ and 4 ♀.
	(4)	Hsin Tien Stage (Kansu) - 10 ♂ and 2 ♀.
ÆNEOLITHIC AGE	(3)	Ma Ch'ang Stage (Kansu) - 3 ♂.
	(2)	Yang Shao Stage (Kansu) - 27 ♂ and 10 .♀
		(Honan - type locality) - 6 ♂ and 4 ♀.
LATE NEOLITHIC AGE	(1)	Ch'i Chia Stage (Kansu) - *no skeletal material recovered.*

The series designated *Æneolithic* in the present investigation comprises 36 adult male skulls or parts thereof from three localities representing two phases of Æneolithic culture; and 14 adult female skulls or parts thereof from two localities representing identical phases of Æneolithic culture. The series designated *Pooled Prehistoric* in the present investigation comprises 64 adult male skulls or parts thereofe representing all localities and prehistoric culture phases; and 20 adult female skulls or parts thereof derived from four localities representing three prehistoric culture phases, there being no adult female skull or parts thereof represented in the material of the Ma Ch'ang or Sha Ching stages. It will be shown in the body of this report that there is ample justification for dealing with this material as a pooled series.

In my preliminary note on the Kansu collection I drew attention to three skulls (two from the second and one from the third culture stage) in which "in contrast to the majority of those in the collection the nasal bones are definitely less compressed and depressed in the region of the nasion while at the same time the plane of the orbital entrance is set relatively obliquely to that of the norm frontalis." (l.c. p. 54). Although in certain other features the skulls in question were fundamentally similar to the dominant Kansu prehistoric type, it was suggested that the three specimens be referred to as "Type X" skulls until the uncertainty as to their status and relationship could be removed.

I have since been able to study the whole prehistoric series in detailed comparison with a fairly representative and extensive collection of modern North China skulls. As a result of this I am now convinced that the skulls tentatively referred to as "Type X" do not constitute a distinct sub-type and should be included as normal variations within the Æneolithic series. The skulls in question certainly differ from the majority of that series in respect to the degree of their facial flatness but the degree of this difference seems to fall well within the range of the normal variability of this character as seen among the specimens of my recent North China skull series of known age, sex, locality and race. The so-called "Type X" skulls accordingly have been incorporated within the series designated *Æneolithic* in the present communication.

It remains to describe briefly the material comprising the modern skull series used in detailed comparisons throughout this report. The normal adult skulls of the series designated *North China—recent* came with but few exceptions from dissecting room material derived from the northern provinces of China, chiefly from Chihli, Shansi and Shantung, with some from Shensi, Fengtien and Northern Honan. In the majority of cases precise information as to birth place, stated age, etc., is known and there can be no reasonable doubt as to the North China origin of the whole series. The male series comprises 86 adult skulls, the mean stated age in the case of 77 specimens being 35.10±0.76 years. The female series unfortunately included but 10 adult skulls, the mean stated age in this case being 39.50± 3.74 years.

The series designated *Non-Asiatic* throughout this report is a miscellaneous collection of 26 normal adult male European-like skulls selected from student study material purchased abroad in England and America. There is every reason to suppose that this series is precisely what its name implies and contains no material of Asiatic origin. The value of such a negative character in a series has become increasingly evident to me in the course of the present investigation where experiments in the combination of measurements were being attempted in an endeavour to differentiate Western from Oriental types. The so-called Leucoderm and Xanthoderm stocks are best differentiated from one another in Western Europe and Eastern Asia and some more accurate biometric definition of the fundamental differences between the two, unaffected by local varieties, should be possible by the selection of an adequate number of representative North Western European skulls to constitute a relatively heterogeneous Leucoderm series for comparison with an adequate number of similarly selected North Eastern Asiatic skulls. Though my Non-Asiatic series falls far short of being a representative of Western Leucoderm stock, it has been used with this idea in mind.

MEASUREMENTS TAKEN AND METHODS OF MEASUREMENT

In the present investigation all linear measurements have been taken to the nearest millimetre except in the case of measurements made upon craniogram tracings for type contour reconstructions where readings to the nearest half millimetre were made. A certain proportion of the readings made necessarily terminated so near to the half millimetre mark that it was not possible to decide which was the nearer millimetre and in all such cases the nearest even number has been recorded. All linear measurements have been recorded in centimetres so that the second decimal retained in the linear means represents an uncertain figure.

A summary of the means, standard deviations and coefficients of variability with their probable errors for the 82 characters investigated in the *Non-Asiatic, North China—recent, Æneolithic* and *Pooled Prehistoric* male series is set forth in Table 20, In view of the smallness of the *Pooled Prehistoric* and *North China—recent* female series, only the means with their probable errors have been recorded in Table 21.

In the tables referred to above the list of characters with their reference numbers is arranged to correspond to that in the list of definitions given below. In referring to skull points and landmarks the abbreviations defined in R. Martin's Lehrbuch (11) have been used wherever possible. For convenience in cross reference the letter symbols used in the definition of skull measurements by workers in the London Biometric Laboratory are cited in the following list with the definition of those measurements to which they are strictly comparable. In a similar way references are given to the key numbers of Martin's list of measurements. Most of the measurements defined in the *Frankfurter Verständigung* and by the International Agreement of 1906 are included among those that follow. (cf. Schmidt, 20; Fawcett, 7; Duckworth, 6; Hrdlicka, 9; etc.)

*LIST AND DEFINITION OF MEASUREMENTS TAKEN.**

Cranium.

1. *Maximum length:* the greatest diameter of the skull measured from the glabella (*g*) with the spreading compass, one branch of the latter being fixed at the glabella while with the other the greatest length is sought. Equivalent to Fawcett's (7) measurement L but not precisely to measurement L of Morant who (12, p. 196) defines "L = maximum length from glabella to occiput in the median plane." However it has been shown by Fawcett that the means of lengths determined on small series of skulls by such slightly differing methods are quite comparable. (l. c. pp. 436-7).

2. *Maximum breadth:* the greatest horizontal breadth of the cranial vault measured with the spreading compass. Equivalent to measurement B of Morant and to measurement 8 of R. Martin.

3. *Least frontal breadth:* the shortest diameter of the frontal bone between the temporal crests measured with the sliding or spreading compass. Equivalent to measurement B' of Morant and to Martin's measurement 9.

5. *Bimastoid breadth:* the greatest diameter between the lateral mastoid surfaces at the level of the centre of the external auditory meatus, lines being drawn on the skull at the required levels and the greatest diameter sought with the spreading compass. Equivalent to Martin's measurement 13 (1).

6. *Interporial breadth (po-po):* the diameter between the poria determined with the sliding or spreading compass, the landmarks having first been marked upon the skull. Practically the equivalent of Diameter 1 or the Interporial Line of the coronal craniograms which constitutes the base line of the Coronal Type Contours.

   N.B. The porion (*po*) which has been defined as the point on the upper border of the porus acusticus externus which lies vertically above its centre, is often difficult to determine from such a definition. In his discussion of this subject Morant noted that he found "a thin lip of bone on nearly every skull, terminating posteriorly at a well-marked notch, and coinciding almost exactly with any line that could be supposed to mark the upper rims of the auricular passage." The point where this lip of bone was intersected by the plane bisecting the orifice constituted Morant's "Auricular point by definition." (v. 12, p. 201). I have found the condition described by Morant obtaining in the majority of the skulls I have examined and the porion marked on my material is practically equivalent to Morant's "auricular point by definition."

7. *Auricular height:* the vertical height of the cranial vault above the interporial plane taken with a special spanner, the skull being oriented on the craniophore in the Frankfort Plane. Equivalent to measurement *OH* of Morant and to Martin's measurement 21.

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*Reference symbols: *linear measurements,* Arabic numerals; *angular measurements,* Roman numerals: *relative measurements,* numerals or letters preceded by the letter R.

8. Basio-bregmatic height (*ba-b*): the diameter between the basion (*ba*) or mid-point on the anterior margin of the foramen magnum, and the bregma (*b*) measured with the spreading compass. The bregma is defined as the point at which the sagittal and coronal sutures meet, but if the former deviated to one side, the bregma has been taken as the point on the coronal suture cut by the mid-sagittal plane. Equivalent to measurement *H'* of Morant and to Martin's measurement 17.

8a. Basio-vertical height: the height from the basion (*ba*) to the point on the cranial vault vertically above it, measured with the spreading compass when the skull is oriented on the craniophore in the Frankfort Plane. Equivalent to measurement *H* of Morant and to Martin's measurement 18.

9. Basis length (*ba-n*): the distance between the basion (*ba*) and the nasion (*n*) measured with the spreading compass; the nasion (*n*) being defined as the point on the fronto-nasal suture cut by the mid-sagittal plane. Equivalent to measurement *LB* of Morant and to Martin's measurement 5.

10. Profile length (*ba-pr*): the distance between the basion (*ba*) and prosthion (*pr*) measured with the spreading compass. In the case of this measurement, the prosthion is defined as the most *anterior* point on the maxillary alveolar border in the mid-sagittal plane between the median incisors. (cf. infra, measurement 15). Equivalent to measurement *GL* of Morant and to Martin's measurement 10. (v. et. Duckworth 6, p. 9).

11. Mid-profile length (*ba-ns*): the distance between the basion (*ba*) and the sub-nasal point or nasospinale (*ns*) measured with the spreading compass. The nasospinale is defined here as the lowest point on the anterior margin of the left side of the pyriform aperture; in the presence of a subnasal groove or fossa the point was taken on a line approximately limiting the floor of the nasal cavity. This landmark was determined and marked in pencil in all cases before the measurement was taken. The difference between measurements 10 and 11 is a measure of the absolute amount of alveolar prognathism; the relative degree of alveolar prognathism may be expressed as a ratio between this difference and measurement 11.

12. Foramen magnum length (*ba-o*): the diameter between the basion (*ba*) and the opisthion (*o*), measured with the sliding compass, the opisthion being defined as the point on the posterior margin of the foramen cut by the mid-sagittal plane. Equivalent to measurement *fml* of Morant and to Martin's measurement 7.

13. Foramen breadth: the transverse diameter of the foramen magnum at its widest part, taken with the sliding compass. Equivalent to measurement *fmb* of Morant and to Martin's measurement 16.

50. Horizontal circumference: the greatest cranial circumference measured in one horizontal plane with a steel tape, passing in front just above the supraorbital ridges and behind over the most prominent part of the occiput. Equivalent to measurement *U* of Morant and to Martin's measurement 23.

51. *Sagittal cranial arc (arc n-o):* the arc of the cranial vault measured with a steel tape in the mid-sagittal plane from the nasion (*n*) to the opisthion (*o*). Equivalent to measurement *S* of Morant and to Martin's measurement 25.

54. *Occipital arc (arc L-o):* the arc of the occipital bone measured with a steel tape in the mid-sagittal plane from the lambda (*L*) to the opisthion (*o*). This measurement is not listed as such in the tables of means in the present report, its definition being given here only for reference in explanation of the derivation of the *Occipital Index.* Equivalent to measurement S_3 of Morant and to Martin's measurement 28.

54a. *Occipital chord:* chord of the occipital arc measured on the skull from *L* to *o* with the sliding compass; like the preceding, it is defined here for reference only. Equivalent to measurement $S'_{,3}$ of Morant and to Martin's measurement 31.

55. *Transverse cranial arc:* the transverse arc of the cranial vault measured with a steel tape from porion to porion through the *apex,* the landmarks having previously been marked on the skull. Following the London Biometric Laboratory usage, the *apex* is defined as the point on the sagittal suture vertically above the poria when the skull is adjusted on the craniophore in the Frankfort Plane. (cf. Thompson 21, p. 111). Equivalent to measurement *Q'* of Morant and to Martin's measurement 24 b.

Face

4. *Bizygomatic breadth:* the maximum transverse breadth of the face between the external surfaces of the zygomatic arches, measured with the spreading compass. Equivalent to measurement *J* of Morant and to Martin's measurement 45.

14. *Morphological facial height (gn-n):* the distance between the gnathion (*gn*) and the nasion (*n*) when the lower jaw is in normal position (i. e. with maxillary and mandibular dentition in normal contact) measured with the sliding compass. This measurement is limited to skulls in which the teeth are well preserved. The gnathion is defined as the lowest point (i. e. most distant from the nasion) on the under surface of the chin in the mid-sagittal plane when the jaw is in normal articulation. Equivalent to measurement *GH* of Fawcett and to Martin's measurement 47.

15. *Facial height (n-pr):* the distance between the nasion (*n*) and the prosthion (*pr*) measured with the sliding compass. The prosthion (*pr*) in this case is defined as the *lowest* point on the maxillary alveolar process between the median incisors. (cf. supra, measurement 10). Equivalent to measurement *G'H* of Morant and to Martin's measurement 48.

16. *Nasal height (n-ns):* the distance between the nasion (*n*) and the nasospinale (*ns*), i. e. the lowest point of the pyriform aperture on the left side, measured with the sliding compass. (cf. supra, definition of *ns,* in measurement 11). Equivalent to measurement *NH* of Morant and to Martin's measurement 55.

17. *Nasal breadth:* the maximum diameter of the pyriform aperture measured with the sliding compass. Equivalent to measurement *NB* of Morant and to Martin's measurement 54.

18. *Malar height* (*zm-fmo*): the distance between the zygomaxillare (*zm*) and the frontomalare orbitale (*fmo*) measured with the sliding compass. Both right and left sides were measured, but the right only is considered in the present communication. The zygomaxillare is defined as the lowest point on the zygomatico-maxillary suture; the frontomalare orbitale being the point where the lateral orbital margin is crossed by the zygomatico-frontal suture.

19. *Malar breadth* (*zm-rim.orb.*): the shortest distance between the zygomaxillare (*zm*) and the rima orbitalis inferior, measured with the sliding compass. Though both sides were measured, the right only is considered in the present communication. Measurements 18 and 19 have been devised in an attempt to obtain a standard measure of absolute malar size for purposes of comparison between Western and Oriental material.

20. *Bimalar breadth* (*zm-zm*): the distance between the right and left zygomaxillaria measured with the sliding compass. Equivalent to measurement *GB* of Morant and to Martin's measurement 46.

21,la *Interorbital breadth* (*la-la*): the distance between the two lachrymalia measured with the sliding compass, the lachrymale (*la*) being defined as the point where the post-lachrymal crest meets the fronto-lachrymal suture. Equivalent to measurement 49 of Martin.

21,d *Interorbital breadth* (*d-d*): the distance between the two dacrya measured with the sliding compass, the dacryon (*d*) being defined as the junction point of the fronto-lachrymal, fronto-maxillary and maxillo-lachrymal sutures. Equivalent to measurement *DC* of Morant and to Martin's measurement 49a.

22. *Biorbital breadth* (*fmo-fmo*): the distance between the right and left frontomalaria orbitalia measured with the sliding compass. Equivalent to measurement *EWO* of Hooke (8) and to Martin's measurement 43, 1.

56. *Orbital breadth* (*mf-ek*): the transverse diameter of the orbit from the maxillofrontale (*mf*) to the ectoconchion (*ek*), measured with the sliding compass, the landmarks being marked on the skull before measurement. Both right and left orbits were measured, but the right only is considered in the present communication. The ectoconchion is defined as the point where the mid-orbital axis, parallel to the superior orbital border, cuts the lateral orbital margin. When the latter was ill defined and rounded, its summit was marked by a pencil lead drawn tangentially over its surface in the plane of the orbital entrance. The maxillofrontale is here defined as the point where a pencil line joining the curves of the produced medial margins of the upper and lower orbital rims cuts the fronto-maxillary suture. The medial orbital margin has thus been located by a method closely similar to that employed by Fawcett in fixing this landmark and termed by Pearson (3, p. 311) the "curvature method," and the measurement here taken is practically comparable to the greatest breadth measurement O_1 of Morant. Equivalent to Martin's measurement 51.

23. *Orbital height:* the greatest height of the orbit at right angles to the preceding measurement, taken with the sliding compass. Both right and left sides were measured, but the right only is considered in the present communication. Equivalent to measurement O_2 of Morant, though not exactly the same as Martin's measurement 52.

Alveolar Arch and Palate.

25. *Alveolar arch breadth:* the greatest breadth of the arch at right angles to the sagittal plane between the outer surfaces of the maxillary alveolar borders, measured with the sliding compass. Equivalent to measurement 61 of Martin.

26. *Alveolar arch length:* the mid-sagittal diameter of the arch from the prosthion (*pr*) to a line tangent to the distal surfaces of the tubera alveolares, measured with a sliding compass, the distal landmark being defined by a thin metal wire. The prosthion in this measurement is defined as in measurement 10 above. Equivalent to measurement 6 a of Martin.

27. *Palate length* (*ol-sta*): the sagittal diameter of the palate between the orale (*ol*) and staphylion (*sta*) measured with the sliding calipers. The orale is defined as the median point of a line tangent to the posterior alveolar borders of the median incisors; the staphylion being the median point of a line tangent to the most anterior curves of the lateral notches on the posterior border of the palate. Equivalent to measurement G'_1 of Morant and to Martin's measurement 62a.

28a. *Palate length* (*ol-sp*): the sagittal diameter of the palate from the orale (*ol*) to the tip of the posterior nasal spine (*sp.*). Equivalent to measurement G_1 of Morant and to Martin's measurement 62a.

29. *Palate breadth:* the transverse diameter of the palate between the medial margins of the alveoli of the second molar teeth, taken with the sliding compass. Equivalent to measurement G_2 of Morant and to Martin's measurement 63.

30. *Palate height:* the height of the palate from the intermaxillary palatine suture to the mid-point of a line joining the free surfaces of the alveolar processes between the first and second molars, measured with Martin's palatometer. Equivalent to measurement 64 of Martin.

Mandible

31. *Bicondylar breadth:* the maximum breadth of the mandible between the most lateral points on the condyles, measured with the sliding compass. Equivalent to measurement w_1 of Morant and to Martin's measurement 65.

N.B. This is the only direct mandibular measurement that will be considered here, the other measurements together with the special morphology of the jaw being dealt with in Part II of the report. Among adults the bicondylar breadth would appear to be the only mandibular diameter that is not directly, progressively and widely affected by dental changes due to age and to disease. Furthermore, it is a measurement that can be made with relative ease on the living subject, where the landmarks become prominent, when the mouth is moderately or widely opened. Taken with the spreading calipers on the living subject, the measurement may contribute important information about the shape of the face and cranium. In the present connection, it is with particular reference to mandibulo-cranial proportions that the bicondylar measurement has been included. (v. infra).

Angular Measurements

I. Fronto-orbital deviation angle: the angle formed between the norma frontalis plane and a line joining the ectoconchion (*ek*) and maxillofrontale (*mf*), measured on both sides with sliding compass and goniometer attachment, the skull being oriented within the cubic craniophore of Martin. In the present communication the angle on the right side only is considered separately though both angles are included in the following measurement. Equivalent to measurement 78 (1) of Martin.

IS. Orbital inclination angle (I Supplement): the angle formed when a line drawn through the right ectoconchion and maxillofrontale meets one drawn through corresponding points on the left side, the angle thus representing the supplement of angle I, i. e.= $180° - (IR + IL)$. Designed to give due representation in one measurement to both the preceding deviation angles.

II. Facial angle (n-pr-FH): the angle formed behind the point of intersection of the nasion-prosthion (*n-pr*) line and the Frankfort Horizontal Plane (*FH*), laid off and measured by protractor on the sagittal craniogram. Practically equivalenut to angular measurement *P* of Morant and to Martin's measurement 72. (v. measurement VI, note on measurement of angles on craniogram).

III. Nasal profile angle (n-ns-FH): the angle formed behind the nasion-nasospinale (*n-ns*) line and the Frankfort Plane (*FH*), laid off and measured on the sagittal craniogram. The angle indicates the degree of upper facial as contrasted with alveolar prognathism. Equivalent to the angular measurement 73 of Martin.

IV. Basilar angle (n-ba-FH): the angle formed between the nasion-basion (*na-ba*) line and the Frankfort Plane *FH*), laid off and measured on the sagittal craniogram or by subtracting angle *VIII* from the supplement of angle *II*. Equivalent to the angular measurement ϑ_1 of Morant and to Martin's measurement 37 (2).

V. Naso-malar deviation angle (1): the angles formed on the right and on the left between the norma frontalis plane and lines joining the nasospinale (*ns*) to the zygomaxillaria (*zm*), measured on the horizontal craniogram on which the landmarks have been projected. The nasospinale is here defined as the projection of the left nasospinale defined above (v. measurement *11*) upon the sagittal plane (v. Figure 1). The angle on the right side only is here considered though both are included in the following measurement.

VS. Lower angle of facial flattening (V Supplement): the angle formed between the lines joining the right and left zygomaxillaria to the nasospinale as defined for measurement *V*, the angle thus representing the supplement of the two angles of the preceding measurement, i.e.= $180° - (VR + VL)$. (v. Figure 1).

Vn. *Naso-malar deviation angle* (2): the angles formed on the right and on the left between the norma frontalis plane and lines joining the nasion (*n*) to the zygomaxillaria (*zm*), measured on the horizontal craniogram on which the landmarks have been projected. (v. Figure 1). The angle on the right side only is here considered thought both are included in the following measurement.

VnS. *Upper angle of facial flattening* (*Vn Supplement*): the angle formed between the lines joining right and left zygomaxillaria to the nasion, the angle thus representing the supplement of the two angles of the preceding measurement, i. e. $= 180° - (VnR + VnL)$. (v. Figure 1).

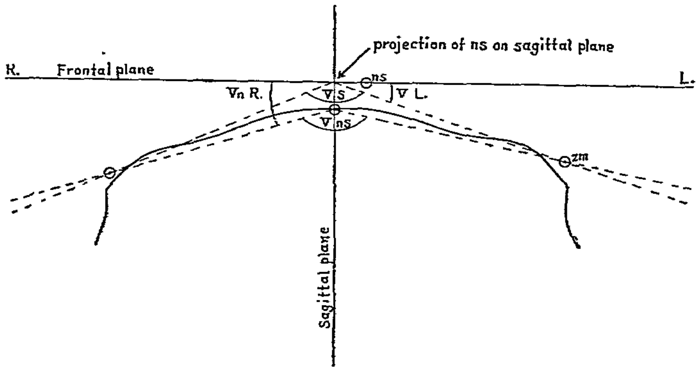


Figure 1. Frontal portion of the glabellar horizontal craniogram of a North China male (PUMC ♂ 6) to illustrate the method of determining angles *V*, *Vn* and their supplements. The abbreviations used are explained in the descriptions of these measurements.

VI. *Alveolar angle* (*n-pr-ba*): the angle formed between lines joining the nasion (*n*) and basion (*ba*) to the prosthion (*pr*), laid off and measured on the sagittal craniogram. Practically equivalent to angular measurement *A* of Morant. (cf. et. measurement 72,5 of Martin).

N. B. This angle and the two following ones (i.e. angles *VI*, *VII* and *VIII*) constitute the angles of Thane's so-called fundamental triangle, the angles of which have been measured on the trigonometer by Fawcett (l. c., p. 418) and all subsequent workers in the London Biometric Laboratory from the known lengths of its sides. In the present work the angles in question have been laid off from similar data on the sagittal craniograms using the *n-ba* diameter as the base, the projection of the nasion upon the craniogram being taken as a fixed point and the projected position of the basion being corrected where necessary. The location of the prosthion was then determined by compass from the *n-pr* and *ba-pr* diameters. Since the definition of the prosthion differs in the latter two measurements (v. supra measurements 10 and 15), the *pr* point determined by measurement on the craniogram cannot correspond exactly to either of these. A similar discrepancy would arise had the angles in question been measured on the trigonometer and results by the two methods should be closely comparable. It is further evident that angles *II* and *IX* have also been slightly affected by this new determination of the prosthion by measurement on the craniogram.

VII. *Basilar angle (n-ba-pr):* the angle formed between lines joining the nasion (*n*) and prosthion (*pr*) to the basion (*ba*) laid off and measured on the sagittal craniogram as described in the preceding note. Practically equivalent to angular measurement *B* of Morant.

VIII. *Nasal angle (ba-n-pr):* the angle formed between the lines joining the basion (*ba*) and prosthion (*pr*) to the nasion (*n*) laid off and measured on the sagittal craniogram as described above. (v. supra measurement *VI* note). Practically equivalent to angular measurement *N* of Morant.

IX. *Basio-prosthion horizontal angle (ba-pr-FH):* the angle formed between the basion-prosthion (*ba-pr*) line and the Frankfort Plane (*FH*), laid off and measured on the sagittal craniogram or by subtracting angle *VI* from angle *II*. Practically equivalent to angular measurement ϑ_2 of Morant. (v. supra measurement *VI* note).

Relative Measurements—Cranium

R1. *Cranial Index:* (*100* x *2/1*) Equivalent to Index *100 B/L* of Fawcett.

R2. *Length-Height A Index:* (*100* x *7/1*)

R3. *Length-Height B Index:* (*100* x *8/1*)

R36. *Length-Height C Index:* (*100* x *8a/1*) Equivalent to Index *100 H/L* of Morant.

R4. *Breadth-Height Index:* (*100* x *8/2*)

R37. *Breadth-Height A Index:* (*100* x *8a/2*) Equivalent to Index *100 H/B* of Fawcett.

R38. *Height-Breadth Index:* (*100* x *2/8a*) Equivalent to Index *100 B/H* of Morant.

R33. *Interporial-Vertical Index:* (*100* x *7/6*) cf. similar Index, Table 17, derived from Coronal Type Contour measurements.

R30. *Vertico-Frontal Index:* (*100* x *3/7*)

R5. *Frontal index:* (*100* x *3/2*)

R13. *Jugo-Frontal Index:* *100* x *3/4*)

R6. *Cranio-Facial Breadth Index:* (*100* x *4/2*)

R7. *Foraminal Index:* (*100* x *13/12*) Equivalent to Index 100 *fmb / fml* of Morant.

R34. *Occipital Index:* (*Oc. I.*) Let measurement *54* = *x* and *54a* = *y*.

$$Oc.\ I. = \frac{100x}{y}\sqrt{\frac{x}{24(x-y)}}$$ Determined with the aid of Tildesley's table of the function (22).

Equivalent to Index *Oc. I.* of Morant.

CM. *Cranial Module:* (*mean of 1 + 2 + 8*)

FM. *Facial Module:* (*mean of 10 + 4 + 14*)

R28. *Cranio-Facial Index:* (*100 FM/CM*)

Relative Measurements—Face

R8. *Total Facial Index:* (*100* x *14/4*)

R9. *Upper Facial A Index:* (*100* x *15/4*)

R10. *Upper Facial B Index:* (*100* x *15/20*) Equivalent to Index *100G'H/GB* of Morant.

R32. *Bimalar-Frontal Index:* (*100* x *22/20*)

R11. *Nasal Index:* (*100* x *17/16*) Equivalent to Index *100 NB/NL* of Morant.

R12. *Interorbital Index:* (*100* x *21, la/22*)

R29. *Interorbital A Index:* (*100* x *21, d/22*)

R31. *Fronto-Interorbital Index:* (*100* x *21, la/3*)

R35. *Right Orbital Index:* (*100* x *58R/56R*) Equivalent to Index *100* O_2R/O_1R of Morant.

R14. *Alveolar Index:* (*100* x *25/26*)

R15. *Palatal Index:* (*100* x *28/27*)

R39. *Palatal A Index:* (*100* x *28/27a*) Equivalent to Index *100* G_2/G_1 of Morant.

Relative Measurements—Cranio-mandibular

RA. *Bicondylar-Auricular Height Index:* (*100* x *7/31*)

RB. *Facial Height-Bicondylar Index:* (*100* x *31/14*)

RC. *Cranial Length-Bicondylar Index:* (*100* x *31/1*)

RD. *Bicondylar-Frontal Index:* (*100* x *3/31*)

THE COEFFICIENT OF RACIAL LIKENESS

An ingenious method of comparing the mean skull characters of two races, by which there can be computed a single coefficient which takes into account a large number of such characters and requires the use of intra-racial standard deviations only, was devised by Professor Karl Pearson and first put into use in 1920 by Tildesley in her study of the Burmese skull (19). This measure, termed the Coefficient of Racial Likeness (C. R. L.), has been used systematically in craniometric research since 1920 by workers in the London Biometric Laboratory (v. et Morant, 12, 13, 14, 15; Morant and Hooke, 16; Hooke, 8), and has been the subject of critical discussion in 1926 by Pearson (19) after more than 700 determinations of the value had been made.

In the present investigation, the Coefficient of Racial Likeness has been computed in the case of each of the series dealt with, using the method as standardized by Morant in his study of the Tibetan skull (12). The following description is extracted practically verbatim from the latter publication (l.c. pp. 205-7).

Let m characters be measured and let the sth character in the first race have M_s for the mean and σ_s for the standard deviation, these two constants being based on n_s individual measurements. Let the corresponding characters for the second race be M'_s σ'_s and N'_s.

Then, if the two races were really samples of the same population, the following expression would be sensibly zero:

$$\frac{1}{m}\left\{ \frac{S(M_s - M'_s)^2}{\dfrac{\sigma_s^2}{n_s} + \dfrac{\sigma'^2_s}{n'_s}} \right\} - 1$$

The value of this expression computed from a number of mean characters of the two races is the Coefficient of Racial Likeness between them and it is thus a measure of the probability of the two being random samples from the same population. It is not a true measure of absolute divergence, and must not for a moment be considered as such, but nevertheless we shall speak of it, for convenience, as if it were an absolute measure of racial affinity. When it is said that a low coefficient between two races A and B indicates a closer relationship than a higher coefficient between, say, A and C, what is meant always is that it is more probable that A and B are random samples from the same population than that A and C are.

Intra-racial correlations between characters not connected in some obvious way, such as the various measurements of head length, are known to be small; otherwise the coefficient could not theoretically be used. The measurements chosen should therefore show little correlation among themselves and at the same time be as representative as possible of all regions of the head. Further, the same list should, as far as possible, be used for computing all coefficients.

The standard deviationss σ_s and σ'_s cannot be determined with at all sufficient accurary from the short series of skulls with which, as a rule, the craniometrician is concerned. Accordingly the assumption has to be made that they are equal to each other and to the standard deviation of the longest homogeneous series of crania available. This supposes that the races considered are alike both in variability and homogeneity.

If $\sigma_s = \sigma'_s$ then:

$$\text{C. R. L.} = \frac{1}{m} S \left\{ \frac{n_s \, n'_s}{n_s + n'_s} \left(\frac{M_s - M'_s}{\sigma_s} \right)^2 \right\} - 1$$

and the probable error of its deviation from zero will be $.67449\sqrt{\frac{2}{m}}$* The coefficient is used in this form.

Thirty-one characters, which include all the more important measurement of the skull, were chosen by Morant for the computation of the C.R.L. These measurements were so chosen that all the correlations between them were fairly small, the majority not differing sensibly from zero, and there was no other method of selection. The values of the standard deviations of these characters for the London Biometric Laboratory series E of Dynastic Egyptians was used in the calculation of the coefficient. These values for males are given in Table II of Morant's paper on the Tibetan skull (12, p. 208,) and for females in Table I of his later communication on Oriental crania (13, p. 14).

Of the various measurements taken as a routine on the material available for the present report, thirty correspond to those selected by Morant for his C. R. L. determinations, an estimation of cranial capacity having been omitted among my measurements in view of the condition of the prehistoric materal. A list of these characters (18 linear, 3 angular and 9 relative measurements) accompanies the

*Corrected value (v. Pearson, 19, p. 107). It is further important to note that "....the probable error is merely intended to enable an appreciation to be made of how far the intensity of the coefficient is influenced by random sampling and how far by the fact that the two groups compared belong to markedly different races. In nearly all cases....the coefficient is influenced in the first place by the differential characterization and not by the sampling, which is of a quite secondary order." (Pearson, l.c., p. 108). The differences between C.R.L.'s may not be estimated in terms of their probable errors only as may be done in the case of most statistical constants. (cf. Morant. 13, p. 12).

tabular summaries of the values of α (Tables 6 to 9) in the section dealing with the comparison of means. The variabilities of these characters are summarized with those of other measurements in Tables 20 and 21 and exact definitions of the methods of measurement have been given in the preceding section.

As a result of my first study of the Honan Yang Shao skeletons and the fragmentary material from the Sha Kuo T'un cave, it was concluded that the Æneolithic Sha Kuo T'un and Yang Shao peoples were similar and appeared to conform to a type essentially similar to that represented by the present day North Chinese with which comparison was made (5). Subsequently in 1925, while carrying on the preliminary examination and arrangement of the Kansu prehistoric collection, certain general impressions were gained as to the physical characters and race of the people represented by this material. At that time a tentative opinion was expressed that the prehistoric Kansu peoples were probably largely of proto-Chinese type, though possibly admixed in the earliest stages with types of more archaic nature.

From the outset, therefore, a relative homogeneity in the prehistoric skull series had been suspected, and as soon as the whole available material had been measured, an investigation of the variability of the cranial length and breadth measurements served to strengthen this view.

It was found that the standard deviation for skull length for 86 recent North China male crania was 0.65 cms., an amount considered by Pearson (18, p. 347) to be the upper limit of variability for this character in relatively homogeneous skull series, while for both Æneolithic and Pooled Prehistoric male series, the standard deviation for this character was but 0.62 cms. For skull breadth, the standard deviation for both the recent North China and Pooled Prehistoric male series was 0.46 cms. and for the Æneolithic male crania 0.27 cms. Since the latter value falls below 0.33 cms, it possibly signifies that the Æneolithic male series represents a fairly stringently selected sample, but the value of this constant for the other two series is well within the limits of what should be expected in a relatively homogeneous population (cf. Pearson, l.c.).

TABLE 1. Coefficients of Racial Likeness between groups of North China Prehistoric Crania. All males.*

		Æneolithic	Hsin Tien	Ssu Wa	Sha Ching
Æneolithic (19.1)	Indices & Angles (12) All characters (30)	—	0.02 ± .28 0.54 ± .17	0.01 ± .28 0.12 ± .17	0.06 ± .28 0.73 ± .17
Hsin Tien (8.2)	Indices & Angles (12) All characters (30)	0.02 ± .28 0.54 ± .17	—	0.49 ± .28 0.30 ± .17	0.42 ± .28 0.75 ± .17
Ssu Wa (2.0)	Indices & Angles (12) All characters (30)	0.01 ± .28 0.12 ± .17	0.49 ± .28 0.30 ± .17	—	0.40 ± .28 0.32 ± .17
Sha Ching (7.0)	Indices & Angles (12) All characters (30)	0.06 ± .28 0.73 ± .17	0.42 ± .28 0.75 ± .17	0.42 ± .28 0.32 ± .17	—

*The numbers in brackets following the names of the various racial or cultural groups in this table and others throughout this report represent the mean number of skulls available for measurement of the characters summarized.

A further test of the propriety of pooling the prehistoric male skull material is to be had by a comparison of their Coefficients of Racial Likeness. Morant has pointed out that it will be reasonable to pool two racial series of means if they both contain fewer than 20 crania and have a C. R. L. not significantly greater than 0.5, i.e., not greater than 0.5 by 3.5 times their probable error. (13, pp. 19-20; cf. et. Pearl, p. 214 et seq.) It will be seen in Table 1 that, in every case, the prehistoric groups compared fulfil this condition. Further justification for pooling this material is thus forthcoming in spite of the small numbers of crania in the groups compared.

TABLE 2. Coefficients of Racial Likeness between various Groups. All Males.

		Non Asiatic	North China	Farringdon St.
Non-Asiatic (25.5)	Indices & Angles (12) All characters (30)	—	11.20 ± .28 11.01 ± .17	8.11 ± .28 10.19 ± .17
North China (78.8)	Indices & Angles (12) All characters (30)	11.20 ± .28 11.01 ± .17	—	50.89 ± .28 50.58 ± .17
Farringdon St. (91.1)	Indices & Angles (12) All characters (30)	8.11 ± .28 10.19 ± .17	50.89 ± .28 50.58 ± .17	—

The relative degrees of association or divergence of the Non-Asiatic, North China recent and Hooke's Farringdon St. 17th Cent. London (8) male series on the basis of these C.R.L. determinations are shown in Table 2. Here it will be seen that the degree of divergence between the recent North China and Farringdon St. series is very marked, the C.R.L. in this case being of Grade VII or that of "very wide divergence" in the suggested provisional scale of comparison arranged by Pearson (19, p. 112). The Non-Asiatic series on the other hand shows no very wide divergence from either of the others, its C.R.L. with the Farringdon St. crania falling within Grade IV of Pearson's scale, indicating "slight association" between the groups. The C.R.L. between the Non-Asiatic and recent North China series falls within Grade V or that of "doubtful association" in Pearson's scale. These values are such as one would expect, in view of the composition of the Non-Asiatic series.

TABLE 3. Coefficients of Racial Likeness between modern North China crania (78.8) and other Groups. All males.

Non-Asiatic (25.5)	Indices and Angles (12) All characters (30)	11.20 ± .28 11.01 ± .17
Farringdon St. (91.1)	Indices and Angles (12) All characters (30)	50.89 ± .28 50.58 ± .17
N. China (Koganei) (69.3)	Indices and Angles (7) All characters (23)	0.68 ± .36 5.41 ± .19
Æneolithic (19.1)	Indices and Angles (12) All characters (30)	3.74 ± .28 3.66 ± .17
Hsin Tien (8.2)	Indices and Angles (12) All characters (30)	0.95 ± .28 0.81 ± .17
Ssu Wa (2.0)	Indices and Angles (12) All characters (30)	0.30 ± .28 0.08 ± .17
Sha Ching (7.0)	Indices and Angles (12) All characters (30)	1.90 ± .28 1.71 ± .17
Pooled Prehistoric (36.3)	Indices and Angles (12) All characters (30)	5.62 ± .28 4.72 ± .17
Khams Tibetans (14.5)	Indices and Angles (12) All characters (30)	6.42 ± .28 7.18 ± .17

When separately compared with the recent North China male series, the values of the C R.L. for each of the prehistoric groups are small, the largest being that for the Æneolithic series, all of the values being such as would indicate in larger series a close or intimate relationship (cf. Table 3). When, however, these prehistoric groups are pooled, the C.R.L. values with the recent North China series are raised to Grade III or that of "moderate association" in Pearson's scale. It is of interest to note that the C.R.L. between the recent North China and Khams Tibetan series is definitely greater than between the former and the Pooled Prehistoric series (cf. Table 3) and further, that the C.R.L. in the case of the two latter series is not of so high an order as that determined by Morant between the North Chinese measured by Koganei (10) and South Chinese (13, p. 57, C. R. L. =All characters, 6.15; Indices and Angles, 5.45).

In Table 3 Koganei's series of North China males have been compared with my own series of recent North China crania with a somewhat surprising result, for, though the two series would appear to be sensibly identical when judged by the C.R.L. based on indices and angles only, this is far from being the case when all characters are considered. Only 23 characters are available for comparison, but even if the seven measurements omitted were identical in the two series, the C.R.L. based on all characters would still be 3.91, which is of an order much higher than is to be expected were the two series random samples drawn from the same population. It is worthy of note that of the 16 linear measurements used in the calculation of this C.R.L., in 14 Koganei's means were greater than mine. Thus Koganei's series represents a type having larger mean head measurements than that represented by my recent North China material, while the cranial proportions in both are identical.

TABLE 4. *Coefficients of Racial Likeness between the Pooled Prehistoric Series* (36.3) *and other groups. All males.*

Non-Asiatic (25.5)	Indices and Angles (12) All characters (30)	11.41 ± .28 9.26 ± .17
North China (78.8)	Indices and Angles (12) All characters (30)	5.62 ± .28 4.72 ± .17
Khams Tibetans (14 5)	Indices and Angles (12) All characters (30)	4.84 ± .28 4 33 ± .17
Koreans (16.5)	Indices and Angles (10) All characters (26)	5.73 ± .30 5.05 ± .19
Mongol Torgods (12.0)	Indices and Angles (9) All characters (26)	13.09 ± .32 10.46 ± .19

In Table 4 comparisons are made between the Pooled Prehistoric series of male crania and various other groups. It would appear that the Pooled Prehistoric series shows a greater degree of resemblance to the Khams Tibetan and recent North China groups than to Koreans, while it differs even more widely from the Mongol Torgod than from the Non-Asiatic series. It is probable, when due consideration is given to the smallness of the Khams Tibetan series, that the Pooled Prehistoric males are quite as closely related to the North China males as to the Khams Tibetans. Again, it is worthy of note that the values of both these C.R.L.'s are of an order smaller than those between Southern Chinese and Koganei's Northern Chinese males as determined by Morant (l.c. v. supra).

The C.R.L.'s of the meagre series of Pooled Prehistoric and of recent North China females are compared here in Table 5 with the surprising result that the two series would seem to be sensibly identical, since their C.R.L.'s do not differ significantly from 0.5. It is to be noted, however, that the degree of divergence evident between the recent North China and Farringdon St. females is of a much lower order than that obtaining between the males of these two groups, and it is possible that Morant's rule may require slight modification before it can be applied to small series of female crania. However, even if the recent North China and Pooled Prehistoric female series are not identical, they would seem to be more closely similar to one another than are the males of these groups.

TABLE 5. Coefficients of Racial Likeness between various Groups. All Females.

		North China	Pooled Prehistoric	Farringdon St.
North China (9.1)	Indices & Angles (12) All characters (30)	—	0.74 ± .28 0.87 ± .17	15.15 ± .28 10.44 ± .17
Pooled Prehistoric (10.3)	Indices & Angles (12) All characters (30)	0.74 ± .28 0.87 ± .17	—	15.20 ± .28 13.42 ± .17
Farringdon St. (115.2)	Indices & Angles (12) All characters (30)	15.15 ± .28 10.44 ± .17	15.20 ± .28 13.42 ± .17	—

It would appear from the foregoing comparisons that the prehistoric male population represented by the pooled Kansu and Honan crania was a fairly homogeneous one of a well marked Oriental type, perhaps intermediate between Khams Tibetans and modern North Chinese. It may be that this ancient male population of the upper and middle Yellow River Valley was closely related to the stock from which were derived both the latter groups. It seems safe to conclude that this prehistoric male population resembles the present-day North China type a good deal more closely than the latter does modern Khams Tibetans, or even modern South Chinese. Further, a most intimate degree of resemblance appears to exist between the female prehistoric and modern North China populations.

COMPARISON OF MEAN MEASUREMENTS

(1) *Values of* α

In dealing with the means of the measurements taken in the present investigation, as in any other involving the determination of Coefficients of Racial Likeness, the comparisons fall naturally into two groups, viz., the means used in C. R. L. determinations and those not so used. In the case of the former, in explanation of the comparative tables of the values of α, I shall again quote practically verbatim from the concise explanation of the subject given by Morant (12, p. 212).

The means of samples taken even from a very skew frequency distribution are known to have themselves a distribution which is nearly normal, so that if the difference of two mean characters divided by the probable error of that difference (i. e.

approximately $\dfrac{M_s - M'_s}{.67449\sqrt{\dfrac{\sigma_s^2}{n_s} + \dfrac{\sigma'^2_s}{n'_s}}}$ with notation of p. 17) is between 0 and 2, the means might very probably have been random samples from the same population; if between 2 and 3, the inference is probable but uncertain; while a value over 3 denotes great improbability (of the order .002). Hence, if the

value of $\left\{\dfrac{(M_s - M'_s)^2}{\dfrac{\sigma_s^2}{n_s} + \dfrac{\sigma'^2_s}{n'_s}}\right\}$ is between 0 and 2.7, a verdict can be given in favour of a common origin; between 2.7 and 6.1, it is uncertain and greater than 6.1 very improbable. After making the assumption that the two standard deviations may be

considered equal, this function, i.e. $\dfrac{n_s\, n'_s}{n_s + n'_s}\left(\dfrac{M_s - M'_s}{\sigma_s}\right)^2$ which has been termed α, becomes one which has already been evaluated for the individual characters selected for computing Coefficients of Racial Likeness. We have C.R.L. $= \frac{1}{m}\, S\,(\alpha) - 1$.

From the values of α it can at once be seen in which characters the two races compared differ most essentially and in which they are most alike.

The values of σ for the series compared are given in Tables 6 to 9 of this report.

Table 6 shows the values of σ for the various male Prehistoric groups investigated and it becomes evident that in but one instance does this value reach or exceed 6.1 (viz. *3. Least frontal breadth* between Æneolithic and Sha Ching groups, $\sigma = 6.15$). In 11 other cases the value of σ rises above 2.7, while in the remaining 168 entries, no significant value of σ obtains. It is noteworthy also that 10 of these uncertain values of σ occur in comparisons of the other three groups with the Æneolithic series indicating possibly that of the whole prehistoric male material, the latter series alone shows indication of sub-type differentiation.

The Oriental groups compared in Table 7 resemble one another and differ widely from the Western material represented by the Non-Asiatic and Farringdon St. series in the following characters: *7, Auricular H.*; *15, Facial H.*; *16, Nasal H.*; in all of which the Oriental measurements are the greater. In no other single character are the two Western series sharply differentiated from all seven of the Oriental groups by the values of σ in this table. However, in each of the Oriental series, a smaller least frontal breadth (measurement *3*) obtains than in the Western series, but the very low mean value of this diameter in the recent North China series (i. e. 8.94 cms.) obscures this fact in the present comparison. Further reference will be made to this matter subsequently when discussing the values of the *vertico-frontal index, R20*.

It will be seen that in eight characters (viz. cranial measurements *2, 3, 13, 50* and *55*; facial measurements *11, 27a* and *28*) Koganei's Northern Chinese series differs significantly from my recent North China material. All these are differences in linear measurements. In all the cranial characters in the list and in bizygomatic breadth (measurement *4*) Koganei's means were greater than mine. In the case of the palatal measurements, *27a* and *28*, the mean diameters in my series were the greater. It would be of interest to know if the standard deviations for skull length and breadth in Koganei's material are of an order comparable with those in mine.

The values of σ between the Æneolithic and recent North China series differ significantly for four cranial characters (viz. *3, 9, 55* and *R1*) and for three facial measurements (viz. *58, 28* and *R5*). The Æneolithic males have thus dolichocranial skulls with somewhat wider foreheads and longer skull bases, and slightly broader palates and lower orbits than recent North China males. Of the later prehistoric male groups, Hsin Tien differs significantly from the recent North China material in one value of σ (viz. *11*), Ssu Wa in none and Sha Ching in three (viz. *17, 58* and *28*); all being differences in facial detail.

Such differences become somewhat more marked when the Pooled Prehistoric and recent North China series of males are compared, for then it will be seen that the values of α are significant for cranial characters *9* and *R1* and facial characters *58, 28, 11, V1, R10, R11* and *R35*. Thus the Pooled Prehistoric male type is more sub-dolichocranial than the recent North Chinese and has a slightly longer skull basis; in the former also the orbits are slightly lower and the upper face and palate slightly broader than in recent North China males.

The Khams Tibetans and recent North Chinese males, as the significant values of α show, differ markedly in seven cranial characters, viz. *1, 3, 13, 50 R1, R36* and *R38*. In the former the skull is the longer by .71 cms., the forehead the broader by .40 cms. and the skull circumference the greater by 2.49 cms., being of sub-dolicho-cranial, sub-hypsicranial and metriocranial form in contrast to the mesocranial, hypsi-cranial and akrocranial North Chinese males. In Khams Tibetans also the face and palate are broader than among recent North Chinese and the nose mesorrhine instead of leptorrhine.

Turning now to a comparison of the Pooled Prehistoric and Khams Tibetan males, it is evident that in six cranial characters (viz. *1,8, 50, R36, R38* and *R34*) the values of α are significant, and in three facial characters (viz. *4, 58* and *R35*) this is also the case. (v. Table 8). In comparison with the Pooled Prehistoric males, the Khams Tibetans show an excess of bizygomatic breadth and orbital height as well as cranial length, circumference and least frontal breadth, their skull breadth and length exceeding skull height to a greater degree than in the Pooled Prehistoric material.

The cranial characters of the Pooled Prehistoric and recent North China males differ significantly in but two characters, the *basis length* (measurement *9*) in the latter being greater and the *cephalic index* (*R1*) lower. In eight facial characters (viz. *58, 28, II, VI, R10, R11, R35* and *R39*) the value of α is significant between recent North China and Pooled Prehistoric males. In the latter the upper face, nose and palate are broader, the orbital height and cranial index lower and the facial and alveolar angles greater. It is of interest to note that the average intensity of the significant values of α between the Pooled Prehistoric series and Khams Tibetans is 13.0 and between the former and recent North China males it is also 13.0.

In Table 9 it becomes evident that in only three characters (viz. *17, 56* and *R11*) does the value of α become significant in the comparison of Pooled Prehistoric and recent North China females. In the former the orbit is broader, and the nose is broader and of a higher index. Apart from these differences in the two series in only three characters are the values of α uncertain (i. e. between 2. 7 and 6.1) the remaining 24 values of α being such as might be expected were the series identical.

TABLE 6. Values of $\alpha = \dfrac{n_s \; n'_s}{n_s + n'_s}\left(\dfrac{M_s - M'_s}{\sigma_s}\right)^2$ *between various groups of North China Prehistoric Crania. All males.*

	Æneolithic (19.1) and			Hsin Tien (8.2) and		Ssu Wa (2.0) and
	Hsin Tien (8.2)	Ssu Wa (2.0)	Sha Ching (7.0)	Ssu Wa (2.0)	Sha Ching (7.0)	Sha Ching (7.0)
1. *Cranial Length*	4.15	0.20	1.81	2.26	0.31	1.28
2. *,, Breadth*	4.91	2.40	0.00	0.85	2.94	2.01
3. *Least Frontal Breadth*	2.07	0.19	6.15	0.14	0.58	0.03
7. *Auricular Height*	3.99	0.25	0.04	2.17	2.54	0.03
9. *Basis Length (ba-n)*	0.41	0.14	0.77	0.00	0.08	0.02
12. *Foramen magnum Length (ba-o)*	1.49	0.29	5.33	0.02	1.57	0.85
13. *,, ,, Breadth*	2.26	2.41	1.39	0.52	0.00	0.44
50. *Circumference*	0.11	1.68	0.21	1.80	0.01	1.99
51. *Sagittal arc (n-o)*	4.82	0.11	3.10	2.21	0.02	1.77
55. *Transverse arc*	0.71	1.79	2.24	0.65	0.47	0.09
4. *Bizygomatic Breadth*	2.82	2.53	2.51	0.46	0.00	0.32
15. *Facial Height (n-pr)*	0.20	0.04	0.76	0.18	1.30	0.08
16. *Nasal Height (n-ns)*	0.36	1.03	0.01	1.62	0.37	0.88
17. *,, Breadth*	0.08	0.01	1.45	0.00	1.74	0.44
56. *Right Orbital Breadth (mf-ek)*	3.88	0.00	2.72	1.12	0.00	0.09
58. *,, ,, Height*	0.00	1.41	0.43	1.27	0.34	2.18
27a *Palate Length (ol-sta)*	1.34	0.02	0.01	0.22	0.06	0.01
28. *,, Breadth*	1.11	0.16	0.28	0.04	2.12	0.46
II. *Facial Angle (n-pr-FH)*	1.50	3.15	1.94	1.03	0.10	0.54
VI. *Alveolar ,, (n-pr-ba)*	0.02	0.72	0.08	0.53	0.13	0.87
VIII. *Nasal ,, (ba-n-pr)*	0.70	1.34	2.34	0.99	0.55	0.19
R1. *Cranial Index (100x2/1)*	1.36	1.62	1.74	0.63	3.07	0.17
R36. *Length-Height I. (100x8a/1)*	2.00	0.05	0.75	0.95	0.20	0.46
R38. *Height-Breadth I. (100x2/8a)*	1.94	1.15	2.42	0.05	0.02	0.02
R7. *Foraminal I. (100x13/12)*	0.41	1.48	0.29	0.72	0.96	2.03
R34. *Occipital I.*	0.05	0.01	1.37	0.00	1.37	0.58
R10. *Upper Facial I. (100x15/20)*	1.20	0.40	0.00	0.09	0.07	0.32
R11. *Nasal I. (100x17/16)*	0.06	0.90	0.38	1.06	0.08	1.50
R35. *Right Orbital I. (100x58/56)*	2.33	1.08	0.46	0.08	0.15	0.27
R39. *Palatal I. (100x28/27a)*	0.22	0.02	0.94	0.02	0.26	0.22
C.R.L. Indices and Angles	-0.02±.28	-0.01±.28	0.06±.28	-0.49±.28	-0.42±.28	-0.40±.28
All characters	0.54±.17	-0.12±.17	0.03±.17	-0.30±.17	-0.75±.17	-0.32±.17

$\frac{{}_{s}\; n'_s}{+\, n'_s}\left(\frac{M_s - M'_s}{\sigma_s}\right)^2$ *between various groups of crania. All males.*

Farringdon St. (91.1) and Non-Asiatic (25.5)	Recent North China Series (78.8) and								
	Non-Asiatic (25.5)	Farringdon St. (91.1)	N. China (Koganei) (69.3)	Æneolithic (19.1)	Hsin Tien (8.2)	Ssu Wa (2.0)	Sha Ching (7.0)	Pooled Prehistoric (36.3)	Khams Tibetans (14.5)
46.82	2.20	171.84	3.40	6.00	.64	1.55	.00	3.06	18.39
2.18	6.43	41.70	11.54	1.49	2.92	1.45	.49	.11	1.17
0.50	51.77	182.02	14.63	9.81	.06	.31	.64	4.32	19.12
21.06	16.79	70.59	5.03	1.23	2.27	.20	.30	.46	.00
1.09	.05	3.84	4.80	10.88	2.33	.49	.80	11.75	.03
11.03	.82	9.76	2.26	.11	1.47	.21	5.65	1.95	6.05
0.04	2.12	3.72	8.35	.12	4.39	3.10	2.31	4.20	12.24
47.21	5.54	189.63	22.49	3.89	.46	4.02	.30	5.33	38.42
32.40	4.86	24.81	2.78	3.62	1.59	.92	.82	.71	5.94
2.08	4.39	8.08	23.97	7.17	.63	.21	.03	4.66	1.82
5.62	18.36	39.17	14.54	3.26	.03	1.01	.27	.31	13.95
0.01	25.47	56.24	.00	.07	.52	.01	.68	.00	1.25
1.50	43.34	61.98	.18	.48	1.41	.66	1.56	.83	.06
1.58	5.18	2.16	.00	1.63	.36	.16	6.66	5.68	18.16
47.67	6.54	36.38	—	5.00	.40	.69	.18	1.26	.00
3.53	21.08	15.43	—	10.56	5.80	.00	8.17	17.92	3.47
0.02	.81	1.81	15.15	.87	.39	.04	.54	.33	.96
1.94	.95	5.72	6.55	16.70	4.97	1.75	17.13	29.10	15.43
0.21	9.05	21.34	1.27	.16	6.23	5.83	5.54	12.53	6.30
4.42	7.31	43.67	—	3.64	.33	2.60	.66	6.81	.52
5.45	2.19	1.62	—	.01	1.04	2.70	3.13	2.49	.42
24.28	1.01	35.35	3.46	18.62	2.32	.00	.80	8.65	9.52
33.65	42.79	304.06	—	3.97	.01	.82	.07	2.48	39.32
5.51	42.92	157.85	.33	1.60	.59	.46	.90	.01	8.43
1.80	.30	1.56	.92	1.38	.04	.07	1.73	1.18	.04
3.64	5.26	41.64	—	.61	.06	.03	5.30	1.55	3.77
0.00	.80	.00	4.34	3.31	4.05	2.23	2.04	8.96	.42
0.01	6.16	13.84	.11	4.08	2.59	.06	5.62	8.91	14.70
29.49	25.01	.12	—	17.89	2.42	.22	2.76	16.98	2.73
0.91	3.58	1.58	1.31	1.72	3.72	.64	6.24	8.94	2.94
8.11±.28	11.20±.28	50.89±.28	0.68±.36	3.74±.28	0.95±.28	0.30±.28	1.90±.28	5.62±.28	6.42±.28
10.19±.17	11.01±.17	50.58±.17	5.41±.19	3.66±.17	0.81±.17	0.08±.17	1.70±.17	4.72±.17	7.18±.17

TABLE 8. Values of $\alpha = \frac{n_s \; n'_s}{n_s + n'_s} \left(\frac{M_s - M'_s}{\sigma_s} \right)^2$ for the Pooled Prehistoric Series and other groups. All males

	Pooled Prehistoric Series (36.3) and				
	Non-Asiatic (25.5)	North China—recent (78.8)	Khams Tibetans (14.5)	Koreans (16.5)	Mongol Torgods (12.0)
1. *Cranial Length*	.00	3.06	8.54	4.20	.51
2. *" Breadth*	7 74	.11	1.50	20.c8	70.70
3. *Least frontal Breadth*	26.23	4.32	7.29	.67	4.38
7. *Auricular Height*	2.90	.46	.17	6.95	.66
9. *Basis Length (ba-n)*	5.75	11.75	3.97	.34	1.22
12. *Foramen magnum Length (ba-o)*	.10	1.95	1.70	.33	.00
13. *" " Breadth*	.79	4.20	3.22	3.28	.94
50. *Circumference*	.41	5.33	17.42	.96	.11
51. *Sagittal arc (n-o)*	.06	.71	2.90	.58	14.04
55. *Transverse arc*	.01	4.66	.12	32.85	1.10
4. *Bizygomatic breadth*	11.11	.31	14.34	13.65	56.52
15. *Facial Height (n-pr)*	18.35	.00	1.03	2.94	1.35
16. *Nasal Height (n-ns)*	2.73	.81	.12	.01	—
17. *" Breadth*	1.48	5.68	6.00	.97	3.61
56. *Right orbital Breadth (mf-ek)*	1.89	1.26	.59	—	11.43
58. *" " Height*	.36	17.02	20.67	—	3.69
27. *Palate Length (ol-sta)*	1.67	.33	.31	.09	.85
58. *" Breadth*	47.42	29.01	.00	2.10	.05
II. *Facial Angle (n-pr-FH)*	.06	12.53	.01	2.81	.59
VI. *Alveolar " (n-pr-ba)*	.05	6.81	5.69	.08	1.73
XIII. *Nasal " (ba-n-pr)*	6.22	2.49	2.65	4.05	9.04
R1. *Cranial Index (100x2/1)*	10.75	8.65	.98	43.86	97.57
R36. *Length-Height (100x8a/1)*	19.55	2.48	23.04	.08	—
R38. *Height-Breadth (100x2/8a)*	35.25	.01	7.57	.63	—
R7. *Foraminal I. (100x13/12)*	1.71	1.18	.30	5.30	1.50
R34. *Occipital I.*	8.94	1.55	6.72	—	3.72
R10. *Upper Facial I. (100x15/20)*	6.59	8.96	2.26	.04	.96
R11. *Nasal I. (100x17/16)*	1.90	8.91	1.68	.13	—
R35. *Right Orbital I. (100x58/56)*	12.94	16.98	19.04	—	11.60
R39. *Palatal I. (100x28/27a)*	44.93	8.94	.18	10.30	.07
C. R. L. Indices and Angles	11.41±.28	5.62±.28	4.84±.28	5.73±.30	13.09±.32
All characters	9.26±.17	4.72±.17	4.33±.17	5.05±.19	10.46±.19

TABLE 9. *Values of* $\alpha = \frac{n_s \; n'_s}{n_s + n'_s}\left(\frac{M_s - M_s}{\sigma_s}\right)$ *between various groups. All females*

	Farringdon St. (115.2) and		N. China—recent (9.1) and
	North China-recent (9.1)	Pooled Prehistoric (10.3)	Pooled Prehistoric (10.3)
1. *Cranial Length*	27.63	21.44	2.30
2. *,, Breadth*	2 05	0.48	0.40
3. *Least Frontal Breadth*	24.60	26.32	0.23
7. *Auricular Height*	37.93	39.14	0.56
9. *Basis Length (ba-n)*	0.27	3.49	0.77
12. *Foramen magnum Length (ba-o)*	0.38	10.60	5.50
13. *,, ,, Breadth*	0.09	0.21	0.12
50. *Circumference*	13.80	15.53	0 33
51. *Sagittal arc (n-o)*	0.82	0.01	0.52
55. *Transverse arc*	1.04	22.38	0.50
4. *Bizygomatic Breadth*	8.46	12.74	0.26
15. *Facial Height (n-pr)*	9.49	12.63	0.13
16. *Nasal Height (n-ns)*	6.94	18.88	1.16
17. *,, Breadth*	0.03	13.74	9.52
56. *Right Orbital Breadth (mf-ek)*	0 58	37.18	11.38
58. *,, ,, Height*	0.08	0.10	0.21
27a *Palate Length (ol-sta)*	6.42	2.08	0.27
28. *,, Breadth*	8.67	1.31	1.26
II. *Facial Angle (n-pr-FH)*	10.64	13.25	0.47
VI. *Alveolar ,, (n-pr-ba)*	23.17	9.53	0.70
VIII. *Nasal ,, (ba-n-pr)*	12.30	5.32	0.31
R1. *Cranial Index (100x2/1)*	11.21	15.27	0.23
R36. *Length-Height I. (100x8a/1)*	69.34	69.49	0.24
R38. *Height-Breadth I. (100x2/8a)*	55 64	48.50	1.09
R7. *Foraminal I. (100x13/12)*	1.85	0.29	1.82
R34. *Occipital I.*	2.37	18.90	3.46
R10. *Upper Facial I. (100x15/20)*	2.04	2.43	0.07
R11. *Nasal I. (100x17/16)*	4.21	3.19	8.14
R55. *Right Orbital I. (100x58/56)*	0.85	2.61	3.00
R39. *Palatal I. (100x28/27a)*	0.16	5.67	1.61
C.R.L. Indices and Angles	15.15±.28	15.20±.28	0.7?±.28
All characters	10.44±.17	13.42±.17	0.87±.17

(2) *Comparative Summaries of Means.*

The variabilities of some fifty-two measurements, in addittion to those required for the calculation of the Coefficients of Racial Likeness, have been determined as a routine in the present investigation. (v. Tables 20 and 21). Of these measurements only such as seem to be of significance in defining the Oriental character or individual peculiarities of the Æneolithic and Pooled Prehistoric male series will be discussed here.

The seven linear measurements whose means are summarized in Table 10 are of interest in this connection. Judged in terms of the probable errors, the mean height of the skull above the basion, whether measured vertically (*8a*) or to the bregma (*8*) is significantly greater among the North China groups both prehistoric and recent than in the Non-Asiatic or Farringdon St. series. In respect to this character, the North China groups resemble such primitive races as the Aino and Eskimo, as well as advanced North-Eastern Oriental peoples, such as Japanese and Koreans. On the other hand, the height of the cranium is greater among the foregoing groups than in Khams Tibetans and more markedly so than among the Western and African series cited.

In respect to the total facial height (*14*), the mean of this measurement is significantly higher in the North China series than in the Æneolithic, Pooled Prehistoric or Non-Asiatic series, the latter groups resembling one another in the low value of this mean. However, it should be noted that among the small number of skulls comprising the later prehistoric groups, Szu Wa and Sha Ching, the mean total facial height is greater than that in the recent North China series.

In viewing any considerable number of North China crania in comparison with crania of Western origin, one cannot avoid the impression that malar size is an important factor in determining the evident differences of the two types. Since there would seem to be no measurements standardized by usage which define the absolute size of the malar bone, measurements *18* and *19* were devised for this purpose. It becomes evident that the malar bone among the recent and prehistoric Oriental series investigated is significantly higher and broader than that of the Western Non-Asiatic type.

Further, in mean bimalar breadth (*20*), there is a very significant difference to be observed between the Oriental and Western series compared. Wide bimalar breadth would seem to be a primitive character which has been retained among Oriental races, serving to distinguish them quite sharply from advanced Western and African stocks.

TABLE 10. Comparative summary of means of linear measurements (in cms.) All males.

	8. Cranial Height (ba-b)	8. Cranial Height (ba-vertical)	14. Total Facial H. (g-n)	18. Right Malar H. (zm-fmo)	19. Right Malar B. (zm-rim. orb.)	20. Bimalar B. (zm-zm)	23. Biorbital B. (fmo-fmo)
Sha Ching	13.68 (9)	13.77 (9)	12.48 (11)	4.58 (5)	2.86 (5)	10.31 (8)	9.57 (6)
Ssu Wa	13.85 (2)	13.85 (2)	12.55 (2)	4.85 (2)	2.85 (2)	10.55 (2)	9.55 (2)
Hsin Tien	13.71 (8)	13.74 (7)	12.00 (8)	4.52 (10)	2.59 (10)	10.07 (10)	9.42 (9)
Æneolithic	13.68±.084 (23)	13.80±.086 (24)	11.71±.094 (19)	4.49±.059 (13)	2.62±.050 (14)	10.14±.083 (12)	9.66±.051 (22)
Pooled Prehistoric	13.70±.061 (42)	13.79±.063 (42)	12.03±.069 (40)	4.54±.040 (30)	2.66±.036 (31)	10.20±.056 (32)	9.57±.038 (39)
North China-recent	13.72±.042 (86)	13.80±.042 (86)	12.46±.034 (83)	4.57±.020 (83)	2.62±.019 (83)	9.79±.033 (83)	9.44±.027 (82)
Khams Tibetans (Morant)	13.41 (15)	13.84 (15)	—	—	—	10.07 (15)	—
Tibetan A. (Morant)	13.09 (35)	—	—	—	—	9.90 (36)	—
Koreans (Morant)	13.63 (3)	14.16 (17)	—	—	—	9.99 (17)	—
Japanese (Morant)	13.78 (16)	14.00 (63)	—	—	—	9.93 (59)	—
Aino (Fawcett)	13.95 (88)	—	—	—	—	10.21 (76)	—
Eskimo (Morant)	14.00 (56)	—	—	—	—	10.04 (29)	—
Non-Asiatc	13.13±.077 (26)	13.28±.069 (26)	12.00±.103 (25)	4.34±.041 (25)	2.34±.034 (26)	9.17±.050 (26)	9.72±.055 (26)
Farringdon St. (Hooke)	12.97±.031 (118)	13.04±.042 (73)	—	—	—	9.14±.048 (74)	9.81±.030 (77)
Naqada (Fawcett)	—	13.52±.031 (134)	—	—	—	9.58±.037 (82)	—
Congo Negroes (Bennington)	—	13.38±.040 (48)	—	—	—	9.48±.055 (46)	—

TABLE 11. *Comparative summary of means: Angles of Deviation from Frontal Plane. All males.*

	I. Right Fronto-Orbital Deviation Angle	IS. Supplement (Orbital Inclination Angle) 180° − (IR+IL)	V. Right Naso-Malar Deviation Angle 1.	VS. Supplement (Angle of Lower Facial Flattening) 180° − (VR+VL)	Vn. Right Naso-Malar Deviation Angle 2.	VnS. Supplement (Angle of upper Facial Flattening) 180° − (VnR+VnL)
Sha Ching	10.2° (6)	159.2° (4)	14.0° (6)	155.0° (3)	13.8° (6)	147.0° (2)
Ssu Wa	12.5° (2)	154.0° (2)	15.0° (1)	150.0° (1)	16.0° (1)	148.0° (1)
Hsin Tien	13.0° (8)	153.0° (7)	16.4° (8)	146.8° (8)	17.4° (8)	144.5° (8)
Æneolithic	14.3°±.57 (19)	148.8° ± .81 (15)	18.7° ± .63 (11)	139.0° ± 1.06 (10)	19.4°±.56 (11)	136.8° ± 1.10 (10)
Pooled Prehistoric	13.2°±.40 (35)	151.7° ± .73 (28)	16.8° ± .42 (26)	144.5° ± 1.05 (22)	17.3°±.51 (26)	141.3° ± 1.08 (21)
North China-recent	14.0°±.22 (82)	152.1° ± .38 (81)	21.2° ± .24 (80)	137.8° ± 0.47 (80)	19.6°±.25 (80)	141.3° ± 0.51 (80)
Non-Asiatic	19.0°±.36 (26)	142.7° ± .65 (26)	26.1° ± .49 (26)	129.0° ± 1.00 (26)	26.7°±.57 (26)	127.5° ± 1.09 (26)
Europeans (R. Martin)	20.0°	140.0°	—	—	—	—

The mean biorbital breadth (*22*) in the recent North China series is significantly less than that in the Farringdon St. and Non-Asiatic material. This is also true for the North China prehistoric group and Farringdon St. Series, though not for the former and the Non-Asiatic material.

It is evident that the mean bimalar diameter tends to be larger and the mean biorbital diameter smaller among Oriental in contrast to Western groups, but, as will be noted below, the relative proportions of these diameters serve in a much more characteristic way to distinguish the two stocks.

The right mean fronto-orbital deviation angle is signficantly less in the Asiatic than in the Western series compared, and the essential and significant difference in the mean angle at which the two orbital entrance planes are inclined towards one another in Western and Oriental groups, is similarly evident in Table II. These measurements give numerical expression to the well-known fact that, as a rule, more of the nasal orbital wall may be seen in Western than in Oriental skulls viewed in profile.

The orbital entrance plane may, however, be set quite obliquely to the frontal plane (relatively large fronto-orbital deviation angle) in individual oriental crania and still the general impression of facial flatness may be retained. This was true in the case of some specimens both among the recent and prehistoric North China crania examined. For this reason, angular craniogram measurements *V* and *Vn*, with their supplements, were devised in an attempt to measure the degree of upper and lower facial flattening regardless of the orbital entrance plane inclination. The technique employed in making these measurements has already been described. (v. supra, pp. 13 and 14). Reference to Table II makes it evident that there are very significant differences in the means of these various angles in the Oriental and Western groups compared.

The mean naso-malar deviation angle, whether measured to the nasion (*Vn*) or to the projection of the nasospinale upon the sagittal plane (*V*) is significantly smaller in the Oriental than in the Non-Asiatic series. Similarly, the mean angles of lower (*V supplement*) and of upper (*Vn supplement*) facial flattening are both significantly greater in the Oriental than in the Non-Asiatic material. It is worthy of note that, save for the recent North China series, the mean lower angle (*Vn supplement*) is uniformly somewhat smaller than the upper (*V supplement*), an expression of the fact that the recent North China crania display a more marked degree of mean maxillary prognathism than obtains in any of the other groups.

TABLE 12. Comparative summary of means: Calvarial Indices. All male.*

	R3. Length-Height I. (100 x 8/1)	*R4. Breadth-Height I.* (100 x 8/2)	*R37. Breadth-Height I.* (100 x 8a/2)	*R30. Vertico-Frontal I.* (100 x 3/7)	*R5. Frontal I.* (100 x 3/2)
Sha Ching	76.54 (7)	98.14 (7)	98.56 (7)	76.72 (9)	64.52 (6)
Ssu Wa	75.50 (2)	97.58 (2)	97.58 (2)	77.12 (2)	64.10 (2)
Hsin Tien	76.71 (7)	97.07 (7)	98.52 (7)	77.57 (7)	63.32 (6)
Æneolithic	75.65 ± .33 (23)	100.45 ± .57 (22)	101.00 ± .62 (22)	78.53 ± .52 (24)	67.05 ± .33 (21)
Pooled Prehistoric	75.97 ± .28 (39)	99.24 ± .51 (38)	99.67 ± .56 (38)	77.84 ± .42 (42)	65.83 ± .33 (35)
North China—recent	77.07 ± .22 (86)	99.53 ± .37 (86)	99.94 ± .38 (86)	77.99 ± .33 (83)	64.87 ± .28 (85)
Khams Tibetans (Morant)	[72.04] (14)	[96.40] (14)	[97.12] (14)	[81.03] (15)	[67.63] (14)
Tibetan A (Morant)	[74.73] (35)	[94.24] (35)	[94.96] (35)	[80.70] (35)	[66.19] (35)
Koreans (Morant)	[76.84] (3)	[95.10] (3)	[99.30] (17)	[77.31] (15)	[64.34] (15)
Japanese (Morant)	[76.67] (16)	[97.87] (16)	[99.29] (63)	[79.17] (14)	[67.38] (20)
Aino (Fawcett)	[75.27] (88)	[99.29] (88)	—	[80.67] (88)	[68.09] (88)
Eskimo (Morant)	[74.47] (56)	[104.48] (56)	—	[83.33] (20)	[70.90] (20)
Non-Asiatic	72.54 ± .50 (26)	93.14 ± .76 (26)	[94.01] ± .77 (26)	85.60 ± .50 (26)	68.15 ± .32 (26)
Farringdon St. (Hooke)	[68.78] (118)	[91.55] (118)	[91.55] (73)	[88.18] (75)	[68.31] (141)
Naqada (Fawcett)	—	—	100.47 (131)	[78.45] (140)	[67.41] (139)
Congo Negroes (Bennington)	—	—	[97.10] (48)	[85.96] (50)	[71.01] (50)

* Indices enclosed in square brackets expaess ratio of two mean measurements.

Turning now to a consideration of mean relative measurements, there is a significant difference to be observed in the mean length-height indices (*R3*) of the recent and prehistoric North China groups and those of the Western material represented by the Farringdon St. and Non-Asiatic series. The means of this index for the Japanese and Korean series resemble those for the North China groups, the Aino, Tibetan A and Eskimo being intermediate between the latter and the Western series, the Khams Tibetan and Non-Asiatic material being practically identical in respect to this character (cf. Table 12). The length-height index, while of value in defining one of the cranial proportions common to the North China groups, is thus useless as a means of differentiating Oriental from other series.

A comparison of the mean values of the breadth-height indices *R7* and *R37* indicates that cranial breadth exceeds cranial height to a greater degree in the case of the Farringdon St. and Non-Asiatic series than in any of the other groups listed, the Tibetan A crania alone among the latter showing any near resemblance to the Western material in respect to this proportion.

Since mean auricular height (*7*) was observed to be greater, and mean least frontal breadth (*8*) less in the Oriental series examined than in the Farringdon St. and Non-Asiatic series, the vertico-frontal index (*R30*) was derived from these measurements to aid in defining the groups studied. The index remains, however, of doubtful value in racial comparisons, as may be seen in Table 12, for, though there are several significantly higher means among the non-Oriental groups listed, the mean of the vertico-frontal index for the Naqada series is practically identical to that for the Æneolithic group.

In comparisons of the mean values of the frontal index (*R5*), lower mean values of the index occur among the Oriental than among the other groups listed, but this proportion also provides no definite criterion for racial diagnosis.

There is a significant difference to be observed in the mean values of the jugo-frontal index (*R13*) between the Non-Asiatic and the various North China series with which comparison is made. Further, it is evident that the mean values of this index are lower in the case of the Oriental and primitive groups than among the Western and African series listed. Similarly, in the case of the cranio-facial breadth index (*R6*) the mean value is definitely higher among the primitive and Oriental than among the Western and African series compared (cf. Table 13).

TABLE 13. Comparative summary of means: Cranial and Facial Indices. All males.*

	R18. Jugo-Frontal I. (100 x 3/4)	*R6. Cranio-Facial Br. I.* (1000 x 4/2)	*R28. Cranio-Facial I.* (100 x FM/CM)	*R9. Upper Facial I.* (100 x 15/4)	*R82. Bimalar.-Front. I.* (100 x 22/20)	*R81. Fronto-Interorb. I.* (100 x 21/3)
Sha Ching	64.15 (5)	96.40 (5)	79.56 (4)	56.66 (5)	93.37 (6)	27.74 (7)
Ssu Wa	66.91 (2)	95.80 (2)	76.39 (2)	55 52 (2)	90.58 (2)	26.39 (2)
Hsin Tien	66.16 (7)	94.50 (8)	76.38 (5)	55.03 (8)	93.55 (9)	28.38 (8)
Æneolithic	70.05±.36 (20)	94.89±.41 (18)	75.45±.32 (11)	56.48±.76 (15)	95.88±.80 (14)	27.42±.27 (19)
Pooled Prehistoric	68.26±.39 (34)	95.09±.36 (33)	76.54±31. (22)	56.08±.45 (30)	94.06±.58 (31)	27.64±.20 (36)
North China-recent	67.53±.25 (83)	96.1 ±.31 (83)	77.89±.19 (79)	56.80±.24 (82)	96.58±.34 (82)	26.51±.14 (84)
Khams Tibetans (Morant)	[68.12] (15)	[99.28] (14)	—	[55.07] (15)	—	—
Tibetan A (Morant)	[70.23] (35)	[94.24] (35)	—	[52.67] (35)	—	—
Koreans (Morant)	[66.67] (14)	[96.40] (14)	—	[52.90] (14)	—	—
Japanese (Morant)	[70.37] (20)	[95.74] (68)	—	[53.33] (55)	—	—
Aino (Fawcett)	[70.07] (74)	[97.16] (74)	—	[40.46] (73)	—	—
Eskimo (Morant)	[69.85] (20)	[101.49] (101)	—	[52.94] (25)	—	—
Non-Asiatic	74.81±.40 (26)	91.23±.38 (26)	76.44±.37 (25)	54.88±.53 (26)	106.00±.60 (26)	25.04±2.2 (26)
Farringdon St. (Hooke)	[74.05] (43)	[92.25] (43)	—	[53.44] (43)	107.69 (74)	—
Naqada (Fawcett)	[72.22] (53)	[93.33] (53)	—	[53.97] (53)	—	—
Congo Negroes (Bennington)	[77.78] (33)	[91.30] (33)	—	[50.00] (33)	—	—

* *Indices enclosed in square brackets express ratio of two mean measurements.*

The cranio-facial index (*R28*) is only of interest as an indication that the facial part of the skull is proportionately larger among recent North Chinese than in the Æneolithic or Non-Asiatic series. The upper facial index (*R9*), however, is higher in the Aino, Khams Tibetans and North China series than in any of the other groups compared. Thus, nothstanding its wide zygomatic breadth, the upper face among the Aino, Khams Tibetan and North Chinese is also proportionately long.

Attention has already been drawn to the wide bimalar (*20*) and narrow biorbital (*22*) diameters characterizing the Oriental material examined and when these measurements are compared in the form of an index, the difference in the facial proportions of Oriental and Western crania becomes strikingly evident. Unfortunately, the biorbital breadth measurement has not been made on the material available for comparison except in the case of the Farringdon St. crania,, so that the value of this index as a criterion of race must remain uncertain.

A significant difference is also to be observed in the mean values of the fronto-orbital index (*R31*) between the Non-Asiatic and both the recent and prehistoric North China series, the difference being due solely to the small mean least frontal breadth characterizing the latter groups.

TABLE 14. *Comparative summary of means: Alveolar arch and Palate measurements.* All males.*

	25. Alveolar arch (Max. breadth) cms.		*R14. Alveolar Index (100x25/26)*		*R15. Palatal Index (100x28/27)*		
Sha Ching	6.74	(5)	125.54	(4)	96 17	(9)	
Ssu Wa	6.60	(2)	128.18	(2)	95.07	(2)	
Hsin Tien	6.53	(10)	124.85	(9)	93.35	(9)	
Æneolithic	6.76 ± .086	(12)	124 64 ± 1.19	(11)	94.28 ± 1.40	(12)	
Pooled Prehistoric	6.65 ± 0.48	(29)	124.86 ± 0.84	(26)	95.20 ± 0.78	(32)	
North China—recent	6.48 ± .026	(85)	123.33 ± 0.62	(81)	89 29 ± 0.70	(56)	
Khams Tibetans (Morant)	—		—		[91.67]	(13)	
Tibetan A (Morant)	—		—		[91.11]	(35)	
Japanese (Morant)	—		—		[81.05]	(6)	
Eskimo (Morant)	—		—		[85.11]	(3)	
Non-Asiatic	6.08 ± .014	(16)	117.05 ± 1.28	(16)	86.43 ± 1.06	(16)	
Farringdon St. (Hooke)	—		—		[84.78]	(53)	
Congo Negroes (Bennington)	—		—		[82.98]	(33)	

*Indices enclosed in square brackets express ratio of two mean measurements.

TABLE 15. Comparative summary of means: Mandibular Bicondylar diameters (in cms.) and Cranio-Mandibular Indices. All males.*

	31. Mand. Bicond. B. (cms.)	RA. Bicond.—Auric. Height I. (100x7/31)	RB. Facial H.—Bicond. I. (100x31/14)	RC. Cranial L.—Bicond. I. (100x31/1)	RD. Bicond.—Frontal I. (100x8/31)
Sha Ching	12.37 (7)	93.99 (7)	100.78 (6)	69.82 (5)	69.87 (6)
Ssu Wa	13.1 (1)	90.77 (1)	102.36 (1)	69.89 (1)	70.77 (1)
Hsin Tien	12.22 (8)	92.80 (7)	102.72 (7)	69.19 (6)	72.37 (6)
Æneolithic	11.98 ± .092 (23)	97.86 ± .74 (17)	102.01 ± 1.11 (17)	65.98 ± .47 (17)	76.85 ± .56 (15)
Pooled Prehistoric	12.12 ± .066 (39)	95.80 ± .56 (32)	102.13 ± .79 (31)	67.42 ± .44 (29)	74.26 ± .58 (28)
North China—recent	12.00 ± .040 (81)	95.78 ± .39 (79)	96.48 ± .45 (81)	67.30 ± .26 (81)	74.63 ± .31 (81)
Khams Tibetans (Morant)	12.20 (12)	[95.76] (12)	—	[65.59] (12)	[77.05] (12)
Tibetan A (Morant)	11.78 (16)	[96.67] (12)	—	[67.43] (12)	[78.81] (12)
Non-Asiatic	11.68 ± 0.67 (26)	96.35 ± .59 (25)	97.57 ± .82 (25)	64.56 ± .44 (25)	82.44 ± .53 (25)
Naqada† (Fawcett)	11.17 (31)	[102.68] (31)	—	[61.20] (31)	[82.14] (31)
Gaboon Negroes (Bennington)	11.26 (27)	[100.88] (27)	—	[62.78] (27)	[84.96] (27)

* Indices enclosed in square brackets express ratio of two mean measurements.

† Means derived from data listed in Fawcett's summary of individual measurements, there being but thirty-one skulls in her series on which each of the five required measurements had been made. It should be noted that in Fawcett's list the individual measurements of mandibular bicondylar breadth have been tabulated by mistake in the column labelled w_2.

The mean breadth of the alveolar arch (*25*) is significantly less in the Non-Asiatic than in the recent and prehistoric North China series and in consequence the alveolar index (*R14*) is significantly greater among the latter groups (cf. Table 14).

The mean palatal index (*R15*) is significantly higher among the recent and prehistoric North China groups than in the Non-Asiatic series. In this proportion, both Tibetan groups resemble the North Chinese and differ sharply from the other series with which comparison has been made.

Attention has been directed to the fact that there would appear to be but one mandibular diameter, viz. bicondylar breadth, which remains throughout adult life relatively unaffected by dental changes due to disease or wear. (v. supra, p. 12) For this reason, it has been thought worth while, in the present invegtigation, to derive as a routine certain cranio-mandibular indices comparing the bicondylar breadth of the jaw with various cranial diameters. The means of these cranio-mandibular indices have been arranged in a comparative summary in Table 15.

It is evident that the mean mandibular bicondylar diameter (*31*) tends to be somewhat greater among the Oriental groups than in the Non-Asiatic and African series listed, a fact probably to be correlated with the greater facial breadth characterizing the former groups.

No significant difference serving to distinguish Oriental from other series is to be observed in the mean values of the bicondylar-auricular height index (*RA*), though it is of interest to note the high mean values of this index for the Naqada and Gaboon series.

The facial height-bicondylar index (*RB*) is consistently higher in each of the prehistoric groups than it is in the recent North China or Non-Asiatic series. This difference, which, in the case of the mean index values for the prehistoric and recent North China groups is possibly significant (being somewhat greater than three times its probable error) is due largely to the magnitude of the mean total facial height of the recent North China series to which attention has already been drawn.

The mean cranial length-bicondylar index (*RC*) is significantly higher in the Pooled Prehistoric and recent North China series than in the Non-Asiatic material. In respect to the mean value of this index, the Æneolithic and Khams Tibetan groups resemble the Non-Asiatic material and differ from the other Oriental groups with which comparison is made.

The mean bicondylar-frontal index (*RD*) is significantly lower in the recent and prehistoric North China groups than in the Non-Asiatic series. It is further evident that a low mean value serves to characterize this index in the case of every Oriental group in marked contrast to the mean index value obtaining in the Non-Asiatic and African series listed.

Thus the evidence furnished by a comparative study of the mean valves of these cranial characters is such as to confirm the conclusions reached as a result of the various C. R. L. determinations discussed in the preceding section of this report There can remain no doubt as to the Oriental character of the prehistoric male population represented by the Pooled Prehistoric Honan and Kansu crania, nor of its relative homogeneity. The resemblances between the prehistoric and recent North China male populations are many, but among the prehistoric male population, the Æneolithic group would seem to be differentiated somewhat further from the modern North Chinese type than are the later prehistoric groups, while presenting several suggestive similarities to Khams Tibetans.

CRANIAL TYPE CONTOURS

A special method for the craniographic record of racial group characters by the use of coronal, horizontal and sagittal type contours, constructed from the means of the measurements of individual craniograms, was described in 1911 by Benington and Pearson (2). As subsequently developed and elaborated, this method has been used extensively by workers in the London Biometric Laboratory in the description and study of various racial types. (v. et. Thompson, 21; Tildesley, 22; Morant, 12, 13). As the latter author has pointed out, no single section of the cranium can constitute in itself a reliable guide to racial relationships, since totally unrelated races may have similar contours. Type contours are thus subsidiary and supplemental to mean direct measurements.

In the present investigation, complete craniographic records have been made as a routine on all material sufficiently well preserved to permit of such procedure. All craniograms have been traced with the diagraph instrument of R. Martin, the skulls first being oriented in the Frankfort Plane within the cubic craniophore designed by the same author (11). It is to be noted that once the skull has been correctly oriented and firmly clamped in the cubic craniophore, craniograms may be drawn successively in any of the standard planes without the necessity of further adjustment of the specimen itself, the six faces of the craniophore framing the corresponding six normae of the skull. On this account, Martin's cubic craniophore constitutes a much more convenient instrument to work with than the Klaatsch holder used by workers in the London Biometric Laboratory Especially hard drawing pencil lead has been used in making the diagraph tracings, the lead supplied with Martin's diagraph being altogether too soft for accurate work. The tracings drawn on a hard finished semi-transparent parchment paper were inked in immediately after they had been made, using waterproof draughting ink in comformity with the colour scheme described by Martin (l.c.).

Before adjustment within the craniophore, the following points, as defined above in the description of measurements, were marked on each specimen:—nasion (*n*), bregma (*b*), lambda (*L*), opisthion (*o*), basion (*ba*), nasospinale (*ns*), R. and L. porion (*po*), R. and L. zygomaxillare (*zm*), R. and L. maxillo-frontale (*mf*), R. and L. ectoconchion (*ek*). Following the usage of Tildesley (22), the inion (*i*) also was marked.

In each case, twelve craniographic tracings have been made as follows:—(a) three sagittal tracings, the left side of the skull being towards the paper in accordance with Martin's technique; (b) one mid-sagittal tracing with the right side of the skull towards the paper, following the usage of the London Biometric Laboratory; (c) three coronal tracings with the occiput towards the paper, in accordance with Martin's technique, the porial plane tracing (brown contour of Martin) in this case corresponding to the transverse vertical section of the London Biometric Laboratory; (d) four horizontal tracings with the vertex towards the paper, in accordance with Martin's technique, the glabellar plane (blue contour of Martin) in this case corresponding to the glabellar horizontal section of the London Biometric Laboratory. In the present report, only those craniograms drawn in conformity to the usage of the latter laboratory have been considered. From the means of certain measurements of these craniograms, type contours have been plotted and drawn as described below.

(1) *Coronal Type Contours*

The skull having been oriented within the cubic craniophore, so that both poria and the left orbitale were in one horizontal plane (i.e. in the Frankfort Plane), the craniophore was turned with the norma occipitalis surface downward and clamped in this position with the paper beneath it upon a leveled surface of polished marble. The diagraph needle was then adjusted to the level of the poria, and a tracing made of the whole skull contour at this level. In each case, the diagraph needle was carried within the external auditory meatus, so as to include in the tracing as much as possible of the roof and floor of that passage. The positions of the poria and of the various sutures crossed at this level were projected and marked upon the craniogram tracings. For subsequent comparison also, the positions of the bregma, nasion and basion were similarly projected and marked upon the drawings.

In laying off these individual coronal contour tracings for measurement, the usage of Tildesley (22) has been followed except that the zygomatic ridge ordinates have been omitted. On each craniogram a line was drawn connecting the right and left poria and upon this a vertical was erected from the point M midway between the two poria to meet the contour outline at A, the right and left halves of the interporial line being termed respectively the right and left ordinate 1 (1R=1L). With the aid of proportional dividers, the line MA was sub-divided into ten equal parts by nine points, from which right and left ordinates, numbered from 2 to 10, parallel to the interporial plane, were drawn to the contour margin. Points were then marked on the MA axis respectively at one quarter the distance from the first to the second ordinate (M$\frac{1}{4}$), and at a similar distance from A to ordinate 10 (A$\frac{1}{4}$), from each of which ordinates parallel to the interporial plane were drawn to the contour margins. The MA axis and the twelve ordinates to the right and to the left of this line were then measured and recorded. From the means of these measurements, the corresponding MA axis and ordinates of the type contours were plotted on millimetre paper and the outlines themselves drawn in with the aid of a spline.

The means of these craniogram measurements for each series investigated are summarized in Table 16, the coronal type contours being reproduced in Figures 2-12. All these contours have been oriented in norma facialis view as were the originals of Benington (2). To facilitate comparisons, the means of the various measurements made have also been indicated on the corresponding lines of the type contours.

A comparison of the coronal type contours of the recent North China and Pooled Prehistoric male series (Figures 2 and 3), makes it evident that the two are practically identical in shape and size when the interporial line and the MA axis are superposed. The interporial diameter and parallels M$\frac{1}{4}$ and 2 of the Æneolithic male contour (Figure 4) are, however, somewhat smaller and its MA axis slightly greater than that of the recent North China males, the further dissimilarities between parallels 3 and 10 in the two contours being due to slight asymmetries of the Æneolithic outline. The height of the MA axis is practically identical in the Hsien Tien (Figure 5) and recent North China male contours, but parallels 1 to 8 are uniformly wider in the former. The Ssu Wa male contour (Figure 6) is uniformly larger throughout than that for recent North China males, but in their general proportions, the two outlines are fundamentally similar, the difference in size being due to the fact that the two Ssu Wa male crania are above the prehistoric series' average size. The Sha Ching male contour (Figure 7) is slightly smaller in both the interporial and MA diameters than the recent North China male outline, but though other slight asymmetrical differences between the two are evident, they are of very similar proportions and size when the small number of Sha Ching crania is taken into consideration.

The interporial and MA diameters of the male coronal type contours have been compared with those of other races in Table 17. In this summary the order of the arrangement of races has been determined on the basis of the contour breadth-height

TABLE 16. *Comparative summary of means used in plotting Coronal Type Coutours*

	MA		*IR = IL*		*M 1/4 R*		*M 1/4 L*		*2R*		*2L*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic (♂16, ♀6.7)	11.53	11.17	5.82	5.74	6.07	5.96	6.05	5.98	6.20	6.08	6.19	6.10
Hsin Tien (♂7, ♀1)	11.48	10.00	6.04	5.40	6.38	5.65	6.37	5.65	6.54	5.95	6.51	5,90
Ssu Wa (♂2, ♀3)	11.75	11.13	6.20	5.72	6.50	6.07	6.45	6.08	6.68	6.23	6.60	6.23
Sha Ching (♂3)	11.37	—	5.80	—	6.07	—	6.12	—	6.27	—	6.27	—
Pooled Prehistoric (♂28, 10. ♀7)	11.52	11.05	5.90	5.70	6.18	5.96	6.17	5.98	6.32	6.11	6.31	6.12
North China-recent (♂79, ♀10)	11.45	11.17	5.92	5.68	6.14	5.90	6.13	5.88	6.30	6.11	6.29	6.06

	3R		*3L*		*4R*		*4L*		*5R*		*5L*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	6.42	6.27	6.46	6.35	6.64	6.48	6.68	6.58	6.62	6.42	6.71	6.55
Hsin Tien	6.76	6.20	6.74	6.10	6.96	6.40	6.91	6.25	6.92	6.40	6.91	6.20
Ssu Wa	6.85	6.48	6.85	6.58	7.00	6.72	6.98	6.83	6.95	6.65	6.92	6.77
Sha Ching	6.45	—	6.33	—	6.63	—	6.62	—	6.70	—	6.68	—
Pooled Prehistoric	6.54	6.32	6.54	6.39	6.74	6.54	6.75	6.62	6.73	6.48	6.78	6.58
North China-recent	6.52	6.29	6.50	6.23	6.69	6.50	6.68	6.43	6.74	6.54	6.74	6.50

	6R		*6L*		*7R*		*7L*		*8R*		*8L*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	6.54	6.31	6.68	6.48	6.34	6.09	6.48	6·28	5.88	5.64	6.02	5.83
Hsien Tien	6.83	6.45	6.81	6.15	6.58	6.30	6.56	6.00	6.06	6.00	6.04	5.60
Ssu Wa	6.80	6.53	6.82	6.73	6.60	6.30	6.62	6.48	6.25	5.83	6.15	6.05
Sha Ching	6.58	—	6.60	—	6.38	—	6.38	—	5.97	—	5.87	—
Pooled Prehistoric	6.64	6.38	6.71	6.52	6.42	6.17	6.50	6 31	5.96	5.72	6.02	5.88
North China-recent	6.67	6 46	6.69	6.42	6.44	6 30	6.45	6·21	5.97	5.86	5.98	5.76

	9R		*9L*		*10R*		*10L*		*A 1/4 R*		*A 1/4 L*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	4.99	4 78	5.10	4.98	3.44	3.41	3.62	3.52	1.75	1.74	2.01	1.87
Hsin Tien	5.15	5.15	5.14	4.80	3.68	3.80	3.66	3.45	1.81	2.00	1.93	1.90
Ssu Wa	5.32	4.92	5.25	5.10	3.80	3.48	3.82	3.67	1.92	1.88	2.15	2.12
Sha Ching	5.05	—	4.92	—	3.55	—	3.50	—	1.72	—	1.73	—
Pooled Prehistoric	5.06	4.85	5.10	5.00	3.54	3.46	3.63	3.56	1.77	1.80	1.97	1.94
North China-recent	5.06	4.96	5.07	4.84	3.61	3.40	3.65	3.36	1.83	1.72	1.93	1.74

index values and it is at once evident that this proportion may be closely similar in widely different races.

The maximum transverse diameter of the male coronal type contours falls on parallel 5 in the recent North China, Pooled Prehistoric, Æneolithic and Sha Ching series; in the Hsin Tien group, parallels 4 and 5 are equally wide and in the Ssu Wa group the maximum diameter falls on parallel 4.

There is thus a very evident similarity in the shapes of the coronal type contours among the prehistoric and recent male series, though among the prehistoric groups, the Æneolithic and, to a lesser extent, the Hsin Tien contours display certain distinctive features.

The MA axis of the recent North China female type contour (Figure 8) is slightly higher than that of the Pooled Prehistoric female series. This diameter is identical in the Æneolithic (Figure 10) and the recent North China female contours since the two outlines differ from one another only in slight asymmetries. The whole vault of the single Hsin Tien female contour (Figure 11) is markedly lower than that of the recent North China outline, but no significance can be attached to such a

TABLE 17. Comparison of Measurements (in cms.) on Coronal Type Contours. Males.

	n	Interporial Breadth B	Auricular Height H	Index (100 H / B)
Eskimo (Bennington)	31	12.80	11.42	89.2
English-Whitechapel (Bennington)	100	12.24	11.15	91.1
Guanch (Bennington)	14	11.96	10.98	91.8
Khams Tibetans (Morant)	15	12.32	11.59	93.3
English, Farringdon St. (Hooke)	75	11.72	11.00	93.8
Egyptian (Bennington)	100	11.74	11.02	93.9
Non-Asiatic	26	11.88	11.12	95.0
Hsin Tien	7	12.08	11.48	95.0
Tibetan A (Morant)	35	11.84	11.31	95.5
Ssu Wa	2	12.40	11.75	95.9
Congo Bantu (Bennington)	50	11.68	11.36	97.3
Sha Ching	3	11.60	11.37	98.3
Pooled Prehistoric	28	11.80	11.52	98.3
North China-recent	79	11.84	11.45	98.3
Burmese A (Tildesley)	44	11.82	11.65	98.6
Æneolithic	16	11.64	11.53	99.2
Nepalese (Morant)	46	11.36	11.32	99.6
Burmese C (Tildesley)	8	11.46	11.56	100.9
Burmese B (Tildesley)	7	11.46	11.57	101.0
Hindu (Morant)	10	10.68	10.96	102.6

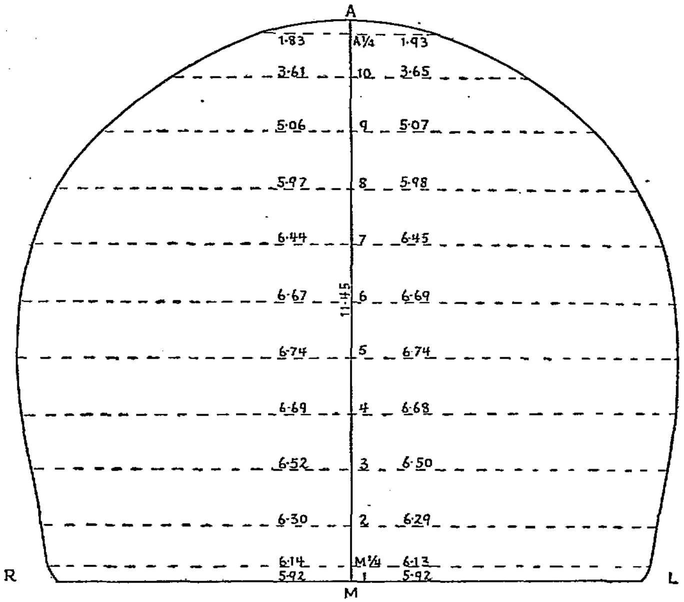


Figure 2 CORONAL TYPE CONTOUR: NORMA FACIALIS — N. CHINA (79 ♂)

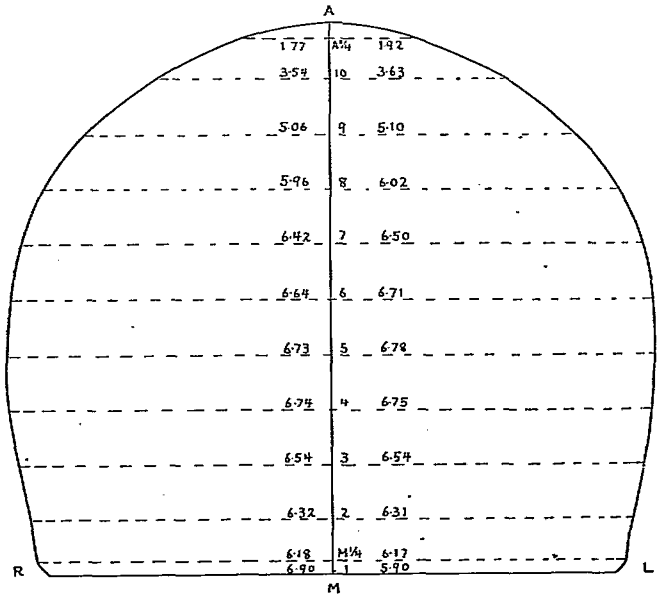


Figure 3 CORONAL TYPE CONTOUR: NORMA FACIALIS—POOLED PREHISTORIC SERIES (28 ♂)

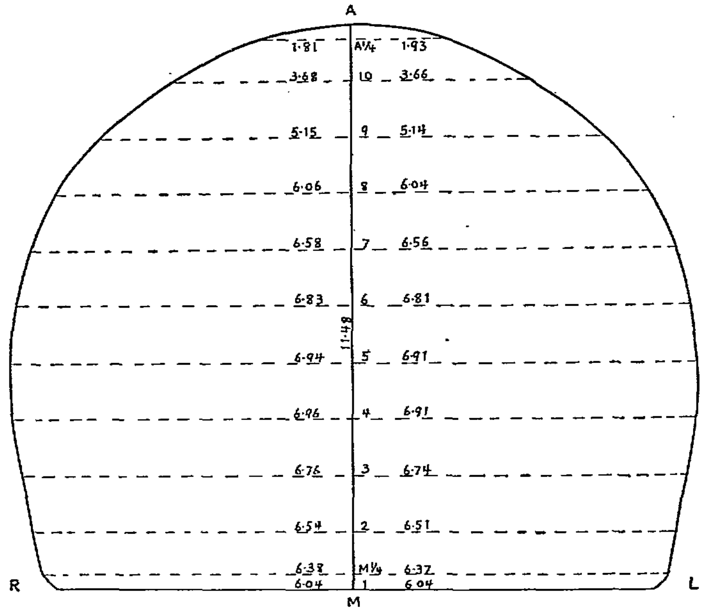


Figure 4 CORONAL TYPE CONTOUR: NORMA FACIALIS—HSIN TIEN (7 ♂)

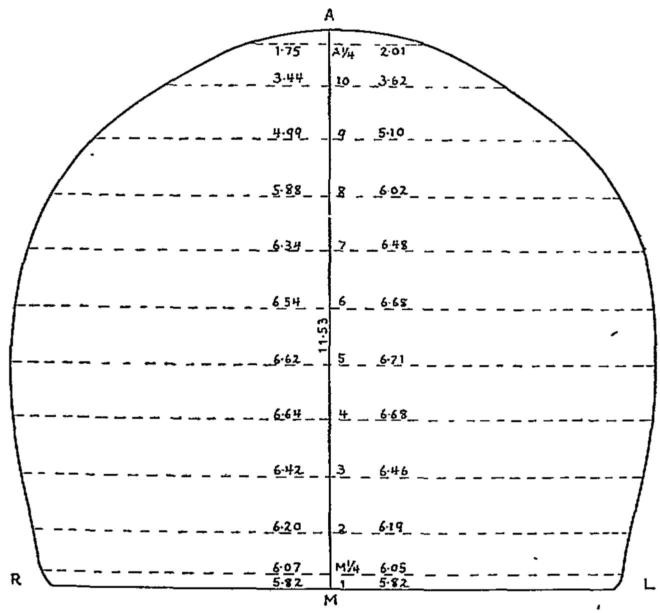


Figure 5 CORONAL TYPE CONTOUR: NORMA FACIALIS—ÆNEOLITHIC SERIES (16 ♂)

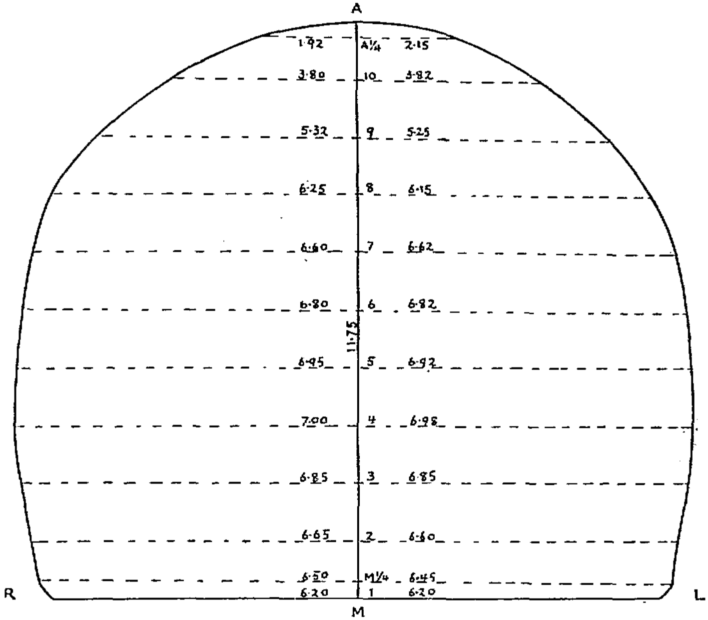


Figure 6 CORONAL TYPE CONTOUR : NORMA FACIALIS—SSU WA (2 ♂)

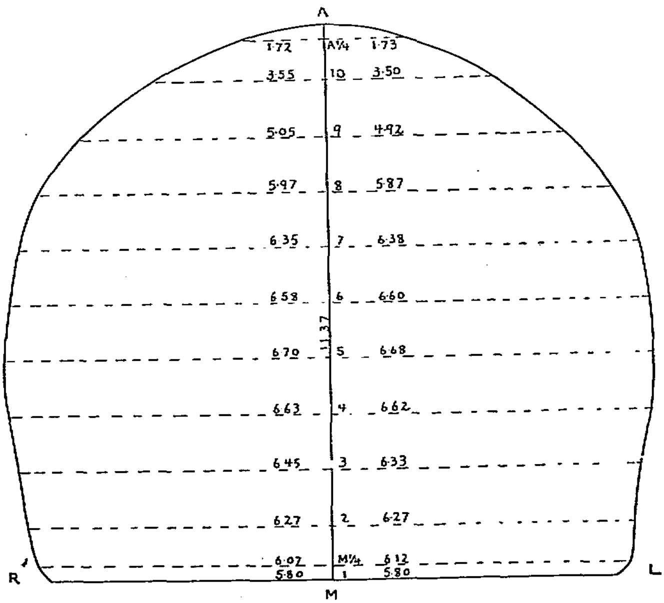


Figure 7 CORONAL TYPE CONTOUR: NORMA FACIALIS—SHA CHING (3 ♂)

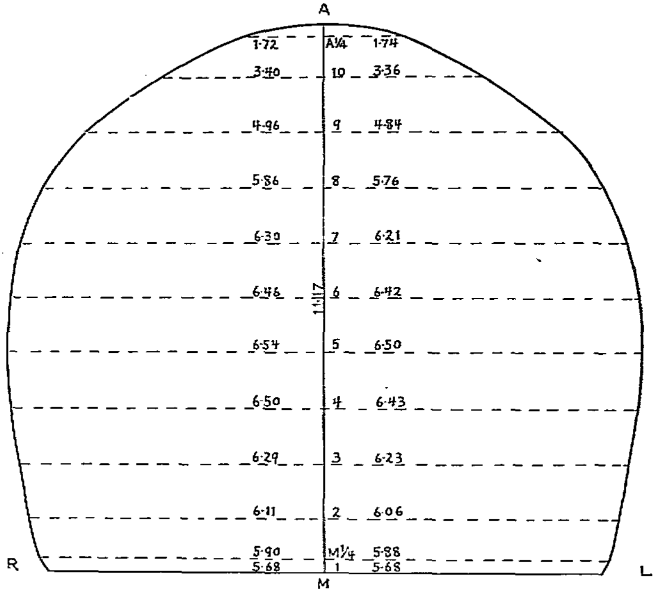


Figure 8

CORONAL TYPE CONTOUR: NORMA FACIALIS—N. CHINA (10 ♀)

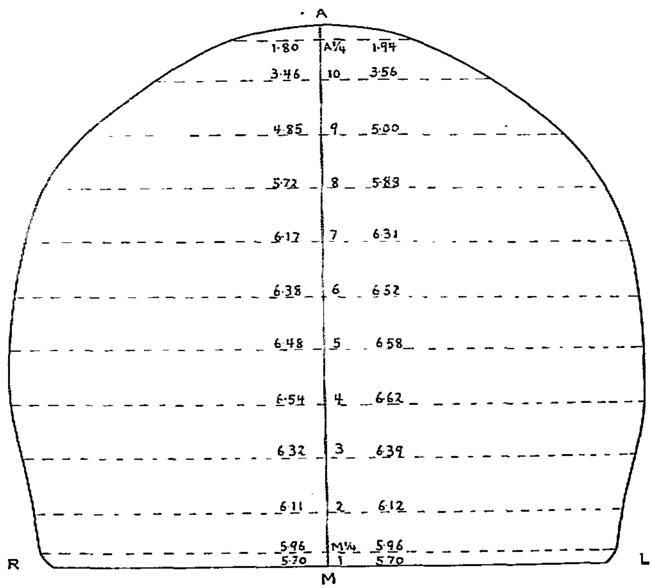


Figure 9

CORONAL TYPE CONTOUR: NORMA FACIALIS. POOLED PREHISTORIC SERIES (11 ♀)

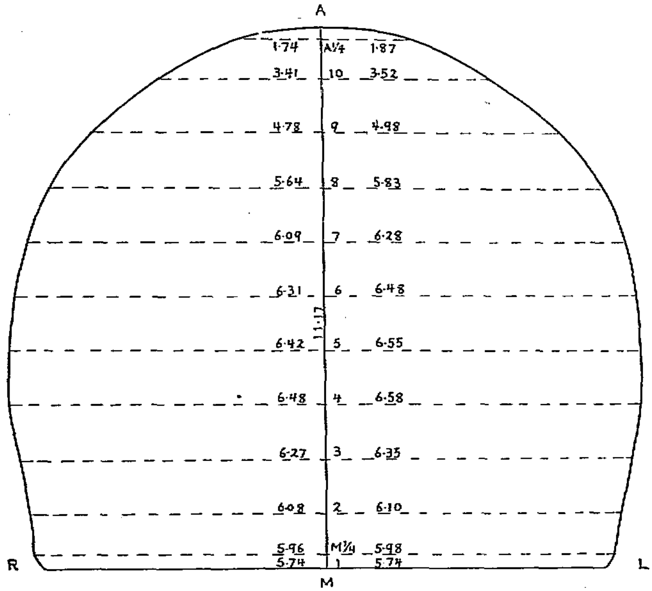


Figure 10 CORONAL TYPE CONTOUR: NORMA FACIALIS ÆNEOLITHIC SERIES (7 ♀)

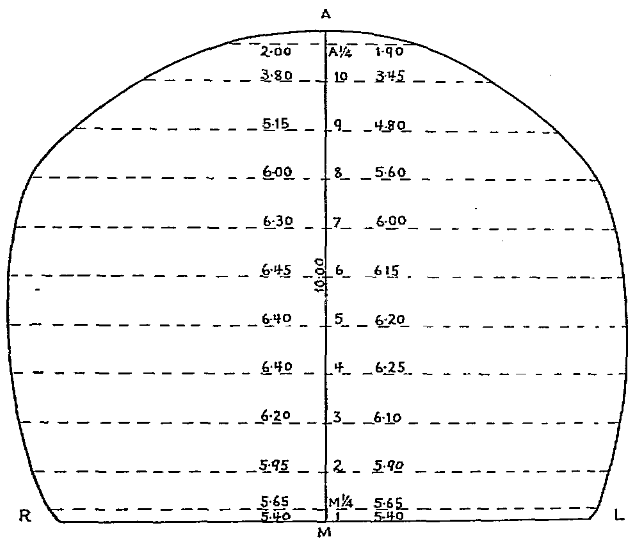


Figure 11 CORONAL TYPE CONTOUR: NORMA FACIALIS—HSIN TIEN (1 ♀)

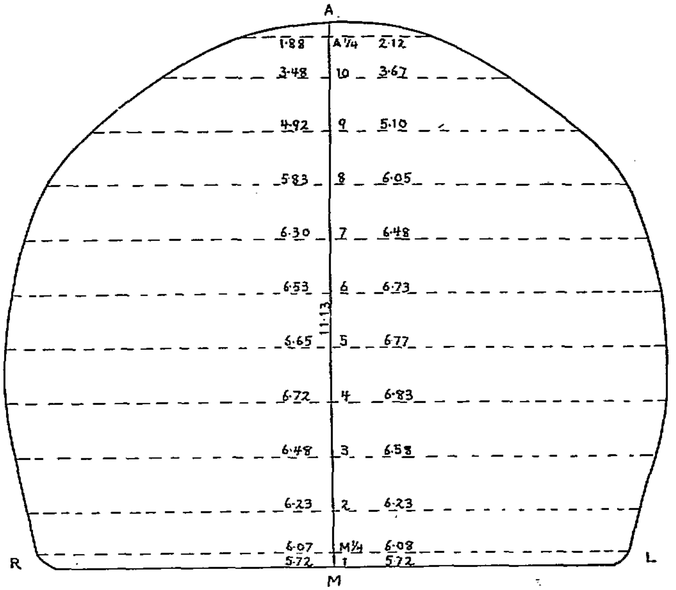


Figure 12 CORONAL TYPE CONTOUR: NORMA FACIALIS—SSU WA (3 ♀)

comparison. But little difference in the lengths of the interporial and MA diameters is to be observed on comparing the Ssu Wa (Figure 12) and recent North China female contours, but the former is considerably wider than the latter between parallels M¼ and 7. The maximum transverse diameter of the recent North China female coronal contour falls on parallel 5, that of the Pooled Prehistoric, Æneolithic, Hsin Tien and Ssu Wa contours falling in each case on parallel 4.

TABLE 18. Comparative summary of means used in plotting Horizontal Type Contour.

	Distance from *F*								*po* Plane			
	FO		*po Plane*		Temporal Ridge *xR*		Temporal Ridge *xL*		*yR*		*yL*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic (♂ 16.3, ♀ 4.9)	17.97	17.22	8.87	8.53	1.73	1.41	1.70	1.54	5.94	6.13	5.79	5.63
Hsin Tien (♂ 6)	17.48	—	8.73	—	1.50	—	1.42	—	6.07	—	6.05	—
Ssu Wa (♂ 2, ♀ 2)	18.22	16.98	9.02	8.10	1.62	1.60	1.70	1.50	6.32	5.70	6.10	5.55
Pooled Prehistoric (♂ 25.3, ♀ 6.9)	17.86	17.14	8.85	8.41	1.64	1.46	1.61	1.52	5.99	6.01	5.89	5.61
North China-recent (♂ 79, ♀ 10)	17.58	16.91	8.59	8.29	1.63	1.50	1.59	1.52	5.94	5.61	5.82	5.67

	F 1/4 R		*F 1/4 L*		*F 1/2 R*		*F 1/2 L*		Temporal Ridge *yR*		Temporal Ridge *yL*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	2.23	2.37	2.49	2.17	4.06	4.28	4.02	4.05	4.96	4.85	4.85	4.70
Hsin Tien	2.32	—	2.52	—	3.99	—	4.17	—	4.72	—	4.80	—
Ssu Wa	2.02	2.12	2.30	2.05	4.00	3.85	4.05	3.92	4.92	4.68	4.88	4.70
Pooled Prehistoric	2.28	2.30	2.54	2.14	4.05	4.16	4.08	4.01	4.88	4.80	4.84	4.70
North China-recent	2.17	2.44	2.18	2.03	3.91	3.69	3.92	3.60	4.77	4.74	4.71	4.50

	2R		*2L*		*3R*		*3L*		*4R*		*4L*		*5R*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	4.91	4.71	4.81	4.65	4.89	4.87	4.94	4.84	5.52	5.54	5.56	5.48	6.31	6.36
Hsin Tien	4.68	—	4.73	—	4.99	—	5.08	—	5.84	—	5.80	—	6.58	—
Ssu Wa	4.80	4.68	4.70	4.65	5.12	4.70	5.15	4.80	5.75	5.35	5.92	5.52	6.78	6.18
Pooled Prehistoric	4.83	4.70	4.78	4.65	4.94	4.82	4.99	4.83	5.63	5.48	5.65	5.49	6.43	6.31
North China-recent	4.68	4.50	4.63	4.43	4.88	4.78	4.86	4.72	5.71	5.48	5.69	5.40	6.46	6.22

	5L		*6R*		*6L*		*7R*		*7L*		*8R*		*8L*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	6.29	6.25	6.79	6.73	6.72	6.63	6.84	6.73	6.72	6.55	6.54	6.39	6.44	6.16
Hsin Tien	6.53	—	6.99	—	6.89	—	6.96	—	6.84	—	6.56	—	6.43	—
Ssu Wa	6.68	6.22	7.10	6.68	6.88	6.62	7.12	6.62	6.88	6.58	6.90	6.30	6.82	6.22
Pooled Prehistoric	6.38	6.24	6.88	6.71	6.78	6.63	6.90	6.70	6.77	6.56	6.58	6.36	6.47	6.18
North China-recent	6.35	6.12	6.82	6.54	6.67	6.52	6.86	6.54	6.68	6.58	6.52	6.14	6.36	6.26

	9R		*9L*		*10R*		*10L*		*O 1/4 R*		*O 1/4 L*		*po from O*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	5.80	5.68	5.75	5.46	4.50	4.33	4.48	4.05	2.70	2.61	2.64	2.40	9.10	8.69
Hsin Tien	5.82	—	5.72	—	4.52	—	4.42	—	2.75	—	2.79	—	8.74	—
Ssu Wa	6.22	5.70	5.95	5.60	4.72	4.35	4.52	4.25	2.62	2.42	2.55	2.40	8.70	8.85
Pooled Prehistoric	5.84	5.68	5.76	5.50	4.52	4.34	4.47	4.11	2.69	2.56	2.68	2.40	8.97	8.74
North China-recent	5.81	5.36	5.69	5.62	4.52	4.11	4.43	4.36	2.63	2.50	2.53	2.80	8.97	8.62

(2) *Horizontal Type Contours*

On completion of the coronal tracings, the cubic craniophore, within which the skull has remained fixed, was turned with the norma verticalis surface downwards and clamped again, with fresh drawing paper beneath it upon the marble surface. The diagraph needle was adjusted to the level of the glabella and a tracing made of the cranial contour. The positions of the following points, in addition to those of the various sutures crossed at this level, were then projected and marked upon the craniogram drawing:— nasion, bregma, lambda, basion, subnasale, R. and L. porion and R. and L. zygomaxillare.

In laying off the individual contour tracings for measurement, the usage of Thompson (21) has been followed, but in addition to her measurements, the positions of the poria and the angular relation of the interporial and fronto-occipital planes have also been recorded here. On each craniogram the line connecting nasion and ambda was drawn to meet the contour at the points F and O respectively. With proportional dividers, the line FO was sub-divided into ten equal parts by nine points, from each of which ordinates at right angles to FO were drawn to meet the right and left margins of the contour. From before backward, these parallels were numbered from 2 to 10. From a point one quarter the distance from O to 10, a line (O$\frac{1}{4}$) parallel to the other ordinates, was drawn to meet the margins of the contour. Points were then marked respectively at one quarter (F$\frac{1}{4}$) and one half (F$\frac{1}{2}$) the distance from F to ordinate 2, and lines parallel to the latter drawn to the contour margins from these points. The points at which the contour tracing crossed the right and left temporal ridges were connected to the FO axis by vertical ordinates (respectively TR and TL) and a straight line (*po-po*) was drawn connecting the two porion points. The FO axis, the thirteen ordinates to the right and to the left of that axis, the distances y from F of TR, TL and *po-po*, the distance of each porion from the FO axis along the interporial line and the angle formed between the latter and the FO axis were then measured and recorded. From the means of these measurements, the FO axis, the various ordinates and the positions of the poria on the type contour were plotted on millimetre paper and the contour outlines drawn in with the aid of a spline.

The means of these craniogram measurements for each series investigated are summarized in Table 18, the horizontal type contours being reproduced in Figures 13-

21. To facilitate comparison, the means of the various measurements have been indicated on the corresponding lines of the type contours. All these contours have been oriented in norma verticalis view following the usage of the London Biometric Laboratory.

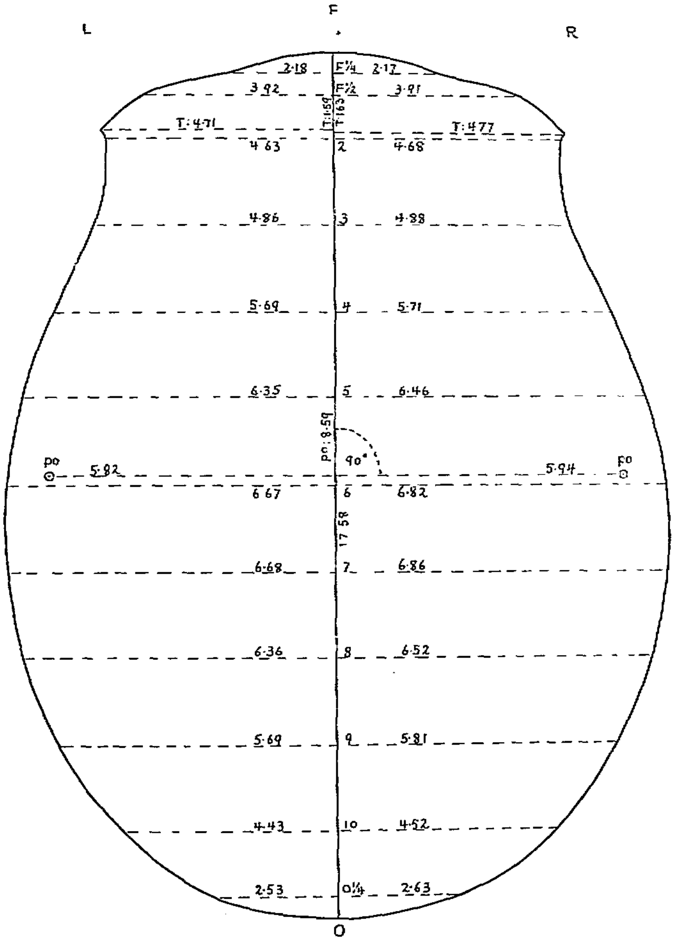
It is of interest to note that the interporial plane is set practically at right angles to the FO axis in all the horizontal type contours constructed in the present investigation. The location of the poria and the measurement of this angle was made as a routine in order to test the relative fixity of the FO axis as a mid-sagittal landmark and also to provide an additional independent point on the FO axis on which contours could be oriented when being directly compared.

The FO axis of the recent North China male contour (Figure 13) is somewhat shorter than that of the Pooled Prehistoric males (Figure 14), but if the interporial planes and FO axes of the two be made to coincide, the contours of the two are seen to be closely similar from parallel 4 backwards; and the same is true where the recent North China and Æneolithic (Figure 15) male contours are similarly compared. The chief differences to be observed between the recent North China and Hsin Tien (Figure 16) male horizontal contours lie in the greater width of parallels 3 to 7 and the slightly arger FO axis in the latter. If the interporial planes and FO axes of the recent North China and Ssu Wa (Figure 17) contours be superposed, the latter is seen to be but an enlargement of the former, the proportions of the two being very similar. This circumstance is to be explained as the result of the two Ssu Wa male crania being above the average size of the prehistoric series while of similar origin.

The most striking character common to all the male horizontal type contours is a peculiar relative flatness of the frontal region. In each contour, both the temporal ordinates TR and TL fall in front of parallel 2 and, except in the case of the Æneolithic contour, the distance separating these parallels is relatively great.

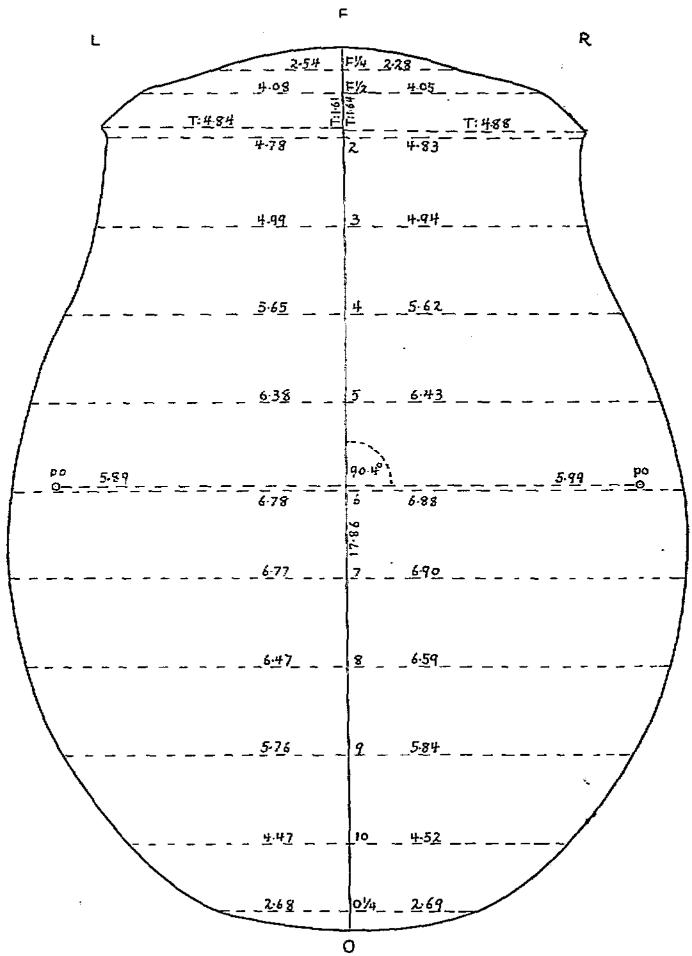
The FO axis of the recent North China female horizontal contour (Figure 18) is somewhat shorter than that for the Pooled Prehistoric females (Figure 19), and if the interporial lines and FO axes of the two be superposed, the latter contour is seen to be slightly the larger over most of its outline, except for some asymmetries. A similar condition is seen to obtain on comparing the recent North China and the Æneolithic (Figure 20) female contours and, except for some slight asymmetries, the Ssu Wa (Figure 21) and recent North China female contours exhibit no important dissimilarities. A characteristic flatness of the frontal region obtains in all the female horizontal type contours constructed, the temporal ordinates TR and TL, as in the male contours, both falling in every case well in front of parallel 2.

Among the many horizontal type contours constructed for other races by workers in the London Biometric Laboratory, only in those of the Khams Tibetans were both temporal ordinates TR and TL observed to fall in front of parallel 2, a circumstance to which Morant has drawn special attention (13, p. 90). It is now evident that this peculiar frontal flatness constitutes a feature characteristic of both sexes of the North China population both recent and prehistoric.



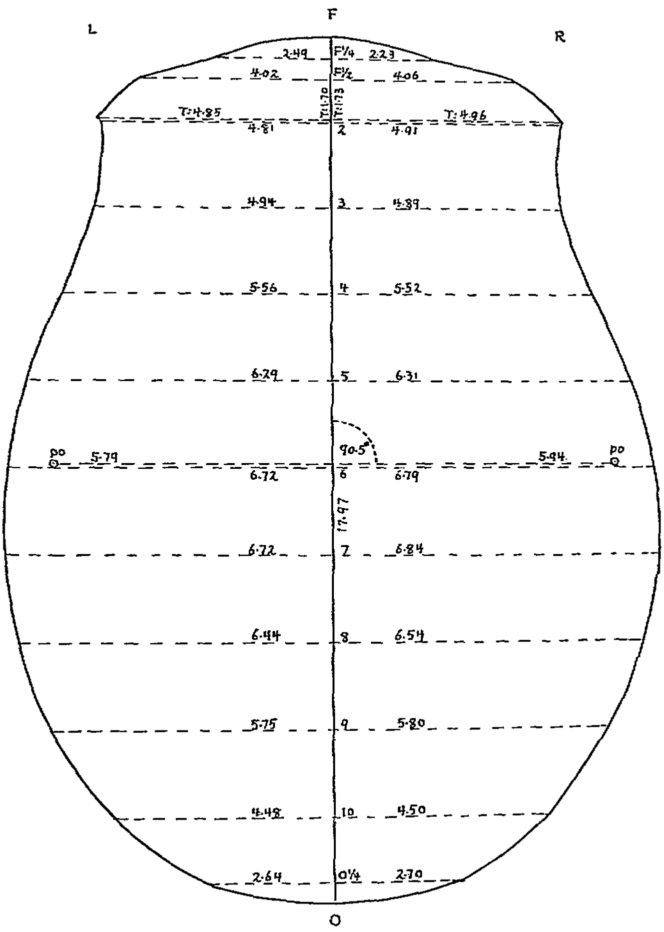
HORIZONTAL TYPE CONTOUR: NORMA VERTICALIS—N. CHINA (79 ♂)

Figure 18



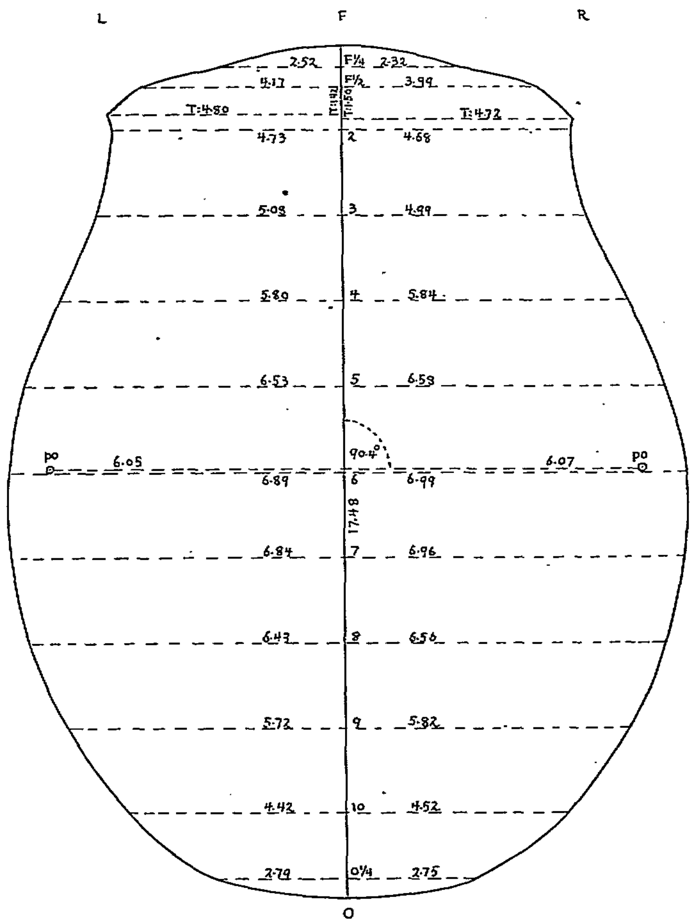
HORIZONTAL TYPE CONTOUR: NORMA VERTICALIS—POOLED PREHISTORIC SERIES (26 ♂)

Figure 14



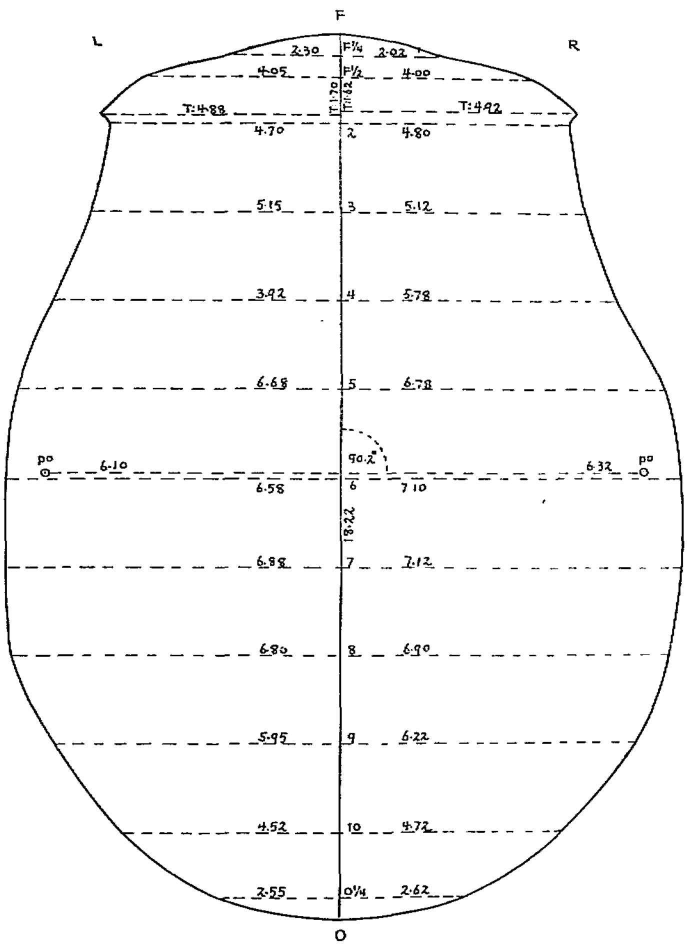
HORIZONTAL TYPE CONTOUR: NORMA VERTICALIS—ÆNEOLITHIC SERIES (17 ♂).

Figure 15



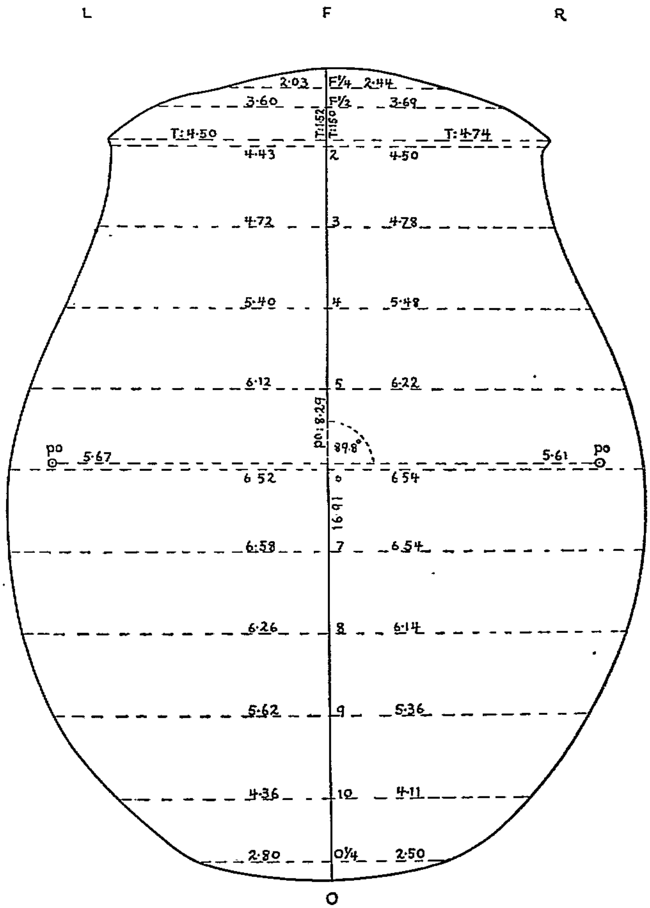
HORIZONTAL TYPE CONTOUR: NORMA VERTICALIS — HSIN TIEN (6♂)

Figure 10



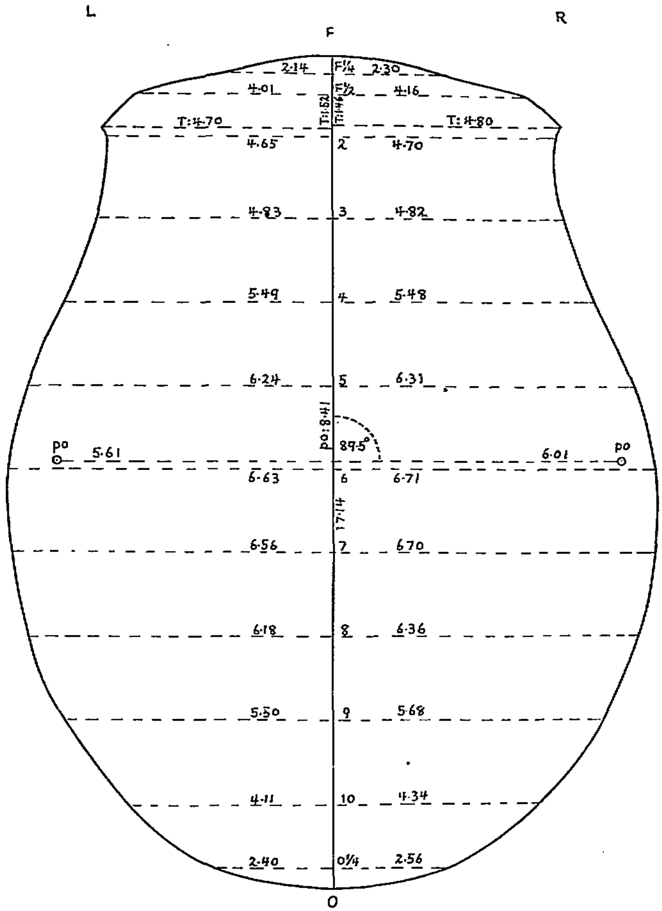
HORIZONTAL TYPE CONTOUR: NORMA VERTICALIS—SSU WA (2 ♂)

Figure 17



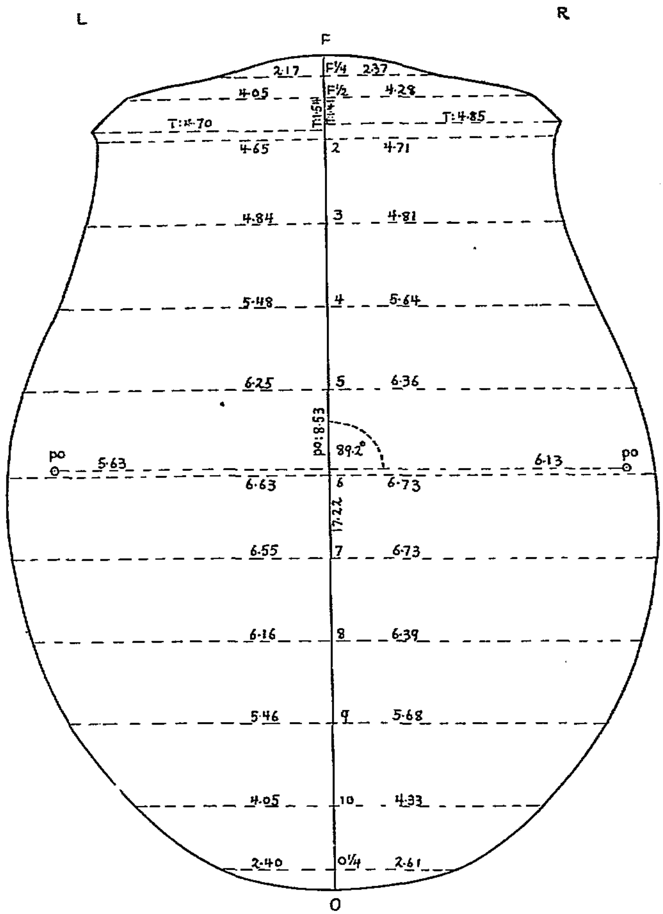
HORIZONTAL TYPE CONTOUR: NORMA VERTICALIS—N. CHINA (10 ♀)

Figure 18



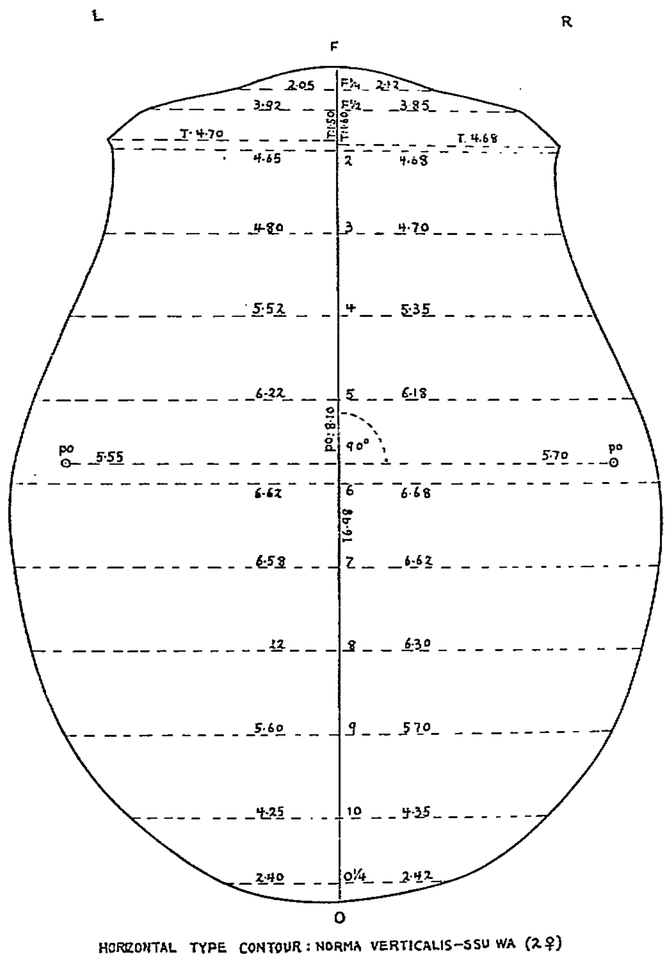
HORIZONTAL TYPE CONTOUR: NORMA VERTICALIS—POOLED PREHISTORIC SERIES (7♀)

Figure 19



HORIZONTAL TYPE CONTOUR. NORMA VERTICALIS—ÆNEOLITHIC SERIES (5 ♀)

Figure 20



HORIZONTAL TYPE CONTOUR: NORMA VERTICALIS—SSU WA (2♀)

Figure 21

(3) *Sagittal Type Contours*

The skull remaining fixed and oriented within the cubic craniophore, on completion of the horizontal tracings, the craniophore was turned with its right norma lateralis surface downard and clamped, with fresh drawing paper beneath it, upon the marble plate. The diagraph needle was then placed at the level of the nasion and a tracing made of the mid-sagittal contour. When the mid-sagittal landmarks (i.e. nasion, bregma, lambda, inion, opisthion, basion and prosthion) did not fall in one plane, the levels of the diagraph needle were adjusted as required, so as to include all these points on the tracing, following the usage of Tildesley (22, p. 294). In addition to the mid-sagittal points mentioned above, the following points were projected and marked on the craniogram drawing:—the left orbitale, the porion and the nasospinale.

In laying off the individual contour tracings for measurement, the usage of Thompson (21) has been followed for the most part, except in the case of the nasal curves, which have been measured as first done by Tildesley (22). On each craniogram a line was drawn parallel to the porion-orbitale plane through the nasion to cut the occipital contour at a point termed the gamma (γ). With the proportional dividers the $n\gamma$ axis was sub-divided into ten equal parts by nine points, from each of which vertical ordinates (numbered from before backwards from 1 to 9) were erected to meet the contour tracing above the $n\gamma$ plane, ordinates 8 and 9 being produced below this plane to meet the lower occipital contour. At both n and γ vertical ordinates were drawn to meet the contour tracing. From the glabella and from the most backward projecting point of the occipital curve (occipital point), vertical tangents were drawn to the produced $n\gamma$ line. At a point one quarter the distance from n to 1, a vertical ordinate ($N\frac{1}{4}$) was drawn to meet the frontal contour. At points respectively one eighth and one quarter the distance from γ to 9, vertical ordinates $\gamma 1/8$ and $\gamma\frac{1}{4}$ were drawn to meet the contour above the $n\gamma$ plane, ordinate $\gamma\frac{1}{4}$ being produced below this palne to meet the lower occipital curve. Vertical ordinates were drawn from the inion, opisthion and bregma to meet the $n\gamma$ line and at a point one half the distance from γ to 9, a further vertical ordinate was drawn from the $n\gamma$ line to the lower occipital curve. A vertical ordinate was also drawn from the porion to the margin of the contour above (*apex*). The following chords were drawn:— nasion-bregma, nasion-lambda, glabella-inion and lambda-opisthion; on each chord a vertical was erected to the highest point of the corresponding arc, and from the $n\gamma$ a vertical was erected to the highest point above it (*vertex*) on the cranial vault curve. From the nasion, a line *NL* was drawn to the tip of the nasal curve, the distance from the nasion to the point on this line cut by the nasal curve being termed *NLL*. A vertical from line *NL* was erected to the point of maximum depth of the nasal curvature. The nasal angle was defined by the lines *NL* and $n\gamma$. The $n\gamma$ axis, the ordinates erected thereon, the cranial chords, the maximum subtenses of their arcs, the nasal lengths, maximum subtense and angle were then measured and recorded. From the means of these fifty-two measurements, the $n\gamma$ axis and the ordinates, chords, etc., of the type sagittal contour were plotted on millimetre paper and the contour outline drawn in with the aid of the spline.

The means of these craniogram measurements for each series investigated are summarized in Table 19, the sagittal type contours being reproduced in Figures 22-31. To facilitate comparisons, the means of most of the linear measurements have been indicated on the corresponding lines of the type contours. All these contours have been oriented in left norma lateralis view, following the usage of the London Biometric Laboratory.

A comparison of the recent North China (Figure 22) and Pooled Prehistoric (Figure 23) male sagittal contours, while making evident certain differences between the two, as already noted in comparing the coronal and horizontal contours, further displays their essential similarities. If the contours be superposed so that the poria and the Frankfort Plane in the two coincide, the curves correspond with but minor differences over the whole cranial vault behind the apex, though, in this orientation, the inion is more prominent and the vertex falls further behind in the recent contour. If the nasion-bregma chords be superposed, the two frontal curves are also practically identical, though the glabella of the recent contour is slightly the more prominent. Similarly, if the lambda-opisthion chords be superposed, the occipital arcs of the two contours are seen to be identical, save for the slightly more prominent inion of the recent contour. The nasal curve is somewhat flatter and the angle somewhat greater (i.e. the nasal bridge more depressed) in the Pooled Prehistoric contour, while the distance separating the porion-orbitale plane and the $n\gamma$ line, is slightly greater in the recent North China contour.

The Æneolithic male sagittal contour (Figure 24) is essentially identical in all its major features to that of the Pooled Prehistoric crania. The Hsien Tien male

TABLE 19. Comparative summary of means used in plotting Sagittal Type Contours.

	Lengths								Bregma			
	n-gamma		*n-Lambda*		*o-Lambda*		*or-porion*		*x from n*		*y*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic (♂18.2, ♀5.5)	17.86	16.82	17.61	16.71	9.90	9.44	7.79	7.57	7.25	6.42	8.57	8.42
Hsin Tien (♂6.5, ♀0.3)	17.35	—	17.11	—	9.60	—	8.01	7.60	7.06	6.95	8.63	—
Ssu Wa (♂2, ♀3.0)	17.95	16.87	17.78	16.85	9.92	9.95	8.18	7.85	7.70	6.72	8.70	8.42
Sha Ching (♂ -.9)	17.50	—	17.52	—	9.55	—	8.38	—	7.23	—	8.53	—
Pooled Prehistoric (♂29.6, ♀8.8)	17.74	16.83	17.50	16.76	9.78	9.63	7.91	7.66	7.24	6.56	8.59	8.42
North China-recent (♂7.95, ♀10)	17.39	16.78	17.24	16.62	9.76	9.70	7.74	7.57	7.39	6.62	8.34	8.18

	Ordinates above *n-gamma*													
	O=n		*N 1/4*		*1*		*2*		*3*		*4*		*5*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	2.46	3.13	3.90	4.60	6.10	6.21	7.43	7.37	8.21	8.08	8.58	8.48	8.74	8.61
Hsin Tien	2.44	1.50	4.16	—	5.98	—	7.35	—	8.16	—	8.63	—	8.80	—
Ssu Wa	2.60	2.38	3.90	3.95	6.08	6.07	7.32	7.32	8.15	8.02	8.68	8.42	8.72	8.60
Sha Ching	2.00	—	3.42	—	5.88	—	7.18	—	8.03	—	8.55	—	8.68	—
Pooled Prehistoric	2.42	2.74	3.91	4.38	6.05	6.16	7.38	7.35	8.18	8.06	8.60	8.46	8.74	8.60
North China-recent	2.07	2.58	3.65	4.38	5.72	5.86	7.06	7.02	7.87	7.75	8.32	8.22	8.50	8.47

	Ordinates above *n-gamma*													
	6		*7*		*8*		*9*		*ϒ 1/4*		*ϒ 1/8*		*ϒ 10*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	8.70	8.48	8.27	8.02	7.41	7.08	5.64	5.42	2.88	2.91	2.28	2.28	+0.96	+0.83
Hsin Tien	8.77	—	8.40	—	7.54	—	5.69	—	2.95	—	2.16	—	+0.04	—
Ssu Wa	8.70	8.62	8.28	8.22	7.22	7.48	5.28	5.87	2.95	3.48	2.38	2.55	+0.65	+1.20
Sha Ching	8.65	—	8.13	—	7.07	—	5.50	—	2.58	—	1.73	—	−0.60	—
Pooled Prehistoric	8.71	8.53	8.28	8.08	7.40	7.21	5.6-	5.57	2.87	3.10	2.22	2.37	+0.60	+0.96
North China-recent	8.49	8.51	8.10	8.16	7.24	7.28	5.59	5.62	3.06	3.22	2.31	2.43	+0.78	+0.56

	Glabella				Max. Height				Porion				Height	
	x from n		*y*		*x from n*		*y*		*x from n*		*y*		*po-vertical*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	0.22	0.21	1.11	1.05	9.40	8.36	8.81	8.67	8.74	8.22	8.76	8.66	11.60	11.21
Hsin Tien	0.16	0.10	1.11	0.70	9.36	8.75	8.84	—	8.56	8.00	8.79	—	11.56	10.00
Ssu Wa	0.28	0.22	1.32	0.98	8.28	8.87	8.78	8.68	8.68	8.05	8.75	8.58	11.72	11.12
Sha Ching	0.22	—	0.98	—	9.62	—	8.73	—	8.65	—	8.68	—	11.33	—
Pooled Prehistoric	0.21	0.20	1.11	1.00	9.34	8.55	8.81	8.67	8.69	8.15	8.75	8.63	11.58	11.06
North China—recent	0.10	0.12	0.99	1.06	9.47	9.36	8.58	8.57	8.29	8.17	8.40	8.45	11.44	11.13

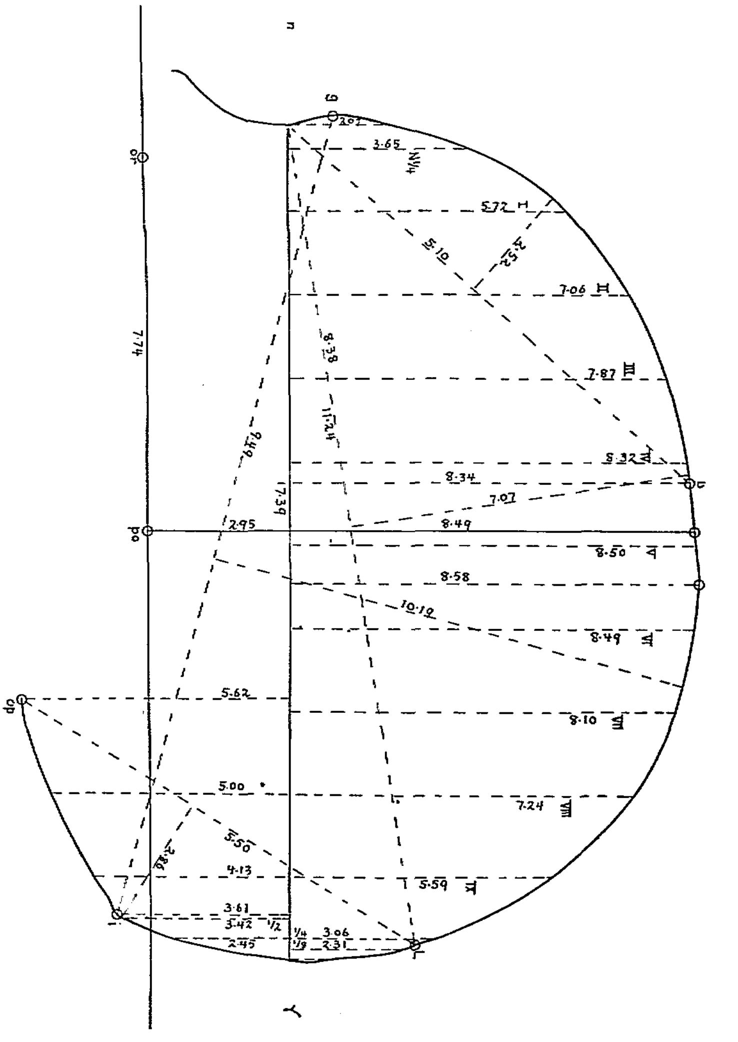
	Ordinates below *n-gamma*								Opisthion				Inion	
	8		*9*		*ϒ 1/2*		*ϒ 1/4*		*x from ϒ*		*y*		*x from ϒ*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	4.84	4.50	3.77	3.48	2.93	2.71	2.01	1.93	5.38	5.42	5.44	5.24	0.78	0.55
Hsin Tien	4.76	—	3.67	—	2.78	—	2.09	—	4.98	—	5.26	—	0.74	—
Ssu Wa	5.28	4.78	4.08	3.98	3.02	2.60	2.35	1.75	5.62	5.33	5.85	5.47	0.85	0.88
Sha Ching	5.32	—	4.08	—	3.38	—	3.00	—	4.82	—	5.73	—	0.10	—
Pooled Prehistoric	4.89	4.61	3.80	3.44	2.94	2.67	2.14	1.87	5.24	5.26	5.46	5.32	0.71	0.66
North China—recent	5.00	4.53	4.13	3.43	3.42	2.80	2.45	2.06	5.40	5.24	5.62	5.14	0.92	0.94

TABLE 19. (Continued) Comparative summary of means use in plotting Sagittal Type Contours.

	Inion		Occipital Point				Porion				Nasalia—lengths			
	y		*x from* ϒ		*y*		*x from* ϒ		*y below n*ϒ		*NL*		*NLL*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	2.47	2.08	0.62	0.83	+0.48	+0.52	9.11	8.59	2.80	2.55	2.47	2.22	2.18	2.02
Hsin Tien	2.56	—	0.04	—	−0.03	—	8.78	—	2.38	2.70	2.61	2.60	2.33	2.15
Ssu Wa	3.40	2.65	0.25	0.05	+0.30	+0.38	9.28	8.82	2.98	2.53	2.72	2.13	2.48	1.78
Sha Ching	2.47	—	0.33	—	−0.65	—	9.15	—	2.65	—	2.78	—	2.58	—
Pooled Prehistoric	2.55	2.27	0.05	0.07	−0.22	+0.39	9.05	8.67	2.71	2.56	2.58	2.24	2.31	1.92
North China—recent	3.61	2.88	0.11	0.05	+0.42	+0.47	9.00	8.62	2.05	2.68	2.60	2.30	2.25	2.05

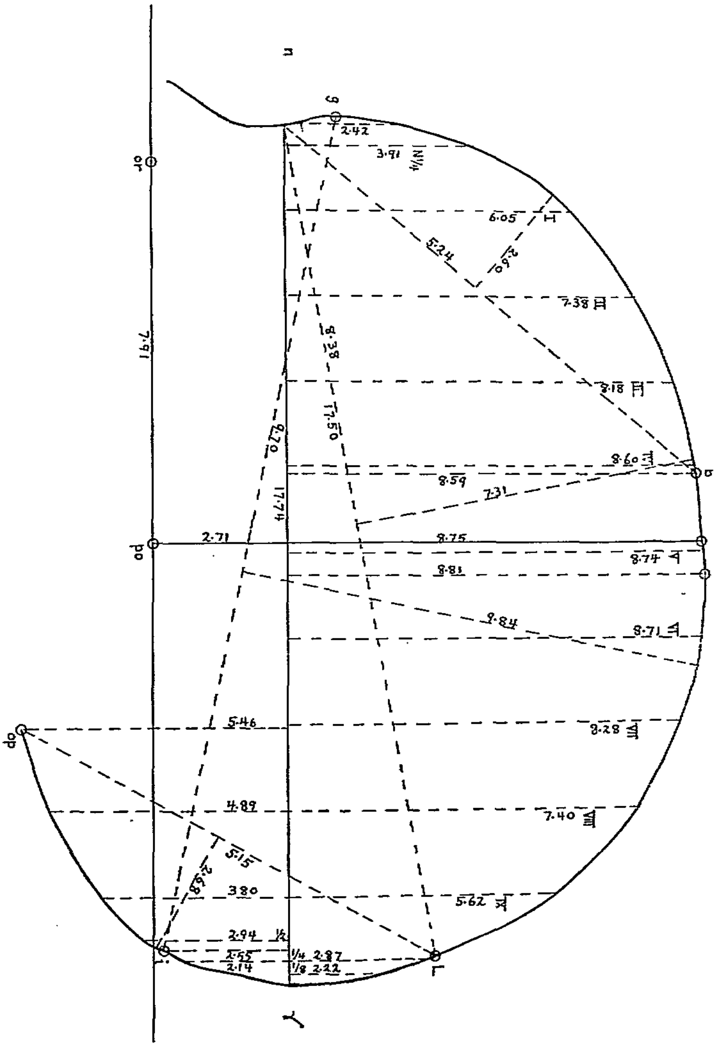
	Nasalia Angle		Nasalia-Max. subtense				Max. subtense chord *n-b*				Max. subtense chord *N-L*			
	*rhi-n-*ϒ		*x from n*		*y*		*x from n*		*y*		*x from n*		*y*	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	111.1	118.0	0.09	0.32	1.06	1.08	5.37	4.85	2.63	2.57	8.32	7.62	7.32	7.28
Hsin Tien	111.9	102.0	0.12	0.00	1.27	1.15	4.88	4.70	2.52	2.30	8.46	7.10	7.18	6.20
Ssu Wa	108.0	114.8	0.10	0.23	1.48	0.93	5.25	5.10	2.78	2.48	8.52	8.05	7.55	7.10
Sha Ching	107.5	—	0.08	—	1.22	—	5.18	—	2.48	—	8.47	—	7.33	—
Pooled Prehistoric	110.6	113.8	0.10	0.22	1.19	1.02	5.24	4.91	2.60	2.52	8.38	7.69	7.31	7.12
North China—recent	115.6	114.2	0.22	0.19	1.11	1.12	5.10	4.50	2.52	2.52	8.38	8.42	7.07	8.74

	Max. Subense chord *g-i*				Max. Subtense chord *o-L*			
	x from g		*y*		*x from L*		*y*	
	♂	♀	♂	♀	♂	♀	♂	♀
Æneolithic	9.80	9.00	9.82	9.28	5.15	4.82	2.66	2.47
Hsin Tien	9.71	—	9.87	—	5.17	—	2.65	—
Ssu Wa	9.75	9.40	10.12	9.80	5.50	5.28	2.82	2.43
Sha Ching	9.58	—	9.67	—	4.88	—	2.75	—
Pooled Prehistoric	9.70	9.13	9.84	9.45	5.15	4.99	2.68	2.46
North China—recent	9.49	9.07	10.19	9.70	5.50	4.91	2.86	2.76



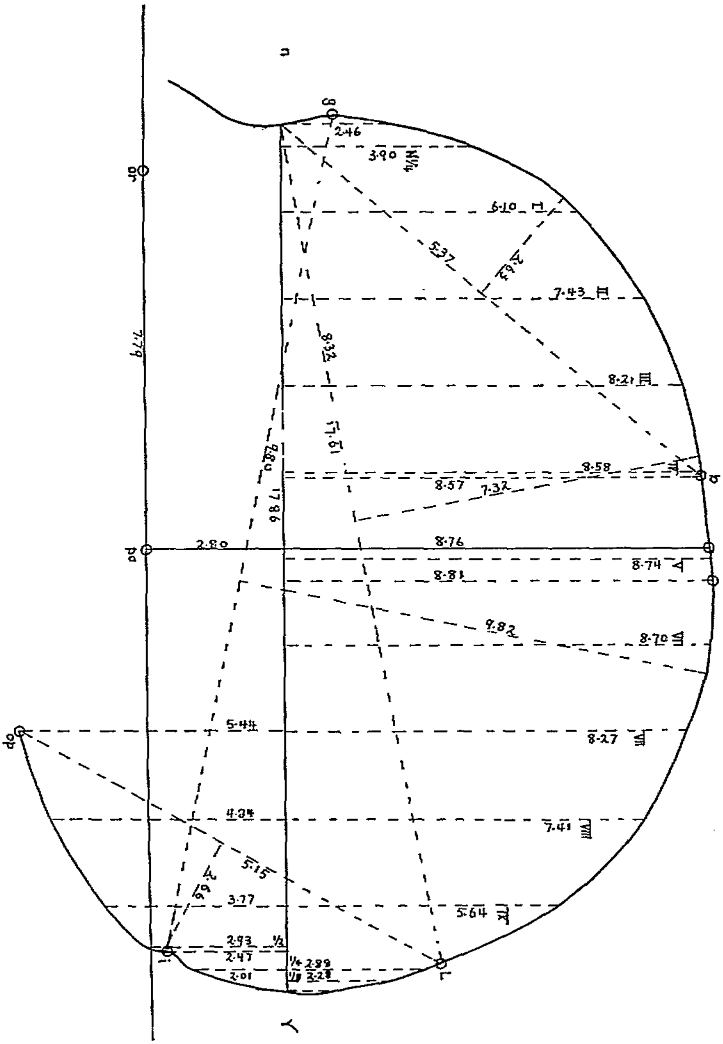
SAGITTAL TYPE CONTOUR—NORTH CHINA (80 ♂)

Figure 38



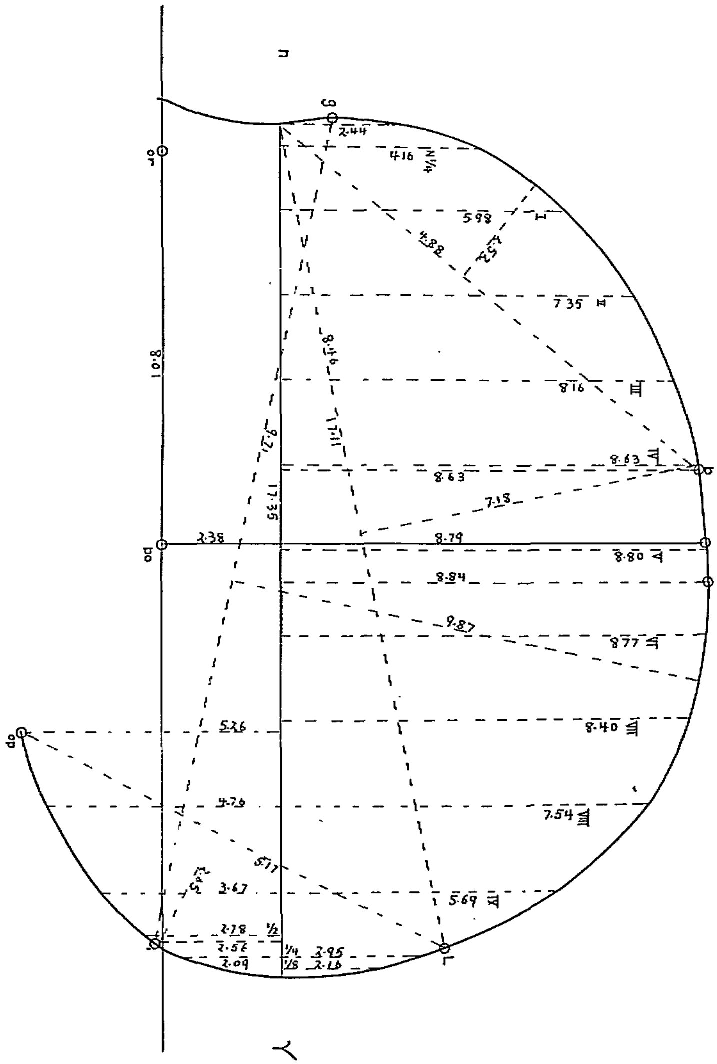
SAGITTAL TYPE CONTOUR—POOLED PREHISTORIC SERIES (32 ♂)

Figure 28



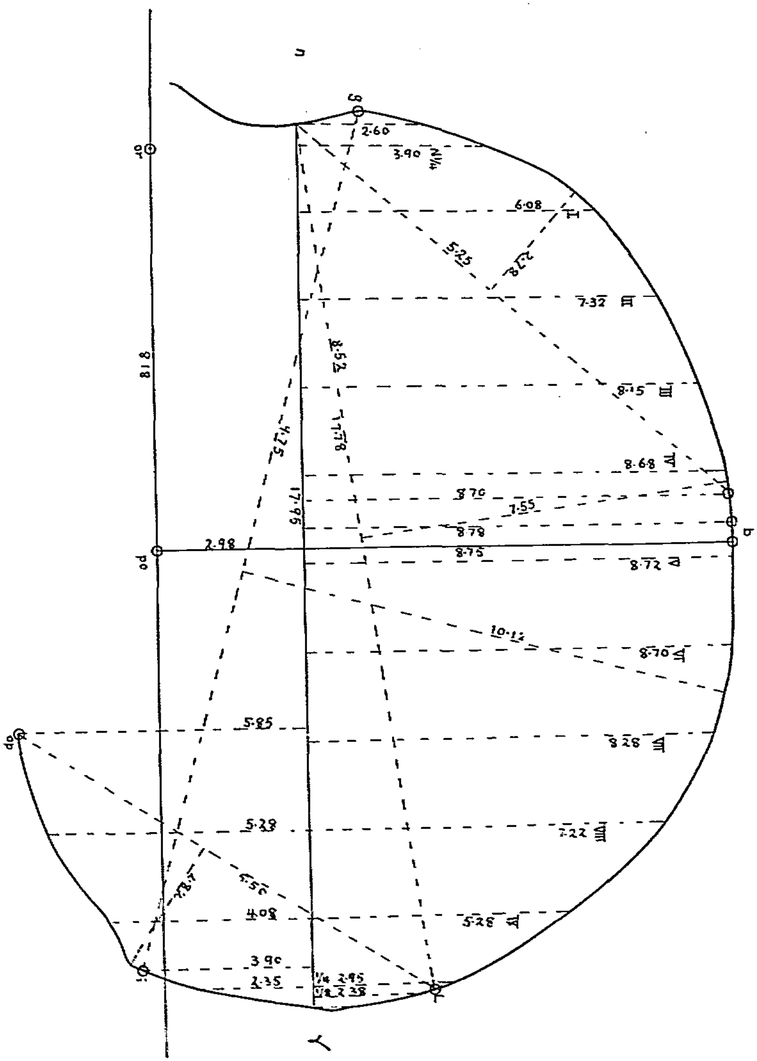
SAGITTAL TYPE CONTOUR — ÆNEOLITHIC SERIES (20 ♂)

Figure 24



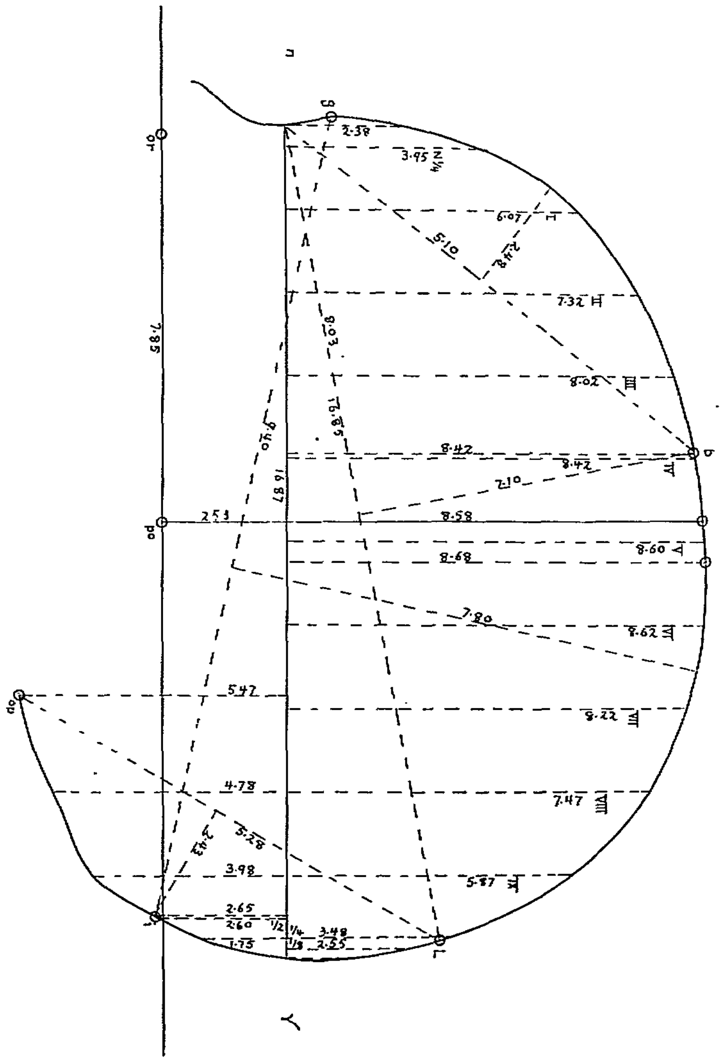
SAGITTAL TYPE CONTOUR — HSIN TIEN (7 ♂)

Figure 25



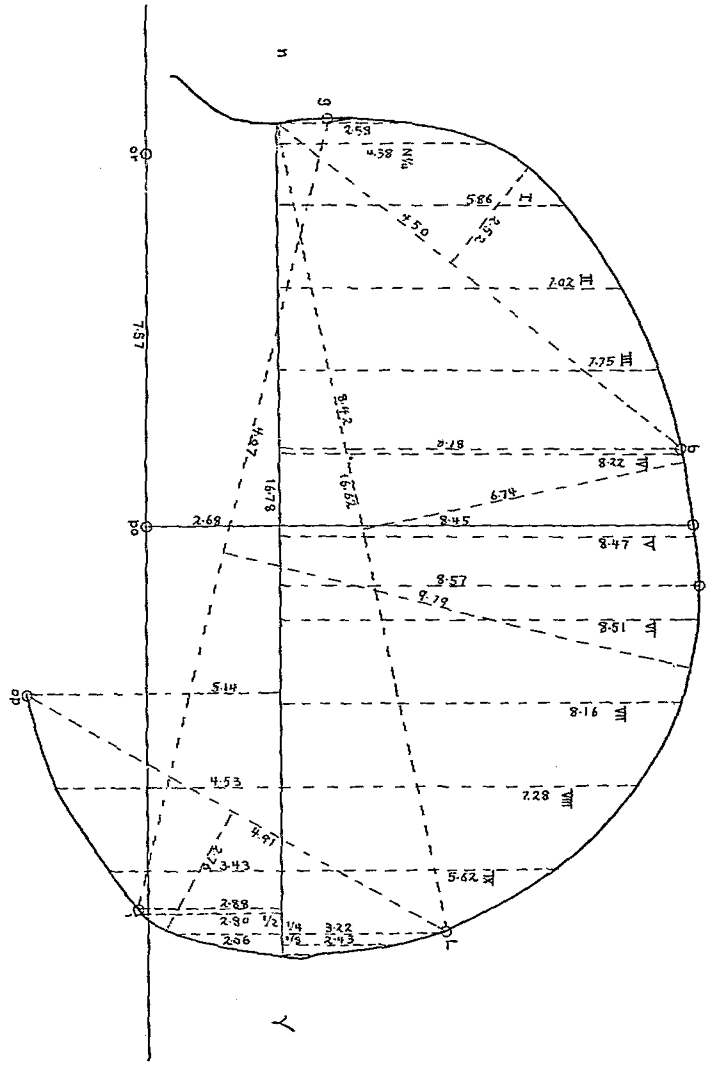
SAGITTAL TYPE CONTOUR — SSU WA (2 b)

Figure 26



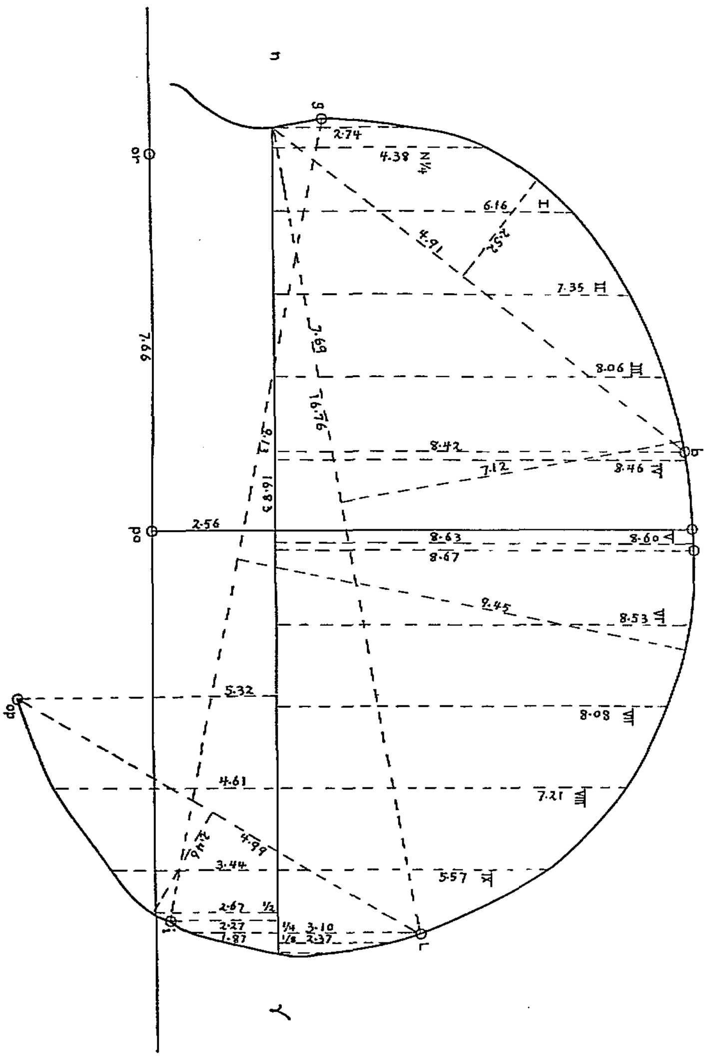
SAGITTAL TYPE CONTOUR SSU WA (3 ♀)

Figure 27



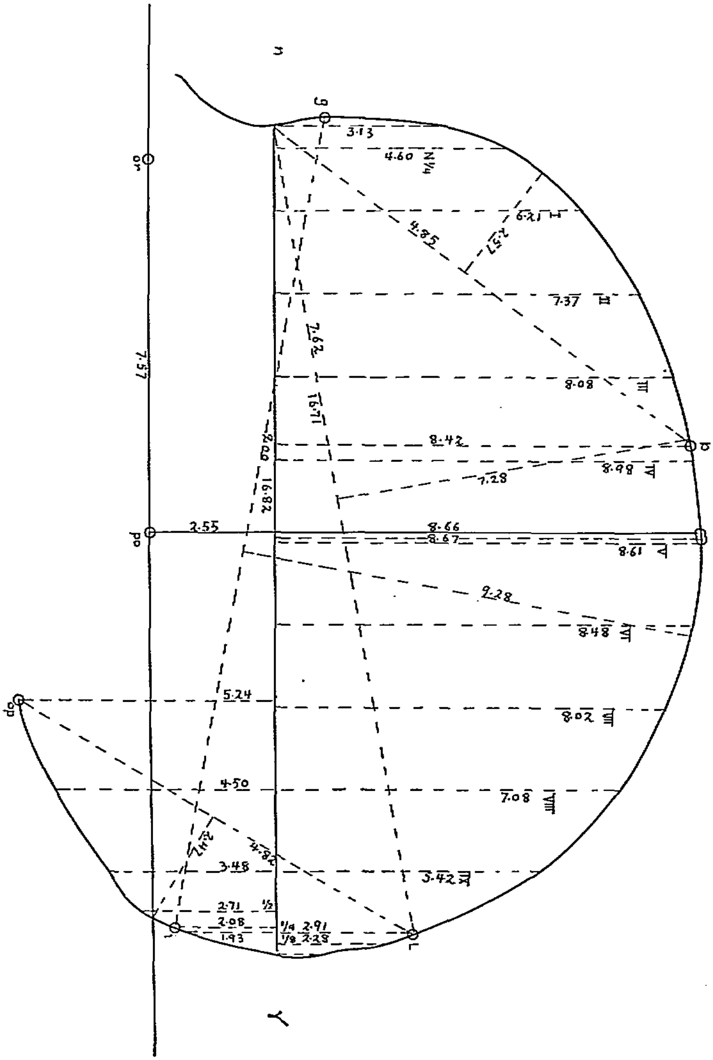
SAGITTAL TYPE CONTOUR — NORTH CHINA (10♀)

Figure 28



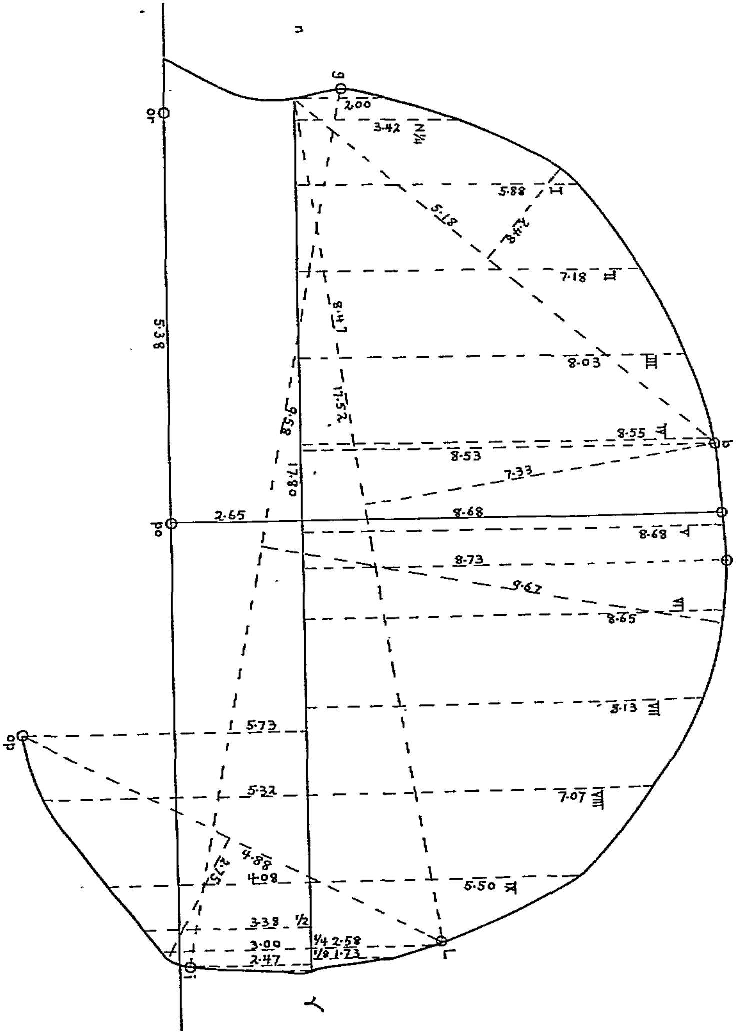
SAGITTAL TYPE CONTOUR — POOLED PREHISTORIC SERIES (♀♀)

Figure 29



SAGITTAL TYPE CONTOUR — ÆNEOLITHIC SERIES (6 ♀)

Figure 80



SAGITTAL TYPE CONTOUR — SHA CHING (3 ♂)

Figure 81

contour (Figure 25) is also closely similar to that of the Pooled Prehistoric crania when the nasion and $n\gamma$ line of each are made to coincide, the differences between the two being largely restricted to the region behind ordinate 7, though the tip of the nasal curve in the Hsin Tien contour is the less prominent. Further, if the lambda-opisthion chords be superposed, the Hsin Tien and Pooled Prehistoric occipital arcs are seen to be identical; the essential difference between the two contours would seem to lie in the relatively higher plane on which the Hsin Tien porion is situated. Resemblances and slight differences of a similar nature are to be observed on comparison of the Ssu Wa (Figure 26) and Sha Ching (Figure 27) male contours with that of the Pooled Prehistoric crania. It is also of interest to note that if the porion and porion-orbitale plane of the Pooled Prehistoric male sagittal contour be superposed upon these landmarks on the Khams Tibetan male sagittal contour (v. Morant, 12, p. 244), the chief differences between the two outlines are likewise restricted to the regions behind the level or ordinate 7. In all the male sagittal contours constructed for the present report, the nasal curves and angles may be described as being typically Oriental.

The sagittal type contours of the recent North China (Figure 28) and Pooled Prehistoric female crania (Figure 29) are very closely similar when the two are compared by superposing, either in the nasion and $n\gamma$, or in the porion and porion-orbitale orientation, the chief differences between the two lying in the somewhat fuller upper part of the frontal arc in the latter. The Æneolithic (Figure 30) and Pooled Prehistoric female sagittal contours are practically identical and only differences of a very minor nature serve to distinguish the latter and the Ssu Wa (Figure 31) female sagittal cranial contcurs. All four of these female type sagittal contours display in its typical form the characteristic female outline of the frontal region, and in each the nasal curve and angle may, as in the males, be described as typically Oriental.

A detailed comparison of the various sagittal type contours thus tends to confirm the conclusions reached as a result of the study of the mean skull measurements in the series investigated.

CONCLUSION

As a result of the foregoing investigation into the group measurements and form relations of the Honan and Kansu prehistoric crania in comparison with recent North China material, it would seem to be established beyond any reasonable doubt that the prehistoric populations represented were essentially Oriental in physical character.

Further, the resemblances between these prehistoric and recent North China populations would appear to be such that the term "proto-Chinese" may with some propriety be applied to the former.

Of the prehistoric populations represented by this material, that of the Æneolithic culture phase would seem to diverge somewhat more widely from the modern North China type than do those of the later prehistoric culture phases, and also to present, in certain suggestive features, some near resemblance to the Tibetan B or Khams Tibetan type described by Morant.

Lastly it should be recalled that, of the Sha Ching skulls, but a relatively small proportion (7 specimens out of 18 represented) were sufficiently free from posthumous deformation to be available for the measurements from which the Coefficients of Racial Likeness have been calculated. While the specimens not available for these measurements will be considered in detail in Part II of this report, it should be noted here that the Sha Ching skull series on the whole appears to include a greater proportion of individuals characterized by somewhat flatter and more coarsely modelled facial features, than obtains among the other prehistoric groups.

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TABLE 20. Comparative Summary of Variabilities.

Characters	Non Asiatic Series				North Chi		
	n	A	σ	C	n	A	σ
LINEAR (in cms.)							
1—Cranial Length Max.	26	18.04±0.073	0.55±0.051	3.04±0.28	86	17.85±0.048	0.6
2—Cranial Breadth Max.	26	14.09±0.087	0.66±0.061	4.65±0.44	86	13.82±0.033	0.4
3—Least Frontal Breadth	26	9.62±0.073	0.55±0.052	5.76±0.54	85	8.94±0.032	0.4
5—Bimastoid Breadth	26	12.51±0.065	0.49±0.046	3.92±0.37	84	12.38±0.034	0.4
6—Interporial Breadth	26	11.91±0.069	0.52±0.049	4.41±0.41	79	11.76±0.027	0.3
7—Auricular Height.	26	11.43±0.055	0.42±0.039	3.66±0.34	83	11.55±0.031	0.4
8—Height (ba-b)	26	13.13±0.077	0.58±0.055	4.46±0.15	86	13.72±0.042	0.5
8a—Height (ba-vert.)	26	13.28±0.069	0.52±0.048	3.91±0.37	86	13.80±0.043	0.5
9—Basis Length (ba-n)	26	9.92±0.060	0.46±0.043	4.61±0.43	86	9.90±0.032	0.4
10—Profile Length (ba-pr)	26	9.49±0.073	0.55±0.052	5.84±0.55	84	9.52±0.041	0.5
11—Mid-Profile Length (ba-ns)	26	8.70±0.071	0.53±0.050	6.14±0.57	83	8.58±0.036	0.4
12—Foramen Magnum Length (ba-o)	26	3.62±0.027	0.20±0.019	5.67±0.53	86	3.57±0.019	0.2
13—Foramen Magnum Breadth	26	3.07±0.026	0.20±0.018	6 35±0.59	86	3.00±0.014	0.1
50—Cranial Circumference	26	50.96±0.173	1.31±0.122	2.57±0.24	74	50.22±0.115	1.4
51—Cranial Sagittal Arc (n-o)	26	36.38±0.172	1.30±0.122	3.58±0.34	82	37.00±0.104	1.4
55—Cranial Transverse Arc	26	31.22±0.154	1.17±0.109	3 74±0.35	60	31.70±0.101	1.1
4—Bizygomatic Breadth	26	12.83±0.068	0.51±0.048	4.01±0.38	83	13.27±0.032	0.4
14—Morphological Facial Height (gn-n)	25	12.00±0.103	0.77±0.073	6.38±0.61	83	12.46±0.034	0.4
15—Facial Height (n-pr)	26	7.06±0.064	0.48±0.045	6.84±0.64	84	7.53±0.030	0.4
16—Nasal Height	26	5.10±0.035	0.26±0.025	5.20±0.49	86	5.53±0.021	0.2
17—Nasal Breadth	26	2.41±0 022	0.17±0.016	6.92±0.65	86	2.50±0.013	0.1
18R—R. Malar Height (zm-fmo)	25	4.34±0.041	0.31±0.029	7.08±0.68	83	4.57±0.020	0.2
19R—R. Malar Breadth (zm-rim. orb.)	26	2.34±0.034	0.26±0.024	11.10±1.04	83	2.62±0.019	0.2
20—Bimalar Breadth (zm-zm)	26	9.17±0.050	0.38±0.035	4.10±0.38	83	9.79±0.033	0.4
21, la—Interorbital Breadth (la-la)	26	2.40±0.027	0.21±0.019	8.57±0.80	85	2.37±0.015	0.2
21, d—Interorbital Breadth (d-d)	23	2.10±0.030	0.21±0.021	10.02±1.00	61	2.02±0.018	0.2
22—Biorbital Breadth (fmo-fmo)	26	9.72±0.055	0.42±0.039	4.30±0.40	82	9.44±0.027	0.3
56R—R. Orbital Breadth (mf-ek)	26	4.50±0.025	0.19±0 018	4.27±0.40	62	4.40±0.026	0.3
58R—R. Orbital Height	26	3.35±0.027	0.20±0.019	6.02±0.56	74	3.55±0.014	0.1
25—Alveolar Arch Breadth	26	6.08±0.041	0.24±0.029	4.02±0.48	85	6.48±0.026	0.3
26—Alveolar Arch Length	22	5.30±0.041	0.28±0.029	5.36±0.54	84	5.25±0.025	0.3
27—Palate Length (ol-sta)	25	4.56±0.043	0.32±0.030	6.98±0.67	85	4.52±0.024	0.3
27a—Palate Length (ol-sp)	26	4.98±0.046	0.35±0.033	7.03±0.66	59	5.05±0.030	0.3
28—Palate Breadth	18	3.83±0.037	0.23±0.026	6 05±0.68	57	4.05±0.023	0.2
29—Palate Height	7	1.19±0.049	0.19±0.035	16.36±3.03	72	1.31±0.017	0.2
31—Mandibular Bicondylar Breadth	26	11.68±0.067	0.51±0.047	4.33±0.40	81	12.00±0.040	0.5
ANGULAR							
IR—R. Fronto-Orb. Deviation Angle	26	19.04±0.36	2.70±0.25	14.16±1.35	82	13.98±0.22	2.
I Supplement	26	142.78±0.65	4.90±0.46	3.43±0.32	81	152.09±0.38	5.1
II—Facial Angle (n-pr-FH)	26	85.56±0.42	3.19±0.30	3.72±0.35	80	83.39±0.25	3.2
III—Nasal Profile Angle (n-ns-FH)	26	90.85±0.41	3.08±0.29	3.40±0.32	81	88.74±0.26	3.4
IV—Basilar Angle (n-ba-FH)	26	28.77±0.47	3.56±0.33	12.36±1.17	81	31.74±0.21	2.

TABLE 21. Mean characters of recent North C

Characters	North China Recent		Pooled Prehistoric	
LINEAR (cms.)				
1—Cranial Length Max.	17.24±0.125	(10)	17.54±0.105	(14)
2—Cranial Breadth Max.	13.36±0.109	(10)	13.48±0.192	(13)
3—Least Frontal Breadth	8.72±0.061	(10)	8.76±0.075	(12)
5—Bimastoid Breadth	12.08±0.077	(10)	11 87±0.077	(15)
6—Interporial Breadth	11.35±0.058	(10)	11.28±0.064	(13)
7—Auricular Height	11.28±0.082	(10)	11.17±0.063	(15)
8—Height (ba-b)	13.16±0.084	(10)	13.01±0.082	(13)
8a—Height (ba-vert.)	13.24±0.068	(10)	13.18±0.089	(13)
9—Basis Length (ba-n)	9.52±0.093	(10)	9.39±0.057	(13)
10—Profile Length (ba-pr)	9.50±0.123	(10)	9.18±0.189	(6)
11—Mid-Profile Length (ba-ns)	8.54±0.140	(10)	8.24±0.097	(7)
12—Foramen Magnum Length (ba-o)	3.34±0.052	(10)	3.57±0.041	(10)
13—Foramen Magnum Breadth	2.89±0.033	(10)	2.88±0.018	(10)
50—Cranial Circumference	49.20±0.288	(8)	49.50±0.240	(14)
51—Cranial Sagittal Arc (n-o)	35.92±0.024	(10)	36.26±0.149	(10)
55—Cranial Transverse Arc	30.30±0.024	(10)	30.56±0.160	(13)
4—Bizygomatic Breadth	12.48±0.073	(10)	12.58±0.111	(10)
14—Morphological Facial Height (gn-n)	11.50±0.128	(10)	11.44±0.134	(9)
15—Facial Height (n pr)	6.96±0.078	(10)	7.02±0.090	(10)
16—Nasal Height (n-ns)	5.04±0.055	(10)	5.16±0.059	(12)
17—Nasal Breadth	2.34±0.027	(10)	2.59±0.041	(7)
18R—R. Malar Height (zm-fmo)	4.31±0.059	(10)	4.33±0.042	(12)
19R—R. Malar Breadth (zm-rim. orb.)	2.49±0.048	(10)	2.36±0.050	(13)
20—Bimalar Breadth (zm-zm)	9.50±0.089	(10)	9.50±0.078	(10)
21, la—Interorbital Breadth (la-la)	2.39±0.035	(10)	2.35±0.046	(10)
21, d—Interorbital Breadth (d-d)	2.07±0.051	(6)	2.11±0.054	(11)
22—Biorbital Breadth (fmo-fmo)	9.14±0.083	(10)	9.25±0.060	(11)
56R—R. Orbital Breadth (mf-ek)	4.08±0.043	(6)	4.35±0.027	(10)
58R—R. Orbital Height	3.35±0.015	(8)	3 39±0.030	(10)
25—Alveolar Arch Breadth	6.23±0.048	(9)	6.42±0.045	(6)
26—Alveolar Arch Length	5.18±0.056	(9)	5.07±0.063	(7)
27—Palate Length (ol-sta)	4.43±0.059	(10)	4.45±0.090	(4)
27a—Palate Length (ol-sp.)	5.00±0.081	(6)	4.90±0.079	(4)
28—Palate Breadth	4.10±0.046	(5)	4.28±0.069	(5)
29—Palate Height	1.14±0.046	(8)	1.30±0.047	(4)
31—Mandibular Bicondylar Breadth	11.60±0.133	(10)	11.56±0.134	(10)
ANGULAR				
IR—R. Front-Orb. Deviation Angle	15.10±0.57	(10)	13.08±0.59	(13)
I Supplement	149.25±0.99	(10)	151.73±1.04	(11)
II—Facial Angle (n-pr-FH)	82.30±0.39	(10)	81.26±1.68	(7)
III—Nasal Profile Angle (n-ns-FH	88.40±0.40	(10)	88.55±1.19	(10)
IV—Basilar Angle (n-ba-FH)	29.50±0.57	(10)	29.67±0.64	(12)

THE GEOLOGICAL SURVEY OF CHINA

PALÆONTOLOGIA SINICA

中 國 古 生 物 誌

Palæontologia Sinica

Preliminary announcement of Volumes and Fascicles designed to cover the material at present in the collections of the Survey. Where not definitely arranged for, the authorship of the fascicle is not given. Except in published fascicles, the number of pages and plates is approximate. The arrangement of the fascicles within the volumes is subject to change.

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VOLS. III, IV & V.

Prehistoric Ceramics and other Artifacts of North China

The detailed description of the large collection of prehistoric ceramics and other artifacts will be entrusted to a number of specialists. Details about the names of the different authors and the titles of their contributions can not be given at present. The various fascicles of Vols. III to V are calculated to comprise 850 pages English and 300 pages Chinese text, with 124 plates (15 in color).

VOL. VI.

Anthropological Studies on Neolithic Man in China.

Fascicle 1. *Davidson Black:* A study of Kansu and Honan Æneolithic skulls, and of specimens from later Kansu prehistoric sites, in comparison with North China and other Crania. Part I: On Measurements and Identification. pp. 83 English; 10 Chinese; 31 text figures; 21 tables. (Published 1928). Price $3.50 Chinese Currency.

Fascicle 2. *Davidson Black:* Ibid. Pt. II. Morphology about 100 pp. English; 10 Chinese; 15 plates (In preparation).

Fascicle 3. *Davidson Black:* The Human Skeletal Remains from the Kansu Æneolithic and Early Historic Sites. About pp. 150 English; 30 Chinese; 15 plates.

VOL. VII.

Lower Quaternary Man in China.

Fascicle 1. *Davidson Black:* On a Lower Molar Hominid Tooth from the Chou-Kou-Tien Deposit, (pp. 26 English, 8 Chinese, 2 plates). Published 1927. Price $3.00 Chinese Currency.

Note:

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的頭形關係，我們可以沒有什麼疑慮的說，史前人種的頭骨在物理性質方面很明顯的代表一種東方派的人種。

因爲史前及現代華北人種有許多相同之點，我們更可以謂史前人種爲中華原始人。

在史前各系人種之中，晚石器時代文化期的標本與現代華北人種相差較遠，而各史前文化後期的標本則與現代華北人種相差較少。而晚石器時代文化期者則與西藏B種人種及西藏甘姆斯人種（摩蘭氏所研究者）有許多形狀相同

最後則提及沙井期的頭骨沙井期之頭骨。未經地下破壞而足供測量以計算種族相似係數者僅有七具。其餘十一具不能供如此測量，則待第二編中再行論及。此處所可說者卽統論沙井期大部分的個人頭骨較其他各史前人種者，其面部狀形較平較粗。

眶外面斜交正前面、換言之即額眶差別角較大』雖說三個頭骨的其他形質與普通由甘肅所採者很相似、然在未找見他們與他種人種之確定關係之前、我暫名為「x派」。

此後我把這史前組又詳細的與一大組可以代表現代華北人的頭骨比較研究、我知道我所謂「x派」的頭骨、不是很清楚的代表晚石器時代人種的一個支派、僅是晚石器時代人種的變異而已。因為這派頭骨與其他大部分之區別、在於臉部扁平的程度。這樣扁平的程度在華北所採標本中、已能確定其年齡性別地方及種族者、亦為所常見的變異。故現在我把x派的頭骨列入晚石器時代中系。

關於本書所輯之現代華北頭骨用以比較者、此處亦當略加說明。這一系的骨、除少數外皆為協和醫院解剖室所解剖者、其省籍概為河北山西山東。為陝西奉天及河南北部者則有幾個。全體統計起來、許多現代人骨就其已知之年齡及產地等而論、不出華北範圍則可定論。

本書所謂亞外系共有二十六具、成年男性頭骨皆為歐洲人種、由英美購來、本是供學生究研用的。這許多標本我狠可以肯定的說、沒有亞洲人種。當我測量各種頭骨以努力區別東方及西方人種之時、我覺得一系人種與他系人種相反的性質是狠值得研究的。雖說所謂白色人種及黃色人種兩種人種的特性處、及許多精密測量、很可以區別西方及東方人種不受產地的影響。然而與本書所用之亞洲人種皆產於亞洲北部者相比、似當就西方歐洲人種中與以同樣的選擇。我對于亞洲系的材料雖很少不敢說可以代表西方白色人種性質、然選擇之時則心嚮往之。

結論

由上述河南甘肅史前人種之頭骨與現代華北者之比較研究的結果、各系各組的測量的研究、及各系各組

本處亦當述及安特生博士所分之甘肅河南之史前各時期。茲據其報告並附以所得標本可識別之性別、且足供本書研究之成年頭骨的數目列表如下。

紅銅器時代及銅器時代

（五）寺窪時期（甘肅）—男性四具及女性四具

（四）辛店時期（甘肅）—男性十具及女性兩具

晚石器時代

（三）馬廠時期（甘肅）—男性三具

（二）仰韶時期（甘肅）—男性二十七具及女性十具

（河南）—男性六具及女性四具

新石器時代末期

（一）齊家時期（甘肅）—未採得遺骸

本書所謂晚石器時代系之頭骨或一部頭骨、共有三十六具。成年男性者從三個地方採得、能代表晚石器時代的兩個文化時期。又有十四具成年的女性頭骨、由兩個地方採得、只能代表晚石器時代的一個文化時期。本書所謂史前混系、共有六十四具成年男性頭骨或頭骨之一部、其採集地方皆能代表史前各文化時期還有二十具成年女性頭骨或頭骨之一部、由四個地方採來、只能代表三個史前文化期。馬廠期及沙井期皆無成年女性頭骨。本書正篇中當可以看見這許多材料。

在描著甘肅史前人種考中曾提及有三個頭骨、很值得注意。（兩個仰韶期採得、一個由馬廠期採得）當時我說「這三個頭骨與大多數頭骨不同的地方如下、（一）鼻額界點之下部不如大多數之窄及低。（二）

具」現在可確定的說說這次採集有一百三十三具、或爲整全頭骨、或爲頭骨之一部、皆能代表一個個人。這一百三十三具頭骨中有五十八具是成年男性者、十六具是成年女性者、保存得尙好、足供我們測量研究。再與由河南仰韶村所採者合攏起來、雖其時代不等、然皆在史前後期的各時期中、故本書中謂之爲「史前混系。」

各種機械工作如修理這許多頭骨、如描畫頭形圖、如頭形測量的記錄等、直至一九二六年秋季始行完竣。現代華北及亞外人種頭骨之觀察及測量、用以與本書研究之史前人類頭骨比較者、至一九二七年六月尙未完成。各種記錄的按排、按性別的按年齡的預備簡表、採用標準、及畫成各部頭形圖等工作、直至同年十二月始云竣事。

最初我本想將河南甘肅頭骨的研究皆發表於中國古生物誌一冊之中、然研究的結果分成了兩部分、一部分是測量及鑑定他、一部分是更普遍的推論、所以分爲兩卷發表。第二卷包括各頭骨的原形、個人測量的詳表、頭骨及下牙牀之形態的說明、及幾個圖板、第一卷則記述測量及形狀的關係、皆以標本全體爲觀察點、以努力訂定與其他種族的確切關係。

本書中各頭骨的性別曾經我很仔細的識別。河南的頭骨或頭骨的一部、大部皆與體骨相連、所以其成年的頭骨性別很少有疑問、其未與體骨相連的、甘肅頭骨狠少、我則謂爲「或爲男性」或「或爲女性」。在簡表中及其他簡略說明中或爲男性者皆列入男性組、或爲女性者則列入女性組。男性包括着八十六個成年的頭骨、其中有七十七個所設的年歲平均爲 35.10 ± 0.76 歲、女組中成年的頭骨只有十個、他們的年歲據說平均爲 39.50 ± 3.74 歲。

甘肅河南晚石器時代及甘肅史前後期之人類頭骨與現代華北及其他人種之比較

英國步達生原著
灤縣裴文中節譯

此著爲專門人種學之研究、裴君原譯幾乎逐句翻譯、甚爲完備、幷承李濟之先生爲之校閱、但專門研究仍賴原文、欲窺大略提要已足、故僅爲節存敍言及結論二段、餘皆從略、　翁文灝附記

敍言

安特生博士自一九二一年至一九二四年於華北各省作了不少考古的工作、同時也採集了許多古人遺骸。至一九二五年十二月承地質調查所丁前所長文江及翁所長文灝二博士的好意、將安博士由甘肅採來這許多人類遺骸送我研究。本書所述卽我研究的結果。

奉天沙鍋屯及河南仰韶期之人類遺骸、除頭骨外我已有專著研究。從河南仰韶期所採的人類遺骸中體骨與頭骨相連者爲數不多、惟至今尙未將其研究之結果出版。其未破碎之頭骨成年女性者一具、成年男性者兩具、其餘已破碎而可以修理拚湊者、有成年者七具合計起來共有女性者六具男性者四具。再與甘肅同時代之頭骨合在一起、卽本書所謂晚石器時代系。

由甘肅採來的人類之遺骸我先已略有研究、且已發表、不過當時簡略的說明及不很確定的結論、是僅僅由我打開箱子修理及按排標本時所得的印象、其中難免有簡略之處。例如當時我說「遺骸共有一百二十多

古生物誌丁種第六號

第一冊

步達生著

甘肅河南晚石器時代及甘肅史前後期之人類頭骨與現代華北及其他人種之比較

中華民國十七年十二月

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（學術研究與國立中央研究院合作）