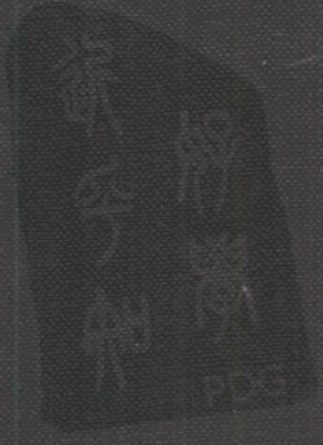
國立中央研究院歷史語言研究所

人類學集刊

第一卷



人類學集刊總目錄

第一册　Volume II

第二册　Volume I

目　錄

An Anthropometric Study of the Chinese Clavicle Based on the Hsiao T'un and Hsiu Chiu Shan Specimens

By T. L. Woo

I. *Introduction.* Among the various bones of the human body, the clavicle, as it connects the upper limb with the trunk, is undoubtedly one of the most interesting for physical anthropology. The available literature concerning it is far less extensive than that concerning the bones of the limbs and the pelvis. Possibly due to the fact that the clavicle is smaller in size and peculiar in form, it has been generally neglected by collectors and investigators.

In the last few decades, studies on a few series of clavicles of different races have been published,[1] but most of these publications are of little value because in them the clavicle is only briefly dealt with in conjunction with other bones and the characters described are few in number. A detailed study of the English clavicle by F. G. Parsons appeared in 1917 in the *Journal of Anatomy*.[2] Besides the direct maximum length and the circumference at the middle, he obtained several linear and angular measurements from drawings of the horizontal and vertical contours for which he constructed types in order to examine the curvature of the bone and other features. As the methods used in orientating the bone and the contour measurements taken on the basis of that orientation are somewhat inadequate, the numerical results arrived at are not of great value for racial comparison. This point is discussed in detail in a later section of the present poper. Metrical data relating to the clavicle of Asiatic races, especially the Chinese, are extremely meagre. The only valuable study of Chinese skeletal remains was made by D. Black.[3] In his paper which appeared in 1925, nine principal bones, including the clavicle, were examined in the case of three series of specimens. Two of these series are of prehistoric date: one is from Sha Kuo

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[1] Anthropological writings on the clavicle up to 1925 are given in the references under "Schultergürtel" in *Lehrbuch der Anthropologie* by R. Martin, Dritter Band, pp. 1605–1608.

[2] F. G. Parsons: "On the Proportions and Characteristics of the Modern English Clavicle." *Journal of Anatomy*, Vol. 51, pp. 71–93, (1917).

[3] D. Black: "The Human Skeletal Remains from the Sha Kuo T'un Cave Deposit in Comparison with those from Yang Shao Tsun and with Recent North China Skeletal Material." *Palaeontologia Sinica*, Series D. Volume I, Fascicle 3, pp. 1–120, (1925).

T'un near Liaoning and the other from Yang Shao Tsun in Honan. The third series is of modern date collected from the North China plain. In the case of the clavicle, the author merely took one direct measurement—the maximum length. In addition to this he made detailed observations on different tubercles of the bone. It was concluded that the general character of clavicular modelling is similar in the Aeneolithic and recent North China series, while in certain morphological characters all these Chinese clavicles display group features which evidently distinguish them from those of non-Asiatic origin.

The present study deals with the clavicle only. The data examined relate to two series of specimens, of both sexes, obtained from two different regions of the country. A considerable number of characters, both metrical and morphological, are used. Several of these were newly devised for the purpose in view. The objects of this study are two-fold, namely: (1) to throw new light on the features of the Chinese clavicle by making comparisons bilaterally, sexually and racially between the available series of the same or different races, and (2) to test the validity of some improved techniques used which may be valuable in the future routine description of the bones of other racial series.

II. *Description of the Material.* Two series of Chinese clavicles obtained from different parts of the country are dealt with in the present study. The sources of the material are:

(1) Hsiao T'un Series. More than 30 complete Chinese skeletons, including the crania, were excavated in 1929–1932 by Dr. Li Chi, the head of the Archæological Section of this Institute, and his colleagues from ancient graves at Hsiao T'un, west of the city of Anyang, Honan. Of these skeletons there are 32 clavicles of both sexes available for measurement. According to the archæological evidence they belong definitely to the people of the Sui-T'ang dynasties (A.D. 581–899), probably of the better class. All the skeletal material recovered at Hsiao T'un has most generously been placed at my disposal for study, a privilege for which I must acknowledge my indebtedness to Professors Fu Ssû-nien and Li Chi. Two separate studies on the crania[1] and humeri[2] of the same series will shortly be published. A full account of the discovery of the Hsiao T'un material is given in the first paper mentioned. The present series consists of 18 right and 14 left clavicles, and among these there are only 13 pairs.

(2) Hsiu Chiu Shan Series. 214 modern Chinese clavicles of either sex, together with the corresponding crania and other parts of the skeleton, were collected in the spring session of 1936 by the writer from numerous unclaimed

[1] T. L. Woo: "A First Study of the Chinese Skull Excavated from Hsiao T'un, Anyang," (ready for publication).

[2] T. L. Woo: "A Study of the Chinese Humerus," (ready for publication).

graves of Hsiu Chiu Shan, north of Hsia Kuan, Nanking. These specimens undoubtedly represent the bones of people of poor class who inhabited the neighbourhood of the city. With the exception of a small number of cases (16.8%) of which the birth places of the occupants of the burials were obtained from the reading of the inscriptions on the tomb-stones, principally representing the natives of provinces of the Yangtze delta, particulars of the origins of the people are unknown. However, the eastern Chinese, the writer believes, are better represented than the people of any other part of the country. Of the total number of specimens, 104 are right bones and the others left. There are only 81 pairs.

In both series, the specimens are nearly all fully adult, as the second centres of ossification for the medial end in a great majority of cases are completely fused. It has generally been recognised by anatomists that the clavicle in males is longer, stouter and more massive than that in females, and that the curvature is also more marked; in males its acromial and sternal ends lie at the same level or the former is the higher, while in females the acromial end is at a lower level than the sternal one. But in actual fact, the variation of characters of the clavicle in both sexes is as large as those for any other part of the skeleton, and the overlapping of the male and female distributions for any character is considerable. An experienced observer will often have great difficulty in sexing the skeleton from the features of the clavicle alone. According to Parsons' experiments[1] on the sexing of the English clavicles of which the sex was previously known, he found that there is an error of 22 per cent., if the sexing of specimens is based on the lengths of the bone only; an error of 16 per cent. on the circumference of the shaft at the middle; an error of 26 per cent. on the size of the inner end calculated from the sum of the height and width of its articular facet. Hence from one-sixth to one-fourth of cases of isolated clavicles will be likely to be incorrectly sexed. Fortunately, the present material mostly consists of complete skeletons. The observer is thus able to examine the characters of the crania, pelves and long bones of the same individuals. As a result of careful sexing, it is found that there are 19♂ and 13♀ bones in the Hsiao T'un series, and 132♂'s and 82♀'s in the Hsiu Chiu Shan series, respectively.

Most of the bones are preserved in a good condition, especially those of the Hsiao T'un series. When considering all the bones together, there are 15 per cent. of cases in which the acromial ends are wholly or in part defective, or worn as a result of exposure. Approximately 5 per cent. are in a similar condition at their sternal ends. These are more frequently found in the Hsiu Chiu Shan specimens. The measurements are taken as far as possible on all the bones.

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[1] F. G. Parsons: *loc. cit.*

III. *Measurements Taken.* The metrical characters recorded fall into three classes, according to the techniques used, viz.: 1. direct measurements, 2. those obtained from the horizontal contour section, and 3. those obtained from the vertical contour section. The definitions of these two sections will be given later.

1. Direct measurements. There are only 8 absolute measurements of the clavicle defined in Martin's *Lehrbuch*.[1] Of these 4 measurements were adopted and taken on the Chinese specimens according to the definitions given. The other four have not been used in the present study on account of the fact that measurements of somewhat similar nature can be more accurately obtained from the drawings of the contours. The measurements are:

(1) Maximum length of the clavicle, the greatest distance from the most lateral point of the acromial end to the most medial point of the sternal end, taken with the osteometric board. The specimen is placed in a horizontal plane with the inner surface in contact with the side wall of the board. In nearly all cases the maximum length of the bone is obtained in this way. A line connecting the two points of contact on the posterior border of the bone is termed the base-line of the clavicle, which is almost parallel to the maximum length. The measurement taken in such a way is practically the same as that given by other authors.

(2) Transverse diameter of the shaft at the middle, a maximum horizontal diameter taken from the anterior edge of the middle of the bone to the posterior edge of it. The points used for the mid-section with regard to the maximum length should be previously marked in pencil.

(3) Sagittal diameter of the shaft at the middle, a maximum diameter taken vertically and at right angle to the previous measurement. Both diameters are taken with small calipers.

(4) Circumference of the shaft at the middle, taken at the same mid-section of the bone with a steel tape.

2. Measurements taken from the horizontal section. Before considering the measurements obtained from the contours it is necessary to understand clearly the method of orientation of the bone employed. Parsons[2] was the first to introduce the technique of drawing both horizontal and vertical contours of the clavicle in connection with English material. According to his method, a small tubercle for the sterno-mastoid muscle, directly above the sternal end, is used for orientation. Failing this he supposes that if the anterior and posterior

[1] See Martin's *Lehrbuch der Anthropologie*, Zweiter Band, pp. 1005–1006.
[2] F. G. Parsons: *loc. cit.*

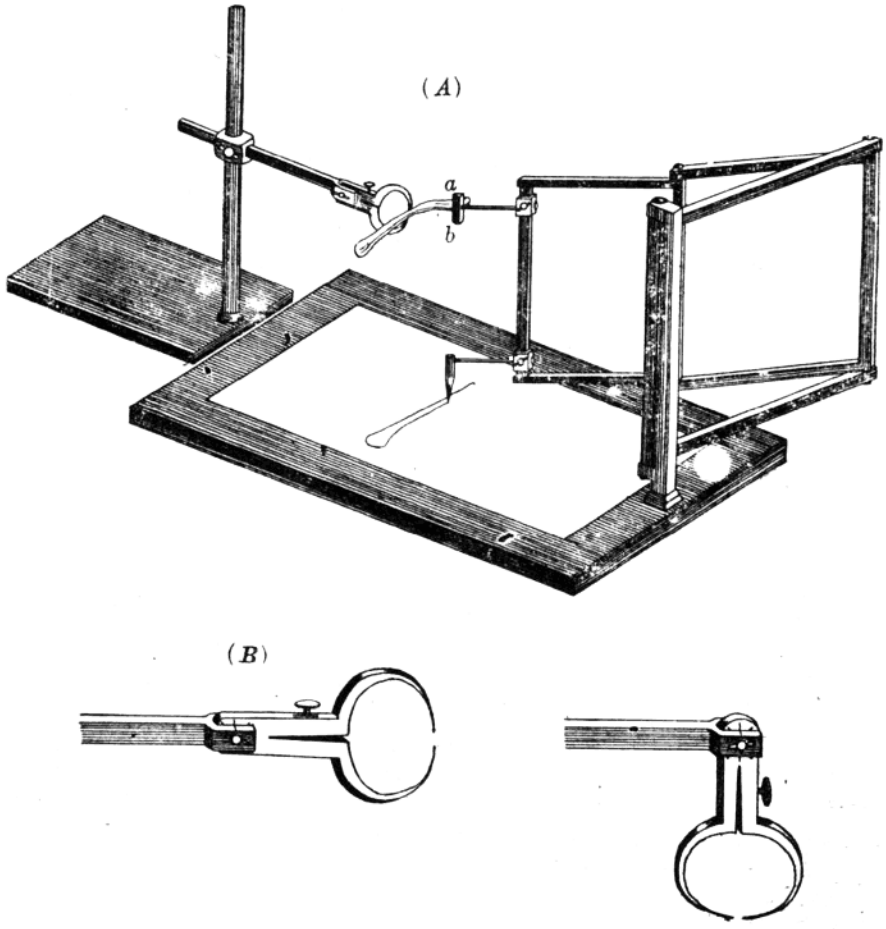
borders of the acromial third of the bone are placed in the same horizontal plane then the bone is orientated very nearly in the living position. It should be noted that any plane must be geometrically determined by three fixed points. It has been found that the tubercle for the sterno-mastoid muscle is very difficult to locate in many cases, or it may be entirely missing. And tubercles of irregular, variable forms are often found on the anterior and posterior borders of the acromial third. For the sake of accuracy, the horizontal plane of the bone adopted in the present investigation is precisely determined by the following three points: (*a*) the mid-point on the superior medial edge of the sternal end, when the bone is hold in a horizontal position as accurate as possible; (*b*) the most projecting point on the anterior border of the bone at a distance of one-fifth of the maximum length (measurement 1) from the acromial extremity, usually located at the sharp edge laterally to the eminence of the deltoid tubercle if it is present; and (*c*) the most projecting point on the posterior border at the same distance. The latter two points are determined in the same horizontal position as mentioned above. When the bone is properly orientated in the plane determined by the above three points and clamped in position, the horizontal outline of the clavicle is then drawn on the paper by a pen of conical form and a prismatic bar which are both attached to the stereograph by Schwarz.[1] The form of this bar and the operation of the whole instrument are shown in Fig. I (A). The bar[2] was specially designed by the writer for the purpose. The vertical bar which has three edges, is about 2 cms. long. In making the drawing the outer or working edge (see the line ab in Fig. I, A), which corresponds exactly to the central perpendicular axis of the pen, is always kept in contact with the bone. In the middle of the surface diametrically opposite to the working edge is attached a horizontal bar which is in turn fixed to the free perpendicular of the stereograph by means of a bracket and a screw. The working edge can thus be readily moved in any direction with the help of the three movable frames of the stereograph. To draw the vertical contour we only need to turn down the handle of the clamp and bring about a rotation through 90° of the clamp that is holding the bone in the horizontal plane (see Fig. I, C). When drawing these contours, the mid-points[3] on the medial and lateral edges of the superior surface of the two clavicular extremities, as well as the conoid tubercle, are marked as points on the paper, and from these several measurements are later taken.

[1] The stereograph used is the one originally designed by Schwarz for drawing the contour of the mandible.

[2] I wish to thank most heartily Dr. G. H. Wang, the Director of the Psychological Institute, Academia Sinica, for help in making this special bar for me in the laboratory of his Institute.

[3] The mid-points on the medial and lateral margins of the bone must be marked on the outline as points on the contour, and the former is practically one of the three points used to determine the horizontal plane.

Fig. I. (A) The Drawing Instrument in Use. (B) The Clamp, Holding the Bone in a Horizontal Position. (C) The Clamp, Holding the Bone in a Vertical Position



It is evident that the drawing of contours with an instrument of this kind is much more convenient than the use of Lucae's or Mollison's dioptograph. The advantages of the revised method are two-fold: (*a*) the plane determined by three definite points can be fixed in any specimen, and (*b*) the two planes are exactly perpendicular to each other.

The form of the clavicle is curved like the letter S: it is convex forwards at its medial part and concave forwards at its lateral part, corresponding to the hollow between the chest and shoulder. The relationship of the chord between the mid-points of the two terminals of the bone to the corresponding arc is important for the purpose of investigating the curvature of the clavicle. If the chord and arc coincide with each other, there is, of course, no curvature. When the arc becomes more convex, both anteriorly and posteriorly, the divergence of the two measurements will be greater. Since the form of the bone presents a double curve, the total chord and its arc must intersect at one point, which divides the whole length into two separate curves, viz. an outer concave and an inner convex curve, viewed anteriorly. The former is bounded by its outer chord and arc, and the latter bounded by its inner chord and arc. The two parts divided in this way indicate the natural state of the curvature of the bone better than any artificial division would.

The following measurements, either linear or angular, are obtained from the horizontal section defined above. Fig. II, (A) shows all the points from which measurements are taken. The definitions are:

(5) Total arc of the clavicle. After the horizontal section has been properly orientated, the mid-points on the medial and lateral edges of the acromial and sternal ends are marked (see *c* and *d* of Fig. II, A). A central broken line from *c* to *d* along the bone is then drawn carefully so that at all points it is midway between the anterior and posterior borders of the bone. The total arc is taken from the point *c*, the terminal of the acromial end, through the central broken line previously marked to the point *d*, the terminal of the sternal end. This can be measured conveniently with a slip of ruled paper.

(6) Outer arc. This arc is measured along the broken line from the point *c* just mentioned to the point of intersection of the entire arc and the chord (*c-d*), i.e. the point *e*.

(7) Inner arc. This is measured along the broken line from the point *e* to the point *d*, the terminal of the sternal end.

(8) Total chord of the clavicle: the distance between the two points *c* and *d*.

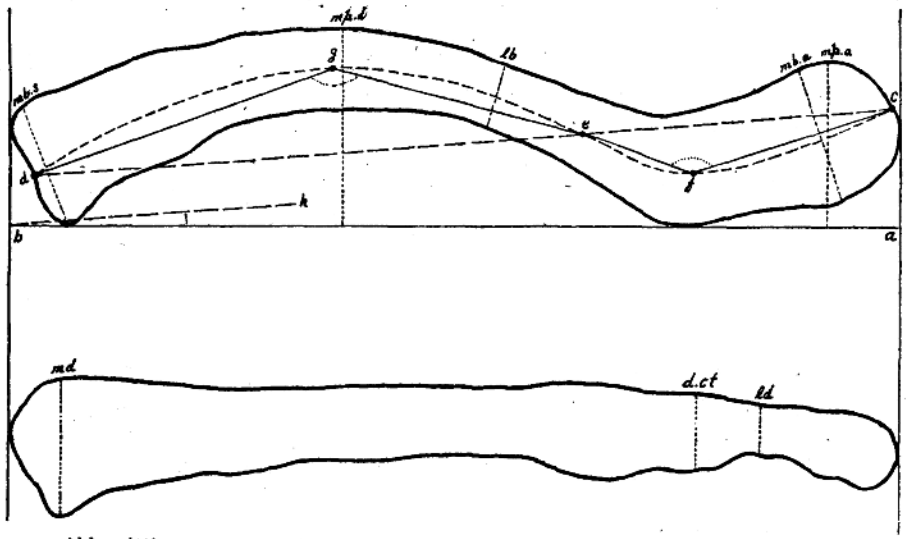
(9) Outer chord: the distance between the points *c* and *e*.

(10) Inner chord: the distance between the points *e* and *d*.

(11) First segment. This chord is taken from *c* to *f*. The last is the point of maximum subtense on the mid- (broken) line of the section from the outer chord (*ec*).

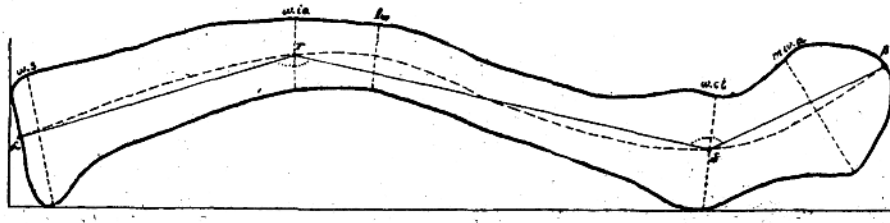
(12) Second segment. This chord is taken from the point *f* to the point of intersection *e*.

Fig. II. The Horizontal (A) and Vertical (B) Sections of the Clavicle, Showing the Positions of Points from Which the Contour Measurements Are Taken



Abbreviations: mp. a, maximum perpendicular of the acromial end; mp. d, maximum subtense of the diaphysis; mb. a, maximum breadth of the acromial end; mb. s, maximum breadth of the sternal end; lb, minimum breadth of the shaft; ld, minimum depth of the acromial end; md, maximum depth of the sternal end; d. ct, depth at the level of the conoid tubercle.

Fig. III. The Horizontal Section of the Clavicle, Showing Contour Measurements Taken by Parsons



Abbreviations: mw. a, maximum width in the acromial third; w. ct, width at the conoid tubercle; lw, least width; w. ia, width at the inner angle, w. s, width at the sternal end; $\beta\delta$ outer segment; $\delta\gamma$, middle segment; γa, inner segment; $\beta\delta\gamma\angle_t$ outer angle; and $\delta\gamma a\angle$, inner angle. These measurements are the ones defined by Parsons.

(13) Third segment. This is measured from e to the point which is the point of maximum subtense from the inner chord (ed).

(14) Fourth segment. This is measured from the point g to the point d, the terminal of the sternal end.

The above four segments are numbered in order from the acromial to the sternal end. Their axial lines are also used for the purpose of finding the angles given below.

(15) Maximum perpendicular of the acromial end. This is a projective 'height' of the acromial end, measured from the most anterior point of this end in the horizontal plane to the base-line of the bone (mp. a in Fig. II, A). It corresponds to one of Martin's direct measurements.

(16) Maximum perpendicular (or subtense) of the diaphysis. This is a projective 'height' taken from the highest point on the upper edge of the convex curve of the diaphysis to the base-line ($mp.\ d$).

(17) Maximum breadth of the acromial end. This is the maximum breadth of the section of the acromial end taken perpendicular to the first segment cf ($mb.\ a$). Without this limitation, the points where the maximum breadth may be taken as shown by Parsons are somewhat indefinite.[1]

(18) Maximum breadth of the sternal end. This is the maximum breadth at the sternal end, taken in the same way as the last but perpendicular to the fourth segment dg ($mb.\ s$).

(19) Minimum breadth of the shaft. This minimum breadth is taken at the narrowest part of the shaft regardless of where this is (lb).

(20) Distance of the position of the minimum breadth. The distance from the mid-point of the minimum breadth to the vertical tangent to the acromial end is taken, so it is parallel to the base-line.

(21) Outer angle. This is measured between the first and second segments. It is the $cfe\ \angle$ shown in Fig. II, A.

(22) Inner angle. This is similarly measured between the third and fourth segments, viz. $dge\angle$.

The method of measuring the angles described here is quite different from Parsons' method. His outer and inner angles relate to three segments, i.e. the $\beta\delta$, $\delta\gamma$, and $\gamma\alpha$ lines in his figure. The framework of his reconstruction of the

[1] Parsons took the width at 5 places from the horizontal section: (1) maximum width in the acromial third, (2) width at the conoid tubercle, (3) minimum width, (4) width at the inner angle, and (5) width of the sternal end. In the present study only the minimum breadth is taken in the same way. Our first and last widths are not similar to those used by Parsons. His measurements of the second and fourth widths are entirely omitted owing to the fact that both are somewhat vaguely defined by him.

horizontal type contour, especially showing the angular measurements taken, is reproduced here for comparison in Fig. III. According to his method, it is clear that a change in one angle is necessarily correlated with a change in the other. The advantage of the revised method used for taking these angles is that the two are not necessarily correlated, while the apices of the angles (*f* and *g* in Fig. II, A) are the points of maximum subtenses from the corresponding chords. Two individuals of any given race, or two racial groups, might have the same value of one angle while differing quite significantly from each other in the other angle.

(23) Inclination of the entire chord of the clavicle. This is the angle between the entire chord *cd* and the base-line *ab*, measured with a protractor. It may be of value in indicating the relative positions of the terminals of the two ends with regard to the base-line. It is evident that when the two extremities are more bent upwards and downwards the angle in question will be greater.

3. Measurements taken from the vertical section. When drawing the vertical contour it is not necessary to reset the bone. All that need to be done is to turn the handle of the joint downwards through 90 degrees (see Fig. I, C). The anterior border of the bone is now uppermost. The plane thus fixed is exactly perpendicular to the horizontal one. In this plane we take the following four measurements on either side and these are shown in Fig. II, B.

(24) Minimum depth of the acromial end. This minimum projective depth is taken at the acromial end. It usually lies in the range between the terminal of the acromial extremity and the level of the conoid tubercle. The form of the acromial end in the vertical section, unlike that of the horizontal one, is usually concave both on the anterior and posterior borders. For this reason the measurement of the minimum depth is chosen (*ld*).

(25) Maximum depth of the sternal end. This projective depth is taken wherever it appears at the sternal end (*md*).

(26) Depth at the level of the conoid tubercle. This projective depth is taken from the central point of the conoid tubercle to the opposite edge of the section. The point of the conoid tubercle should be previously marked in pencil (*d. ct*).

(27) The distance of the position of the conoid tubercle. A horizontal distance is measured from the centre of the conoid tubercle to the extremity of the acromial end, taken parallel to the base-line. This measurement may be taken from either standard plane. Since the tubercle appears more marked in

the vertical plane, it is included as one of the characters of this group. It should be borne in mind that the first three depth measurements are all perpendicular to the base-line.[1] Readings of the above characters measured with the osteometric board, or with a tape or slip of ruled paper, are given to the nearest 0.5 mm., while those measured with small callipers are to the nearest 0.1 mm., an instrument with a vernier scale being used.

4. Indices. In order to obtain measures of the shapes of different parts of the bone, the following 10 indices were used. Several of these are new ones derived from measurements of the horizontal and vertical sections. Their definitions are:

(28) Caliber index:

$$\frac{\text{100x Circumference of the shaft at the middle (4)}}{\text{Maximum length of the clavicle (1)}}$$

This index expresses the relative delicacy or robustness of the bone as a whole, the larger the value, the stouter the bone.

(29) Shaft index at the middle:

$$\frac{\text{100x Sagittal diameter of the shaft at the middle (3)}}{\text{Transverse diameter of the shaft at the middle (2)}}$$

A higher value signifies that the cross-section at the middle of the shaft shows a closer approach to the cylindrical form, while a lower value indicates greater flattening of the shaft transversely.

(30) Length-height index of the clavicle:

$$\frac{\text{100x Maximum subtense of the diaphysis (16)}}{\text{Maximum length of the clavicle (1)}}$$

The more curved the specimen is, the larger the index will be.

(31) Claviculo-humeral index:

$$\frac{\text{100x Maximum length of the clavicle (1)}}{\text{Maximum length of the humerus}^2}$$

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[1] Parsons took the depth at four places, namely: (1) the minimum depth of the acromial end (2) depth at the conoid tubercle, (3) depth at the middle, and (4) depth of the sternal end. The first, third and fourth measurements of depth are taken in a similar (but not the same) way in the present study but they are all perpendicular to the base-line. The depth at the middle is omitted since it was taken directly from the bone.

[2] This represents the first measurement of the humerus in Martin's *Lehrbuch*. Its definition is: the greatest distance from the highest point of the caput to the lowest point of the trachea, measured with the osteometric board. The mean measurements of this character for the two Chinese series are given in the writer's paper on the Chinese humerus, *loc. cit.*

This index has been widely used by different authors, so the comparative data for it are more abundant than those for any of the clavicular indices.

(32) Total curvature index:

$$\frac{100\text{x Total chord of the clavicle (8)}}{\text{Total arc of the clavicle (5)}}$$

This index is designed to give a measure of the total curvature of the bone, the lower the index is the more curved the bone must be.

(33) Index of the two arcs:

$$\frac{100\text{x Outer arc (6)}}{\text{Inner arc (7)}}$$

This indicates the relative extents of the two segments. As the inner arc is usually greater than the outer one, the index will usually be less than 100.

(34) Sterno-acromial breadth index:

$$\frac{100\text{x Maximum breadth of the sternal end (18)}}{\text{Maximum breadth of the acromial end (17)}}$$

This index gives the relative measure of the maximum breadth taken at the two ends of the bone.

(35) Sterno-acromial depth index:

$$\frac{100\text{x Minimum depth of the acromial end (24)}}{\text{Maximum depth of the sternal end (25)}}$$

This is of the same nature as the foregoing index giving a relative measure of depths taken at the two extremities of the bone.

(36) Minimum breadth position index:

$$\frac{100\text{x Horizontal distance of the minimum breadth (20)}}{\text{Maximum length of the clavicle (1)}}$$

This gives a relative measure of the position where the minimum breadth is located. A lower index signifies that the position of the minimum breadth is nearer to the acromial end.

(37) Position index of the conoid tubercle:

$$\frac{100\text{x Horizontal distance from the conoid tubercle (27)}}{\text{Maximum length of the clavicle (1)}}$$

As the distance is measured from the terminal of the acromial end, a lower index denotes a more lateral position of the conoid tubercle.

IV. *Comparisons of Mean Measurements.* The mean measurements of all the clavicular characters for each sex considered separately and for the two Chinese series are provided in the Appendix I. The mean constants given are of the following kinds: (1) mean values of the paired specimens for each side separately, (2) means for all the paired bones, the measurements of those of

the right and left sides being pooled, (3) means for all available specimens on each side, and (4) means for all available specimens without regard to side. The probable errors of these constants are only given for the longest, i.e. the Hsiu Chiu Shan, series.

The kinds of means used depend on the nature of comparisons to be made. In the present section there are four comparisons which will be made, viz.: (1) intra-group comparison of all the clavicular characters between the two sides, (2) the same between the two sexes, (3) inter-group comparison between the two series of bones dealt with, and (4) the same between different races for the few characters for which material is available. Excluding the case of the bilateral comparisons, for which means of paired specimens only are used, for sexual and other intra- and inter-racial comparisons the pooled means for all available bones on both sides are adopted in order to make the samples as large as possible. It has been found that differences between means deduced from paired specimens and those deduced from all available cases are all too small to be significant.[1] Hence it is justifiable to use the pooled values for both sides for all except bilateral comparisons.

(1) Bilateral Comparisons. Much have written about the asymmetry of cranial characters but less is known about the asymmetry of other parts of the skeleton. Since our data relate to a considerable number of characters, it seemed desirable to examine the asymmetrical nature of the clavicle. The present comparisons are restricted to the male and female means for the Hsiu Chiu Shan series although the female constants are based on fewer cases. In Table I are provided the mean of the paired specimens for each side, and the side ratios which are formed by expressing the right mean as a percentage of the corresponding left mean.[2] If the right mean is larger than the left the ratio will exceed 100. From the values of these ratios the preponderance of one side over the other can at once be seen. Of 74 comparisons made for both sexes 33 of them show the right side greater and the remaining cases the left side greater. There are 30 characters (80.1%) which show the same side greater for both sexes. Although in the remaining seven cases agreement is not found between the two sexes, yet their deviations of the ratios for these from 100 are all negligible. The average side ratios of absolute characters, and angles and indices for the male series are 99.8 and 101.1, while those for the female series are 99.6

[1] The ratios of differences between pairs of corresponding means to their probable errors are all less than 2.0.

[2] The ratio is 100x right mean/left mean, which may be termed the "side ratio." The inverse form, i.e. 100x left mean/right mean, was previously used by Hrdlička for examining the side difference of humeral characters.